2013 Hamilton County
Multi-Hazard Mitigation Plan

Prepared by:

The Polis Center at IUPUI
1200 Waterway Blvd
Indianapolis, IN 46202
www.polis.iupui.edu

Department of Geography
University of Cincinnati
401 Braunstein Hall
Cincinnati, OH 45221
www.uc.edu

Hamilton County EMA
2000 Radcliff Drive
Cincinnati, OH 45204
www.hamiltoncountyema.org

CONTENTS

Supplemental and Referential Documents

Annex: Community Snapshots

Appendix A: Meeting Minutes
Appendix B: Newspaper Articles
Appendix C: NCDC Reports
Appendix D: Historical Hazards Plot
Appendix E: Adopting Resolutions
Appendix F: Critical and Essential Facilities Plot
Appendix G: List of Critical and Essential Facilities
Appendix H: Landslide Analysis
Appendix I: Hazus-MH Earthquake Global Summary Reports

EXECUTIVE SUMMARY

The Hamilton County Multi-Hazard Mitigation Plan (MHMP) was developed to guide the county in a risk-based approach to become more resilient to the impacts of natural and technological hazards through mitigation planning. The plan documents historical disasters, assesses probabilistic disasters through Hazus-MH and GIS analyses, and addresses specific strategies to mitigate the potential impacts of these disasters.

This five-year update was a collaborative effort among the Hamilton County planning team, The Polis Center of Indiana University Purdue University-Indianapolis, and the University of Cincinnati.

The Hamilton County MHMP:

- Identifies areas of risk and assesses the potential cost and magnitude
- Establishes strategies and priorities to mitigate risk from natural and technological hazards
- Identifies specific mitigation projects to pursue for each identified hazard
- Guides the communities in their risk management activities and minimizes conflicts among agencies
- Establishes eligibility for future mitigation program funds

The 2013 MHMP includes the following key updates:

- Historical hazards: Each hazard section within this plan documents NCDC-reported hazards within the past five years. Where data are available, historical hazards are graphed by decade, showing disaster trends over the past 50 years.
- County profile: Demographics, social, and economic data, as well as existing and future land use descriptions, are updated to reflect the current status of the county and its jurisdictions.
- Planning description: The new planning team and updated planning process are described and documented.
- Risk assessment: The updated risk assessment includes Hazus-MH and GIS analyses that utilize site-specific data from the county. It also includes new analyses of a hazardous materials release and dam and levee failure.
- Mitigation: The mitigation section addresses status of previous plan's strategies in addition to new mitigation goals, objectives, and strategies. Due to FEMA requirements, strategy completion dates are contingent on funding.

Additional updates include new sections for community snapshots and funding sources.

Section 1

INTRODUCTION

Hazard mitigation is defined as any sustained action to reduce or eliminate long-term risk to human life and property from hazards. The Federal Emergency Management Agency (FEMA) has made reducing hazards one of its primary goals. Hazard mitigation planning and the subsequent implementation of the projects, measures, and policies developed as part of this plan, is a primary mechanism in achieving FEMA's goal.

The federal Disaster Mitigation Act of 2000 requires jurisdictions to develop and maintain a Multi-Hazard Mitigation Plan (MHMP) to remain eligible for certain federal disaster assistance and hazard mitigation funding programs. Renewal of the plan every five years is required to encourage the continual awareness of mitigation strategies. In order for the National Flood Insurance Program (NFIP) communities to be eligible for future mitigation funds, they must adopt the MHMP.

Since the year 2000, FEMA has declared 23 emergencies and disasters for the state of Ohio. Emergency declarations allow states access to FEMA funds for Public Assistance (PA), and disaster declarations allow for additional PA funding, including Individual Assistance (IA) and the Hazard Mitigation Grant Program (HMGP). Hamilton County has received federal aid for PA funding for seven declared disasters since 2000. Figure 1-1 depicts the disasters and emergencies declared in Ohio by county. Table 1-1 describes the disasters that have impacted Hamilton County.

Figure 1-1: FEMA-Declared Emergencies and Disasters in Ohio (2000-2012)

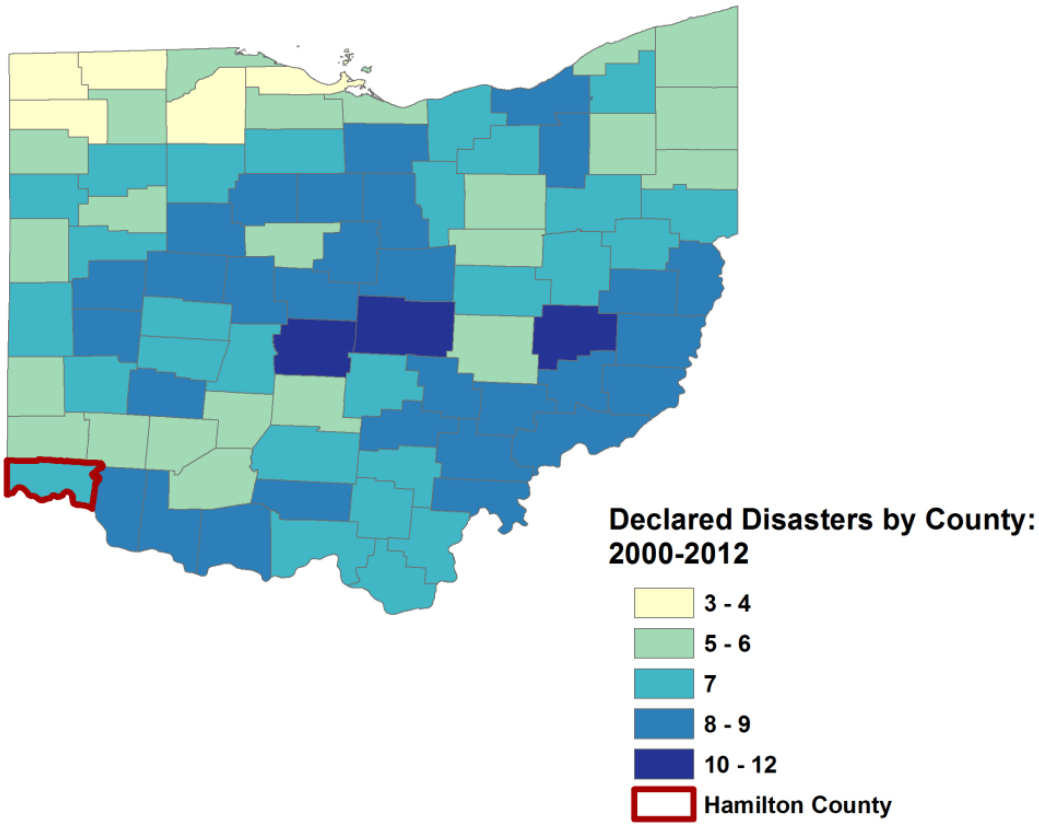


Table 1-1: Hamilton County Declared Disasters (2000-2012)

Disaster Number	Declaration Date	Incident Period	Incident Type	Federal Funding Program(s)*	FEMA Public Assistance Funds
1390	08/27/01	07/17/01–07/18/01	Severe storms	HM	$2,768,149.98
1556	09/19/04	08/27/04–09/27/04	Severe storms	IH, IA, HM	
1805	10/24/08	09/14/08–09/14/08	Severe storms	HM	$9,014,293.92
3198	01/11/05	12/22/04–12/24/04	Snow		$1,297,057.71
3250	09/13/05	08/29/05–10/01/05	Hurricane		$293,626.77
3346	06/30/12	06/29/12–07/02/12	Severe storms		
4002	07/13/11	04/04/11–05/15/11	Severe storms	HM	$2,735,065.97

*IH – Individuals and Households program
IA – Individual Assistance program
HM – Hazard Mitigation program

Section

2

PREREQUISITES

The Hamilton County Multi-Hazard Mitigation Plan meets the requirements of the Disaster Mitigation Act of 2000, which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act to require state, local, and tribal entities to closely coordinate mitigation planning and implementation efforts.

2.1 Plan Adoption

This plan represents a comprehensive description of Hamilton County's commitment to significantly reduce or eliminate the potential impacts of disasters through planning and mitigation. Adoption by the local governing bodies within the county legitimizes the plan and authorizes responsible agencies to implement mitigation responsibilities and activities.

To be eligible for federal mitigation funding, each participating jurisdiction must adopt the plan. After thorough review, the Hamilton County Board of Commissioners adopted the plan on <date adopted>. Additional adoptions are included in Appendix E.

Following Federal review and approval, the participating jurisdictions in this plan intend to formally adopt the plan by Resolution or Ordinance.

2.2 Jurisdiction Participation

All 49 jurisdictions were invited to participate in the planning process. The jurisdictions listed in Table 2-1 were represented by one or more municipal officials. Representatives not only attended the meetings, but also participated by gathering appropriate data and historical information, completing strategy surveys, phone interviews, reviewing drafts, and participating in mitigation brainstorming sessions. Names, titles, and jurisdictions of these representatives are available in Table 3-1.

Table 2-1: Participating Jurisdictions

Name	Type	Participated in 2007 Plan	Participated in 2013 Plan
Addyston	Village	Yes	Yes
Amberley	Village	Yes	Yes
Arlington Heights	Village	Yes	Yes
Cleves	Village	Yes	Yes
Elmwood Place	Village	Yes	No
Evendale	Village	Yes	Yes
Fairfax	Village	No	Yes
Glendale	Village	Yes	Yes
Golf Manor	Village	Yes	Yes
Greenhills	Village	Yes	Yes
Lincoln Heights	Village	Yes	Yes
Lockland	Village	Yes	Yes
Mariemont	Village	Yes	Yes
Newtown	Village	Yes	Yes
North Bend	Village	Yes	Yes
Terrace Park	Village	Yes	Yes
Woodlawn	Village	Yes	Yes
Anderson	Township	Yes	Yes
Colerain	Township	Yes	Yes
Columbia	Township	Yes	Yes
Crosby	Township	Yes	Yes
Delhi	Township	Yes	Yes
Green	Township	Yes	Yes
Harrison	Township	Yes	Yes
Miami	Township	Yes	Yes
Springfield	Township	Yes	Yes
Sycamore	Township	Yes	Yes
Symmes	Township	Yes	Yes
Whitewater	Township	Yes	Yes
Blue Ash	City	Yes	Yes
Cheviot	City	Yes	Yes
Cincinnati	City	Yes	Yes
Deer Park	City	Yes	Yes
Forest Park	City	Yes	Yes
Harrison	City	Yes	Yes
Indian Hill	City	Yes	Yes
Loveland	City	Yes	Yes
Madeira	City	Yes	Yes
Milford	City	No	Yes
Montgomery	City	No	Yes
Mt. Healthy	City	Yes	Yes
North College Hill	City	Yes	Yes
Norwood	City	Yes	Yes
Reading	City	Yes	Yes
Sharonville	City	Yes	Yes
Silverton	City	Yes	Yes
Springdale	City	Yes	Yes
St. Bernard	City	Yes	Yes
Wyoming	City	Yes	Yes

The county also invited local watershed organizations to review the plan. Table 2-2 lists each watershed and a description of its participation. The invitation e-mail is included in Appendix A.

Table 2-2: Organizations Invited to Participate

Organization	Representative	Description of Participation
Friends of the Great Miami River	Sent to website contact	Reviewed plan; no revisions
Greenacres Water Quality Project	Anne Lyon, Water Quality Project Director	Reviewed plan; no revisions
Little Miami, Inc.	Sent to website contact	Reviewed plan; no revisions
Little Miami River Partnership	Sent to website contact	Reviewed plan; no revisions
Miami Conservancy District	Kurt Rinehart, Chief Engineer	Reviewed plan; no revisions
Mill Creek Restoration Project	Sent to website contact	Reviewed plan; no revisions
Mill Creek Watershed Council of Communities	Jennifer Eismeier, Executive Director	Reviewed plan; no revisions

The following representatives of major employers participated in the planning process. Proctor & Gamble was also invited to participate but declined.

Table 2-3: Contributing Major Employers

Employer	Representative	Description of Participation
University of Cincinnati	Changjoo Kim	Developed landslide analysis as contractor, assisted Polis in peer review of plan, attended planning team meetings
Duke Energy	Marvin Blade	Reviewed plan; no revisions to current but suggested ideas for additional pipeline analyses for future planning efforts

Section

3

PLANNING PROCESS

The Hamilton County Emergency Management Agency (EMA), The Polis Center (Polis), and the University of Cincinnati (UC) have joined efforts to develop this five-year plan update. The planning process consisted of the following tasks:

Task 1: Organize Resources

The Hamilton County EMA created a planning team to attend meetings, gather data and historical information, review drafts, and participate in mitigation brainstorming sessions.

Task 2: Risk Assessment

The planning team identified the natural and technological hazards to include in this plan, and Polis and UC developed hazard event profiles to address the possible magnitudes and severities associated with each hazard. The team then used local resources to inventory the county's assets and estimate losses.

Task 3: Public Involvement

The public was invited to attend one of two meetings to review the risk assessment results and discuss mitigation strategies. The public meeting was advertised locally prior to the meetings. A copy of the newspaper announcement is available in Appendix B. Additionally, after the planning team made final edits, the plan was posted on Hamilton County's website, and the county sent a press release (available in Appendix B) to invite the public to review the plan and submit comments.

Task 4: Develop Mitigation Strategies

Polis and UC met with representatives of each community to develop and prioritize mitigation strategies and action items that would reduce the costs of disaster response and recovery, protect people and infrastructure, and minimize overall disruption to the county in the event of a disaster.

Task 5: Complete the Plan

Polis compiled all of the planning team documentation and research with the risk assessment and mitigation strategies to produce a draft plan for review. The Hamilton County planning team had multiple opportunities to review and revise the plan before submitting to the Ohio Emergency Management Agency and FEMA for approval.

Task 6: Plan Adoption

The Hamilton County EMA coordinated the effort to collect adoptions from each participating jurisdiction.

Figure 3-1: Planning Team Meetings

3.1 Planning Team Information

The planning team is headed by Hamilton County Operations Manager Bary Lusby. Other members of the planning team include representatives from various county departments, cities and villages, and public and private utilities. All members of the planning committee were actively involved in attending the MHMP meetings, providing available Geographic Information Systems (GIS) data and historical hazard information, reviewing and providing comments on the draft plans, coordinating and participating in the public input process, and coordinating the county's formal adoption of the plan.

Table 3-1: Planning Team Members

Name	Title	Organization
Bary Lusby	Operations Manager	Hamilton County Homeland Security/ Emergency Management
Steve Ashbrock	Fire Chief	Madeira Indian Hill Fire Department
Melanie Augustin	Emergency Management	Hamilton County EMA
Greg Ballman	Fire Chief	Golf Manor Fire Department
James Benjamin	Fire Chief	Lockland Fire Department
Keith Belcher	Sergeant	Milford Police Department
Michael Berens	Safety Service Director	City of Deer Park and Silverton
Frank Birkenhauer	Asst. Administrator	Colerain Township
Richard Brown	Fire Chief	Blue Ash Fire Department
Ron Crider	Sergeant	Milford Police Department

Name	Title	Organization
Thomas Doyle	Chief Ranger	Hamilton County Park District
Annalee Duganier	Asst. to the City Manager	City of Madeira
Tim Feichtner	Asst. Fire Chief	Mariemont Fire Department
Brian Fels	Fire Chief	Mt Healthy/North College Hills FD
John Ferguson	Sergeant	North College Hill Police Department
Mark Fitzgerald	City Administrator	City of North College Hill
Ed Frambes	Emergency Planning Coordinator	Hamilton County EMA
Ray Gemmell		Green Township Fire Department
Dan Graham	Lieutenant	Evendale Fire Department
Ralph Hammonds	Fire Chief	Sharonville Fire Department
Mike Hauck	Fire Chief	Evendale Fire Department
Shawn McBreen	Lieutenant	Newton Police Dept
Jerry Hayhow	Chief of Police	Terrace Park Police Dept
Jim Henderson		Mariemont Fire Department
Otto Huber	Fire Chief	Loveland-Symmes Fire Department
Rob Hursong	Fire Chief	Harrison Fire Department
BJ Jetter		Sycamore Township Fire Department
Kevin Kaiser	Fire Chief	Reading Fire Department
Jennifer Kaminer	Village Administrator	Village of Fairfax
Steve Kelly	Lieutenant	Fairfax Police Department
Bob Klein	Fire Chief	Cheviot Fire Department
Thomas Lakamp	District Fire Chief	Cincinnati Fire Department
Robert Leininger	Fire Chief	Springfield Township Fire Department
Charles Lindsey	Chief of Police	Harrison Police Department
Matt Maley	Volunteer	Hamilton County EMA
Dan McCormick	Lieutenant	Deer Park Police Department
Rick Merschbach	Captain	Hamilton County Sheriff's Department
Paul Meyers	Building, Planning, Development Director	City of St. Bernard
Jamey Mills	Police Chief	Milford Police Department
Thomas Moeller	City Manager	City of Madeira
Jesse Moore	Asst. Fire Chief	Delhi Township Fire Department
Mark Ober	Fire Chief	Anderson Township Fire Department
Steve Ober	Fire Chief	Cleves/Miami Township FD
Michael Ott	Sergeant	Springdale Police Department
Derrick Parham	City Administrator	City of Springdale
Anthony Pecord		Loveland Police Department
Dan Pillow	Mayor	Village of Addyston
Steve Rump	Asst. Fire Chief	Norwood Fire Department
Mike Rupp	Asst. Fire Chief	Forest Park Fire Department
Rob Penny	Assistant Fire Chief	Sycamore Township Fire Department
Jason Phillips		Amberley Village Public Safety Dept.
Steve Rasfeld	Public Works Supervisor	Amberley Village

Name	Title	Organization
Robert Reilage	Fire Chief	Wyoming Fire Department
Ron Ripperger	Director	Delhi Public Works
Loretta Rokey	Village Administrator	Village of Glendale
Terri Rolfes	Emergency Management	Hamilton County EMA
Scott Schorsch	Fire Chief	Whitewater Fire Department
Dana Schratt	Emergency Management	Hamilton County EMA
John Servizzi	Road Superintendent	Columbia Township
Joe Silvati	Deputy Chief	Colerain Township Fire Department
Carolyn Smiley-Robertson	City Manager	Village of Woodlawn
Warren Strunk	Trustee	Crosby Township
Anson Turley	District Chief	Cincinnati Fire Department
Valerie Van Valkenburg	Safety Director	City of St. Bernard
Doug Witsken	Fire and EMS Chief	Green Township Fire and EMS
Paul Wright	Fire Chief	Montgomery Fire Department
William Zoz	Fire Chief	Delhi Township Fire Department
Chris Zumbiel	Lieutenant	Madeira Police Department
Doug Sammons	Mayor	Village of North Bend
Ken Harper	Police Chief	Arlington Heights
Evonne Kovach	Municipal Manager	Village of Greenhills
Stephanie Summerow Dumas	Village Manager	Village of Lincoln Heights
Bob Harper	Co-Chair	Hamilton County LEPC

3.2 Review of Existing Plans

Hamilton County completed its initial MHMP in 2007. Polis, UC, and the planning team reviewed the 2007 plan prior to beginning this five-year update process. Additionally, the county and local communities utilize land use plans, emergency response plans, municipal ordinances, and building codes to direct community development. Table 3-2 lists the plans, studies, reports, and ordinances reviewed prior to the development of this plan.

Table 3-2: Documents Reviewed for 2013 MHMP

Year	Title	Author(s)	Description
2007	Natural Hazard Mitigation Plan	Hamilton County Emergency Management Agency and Fuller, Mossbarger, Scott & May Engineers (FMSM), Inc.	Multi-hazard mitigation plan
2010-2013	2013 Proposed Annual Action Plan	Community Development Division of the Planning and Development Department	Description of housing and community development needs and objectives from March 2010 through February 2015
2011	Annual Report	Hamilton County Regional Planning Commission and Planning Partnership	Initiatives and accomplishments related to community development

Year	Title	Author(s)	Description
2011	State of Ohio Enhanced Hazard Mitigation Plan	State of Ohio	State mitigation plan
2009	Hamilton County Report Card	Hamilton County	Describes time-series trends in public safety, public health, education, criminal justice, environment, economy, housing, homeland security, etc.
2013	Lower Mill Creek Watershed Study	Metropolitan Sewer District of Greater Cincinnati: Project Groundwork	Alternatives analysis for planning, design, and construction phases to fulfill WWIP
2013	Interactive Map of Subdivisions	CAGIS	Interactive land use and zoning maps for Hamilton County and jurisdictions
2012	Development Regulations Analysis for Energy Efficiency and Sustainability	Clarion Associates	Diagnostic report and recommendations to achieve more sustainability and energy efficiency
2012	Special Flood Hazard Area	Hamilton County Planning & Development	Description of SFHA and associate land use compliance and storm drainage regulations
2013	Storm Events Database	NCDC	Database of past reported storm events for Hamilton County
2010	Community Profiles	Hamilton County Data Center	Descriptions of each jurisdiction's land use, population, demographics, industry, etc.
2010	Zoning Maps	Hamilton County Map Shop	Zoning maps for Hamilton County, Harrison Township, Miami Township, Green Township, Columbia Township, Symmes Township
2010	Land Use Maps	Hamilton County Map Shop	Land use maps for: Anderson Twp, Colerain Twp, Columbia Twp, Crosby Twp, Green Twp, Harrison Twp, Miami Twp, Springfield Twp, Sycamore Twp, Symmes Twp
2005	Thoroughfare Plan	Hamilton County Map Shop	Eastern corridor land use vision; western Hamilton Co. Collaborative Plan Concept
2013	Community Status Book Report Ohio	FEMA	Communities participating in the NFIP
2013	Repetitive Loss Properties	Ohio Emergency Management Agency	Rep losses for Hamilton County
2013	Severe Repetitive Loss Properties	Ohio Emergency Management Agency	Severe rep losses for Hamilton County
2013	Digital Flood Insurance Rate Maps	ODNR/FEMA	DFIRMs for the flood model
2013	Digital Elevation Map	ODNR	DEMs for the flood model

3.3 Review of Technical and Fiscal Resources

The planning team identified representatives from key agencies to assist in the planning process and share technical data, reports, and studies. The organizations and associated contributions are listed in Table 3-3.

Table 3-3: Key Resources

Agency	Resource
Cincinnati Area Geographical Information System	GIS data
University of Cincinnati	Landslide chapter and data
Ohio Department of Natural Resources	GeoFacts: Landslides in Ohio
United States Army Corps of Engineers	National Inventory of Dams
United States Army Corps of Engineers	National Levee Database

3.4 Public Involvement

The planning team organized two public meetings during the planning process. The public meetings were held on November 7 and 8. The team reviewed the results of the risk assessment and discussed potential mitigation strategies. Appendix A includes meeting minutes. Appendix B includes the legal notices published in the local newspaper to announce the meetings. It also includes confirmation that the notice was published one time in the *Cincinnati Enquirer* and once on http://cincinnati.com on November 2, 2012. The intent of these legal notices was to encourage the public to attend one of the meetings and actively participate in the planning process.

Additionally, after the planning team made final edits, the plan was posted on Hamilton County's website, and the county sent a press release (available in Appendix B) to invite the public to review the plan and submit comments.

3.5 Neighboring Community Involvement

The Hamilton County planning team invited neighboring counties in all three states to review and comment on the draft plan. Do we have the e-mail invitation sent to these communities? Details of neighboring stakeholders' involvement are summarized in Table 3-4.

The invited counties included the following:

Ohio: Butler, Clermont, Warren

Kentucky: Boone, Campbell, Kenton

Indiana: Dearborn, Franklin

Table 3-4: Neighboring Community Participation

Person Participating	Neighboring Jurisdiction	Organization	Participation Description
Jeff Galloway	Butler County, OH	Butler County EMA	Reviewed and provided input
Pam Broughton	Clermont County, OH	Clermont County EMA	Reviewed and provided input
Michael Bunner	Warren County, OH	Warren County EMA	Reviewed and provided input
Mark Ihrig	Boone County, KY	Boone County EMA	Reviewed and provided input
William Turner	Campbell County, KY	Campbell County EMA	Reviewed and provided input
Steve Hensley	Kenton County, KY	Kenton County EMA	Reviewed and provided input
William K Black, Jr.	Dearborn County, IN	Dearborn County EMA	Reviewed and provided input
Edward Hollenbach	Franklin County, IN	Franklin County EMA	Reviewed and provided input

Section

4

COUNTY PROFILE

Hamilton County is the third most populous county in the state with a population of 802,374 (U.S. Census Bureau, 2010) and 49 jurisdictions including 20 cities, 17 villages, and 12 townships.

4.1 Topography

Hamilton County is located in the southwest corner of Ohio. The north bank of the Ohio River marks the southern boundary of the county. According to 2010 U.S. Census data, Hamilton County has a total land area of 407 square miles.

The topography of southwest Ohio has been determined by years of glacial erosion. As glaciers advancing from the northwest melted, they dropped deposits of sand and gravel, forming the rivers, valleys, and terrain of the Ohio Valley. There are five primary rivers that impact its topography: Whitewater River, Great Miami River, Mill Creek, Little Miami River, and the Ohio River. The lowest surface elevation in Ohio is about 455 feet above sea level and is located where the Ohio River exits the state in the extreme southwest corner of Hamilton County.

4.2 Climate

Hamilton County has a continental climate with cold winters and warm summers. Winters are moderately cold with extensive cloudiness, average high temperatures around 40°F, and average lows in the mid-20s. Summers are warm and humid with daytime temperatures averaging in the mid-80s, while evenings cool down into the 60s. The average annual precipitation is 40.14 inches, more than half of which (23.9 inches) is snow. The average temperatures range from 28.9°F in January to 75.3°F in July. Severe weather is not uncommon in the state.

4.3 Demographics

The 2010 U.S. Census reported that Hamilton County has a population of 802,374. The majority of this population resides in cities and other incorporated areas. Cincinnati, the largest city in the county, houses over 37% of Hamilton County residents. Table 4-1 lists population distribution by jurisdiction.

Table 4-1: Population by Jurisdiction

Jurisdiction Name	Type	2010 Population
Cincinnati	City	296,950
Colerain	Township	58,499
Green	Township	58,370
Anderson	Township	43,446
Fairfield*	City	42,510
Springfield	Township	36,319
Delhi	Township	29,510
Norwood	City	19,207
Sycamore	Township	19,200
Forest Park	City	18,720
Miami	Township	15,757
Symmes	Township	14,683
Harrison	Township	13,934
Blue Ash	City	12,114
Springdale	City	11,223
Sharonville*	City	11,197
Reading	City	10,385
Montgomery	City	10,251
Harrison	City	9,897
North College Hill	City	9,397
Loveland*	City	9,348
Madeira	City	8,726
Wyoming	City	8,428
Cheviot	City	8,375
Milford*	City	6,709
Mount Healthy	City	6,098
Village of Indian Hill	City	5,785
Deer Park	City	5,736
Whitewater	Township	5,519
Silverton	City	4,788
Columbia	Township	4,532
St. Bernard	City	4,368
Greenhills	Village	3,615
Golf Manor	Village	3,611
Amberley	Village	3,585
Lockland	Village	3,449
Mariemont	Village	3,403
Woodlawn	Village	3,294
Lincoln Heights	Village	3,286
Cleves	Village	3,234
Crosby	Township	2,767
Evendale	Village	2,767
Newtown	Village	2,672
Terrace Park	Village	2,251
Elmwood Place	Village	2,188
Glendale	Village	2,155
Fairfax	Village	1,699
Addyston	Village	938
North Bend	Village	857
Arlington Heights	Village	745

*Community is split between two or more counties.

4.4 Economy

In 2010, the U.S. Census reported that 83.4% of the workforce in Hamilton County was employed in the private sector. The breakdown is included in Table 4-2. Educational services, health care and social assistance represent the largest sector, employing over 25% of the workforce. The median income of households in Hamilton County in 2010 was $46,236, while 16% of households had an annual income of less than $15,000.

Table 4-2: Industrial Employment by Sector

Industrial Sector	% of County Workforce (2010)
Agriculture, forestry, fishing, hunting and mining	.2%
Construction	4.4%
Manufacturing	11.9%
Wholesale trade	2.8%
Retail trade	12.1%
Transportation, warehousing, and utilities	3.9%
Information	1.9%
Finance and insurance, real estate and leasing	7.2%
Professional, scientific, management and administrative	11.8%
Educational services, health care and social assistance	25.9%
Arts, entertainment, recreation, accommodation and food	10.2%
Other services (except public administration)	4.4%
Public administration	3.5%

Source: http://factfinder2.census.gov

4.5 Industry

Hamilton County's major employers and number of employees are depicted below in Table 4-3. The Kroger Company is the largest employer with approximately 17,000 employees. The University of Cincinnati, the county's second largest employer, has an economic impact of more than $3 billion. The University of Cincinnati actively participated in the planning process and completed the landslide analysis, which is available in Section 5 of this plan. National and international companies, along with numerous federal agencies, are attracted to the solid transportation systems in this area.

Table 4-3: Major Employers

Company Name	Location	Employees
Kroger Company	Cincinnati	17,000
University of Cincinnati	Cincinnati	15,340
Proctor & Gamble Company	Cincinnati	13,000
Cincinnati Children's Hospital	Cincinnati	11,385
Health Alliance of Greater Cincinnati	Cincinnati	10,000
TriHealth, Inc.	Cincinnati	9,875
Archdiocese of Cincinnati	Cincinnati	8,000
Walmart (24 locations)	Cincinnati	7,375
Mercy Health Partners	Cincinnati	7,316
Fifth Third Bank	Cincinnati	7,219

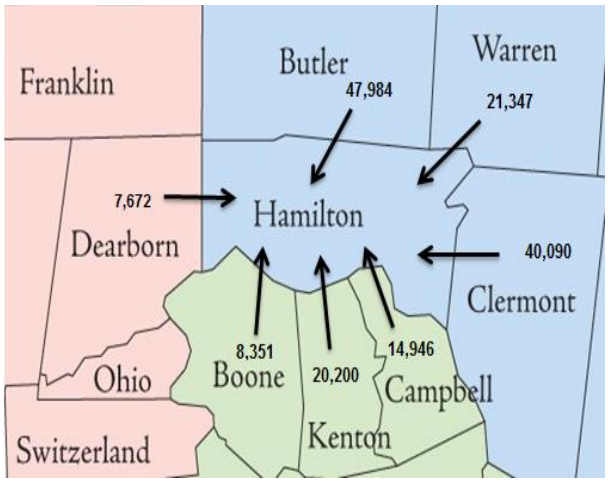
Sources: http://www.cincinnatichamber.com and http://www.city-data.com

4.6 Commuter Patterns

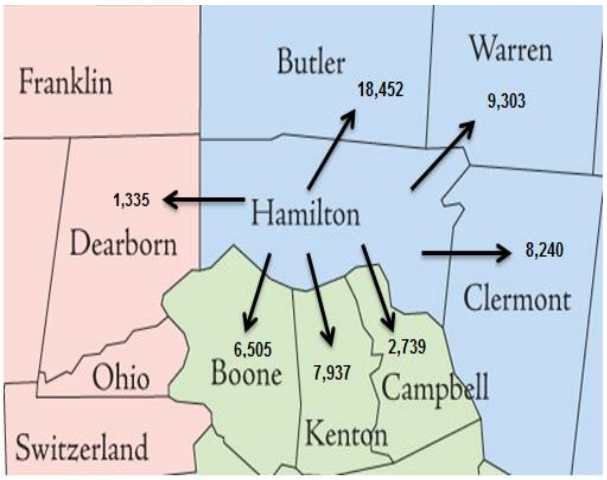
According to the 2011 American Community Survey estimate, Hamilton County has a civilian labor force of 419,633. With 370,091 of the labor force employed, the county is currently experiencing an unemployment rate of 7.8%. While approximately 54,511 leave Hamilton County for employment, over 160,000 commute into the county to work. Figure 4-2 depicts the commuting patterns into and out of the surrounding jurisdictions.

Figure 4-2: Hamilton County Commuting Patterns

COMMUTING IN



COMMUTING OUT



Note: The Cincinnati metropolitan area extends into Kentucky and Indiana

4.7 Major Lakes, Rivers, and Watersheds

Hamilton County is bounded on the south by the Ohio River and Kentucky and on the west by Indiana. Lakes within Hamilton County include Lake Isabella, Miami Whitewater Forest Lake, Sharon Woods Lake, and Winton Lake.

Following a catastrophic flood in March 1913, the Miami Conservancy District was established in 1914 to build dams and levees. The Miami Conservancy District is a river management agency operating in Southwest Ohio to control flooding of the Great Miami River and its tributaries.

The county crosses five Hydrologic Unit Code (HUC) 8 watersheds. Table 4-4 lists each watershed and the communities and bodies of water within them.

Table 4-4: HUC 8 Watersheds and Impacted Areas

	Watersheds				
	Lower Great Miami 5080002	**Ohio Brush-Whiteoak** 5090201	**Little Miami** 5090202	**Middle Ohio-Laughery** 5090203	**Whitewater** 5080003
Rivers					
Ohio River	X	X		X	
East Fork Little Miami River			X		
Great Miami River	X				
Whitewater River					X
Creeks					
Banklick Creek	X				
Blue Rock Creek	X				
Bold Face Creek				X	
Dry Fork Creek					X
Mill Creek				X	
North Branch Creek			X		
West Fork Mill Creek/Winton Lake				X	
Threemile Creek		X			
Fourmile Creek		X			
Fivemile Creek		X			
Eightmile Creek		X			
Runs					
Salt Run			X		
Stony Run		X			
Communities					
Addyston				X	
Amberley Village				X	

	Watersheds				
	Lower Great Miami 5080002	**Ohio Brush-Whiteoak** 5090201	**Little Miami** 5090202	**Middle Ohio-Laughery** 5090203	**Whitewater** 5080003
Anderson Township		X	X		
Arlington Heights				X	
Blue Ash			X	X	
Cheviot	X			X	
Cincinnati		X	X	X	
Cleves	X			X	
Colerain Township	X			X	
Columbia Township			X	X	
Crosby Township	X				X
Deer Park			X	X	
Delhi Township				X	
Elmwood Place				X	
Evendale			X	X	
Fairfax			X		
Fairfield	X				
Forest Park	X			X	
Glendale				X	
Golf Manor				X	
Green Township	X			X	
Greenhills				X	
Harrison					X
Harrison Township					X
Indian Hill			X		
Lincoln Heights				X	
Lockland				X	
Loveland			X		
Madeira			X		
Mariemont			X		
Miami Township	X			X	
Milford			X		
Montgomery			X	X	
Mount Healthy				X	
Newtown			X		
North Bend	X			X	
North College Hill				X	
Norwood			X	X	
Reading				X	
Saint Bernard				X	

	Watersheds				
	Lower Great Miami 5080002	**Ohio Brush-Whiteoak** 5090201	**Little Miami** 5090202	**Middle Ohio-Laughery** 5090203	**Whitewater** 5080003
Sharonville				X	
Silverton			X	X	
Springdale	X			X	
Springfield Township	X			X	
Sycamore Township			X	X	
Symmes Township			X		
Terrace Park			X		
Whitewater Township	X				X
Woodlawn				X	
Wyoming				X	

4.8 Land Use and Future Development

Hamilton County's Regional Planning Commission (HCRPC) provides advisory planning services to the 12 unincorporated townships of the county and provides similar services upon request to county municipalities. Its planning activities include programs for subdivision compliance, community planning, and development review to ensure that land use control is consistent with zoning regulations.

HCRPC is a consortium member to the Cincinnati Area Geographic Information System (CAGIS) and receives notifications of new roadways, zone changes, jurisdiction annexation changes, and school district changes that require updates in the CAGIS database. Technical support for communities includes geographic mapping and analysis, census analysis and reports, database design and management, and more.

4.8.1 Population Trends

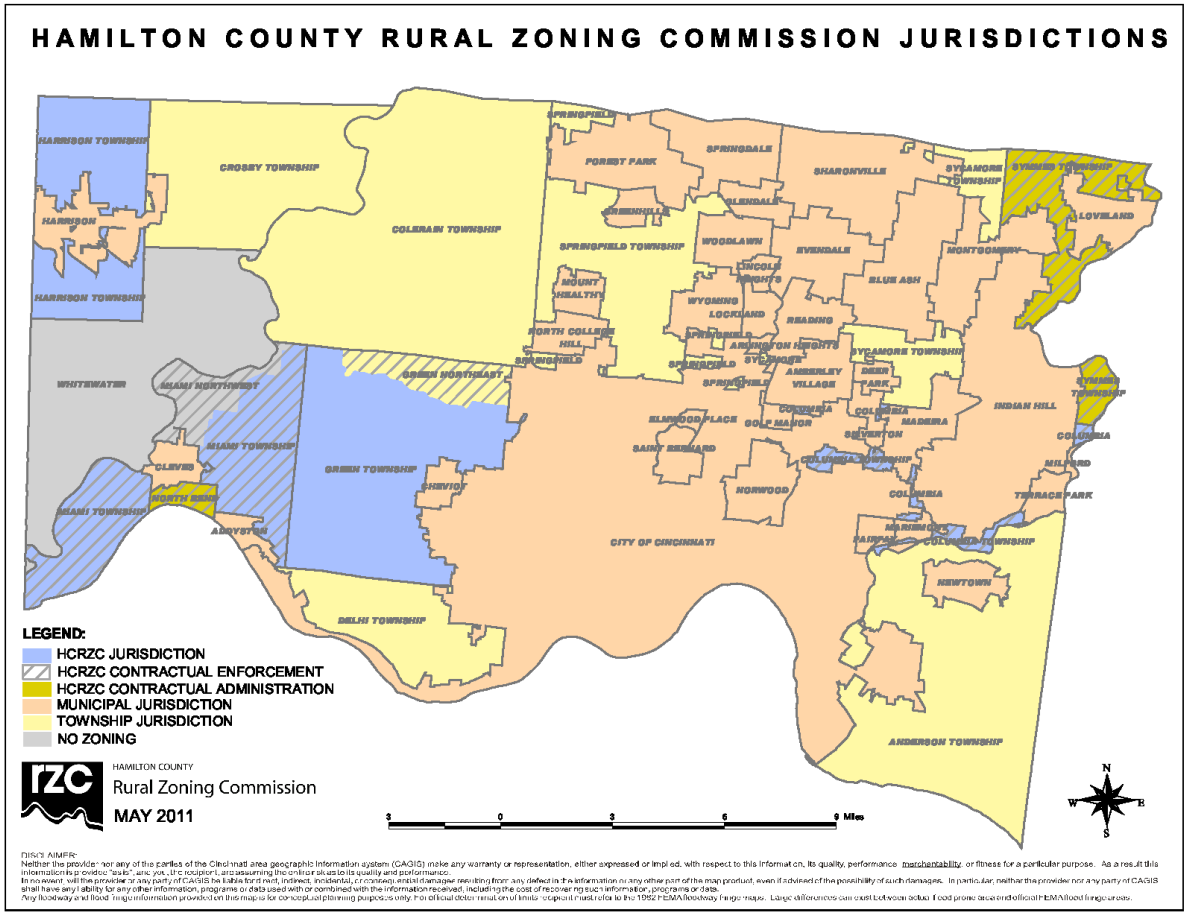
Hamilton County has experienced significant fluctuation in growth over the past 40 years and has lost more than one-tenth of its population in the past 10 years. Trends show that as the urban core of the county decreases in population, many of the rural and suburban areas increase. The 2010 Census revealed that the City of Cheviot is the most dense community (7,158 people per square mile), and Crosby Township is the least dense (142 people per square mile).

The county is also becoming more diverse. From 2000–2010, the white population declined from 72% of the county population to 69%, while all other racial and ethnic groups grew. The Hispanic population grew at the fastest rate, increasing its population from 1% to nearly 3%. These data are important for the county to consider when developing mitigation strategies and communicating them effectively to all residents.

4.8.2 Zoning and Land Use Maps

The Rural Zoning Commission Zoning Inspectors serve the residents of Hamilton County by enforcing zoning regulations. The following map shows the zoning commission jurisdictions.

Figure 4-3: Zoning Jurisdictions



HCRPC has also adopted land use plans for all or portions of 9 townships. These plans guide future development as part of a continuous planning process and serve as advisory documents in the review of zoning and development decisions. The CAGIS Internet Server (http://cagisonline.hamilton-co.org/cagisonline/index.html) provides interactive versions of zoning and land use maps to the public.

Additional land use plans are included in the Annex of Community Snapshots.

Section

5

RISK ASSESSMENT OVERVIEW

The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, disruption to local and regional economies, and the expenditure of public and private funds for recovery. Sound mitigation must be based on sound risk assessment. A risk assessment involves quantifying the potential loss resulting from a disaster by assessing the vulnerability of buildings, infrastructure, and people.

This assessment identifies the characteristics and potential consequences of a disaster, how much of the community could be affected by a disaster, and the impact on community assets. A risk assessment consists of three steps: 1) identify hazards, 2) assess vulnerability, and 3) profile hazards and analyze risk.

5.1 Identify Hazards

5.1.1 Existing Plans

To facilitate the planning process, we reviewed pre-existing plans and data, such as the 2007 Hamilton County Natural Hazard Mitigation Plan and Ohio digital flood maps. A component of these plans included a determination of the current primary hazards to Hamilton County. For a full list of reviewed resources, see Table 3-3 in Section 3 of this plan.

Planning efforts associated with the development of the 2007 Hamilton County Natural Hazard Mitigation Plan identified the principal natural hazards to Hamilton County:

1) Flooding
2) Tornadoes
3) Severe Winds/Thunderstorms
4) Ice Storms

Recent planning efforts for the 2013 Hamilton County Multi-Hazard Mitigation Plan updated the most concerning current hazards to:

1) Severe Winds/Thunderstorms
2) Winter Weather

5.1.2 Historical Hazards Records

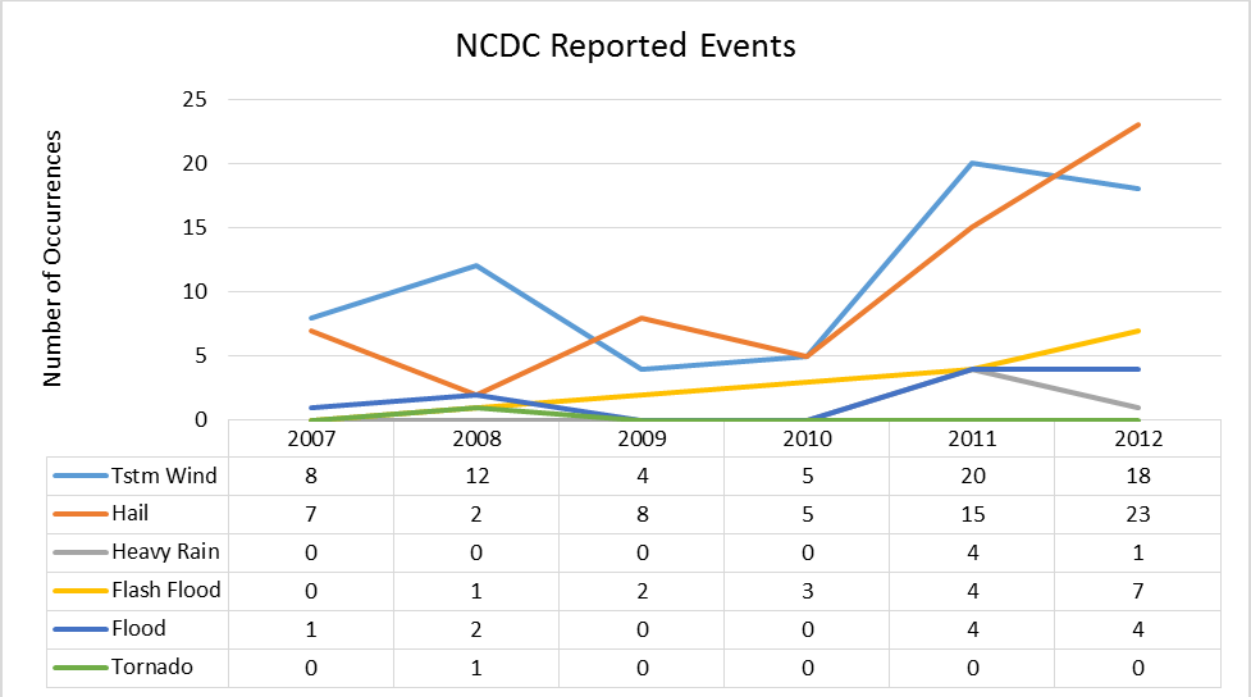
To assist the planning team, historical storm-event data from the past five years were compiled from the National Climatic Data Center (NCDC). NCDC records are estimates of damage reported to the National Weather Service from various local, state, and federal sources. These estimates, however, are often preliminary in nature and may not match the final assessment of economic and property losses related to given weather events.

The NCDC Storm Events Database includes the following events related to the following hazards:

- Tornadoes
- Severe thunderstorms
- Drought
- Extreme temperatures
- Winter storms
- Floods

The NCDC data included 161 reported events in Hamilton County between January 1, 2007, and December 31, 2012. Figure 5-1 shows number of occurrences of each hazard within that timeframe.

Figure 5-1: Events Reported to NCDC (2007-2012)



	2007	2008	2009	2010	2011	2012
Tstm Wind	8	12	4	5	20	18
Hail	7	2	8	5	15	23
Heavy Rain	0	0	0	0	4	1
Flash Flood	0	1	2	3	4	7
Flood	1	2	0	0	4	4
Tornado	0	1	0	0	0	0

5.1.3 Hazard Ranking Methodology

During Meeting #1, held on July 31, 2012, the planning team reviewed historical hazards information and participated in a risk analysis exercise to rank hazards by community and according to severity of risk.

The team calculated the probability rating (Low, Medium, High) of each hazard, based on the number of events that have occurred in the county within the past five years. Throughout the planning process, the MHMP team had the opportunity to update the NCDC data with more accurate local information. For example, the NCDC records often list the locations of hazards, such as floods, under the county, not accounting for how the individual communities were affected. In such situations, the probability rating assigned to the county was applied to all jurisdictions within the county.

Team consensus was also important in determining the probability of hazards not recorded by NCDC, for example, dam and levee failure, earthquakes, and hazardous materials spills. The probabilities for these hazardous events were determined by the planning team's estimation, derived from local experience and records, of the number of historical events that have occurred within the past five years.

After improving the NCDC data with additional local data, the team determined each hazard's potential impact on the communities. The guidelines used to determine probability and impact ratings are included in Table 5-1.

Table 5-1: Guidelines for Determining Probability and Impact

PROBABILITY		IMPACT	
Low	0-5 events in 10 years	Minimal	>Incident results in only minor injuries and no fatalities >Damage contained to a single incident scene and immediate area >Up to 5% of community facilities are damaged, destroyed, or inaccessible >Community able to effectively respond to incident with community resources and personnel >Complete shutdown of community facilities and loss of services for up to 3 days; community operations may be cancelled or relocated temporarily
Medium	6-10 events in 10 years	Moderate	>Incident results in a number of minor injuries, limited serious injuries, and few, if any, fatalities >Damage to critical infrastructure and property over a small area of community >Up to 25% of community facilities are damaged, destroyed, or inaccessible >Community is able to effectively respond to the incident with standard local mutual aid support >Complete shutdown of community facilities and loss of services for up to 1 week; some community operations must be cancelled or relocated temporarily
High	11+ events in 10 years	Significant	>Incident results in numerous serious injuries and multiple fatalities >Damage to critical infrastructure and property over a large area of community >Up to 50% of community facilities are damaged, destroyed, or inaccessible >Community has reached the limit of their response capabilities. Significant local mutual aid support required. >Complete shutdown of community facilities and loss of services for up to 2 weeks; community operations must be cancelled or relocated for an extended period of time.

Finally, the overall hazard risk was determined by multiplying probability and impact. It is important to consider both probability and impact when determining risk.

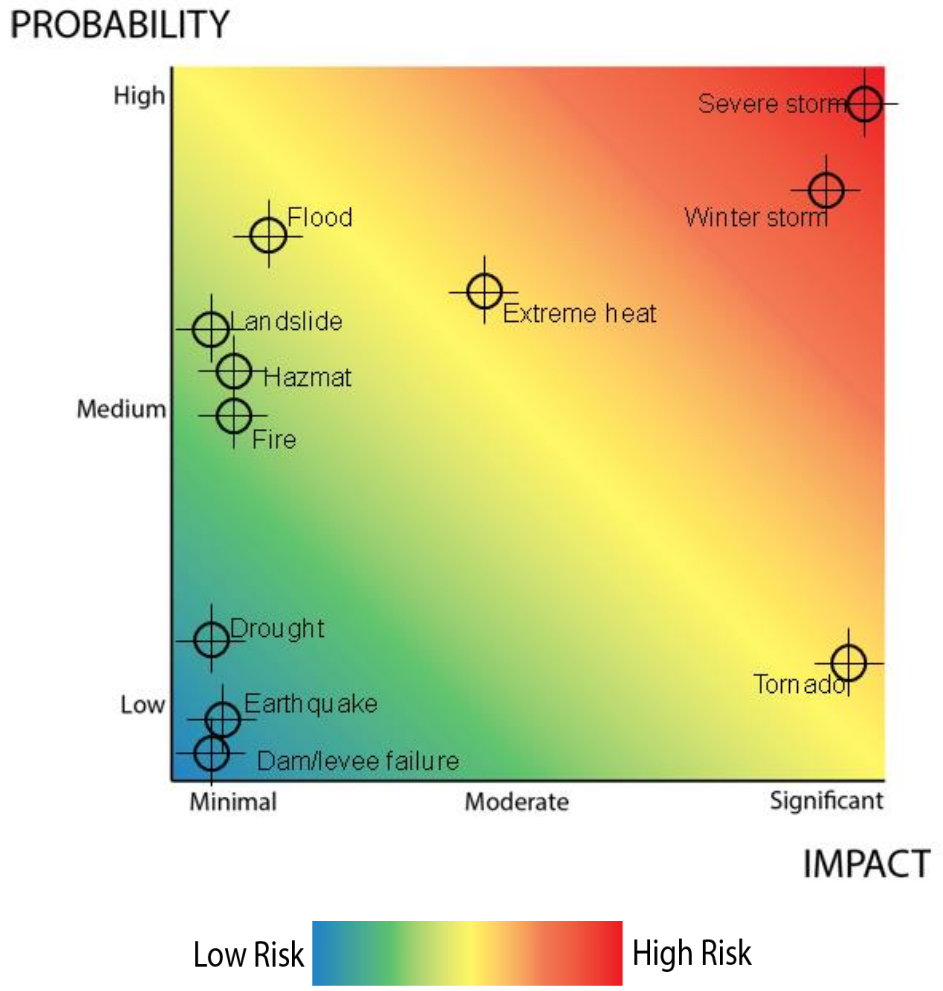
PROBABILITY X IMPACT = RISK

For example, if an asteroid were to collide with Earth, the impact would be extreme; but the probability of an asteroid strike (has not happened in billions of years) is so negligible that the overall risk is extremely low. In contrast, other potentially damaging events like thunderstorms and floods are relatively less severe but have occurred regularly in many places.

The planning team identified severe thunderstorms and winter weather as the most significant hazards affecting Hamilton County. Figure 5-2 illustrates the planning team's ranking of all hazards as they impact Hamilton County on average.

Section 5.3 contains figures to illustrate the vulnerability of individual communities to each hazard. The community snapshots in the Annex provide additional detail by community.

Figure 5-2: Hamilton County Hazard Rankings



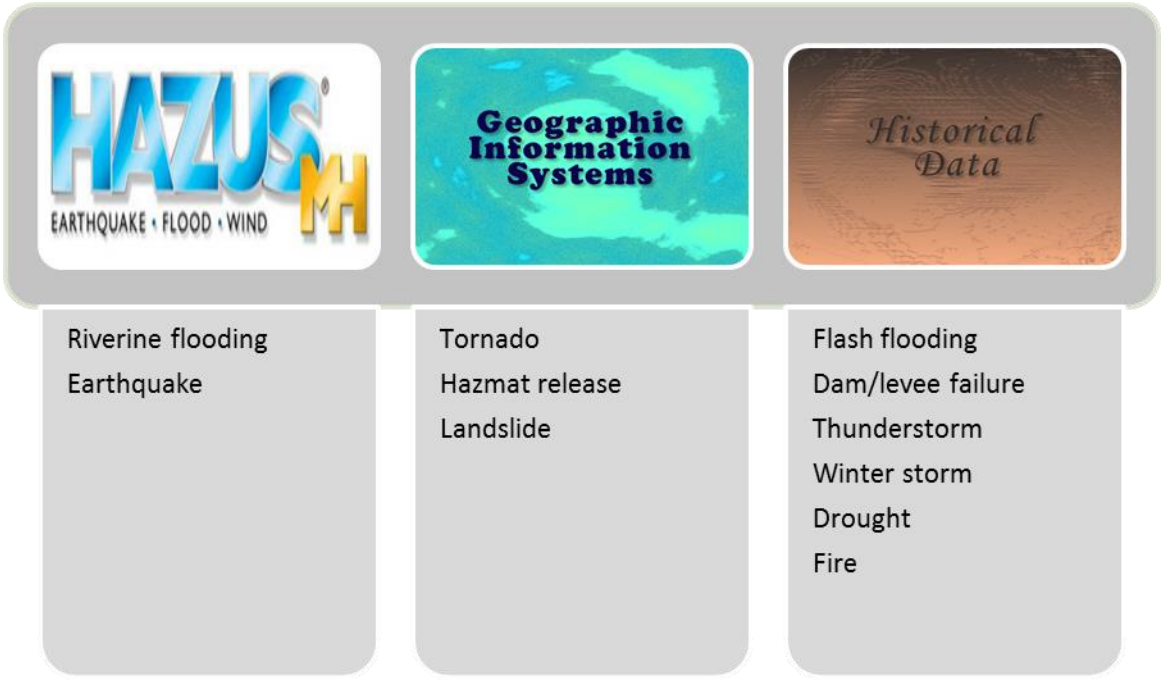
5.1.4 GIS and Hazus-MH Modeling

FEMA's Pre-Disaster Mitigation (PDM) program is designed to provide assistance to local communities to develop and implement their hazard mitigation plan, thereby reducing risk to property and lives. The initial multi-hazard mitigation plan (MHMP) for Hamilton County, Ohio was submitted to FEMA and approved in 2007. Existing Hazus-MH technology was used in the development of the vulnerability assessment for flooding and earthquakes. With the implementation of new technology and locally available parcel datasets, more accurate results are now available. Multi-hazard mitigation plan updates may document significant variances from the original MHMP.

The risk assessment is based on a Level 2 Hazus analysis. Hazus-MH generated a combination of site-specific (flood) and aggregated loss (earthquake) estimates. Aggregate inventory loss estimates, which include building stock analysis, are based upon the assumption that building stock is evenly distributed across census blocks/tracts. With this in mind, total losses tend to be more reliable over larger geographic areas than for individual census blocks/tracts. Site-specific analysis is based upon loss estimations for individual structures. For flooding, analysis of site-specific structures takes into account the depth of water in relation to the structure. Hazus-MH also takes into account the actual dollar exposure to the structure for the costs of building reconstruction, content, and inventory. Damages, however, are based upon the assumption that each structure will fall into a structural class, and structures in each class will respond in a similar fashion to a specific depth of flooding. Site-specific analysis also is based upon a point location rather than a polygon; therefore the model does not account for the percentage of a building that is inundated.

It is important to note that Hazus-MH is not intended to be a substitute for detailed engineering studies. Rather, it is intended to serve as a planning aid for communities interested in assessing their risk to flood, earthquake, and hurricane-related hazards. This documentation does not provide full details on the processes and procedures completed in the development of this project. It is only intended to highlight the major steps that were followed during the project.

We analyzed 11 hazard events using Hazus-MH, GIS, and historical information to predict which communities would be at risk.



5.2 Assess Vulnerability

The planning team members were provided with a plot and report of essential and critical facilities, as well as community assets. The planning team took GIS data provided by The Polis Center; verified the datasets, using local knowledge, and allowed The Polis Center to use its local GIS data for additional verification. Polis GIS analysts made these updates and corrections to the Hazus-MH data tables prior to performing the risk assessment. These changes to the Hazus-MH inventory reflect an enhanced level 1 analysis. This update process improved the accuracy of the model predictions.

The default Hazus-MH data have been updated as follows:

- The Hazus-MH defaults, critical facilities, and essential facilities have been updated based on the most recent available data sources. Critical and essential point facilities have been reviewed, revised, and approved by local subject matter experts.
- The essential facility updates (schools, medical care facilities, fire stations, police stations, and EOCs) have been applied to the Hazus-MH model data. Hazus-MH reports of essential facility losses reflect updated data.

5.2.1 Identify Facilities

For the purpose of this plan, ***essential facilities*** are defined as those that are vital to the county in the event of a hazard. These include emergency operations centers, police departments, fire stations, schools, and care facilities.

Table 5-2 identifies the essential facilities that were added or updated for the analysis. Essential facilities are a subset of critical facilities. Names and locations of all essential and critical facilities are documented in Appendix E.

Table 5-2: Essential Facilities of Hamilton County

Facility	Number of Facilities
Care Facilities	230
Emergency Operations Centers	1
Fire Stations	96
Police Stations	59
Schools	371

Critical facilities are additional entities that are deemed economically or socially viable to the county, including communication facilities, utilities, transportation facilities, infrastructure, and hazardous materials sites.

5.2.2 Facility Replacement Costs

Facility replacement costs and total building exposure are identified in Table 5-3. The replacement costs have been updated by local data. Table 5-5 also includes the estimated number of buildings within each occupancy class.

Table 5-3: Building Exposure

General Occupancy	Estimated Total Buildings	Total Building Exposure
Agricultural	694	$246,059,000
Commercial	9,764	$8,485,338,000
Education	534	$2,052,695,000
Government	2,086	$2,057,582,000
Industrial	2,808	$9,115,073,000
Religious/Non-Profit	2	$844,836,000
Residential	236,691	$31,335,984,000
Total	252,579	$54,137,567,000

The Assessor records often do not contain values for many critical facilities because those parcels are not taxable. For purposes of analysis, only buildings on taxable properties are included.

5.3 Profiling Hazards

5.3.1 Tornado Hazard

Tornadoes pose a great risk to the state of Ohio and its citizens. Tornadoes can occur at any time during the day or night. They can also happen during any month of the year. The unpredictability of tornadoes makes them one of Ohio's most dangerous hazards. Their extreme winds are violently destructive when they touch down in the region's developed and populated areas. Current estimates place the maximum velocity at about 300 miles per hour, but higher and lower values can occur. A wind velocity of 200 miles per hour will result in a wind pressure of 102.4 pounds per square foot of surface area—a load that exceeds the tolerance limits of most buildings. Considering these factors, it is easy to understand why tornadoes can be so devastating for the communities they hit.

Tornadoes are defined as violently-rotating columns of air extending from thunderstorms to the ground. Funnel clouds are rotating columns of air not in contact with the ground; however, the violently-rotating column of air can reach the ground very quickly and become a tornado. If the funnel cloud picks up and blows debris, it has reached the ground and is a tornado.

Tornadoes are classified according to the Fujita tornado intensity scale. Originally introduced in 1971, the scale was modified in 2006 to better define the damage and estimated wind scale. The Enhanced Fujita Scale ranges from low intensity EF0 with effective wind speeds of 65 to 85 miles per hour, to EF5 tornadoes with effective wind speeds of over 200 miles per hour. The Enhanced Fujita intensity scale is included in Table 5-4.

Table 5-4: Enhanced Fujita Tornado Rating

Fujita Number	Estimated Wind Speed	Path Width	Path Length	Description of Destruction
EF0 Gale	65-85 mph	6-17 yards	0.3-0.9 miles	Light damage, some damage to chimneys, branches broken, sign boards damaged, shallow-rooted trees blown over.
EF1 Moderate	86-110 mph	18-55 yards	1.0-3.1 miles	Moderate damage, roof surfaces peeled off, mobile homes pushed off foundations, attached garages damaged.
EF2 Significant	111-135 mph	56-175 yards	3.2-9.9 miles	Considerable damage, entire roofs torn from frame houses, mobile homes demolished, boxcars pushed over, large trees snapped or uprooted.
EF3 Severe	136-165 mph	176-566 yards	10-31 miles	Severe damage, walls torn from well-constructed houses, trains overturned, most trees in forests uprooted, heavy cars thrown about.
EF4 Devastating	166-200 mph	0.3-0.9 miles	32-99 miles	Complete damage, well-constructed houses leveled, structures with weak foundations blown off for some distance, large missiles generated.
EF5 Incredible	> 200 mph	1.0-3.1 miles	100-315 miles	Foundations swept clean, automobiles become missiles and thrown for 100 yards or more, steel-reinforced concrete structures badly damaged.

Source: http://www.srh.noaa.gov

Summary Vulnerability Assessment

Tables 5-5 through 5-7 provide a summary of the estimated damages from the tornado model. To complete the analyses, The Polis Center used a GIS overlay model to estimate damages for three scenarios (one historical tornado path and two hypothetical paths). The planning team chose the two different hypothetical scenarios to evaluate different magnitudes of tornado impact. The results are presented in the following tables.

NOTE: The modeled scenarios did not include critical facilities' building losses because assessor values were not available. Therefore, the following tables include *estimated losses* for residential and non-residential values and *estimated exposure* for critical facilities based on default Hazus estimates.

Table 5-5: Scenario #1 – Historical F4 Path through Harrison and Fairfield

Building Type	Number of Buildings	Estimated Losses/Exposure
Residential	1,369	$77,963,000
Non-Residential	74	$49,123,000
Critical Facilities	8	$84,620,000
Totals	1,451	$211,706,000

Table 5-6: Scenario #2 – Hypothetical F4 Path through North College Hill

Building Type	Number of Buildings	Estimated Losses/Exposure
Residential	3,726	$208,833,000
Non-Residential	179	$90,213,000
Critical Facilities	10	$78,660,000
Totals	3,915	$377,621,085

Table 5-7: Scenario #3 – Hypothetical F3 Path through Norwood and Indian Hill

Building Type	Number of Buildings	Estimated Losses/Exposure
Residential	887	$52,535,000
Non-Residential	67	$23,568,000
Critical Facilities	4	$21,520,000
Totals	958	$97,623,000

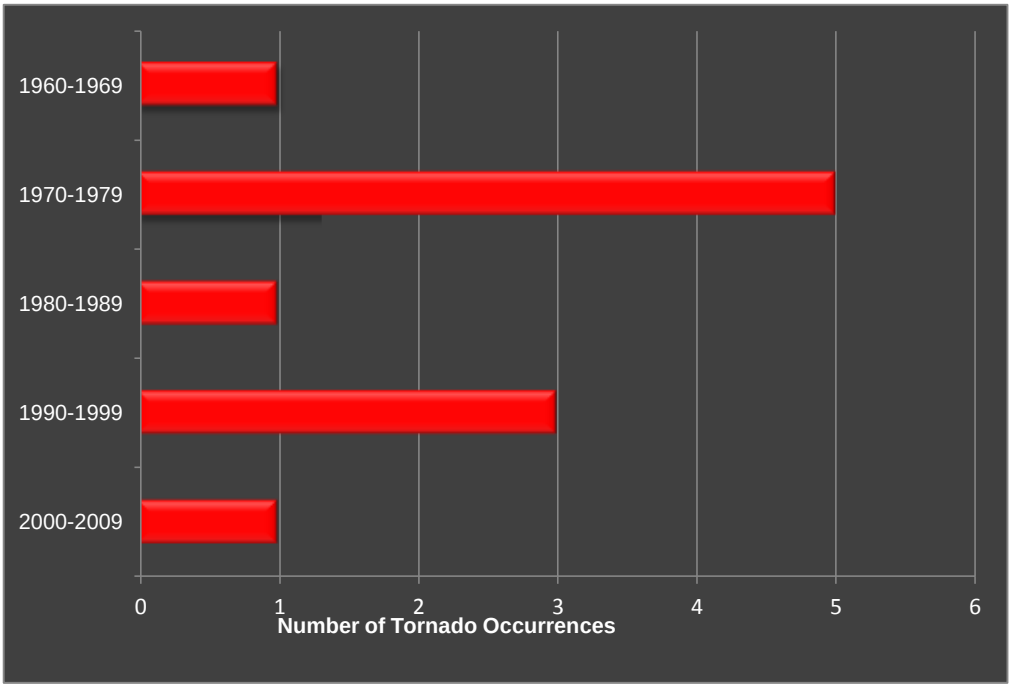
Previous Occurrences for Tornado Hazard- 5 Year

The NCDC database reported one tornado in Hamilton County since January 1, 2007. The tornado, reported to NCDC as an F0, occurred on June 4, 2008 just west of Newtown. Property damage was estimated at $40,000. Additional details for NCDC events are included in Appendix C.

Previous Occurrences for Tornado Hazard- 50 Year

There have been several occurrences of tornados within Hamilton County during the past few decades. The NCDC database reported 11 tornados/funnel clouds in Hamilton County since 1962. Figure 5-3 shows the number of tornado occurrences by decade. Although these tornados have been F0 on the standard Fujita Scale, they would have caused significant property damage over the past 50 years.

Figure 5-3: Hamilton County Tornado Occurrences-50 Year



Geographic Location for Tornado Hazard

The entire county has the same risk for occurrence of tornadoes. They can occur at any location within the county.

Hazard Extent for Tornado Hazard

The historical tornadoes generally moved from southwest to northeast across the county. The extent of the hazard varies in terms of the extent of the path and the wind speed. Tornadoes can occur at any location within the county.

Risk Identification for Tornado Hazard

Based on historical information, the probability of a tornado is low, and the potential impact of a tornado is significant; therefore, the overall risk of a tornado hazard for Hamilton County is moderate.

Vulnerability Analysis for Tornado Hazard

Tornadoes can occur within any area in the county; therefore the entire county population and all buildings are vulnerable to tornadoes. To accommodate this risk, this plan will consider all buildings within the county as vulnerable.

Essential Facilities

All essential facilities are vulnerable to tornadoes. An essential facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts will vary, based on the magnitude of the tornado, but can include structural failure, damaging debris (trees or limbs), roofs blown off or windows broken by hail or high winds, and loss of facility functionality (e.g., a damaged police station will no longer be able to serve the community).

Building Inventory

The same impacts to buildings within the county can be expected. The impacts are similar to those discussed for critical facilities and include structural failure, damaging debris (trees or limbs), roofs blown off or windows broken by hail or high winds, and loss of building function (e.g., damaged home will no longer be habitable causing residents to seek shelter).

Infrastructure

During a tornado, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, bridges, and ports. Because the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these structures could become damaged during a tornado. The impacts to these structures include broken, failed, or impassable roadways, broken or failed utility lines (e.g., loss of power or gas to community), and railway failure from broken or impassable railways. Bridges could fail or become impassable, causing risk to traffic. Ports could be closed causing delays to commerce.

GIS Tornado Analysis

The following analysis utilizes three example scenarios to gauge the anticipated impacts of tornados in the county, in terms of numbers and types of buildings and infrastructure.

Tornado Scenario 1: Towns of Harrison and Fairfield

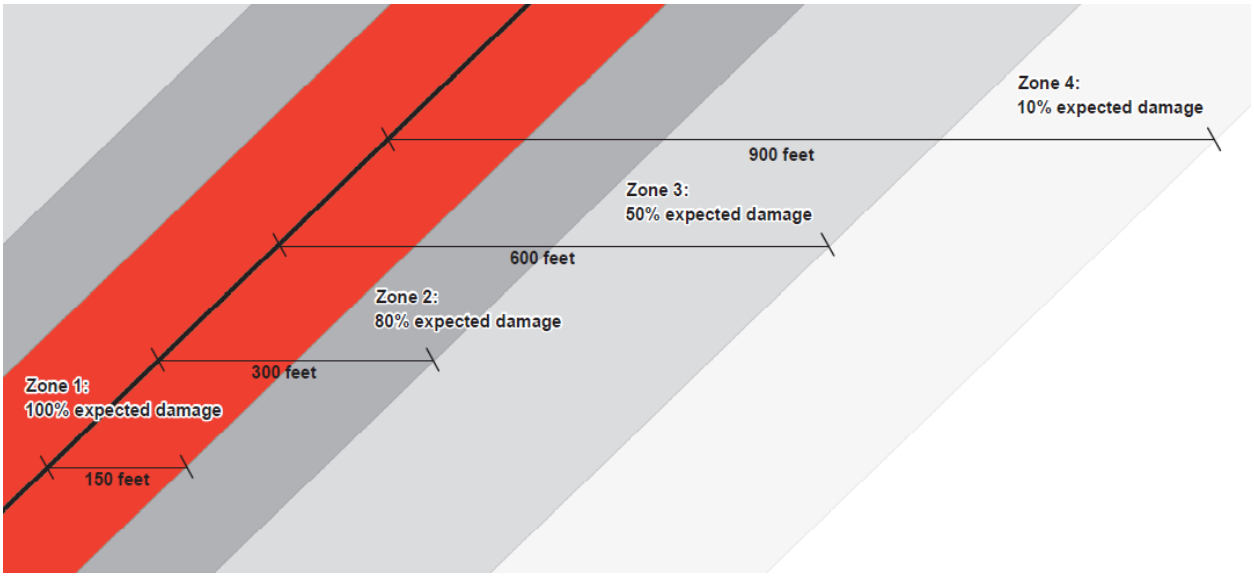
GIS overlay modeling was used to determine the potential impacts of an F4 tornado. The analysis used a historical path based upon the F4 tornado event that ran for 15.8 miles through the Town of Harrison and the northwest part of the Town of Fairfield in 1990.The selected widths were modeled after a recreation of the Fujita-Scale guidelines, based on conceptual wind speeds, path widths, and path lengths. There is no guarantee that every tornado will fit exactly into one of these six categories. Table 5-8 depicts tornado damage curves as well as path widths.

Table 5-8: Tornado Path Widths and Damage Curves

Enhanced Fujita Scale	Path Width (feet)	Maximum Expected Damage
EF5	2,400	100%
EF4	1,800	100%
EF3	1,200	80%
EF2	600	50%
EF1	300	10%
EF0	150	0%

Within any given tornado path there are degrees of damage. The most intense damage occurs within the center of the damage path with decreasing amounts of damage away from the center. After the historical path is digitized on a map the process is modeled in GIS by adding buffers (damage zones) around the tornado path. Figure 5-4 and Table 5-9 describe the zone analysis. The selected historical tornado path is depicted in Figure 5-5, and the damage curve buffers are shown in Figure 5-6.

Figure 5-4: GIS Analysis Using Tornado Buffers



An F4 tornado has four damage zones. Total devastation is estimated within 150 feet of the tornado path (the darker-colored Zone 1). The outer buffer is 900 feet from the tornado path (the lightest colored Zone 4), within which 10% of the buildings will be damaged.

Table 5-9: Tornado Zones and Damage Curves

Fujita Scale	Zone	Buffer (feet)	Damage Curve
F-4	4	600-900	10%
F-4	3	300-600	50%
F-4	2	150-300	80%
F-4	1	0-150	100%

The selected historical tornado path is depicted in Figure 5-5, and the damage curve buffers are shown in Figure 5-6.

Figure 5-5: Historical F-4 Tornado Path in Hamilton County

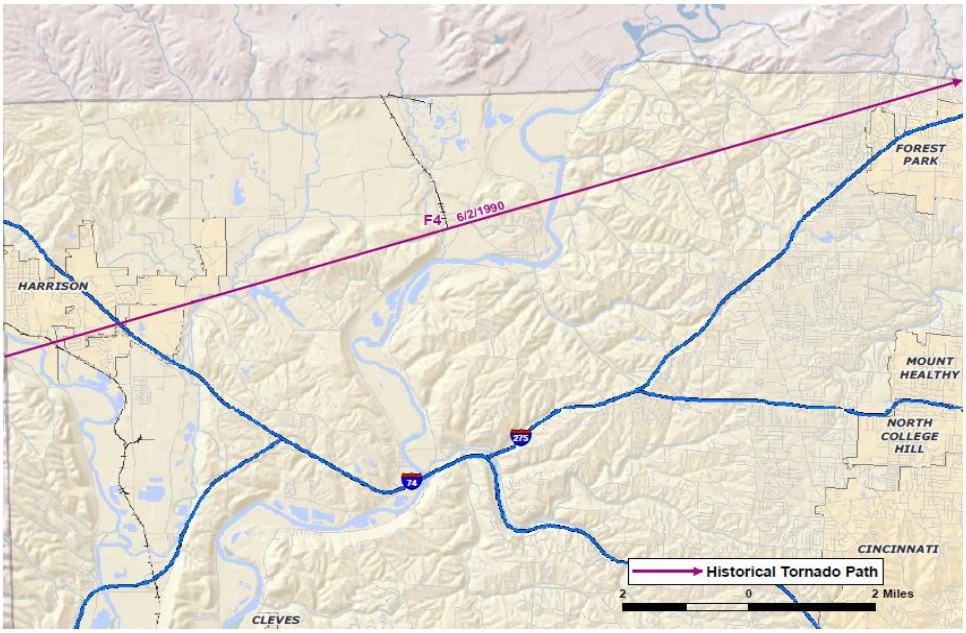
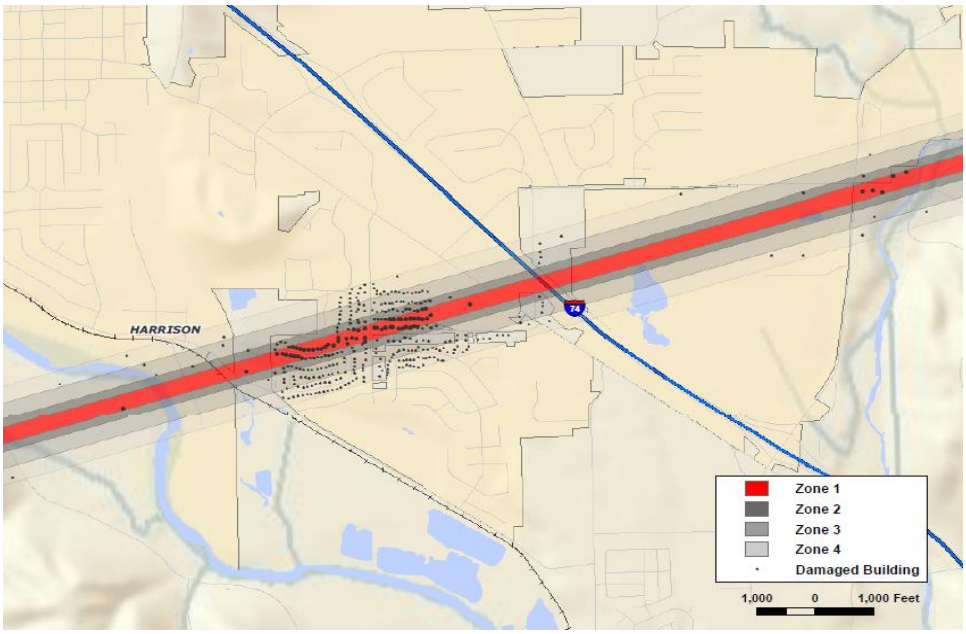


Figure 5-6: Modeled F4 Tornado Damage Buffers in Hamilton County



The results of the analysis are depicted in Tables 5-10 and 5-11. The GIS analysis estimates that 1,443 buildings will be damaged. The estimated building losses were $127,067,000. The building losses are an estimate of building replacement costs multiplied by the percentages of damage. The overlay was

performed against parcels provided by Hamilton County that were joined with Assessor records showing property improvement.

The Assessor records often do not contain values for many critical facilities because those parcels are not taxable. For purposes of analysis, only buildings on taxable properties are included.

Table 5-10: Estimated Numbers of Buildings Damaged by Occupancy Type

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	229	217	454	469
Commercial	4	6	7	8
Industrial	0	1	2	3
Agriculture	4	6	8	7
Religious	0	1	0	3
Government	2	3	2	4
Education	0	1	2	0
Total	239	235	475	494

Table 5-11: Estimated Building Losses by Occupancy Type

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	$23,066,000	$23,676,000	$26,217,000	$5,004,000
Commercial	$7,057,000	$9,840,000	$2,081,000	$1,669,000
Industrial	$0	$263,000	$41,000	$5,069,000
Agriculture	$955,000	$2,056,000	$342,000	$211,000
Religious	$0	$908,000	$0	$241,000
Government	$387,000	$2,708,000	$1,012,000	$254,000
Education	$0	$4,619,000	$9,410,000	$0
Total	$31,465,000	$44,070,000	$39,103,000	$12,448,000

Essential and Critical Facilities Damage

There are eight essential and/or critical facilities located within 900 feet of the historical tornado path. The affected facilities are identified in Table 5-12, and the geographic locations of all vulnerable facilities are shown in Figures 5-7 and 5-8.

Table 5-12: Estimated Facilities Affected

Facility Type	Facility Name
Care	Veranda Gardens
Hazmat	Kopp Turkeys Inc
School	Harrison Junior High
School	Harrison High
School	Pleasant Run Elementary
School	Pleasant Run Middle
School	Welch Primary
Dam	Wright Farm West Detention Basin Dam

Figure 5-7: Vulnerable Facilities within Tornado Path

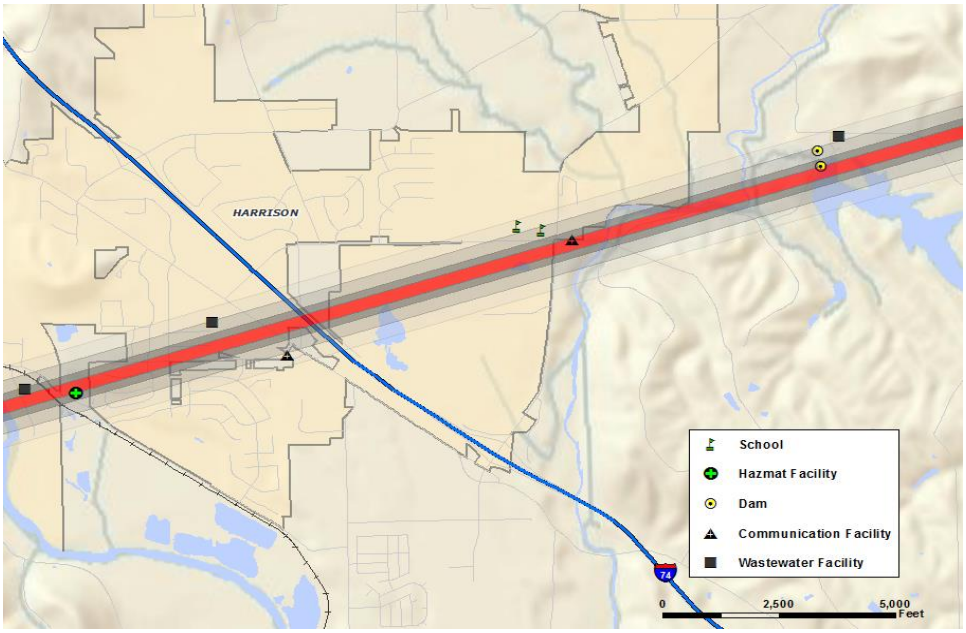
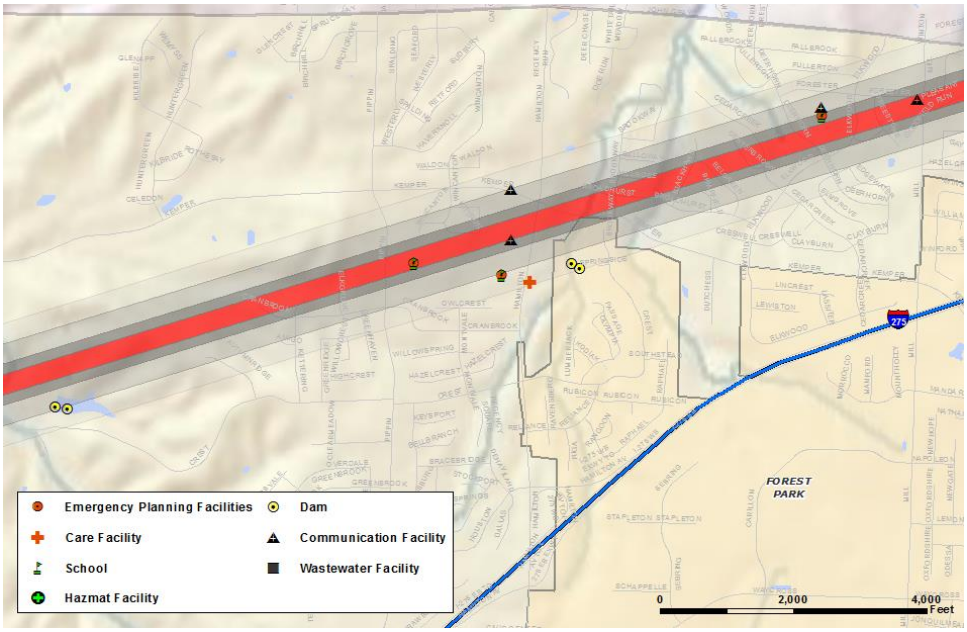


Figure 5-8: Vulnerable Facilities within Tornado Path



Tornado Scenario 2: Town of North College Hill

GIS overlay modeling was used to determine the potential impacts of an F-4 tornado. The analysis used hypothetical path based upon the F4 tornado event that ran for 9.9 miles through the Town of North College Hill and north of Wyoming and Lincoln Heights. The selected widths were modeled after a recreation of the Fujita-Scale guidelines based on conceptual wind speeds, path widths, and path lengths. There is no guarantee that every tornado will fit exactly into one of these six categories. Table 5-13 depicts tornado damage curves as well as path widths.

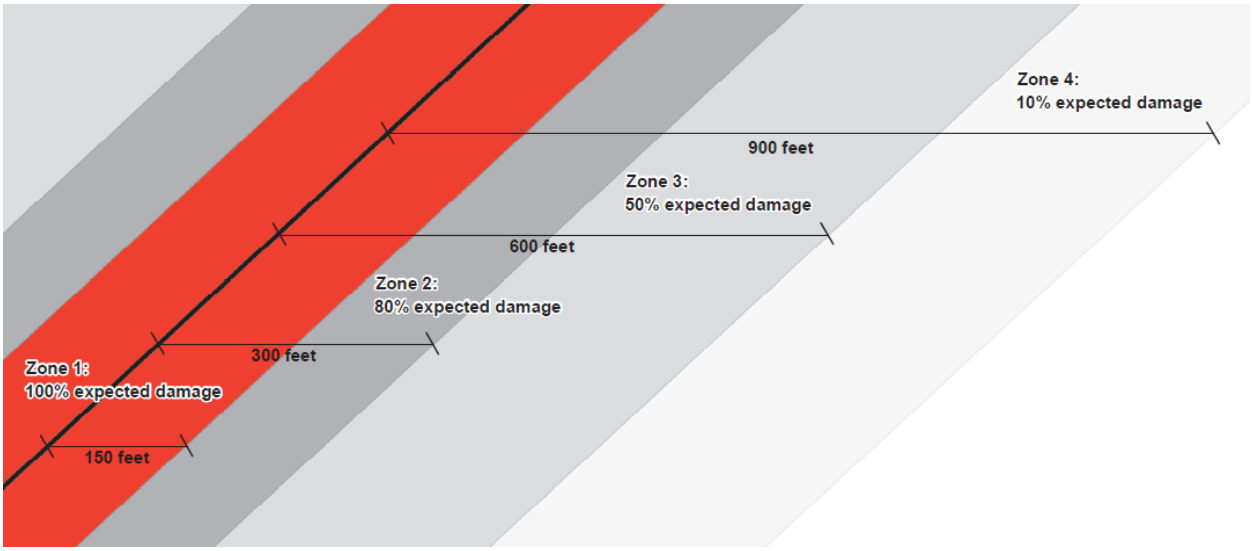
Table 5-13: Tornado Path Widths and Damage Curves

Fujita Scale	Path Width (feet)	Maximum Expected Damage
5	2,400	100%
4	1,800	100%
3	1,200	80%
2	600	50%
1	300	10%
0	150	0%

Within any given tornado path there are degrees of damage. The most intense damage occurs within the center of the damage path with decreasing amounts of damage away from the center. After the hypothetical path is digitized on a map the process is modeled in GIS by adding buffers (damage zones) around the tornado path. Figure 5-9 and Table 5-11 describe the zone analysis. The selected

hypothetical tornado path is depicted in Figure 5-10, and the damage curve buffers are shown in Figure 5-11.

Figure 5-9: F4 Tornado Analysis Using GIS Buffers



An F4 tornado has four damage zones, depicted in Table 5-14. Total devastation is estimated within 150 feet of the tornado path. The outer buffer is 900 feet from the tornado path, within which buildings will experience 10% damage.

Table 5-14: F4 Tornado Zones and Damage Curves

Zone	Buffer (feet)	Damage Curve
1	0-150	100%
2	150-300	80%
3	300-600	50%
4	600-900	10%

Figure 5-10: Hypothetical F4 Tornado Path in Hamilton County

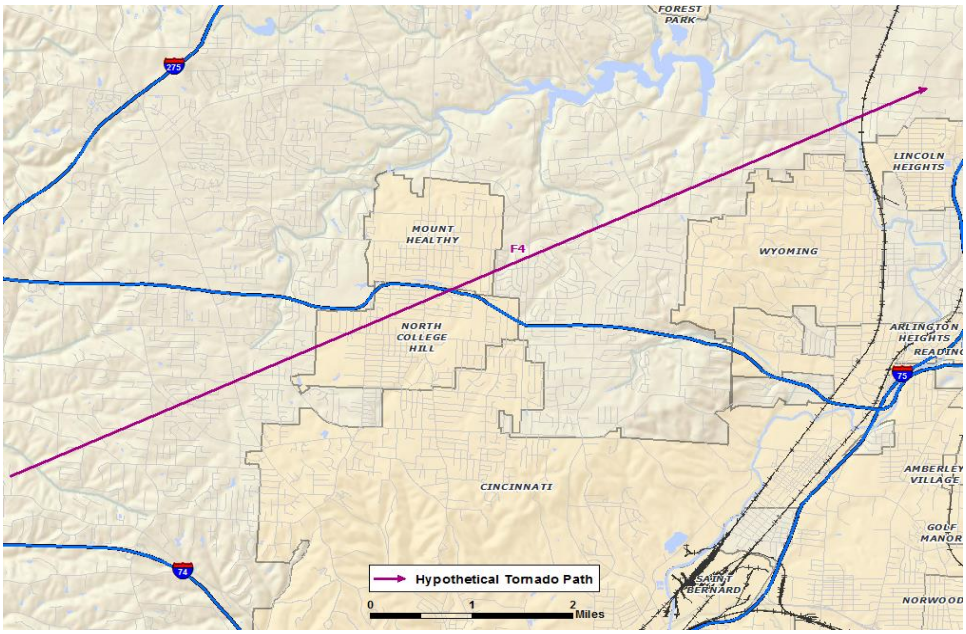
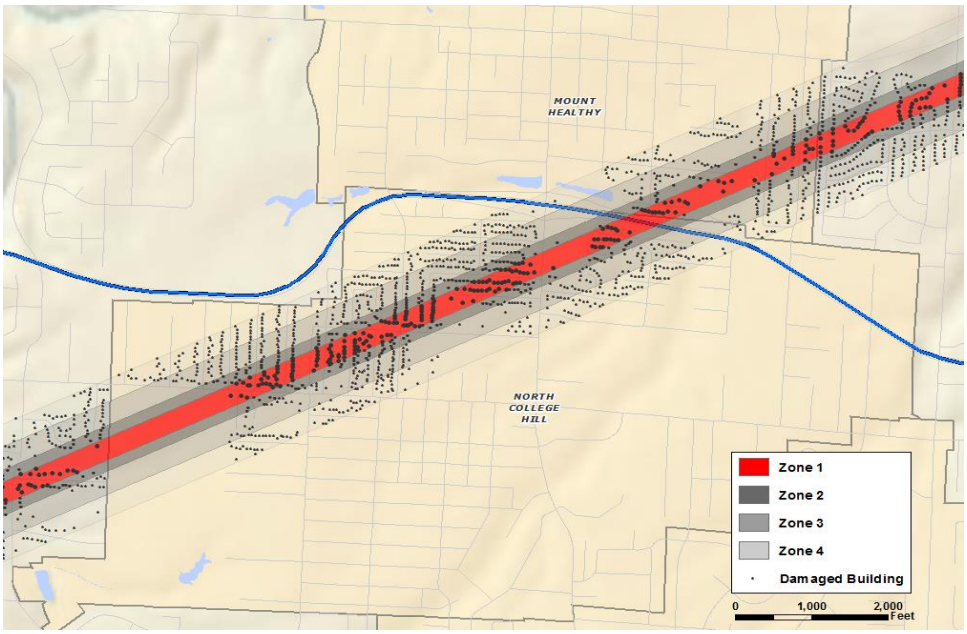


Figure 5-11: Modeled F4 Tornado Damage Buffers in Hamilton County



The results of the analysis are depicted in Tables 5-15 and 5-16. The GIS analysis estimates that 3,905 buildings will be damaged. The estimated building losses were $299,047,000. The building losses are an estimate of building replacement costs multiplied by the percentages of damage. The overlay was performed against parcels provided by Hamilton County that were joined with Assessor records showing property improvement.

The Assessor records often do not contain values for many critical facilities because those parcels are not taxable. For purposes of analysis, only buildings on taxable properties are included.

Table 5-15: Estimated Numbers of Buildings Damaged by Occupancy Type

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	598	619	1,246	1,263
Commercial	17	10	24	44
Industrial	4	2	17	13
Agriculture	0	1	0	1
Religious	2	0	6	9
Government	5	3	7	11
Education	1	0	2	0
Total	627	635	1,302	1,341

Table 5-16: Estimated Building Losses by Occupancy Type

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	$68,591,000	$51,531,000	$74,429,000	$14,282,000
Commercial	$7,752,000	$9,057,000	$9,014,000	$1,939,000
Industrial	$7,267,000	$2,950,000	$19,890,000	$4,172,000
Agriculture	$0	$85,000	$0	$66,000
Religious	$465,000	$0	$3,070,000	$1,090,000
Government	$2,372,000	$7,029,000	$5,236,000	$1,520,000
Education	$5,231,000	$0	$2,008,000	$0
Total	$91,678,000	$70,567,085	$113,647,000	$23,069,000

Essential and Critical Facility Damage

There are 10 essential and/or critical facilities located within 900 feet of the hypothetical tornado path. The affected facilities are identified in Table 5-17. Figure 5-12 and Figure 5-13 shows the geographic location of some essential and critical facilities.

Table 5-17: Estimated Facilities Affected

Facility Type	Facility Name
Care Facility	Glendale Place Care Center
Fire Station	Station 96
School	John Paul II Catholic School
School	St. James the Greater School
School	North College Hill Elementary
School	Hillcrest Training School
School	Struble Elementary
School	Brown Mackie College-Cincinnati
Emergency Planning Facility	Woodlawn Ohio National Training And Comm
Emergency Planning Facility	Angels Of Joy Children Learning Center

Figure 5-12: Vulnerable Facilities within Tornado Path in North College Hill

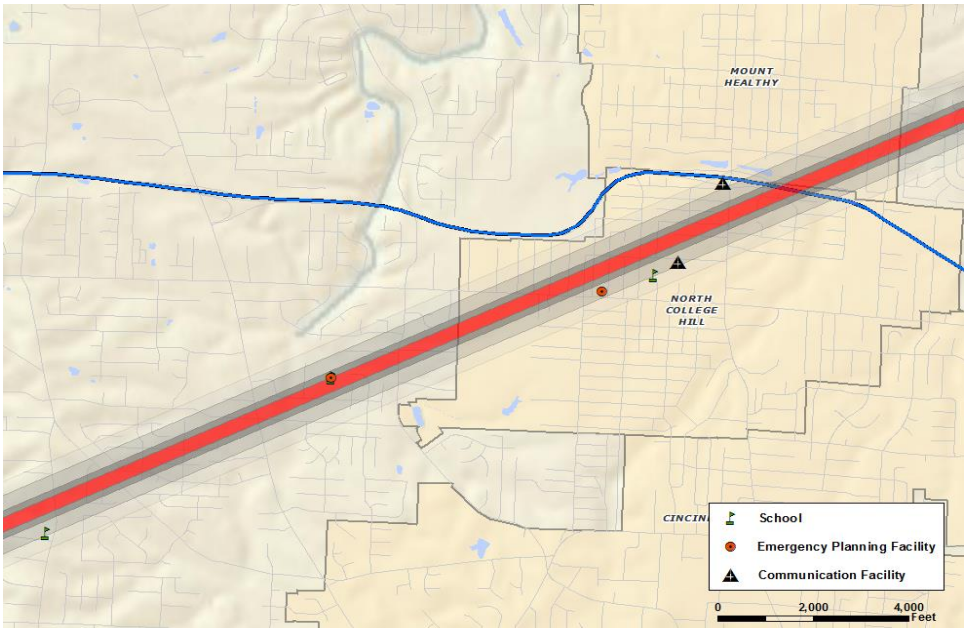
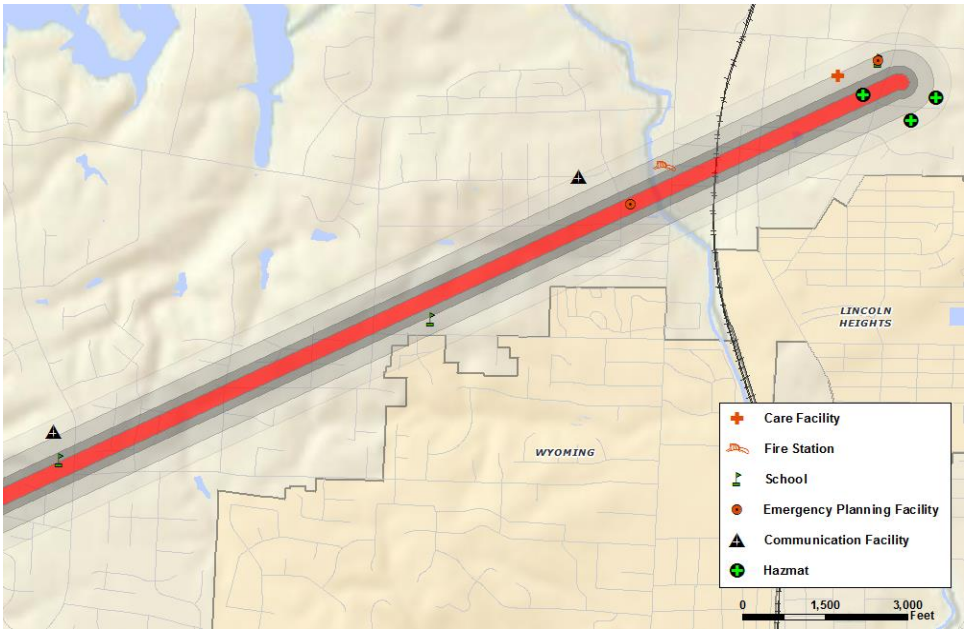


Figure 5-13: Vulnerable Facilities within Tornado Path north of Wyoming and Lincoln Heights



Tornado Scenario 3: Village of Indian Hill and City of Milford

GIS overlay modeling was used to determine the potential impacts of an F-3 tornado. The analysis used a hypothetical path based upon the F3 tornado event that ran for 9.6 miles through south of Indian Hill and Milford. The selected widths were modeled after a recreation of the Fujita-Scale guidelines based on conceptual wind speeds, path widths, and path lengths. There is no guarantee that every tornado will fit exactly into one of these six categories. Table 5-18 depicts tornado damage curves as well as path widths.

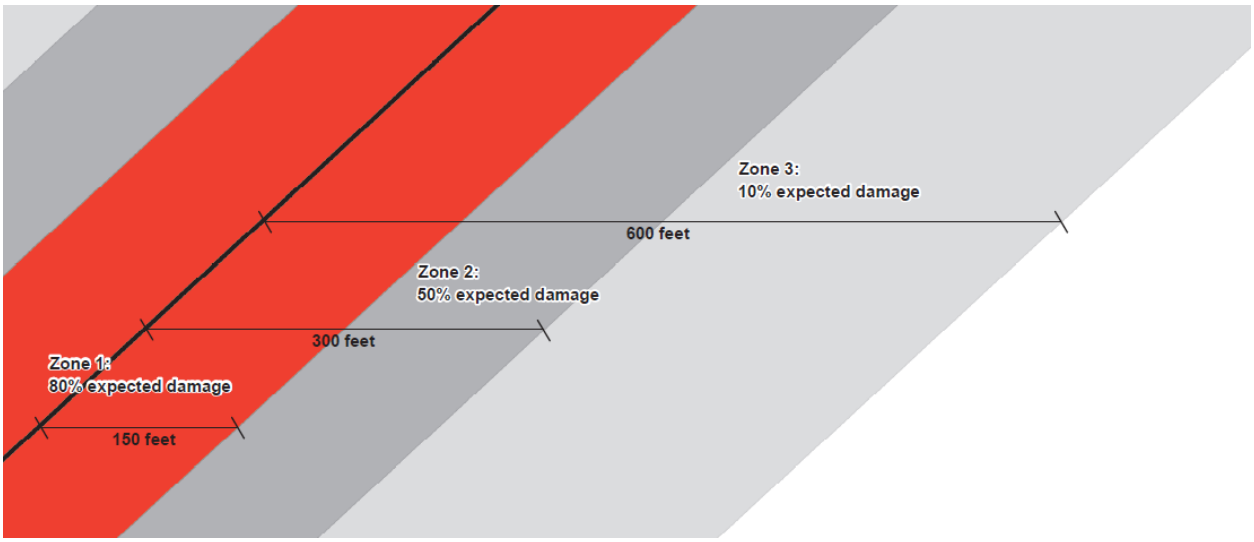
Table 5-18: Tornado Path Widths and Damage Curves

Fujita Scale	Path Width (feet)	Maximum Expected Damage
5	2,400	100%
4	1,800	100%
3	1,200	80%
2	600	50%
1	300	10%
0	150	0%

Within any given tornado path there are degrees of damage. The most intense damage occurs within the center of the damage path with decreasing amounts of damage away from the center. After the hypothetical path is digitized on a map the process is modeled in GIS by adding buffers (damage zones) around the tornado path. Figure 5-14 and Table 5-19 describe the zone analysis. The selected

hypothetical tornado path is depicted in Figure 5-15, and the damage curve buffers are shown in Figure 5-16.

Figure 5-14: F3 Tornado Analysis Using GIS Buffers



An F3 tornado has three damage zones. 80% damage to buildings is estimated within 150 feet of the tornado path. The outer buffer is 600 feet from the tornado path, within which buildings will experience 10% damage.

Table 5-19: F3 Tornado Zones and Damage Curves

Zone	Buffer (feet)	Damage Curve
1	0-150	80%
2	150-300	50%
3	300-600	10%

Figure 5-15: Hypothetical F3 Tornado Path in Hamilton County

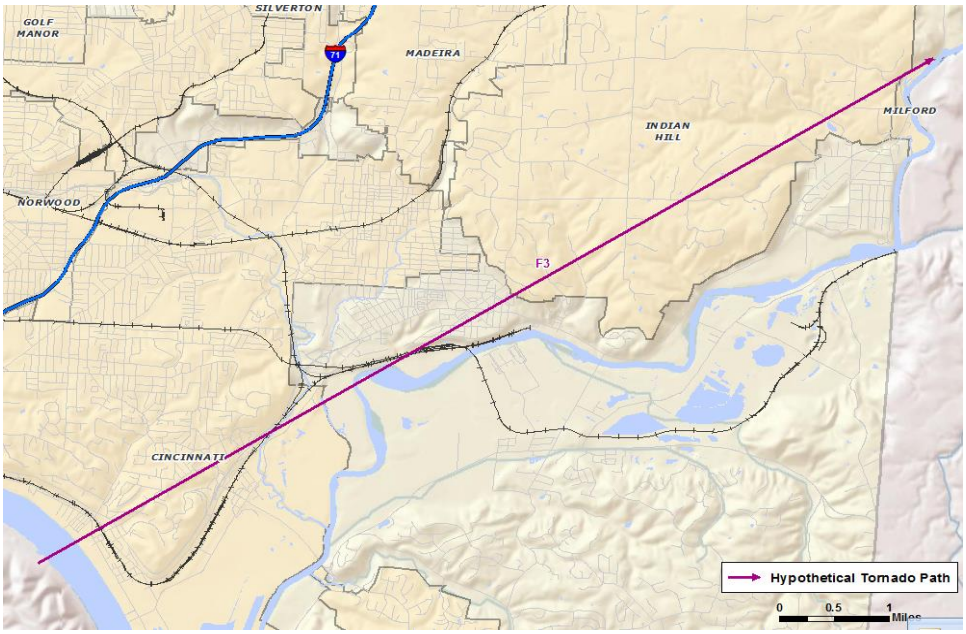
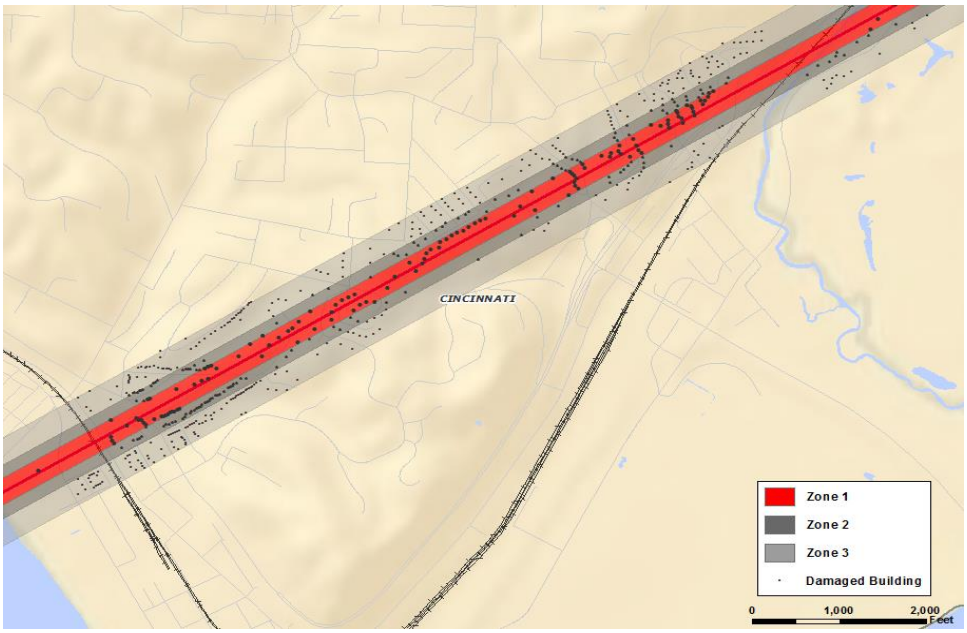


Figure 5-16: Modeled F3 Tornado Damage Buffers in Hamilton County



The results of the analysis are depicted in Tables 5-20 and 5-21. The GIS analysis estimates that 954 buildings will be damaged. The estimated building losses were $76,104,000. The building losses are an estimate of building replacement costs multiplied by the percentages of damage. The overlay was performed against parcels provided by Hamilton County that were joined with Assessor records showing property improvement.

The Assessor records often do not contain values for many critical facilities because those parcels are not taxable. For purposes of analysis, only buildings on taxable properties are included.

Table 5-20: Estimated Numbers of Buildings Damaged by Occupancy Type

Occupancy	Zone 1	Zone 2	Zone 3
Residential	251	252	384
Commercial	7	9	19
Industrial	6	3	7
Agriculture	4	1	1
Religious	0	0	1
Government	2	2	3
Education	1	0	1
Total	271	267	416

Table 5-21: Estimated Building Losses by Occupancy Type

Occupancy	Zone 1	Zone 2	Zone 3
Residential	$30,534,000	$17,148,000	$4,853,000
Commercial	$2,168,000	$1,579,000	$648,000
Industrial	$7,160,000	$1,942,000	$155,000
Agriculture	$1,029,000	$290,000	$210,000
Religious	$0	$0	$43,000
Government	$416,000	$1,596,000	$164,000
Education	$5,945,000	$0	$223,000
Total	$47,252,000	$22,555,000	$6,296,000

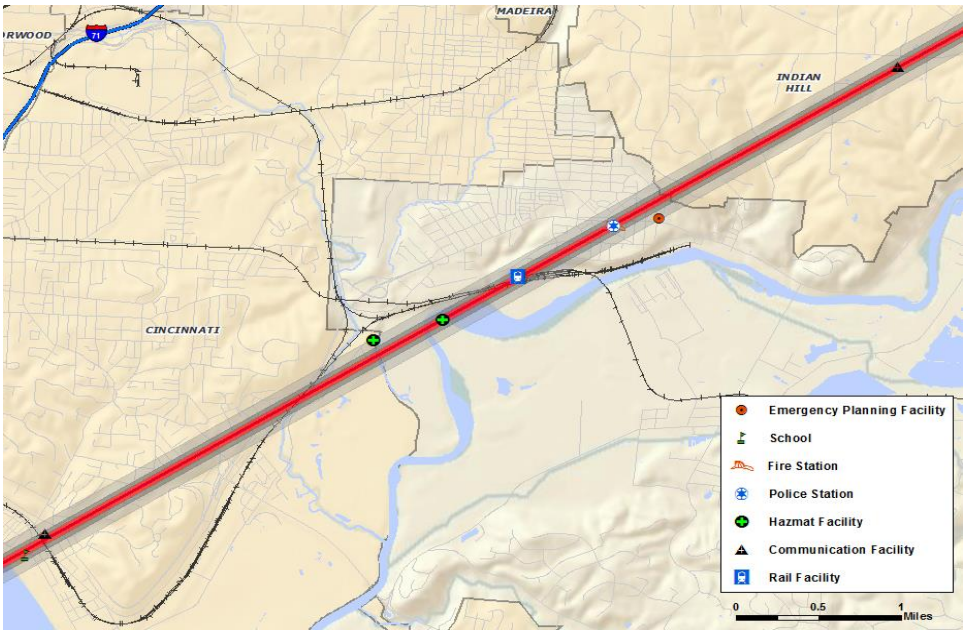
Essential and Critical Facility Damage

There are four essential and/or critical facilities located within 900 feet of the hypothetical tornado path. The affected essential facilities are identified in Table 5-22, and Figure 4-4 shows the geographic location of some essential and critical facilities.

Table 5-22: Estimated Facilities Affected

Facility Type	Facility Name
School	Riverview East Academy
School	Mariemont High School
Police Station	Mariemont Police Department
Fire Station	Mariemont Fire Station 67

Figure 5-17: Vulnerable Facilities within Tornado Path



5.3.2 Flood Hazard

Flooding is a significant natural hazard throughout the United States. The type, magnitude, and severity of flooding are functions of the amount and distribution of precipitation over a given area, the rate at which precipitation infiltrates the ground, the geometry of the catchment, and flow dynamics and conditions in and along the river channel. Floods can be classified as one of two types: upstream floods or downstream floods. Both types of floods are common in Ohio.

Upstream floods, also called flash floods, generally occur in the upper parts of drainage basins and are generally characterized by periods of intense rainfall over a short duration. These floods arise with very little warning and often result in locally intense damage, and sometimes loss of life, due to the high energy of the flowing water. Flood waters can snap trees, topple buildings, and easily move large boulders or other structures. Six inches of rushing water can upend a person; another 18 inches might carry off a car. Generally, upstream floods cause damage over relatively localized areas, but they can be quite severe in the areas in which they occur. Urban flooding is a type of upstream flood. Urban flooding

involves the overflow of storm drain systems and can be the result of inadequate drainage combined with heavy rainfall or rapid snowmelt. Upstream or flash floods can occur at any time of the year in Ohio, but they are most common in the spring and summer months.

Downstream floods, sometimes called riverine floods, refer to floods on large rivers at locations with large upstream catchments. Downstream floods are typically associated with precipitation events that are of relatively long duration and occur over large areas. Flooding on small tributary streams may be limited, but the contribution of increased runoff may result in a large flood downstream. The lag time between precipitation and time of the flood peak is much longer for downstream floods than for upstream floods, generally providing ample warning for people to move to safe locations and, to some extent, secure some property against damage. Riverine flooding on the large rivers of Ohio generally occurs during either the spring or summer.

Summary Vulnerability Assessment

Tables 5-23 provides a summary of the estimated damages from the Hazus-MH flood model. The results are presented in the following table.

NOTE: The modeled scenarios did not include critical facilities' building losses because assessor values were not available. Therefore, the following tables include *estimated losses* for residential and non-residential values and *estimated exposure* for critical facilities based on default Hazus estimates.

Table 5-23: Hazus-MH Flood Analysis

Building Type	Number of Buildings	Estimated Losses/Exposure
Residential	2,377	$72,428,000
Non-Residential	923	$349,868,000
Critical Facilities	194	$1,085,617,000
Totals	3,494	$1,507,913,000

Previous Occurrences for Flooding- 5 Year

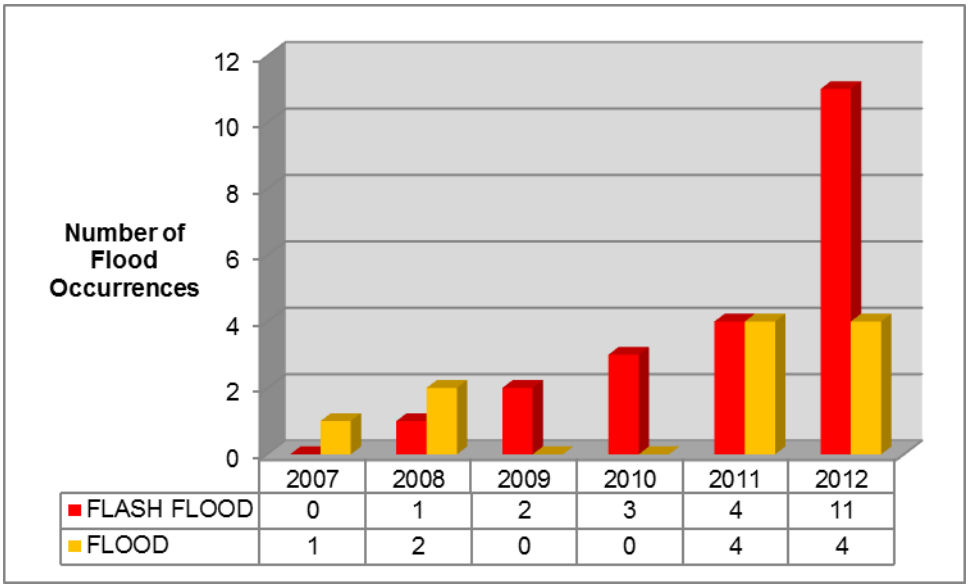
The NCDC database reported 31 flood events in Hamilton County since 2007. These flood events have resulted in nearly $82,000 in property damage. One of the most recent damaging events occurred in July 2012 when flash flooding in Cincinnati was attributed to approximately $10,000 property damage.

Hamilton County NCDC recorded floods for the past five years are identified in Table 5-24 and Figure 5-18. Additional details for NCDC events are included in Appendix C.

Table 5-24: Hamilton County Floods

Date	Type	Location	Fatalities	Injuries	Property Damage
3/2/2007	Flood	Cincinnati	0	0	$3,000
5/15/2008	Flood	Cincinnati	0	0	$2,000
6/4/2008	Flash Flood	Harrison Airport	0	0	$3,000
6/2/2009	Flash Flood	Hyde Park	0	0	$1,000
6/30/2009	Flash Flood	Cincinnati	0	0	$5,000
6/15/2010	Flash Flood	Cincinnati	0	0	$2,000
6/27/2010	Flash Flood	Cincinnati	0	0	$2,000
6/28/2010	Flash Flood	Madeira	0	0	$5,000
4/20/2011	Flood	Cincinnati	0	0	$10,000
4/22/2011	Flood	Green Township	0	0	$1,000
4/23/2011	Flash Flood	Cincinnati	0	0	$1,000
6/10/2011	Flash Flood	Green Township	0	0	$15,000
6/21/2011	Flash Flood	Anderson Township	0	0	$1,000
6/21/2011	Flash Flood	Cincinnati	0	0	$1,000
12/5/2011	Flood	Cincinnati	0	0	$1,000
12/5/2011	Flood	Milford	0	0	$1,000
1/17/2012	Flood	Green Township	0	0	$1,000
1/17/2012	Flood	Cincinnati	0	0	$1,000
1/17/2012	Flood	Mariemont	0	0	$1,000
1/17/2012	Flood	Montgomery	0	0	$1,000
3/15/2012	Flash Flood	Cincinnati	0	0	$1,000
3/15/2012	Flash Flood	Cincinnati	0	0	$1,000
3/15/2012	Flash Flood	Cincinnati	0	0	$1,000
3/15/2012	Flash Flood	Cincinnati	0	0	$1,000
3/15/2012	Flash Flood	Cincinnati	0	0	$1,000
3/15/2012	Flash Flood	Cincinnati	0	0	$1,000
5/1/2012	Flash Flood	Sharonville	0	0	$1,000
5/1/2012	Flash Flood	Harrison	0	0	$5,000
5/1/2012	Flash Flood	Wyoming	0	0	$1,000
5/2/2012	Flash Flood	Loveland	0	0	$1,000
7/18/2012	Flash Flood	Cincinnati	0	0	$10,000

Figure 5-18: Hamilton County Floods since 2007

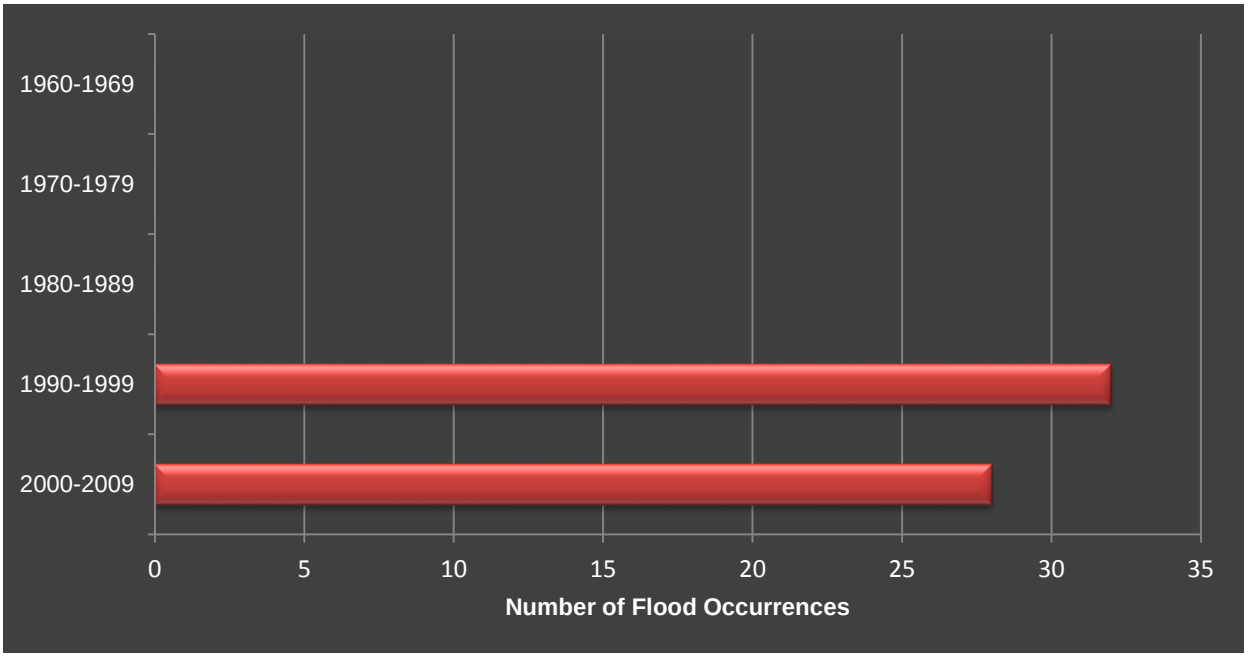


Previous Occurrences for Flooding- 50 Year

There have been many occurrences of flooding in Hamilton County during the past few decades. The NCDC database reported 88 flood and flash flood events in Hamilton County since 1961, with over $15 million in damages since 1993.

Hamilton County NCDC recorded flooding events, by decade, are identified in Figure 5-19. Additional details for NCDC events are included in Appendix C.

Figure 5-19: Hamilton County Floods since 1961



**NCDC data do not reflect flooding events prior to 1993.*

Repetitive Loss Properties

FEMA defines a repetitive loss structure as a structure covered by a contract of flood insurance issued under the NFIP, which has suffered flood loss damage on two occasions during a 10-year period that ends on the date of the second loss, in which the cost to repair the flood damage is 25% of the market value of the structure at the time of each flood loss.

Table 5-25 lists repetitive loss data in detail and Table 5-26 specifies severe repetitive loss (SRL) data.

In summary:

Total residential repetitive loss payments: $3.86 million
Total non-residential repetitive loss payments: $5.09 million

Total residential severe repetitive loss payments: $608,600
Total non-residential severe repetitive loss payments: $0

Table 5-25: Hamilton County Repetitive Losses

Community	Structure Type	Properties	Losses	Building Pmts	Contents Pmts	Total Pmts
Amberley	Residential:	3	10	$ 71,793.33	$ 29,092.69	$ 100,886.02
	Non-Residential:	0	0	$ -	$ -	$ -
Cincinnati	Residential:	33	105	$ 1,197,609.35	$ 571,450.20	$ 1,769,059.55
	Non-Residential:	27	82	$ 1,966,582.91	$ 1,781,943.22	$ 3,748,526.13
Cleves	Residential:	1	7	$ 146,739.43	$ 26,708.65	$ 173,448.08
	Non-Residential:	1	4	$ 15,308.92	$ 38,486.25	$ 53,795.17
Evendale	Residential:	0	0	$ -	$ -	$ -
	Non-Residential:	3	11	$ 345,185.44	$ 373,147.90	$ 718,333.34
Fairfax	Residential:	1	2	$ 10,711.17	$ -	$ 10,711.17
	Non-Residential:	3	8	$ 191,777.84	$ 176,657.67	$ 368,435.51
Greenhills	Residential:	3	11	$ 40,597.24	$ 15,704.03	$ 56,301.27
	Non-Residential:	0	0	$ -	$ -	$ -
Hamilton County	Residential:	33	89	$ 1,163,566.93	$ 290,710.11	$ 1,454,277.04
	Non-Residential:	3	6	$ 56,986.06	$ 4,910.62	$ 61,896.68
Harrison	Residential:	1	2	$ 4,238.97	$ 3,247.83	$ 7,486.80
	Non-Residential:	0	0	$ -	$ -	$ -
Indian Hill	Residential:	1	2	$ 42,128.90	$ 3,664.59	$ 45,793.49
	Non-Residential:	0	0	$ -	$ -	$ -
Mount Healthy	Residential:	1	2	$ 1,028.23	$ 1,831.75	$ 2,859.98
	Non-Residential:	0	0	$ -	$ -	$ -
Newtown	Residential:	1	2	$ 22,715.17	$ 16,513.46	$ 39,228.63
	Non-Residential:	1	2	$ 353.00	$ 13,324.99	$ 13,677.99
North College Hill	Residential:	3	6	$ 61,427.83	$ 3,963.68	$ 65,391.51
	Non-Residential:	0	0	$ -	$ -	$ -
Reading	Residential:	2	5	$ 50,611.64	$ -	$ 50,611.64
	Non-Residential:	0	0	$ -	$ -	$ -
Springdale	Residential:	1	2	$ 61,664.29	$ -	$ 61,664.29
	Non-Residential:	2	4	$ 52,298.40	$ -	$ 52,298.40
Terrace Park	Residential:	0	0	$ -	$ -	$ -
	Non-Residential:	1	2	$ 5,879.78	$ -	$ 5,879.78
Woodlawn	Residential:	0	0	$ -	$ -	$ -
	Non-Residential:	1	3	$ 37,836.25	$ 27,737.57	$ 65,573.82
Wyoming	Residential:	1	2	$ 14,245.45	$ 8,935.90	$ 23,181.35
	Non-Residential:	0	0	$ -	$ -	$ -

Table 5-26: Hamilton County Severe Repetitive Losses

Community	Structure Type	Properties	Losses	Building Pmts	Contents Pmts	Total Pmts
Cincinnati	Residential:	1	4	$ 72,459.87	$ -	$ 72,459.87
	Non-Residential:	0	0	$ -	$ -	$ -
Cleves	Residential:	1	6	$ 146,739.43	$ 26,708.65	$ 173,448.08
	Non-Residential:	0	0	$ -	$ -	$ -
Hamilton County	Residential:	3	8	$ 253,618.10	$ 109,086.86	$ 362,704.96
	Non-Residential:	0	0	$ -	$ -	$ -

Geographic Location for Flooding

Most river flooding occurs in the spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Severe thunderstorms may cause flooding during the summer or fall, but tend to be localized.

Flash floods, brief heavy flows in small streams or normally dry creek beds, also occur within the county. Flash flooding is typically characterized by high-velocity water, often carrying large amounts of debris. Urban flooding involves the overflow of storm drain systems and is typically the result of inadequate drainage following heavy rainfall or rapid snowmelt.

DFIRM was used in the analysis to identify specific stream reaches for analysis.

Hazard Extent for Flooding

The Hazus-MH flood model is designed to generate a flood depth grid and flood boundary polygon by deriving hydrologic and hydraulic information based on user-provided elevation data or by incorporating selected output from other flood models. Hazus-MH also has the ability to clip a Digital Elevation Model (DEM) with a user-provided flood boundary, thus creating a flood depth grid. For Hamilton County, Hazus-MH was used to extract flood depth by clipping the DEM with the DFIRMs Base Flood Elevation (BFE) boundary. The BFE is defined as the area that has a 1% chance of flooding in any given year.

Flood hazard scenarios were modeled using GIS analysis and Hazus-MH. The flood hazard modeling was based on historical occurrences and current threats. Existing flood maps were used to identify the areas of study. These digital files, although not official FIRMs, provided the boundary which was the basis for this analysis. Planning team input and a review of historical information provided additional information on specific flood events.

Risk Identification for Flood Hazard

Based on historical information, the probability of a flood is high. In Meeting 1, the planning team determined that the potential impact of a flood is minimal; therefore, the overall risk of a flood hazard for Hamilton County is moderate.

Hazus-MH Analysis: 100-Year Flood Boundary and County Parcels

Hazus-MH generated the flood depth grid for a 100-year return period and made calculations by clipping the digital elevation model (DEM) to the 100-year DFIRM boundary. Next, Hazus-MH utilized a user-defined analysis of Hamilton County with site-specific parcel data provided by the county.

Hazus-MH estimates the 100-year flood would damage 3,300 buildings at a replacement cost of $422 million. The total estimated numbers of damaged buildings are given in Table 5-27. Figure 5-20 depicts the Hamilton County parcel points that fall within the 100-year floodplain. Figures 5-21 and 5-22 highlight damaged buildings within the floodplain areas in Cincinnati and Harrison.

Table 5-27: Flood Related Building Damages

General Occupancy	Number of Buildings Damaged	Total Building Damage
Residential	2,377	$72,428,000
Commercial	421	$85,056,000
Industrial	290	$231,867,000
Agricultural	39	$2,541,000
Religious	11	$520,000
Government	153	$28,030,000
Education	9	$1,854,000
Total	3,300	$422,296,000

Figure 5-20: Hamilton County Buildings in 100-Year Floodplain

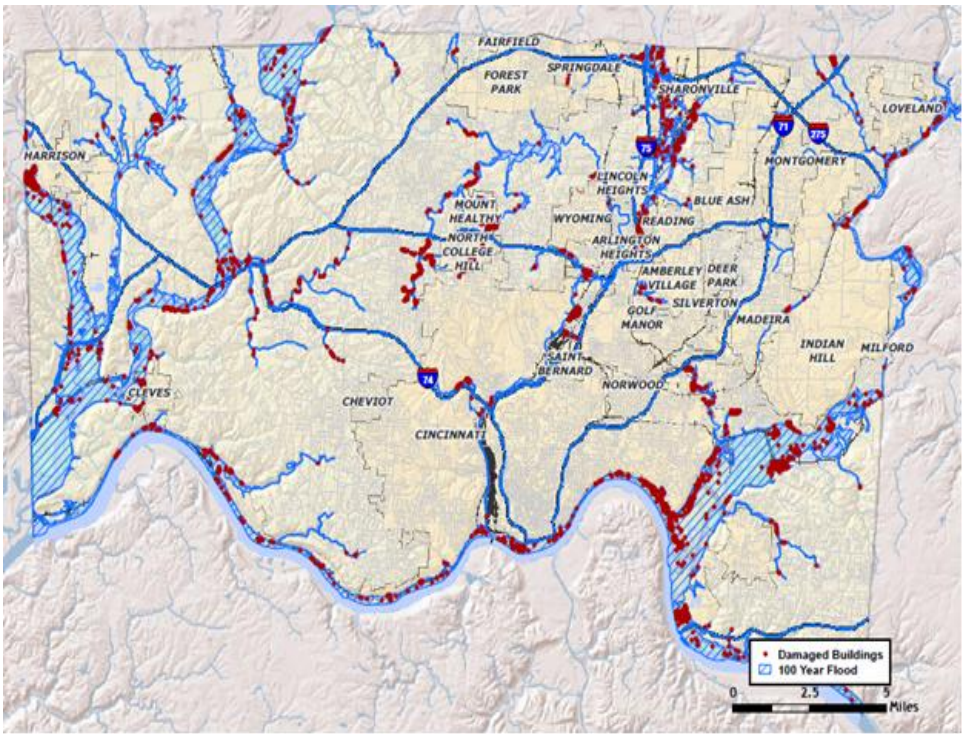


Figure 5-21: Hamilton County Urban Areas (Cincinnati) Flood Prone Areas

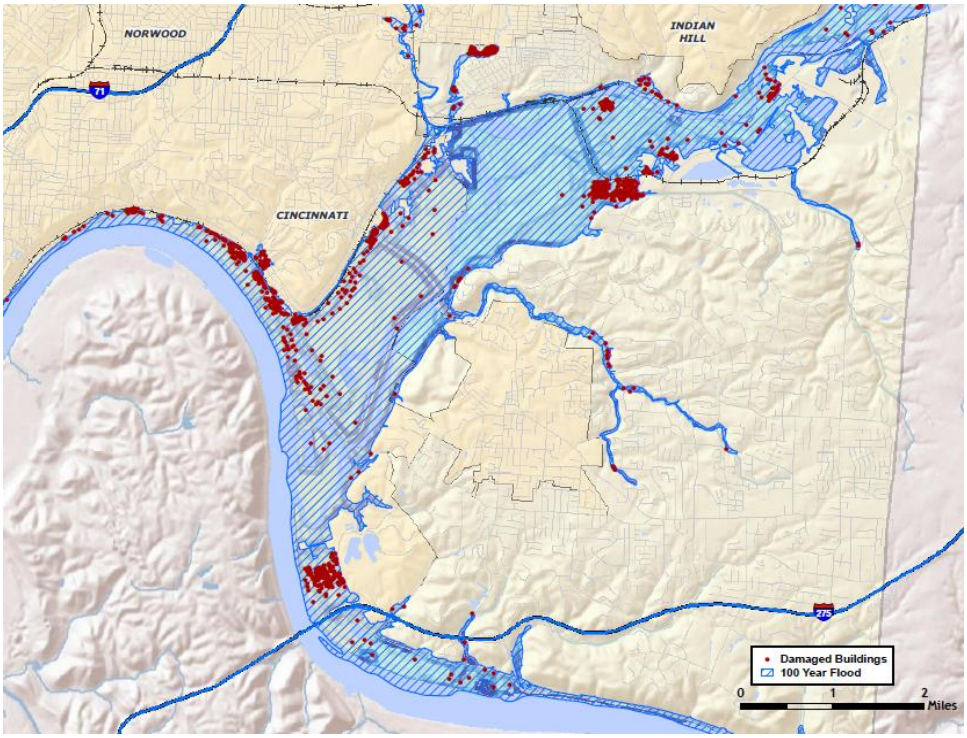
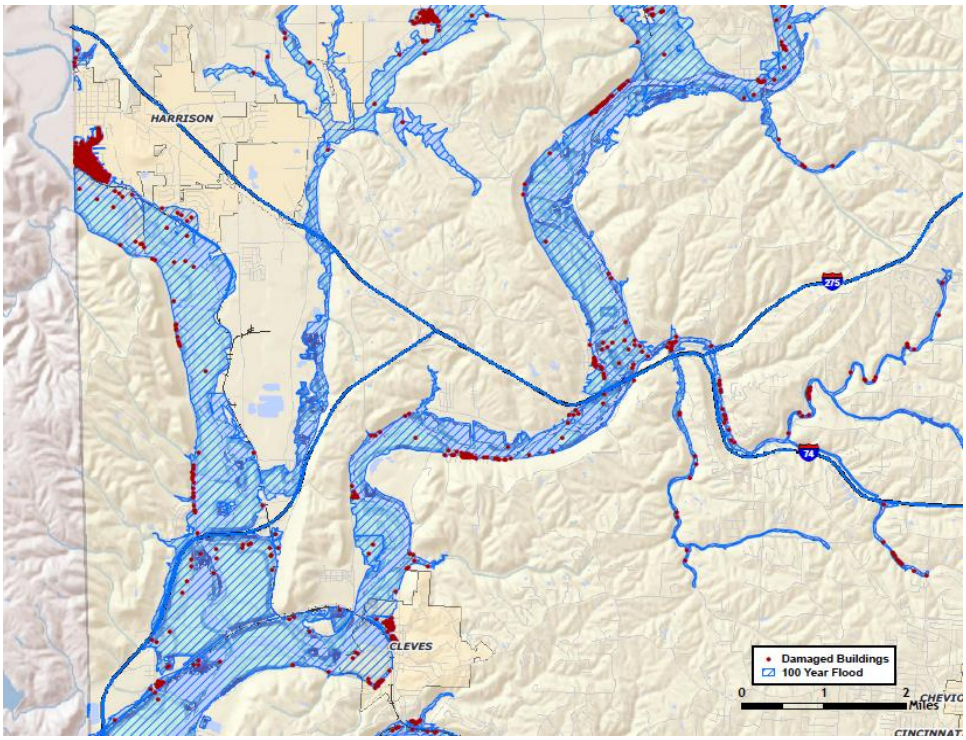


Figure 5-22: Hamilton County Urban Areas Harrison and Cleves Flood-Prone Areas



Essential and Critical Facility Losses

An essential facility will encounter many of the same impacts as other buildings within the flood boundary. These impacts can include structural failure, extensive water damage to the facility and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). A complete list of all the critical facilities, including replacement costs, is included in Appendix G. A map of the critical facilities is included in Appendix F.

The following essential and critical facilities may be impacted: 2 care facilities, 3 schools, 3 fire stations, 4 emergency planning facilities, 83 hazmat facilities, 49 port facilities, 29 communication facilities, 11 wastewater facilities, 4 rail facilities, 1 oil facility, 1 ferry facility, 1 military facility, and 3 airports. A list of the vulnerable facilities within Hamilton County is given in Table 5-28. A map of some of the vulnerable facilities potentially at risk to flooding is shown in Figures 5-23 through 5-26.

Table 5-28: Facilities Impacted by Flooding

Hazmat Facilities
1. Marathon Oil Co. Cincinnati Oh Terminal (3)
2. U.S. Drill Head Co.
3. Astro Containers Inc. (5)
4. Hercules - Port Plastics (5)
5. Bayer Port Plastics (8)
6. Solutia-Port Plastics (8)
7. Solutia-Port Plastics (7)
8. Marathon Oil Co. Cincinnati Oh Terminal (2)
9. The Valvoline Co.
10. "Hadronics, Inc."
11. Witt Industries Inc. Cincinnati Galvanizing
12. KDM Signs Inc.
13. GE Co. Aircraft Engines (4)
14. Sawbrook Steel Castings Co. (3)
15. General Polymers Corp.
16. Cincinnati Steel Treating Co.
17. ILSCO (5)
18. Schulte Metal Finishing Inc. (2)
19. River Transportation (3)
20. River Transportation (2)
21. Ford Motor Co. Sharonville Plant (4)
22. Feintool Cincinnati Inc.
23. Trans-Acc Inc.
24. General Mills Operations, Inc.
25. GKN Aerospace
26. Air Products And Chemicals, Inc.
27. Ashland Inc.
28. Auxier Gas Inc

Hazmat Facilities (continued)
29. AZZ Galvanizing, Cincinnati
30. Barrett Paving Materials Inc. (2)
31. BP (Triumph Energy)
32. Buzzi Unicem USA, Cincinnati Distribution
33. Cargill AgHorizons
34. CEMEX USA
35. CF Industries
36. Kost USA, Inc.
37. Lehigh Cement Co
38. Liquid Transfer Terminal Ohio, Inc.
39. Marathon, River Road
40. Michelman, Inc. Kemper Facility
41. Ohio Cat
42. Derrick Co., Inc
43. Duke Energy
44. PCS Purified Phosphates
45. Peter Cremer North America LP
46. Pitt Ohio Express, LLC
47. Pristine, Inc. Site
48. Procter & Gamble
49. Procter & Gamble
50. Speedway 9637
51. Sunoco (Sunset)
52. Sysco Food Services
53. Cincinnati Bell Telephone, Evendale
54. Cincinnati Bulk Terminals, LLC
55. Cincinnati Freezer Corp.
56. Cincinnati Steel Products

Hazmat Facilities (continued)
57. CNW Limited LLC
58. Fibre Glass-Evercoat
59. Ford Motor Co
60. Consolidated Grain And Barge
61. Graphic Packaging International
62. Grippo Potato Chip Co.
63. Hilltop Basic Resources - East Cincinnati
64. Hilltop Basic Resources - River Terminal
65. Holcim (US) Inc
66. ILSCO
67. INEOS ABS (USA) Corp, Addyston, OH
68. Kellogg Snacks
69. Kinder Morgan
70. Queen City Terminals
71. Quick Pak LLC (MMC)
72. Qwest Communications - Cincinnati Regen
73. Republic Waste Services
74. Rhodia Inc. (Cincinnati Warehouse)
75. Rhodia Inc
76. Sherwin - Williams Company
77. Southside River-Rail Terminal, Inc.
78. Truckway Leasing
79. TSS Aviation
80. Valley Asphalt Corporation Plant #19
81. Valvoline Cincinnati Packaging Plant
82. Westway Feed Products Company
83. White Castle System, Inc.

Port Facilities
1. Deutch & Sons Dock.
2. Southside River Rail Corp. Dock.
3. Cohen Terminal Lower Dock.
4. Cargill Cincinnati Molasses Terminal Wharf
5. Cohen Terminal Upper Dock.
6. Kosmos Cement Co., Cincinnati Southside
7. Consolidated Grain & Barge Co., Cincinnati
8. Peter Cremer North America
9. CGB Marine Services, Sayler Park Mooring
10. River Transportation Co., Upper Landing.
11. Shell Oil Co., Cincinnati Asphalt Plant
12. CF Industries Cincinnati Warehouse Wharf
13. McGinnis Cincinnati Terminal Lower Fleet
14. Cargill Cincinnati, River Road Terminal
15. McGinnis Cincinnati Terminal Wharf.
16. McGinnis Cincinnati Terminal Upper Fleet
17. Cargill Cincinnati Terminal Elevator Wharf
18. Hilltop Basic Resources, East Cincinnati
19. Port Of Cincinnati
20. Cincinnati Bulk Terminals, Grain Dock.
21. Cincinnati Bulk Terminals, Unloading Doc
22. Cincinnati Bulk Terminals, Loading Dock.
23. Hilltop Basic Resources Cincinnati River
24. Cincinnati Public Landing Wharf.
25. River Transportation Co. Lower Landing.
26. River Transportation Co. Dry Bulk Cargo
27. River Transportation Co., General Cargo
28. Kinder Morgan Terminals

Port Facilities (continued)
29. Defense Fuel Support Point, Cincinnati
30. Consolidated Grain & Barge-Anderson Ferry
31. Ashland Petroleum Co., Cincinnati Terminal
32. Consolidated Grain & Barge, North Bend
33. INEOS ABS/Lustran Polymers
34. Du Pont, Fort Hill Plant Dock.
35. Cincinnati Gas & Electric Co., Miami For (3)
36. Chevron U.S.A., Cincinnati Asphalt Terminal
37. Koch Materials Co., Cincinnati Terminal D
38. Benchmark River And Rail Terminals
39. Buzzi Unicem
40. Cincinnati Tunnel Partners
41. Kinder Morgan
42. Kosmos Cement
43. Liquid Transfer Terminals, Cincinnati
44. Marathon Petroleum Company
45. Martin Marrietta
46. SGS North America
47. Spurlino Materials
48. Stewart Terminal
49. Valvoline Oil Company
Communication Facilities
1. Cincinnati Bell, 3389 River Rd
2. Cincinnati Bell, 10 Waits Avenue
3. Cincinnati Bell, North Of Purple People Bridge
4. Cincinnati Bell , One Paul Brown Stadium
5. 3534 Eastern Ave
6. 7141 Forfeit Run Rd

Communication Facilities (continued)
7. 313 E Kemper Rd
8. STC Two Tower, 11041 US 50
9. SpectraSite, 11399 Tamarco Dr
10. New Par, 11399 Tamarco Dr
11. Southern Ohio Telephone, 100350 Evendale
12. Arcadia Towers, 250 E Kemper Rd
13. Pinnacle Towers, 5302 Brotherton Rd
14. SpectraSite ,3510-3522 West St
15. STC Two Tower, 4247 Airport Rd
16. Cincinnati, 262 Wilmer Ave
17. Valvoline, 4235 River Rd (siren)
18. 4703 Wilmer Ave (siren)
19. 2423 Eastern Ave (siren)
20. 202 Sutton Ave (siren)
21. 10690 Medallion Drive (siren)
22. 7500 New Haven Rd (siren)
23. 2040 Kemper Rd (siren)
24. Boathouse Location (siren)
25. 11055 Hamilton Cleves Rd (SR 128) (siren)
26. 8196 Hamilton Cleves Rd (SR 128) (siren)
27. 7958 Harrison Ave (siren)
28. 3949 Newtown Rd (siren)
29. 4396 River Rd (siren)
Schools
1. Whitewater Valley Elementary
2. Heritage Hill Elementary
3. Riverview East Elementary

Wastewater Facilities
1. Taylor Creek WWTP
2. Hamilton Co. - Little Miami
3. Hamilton County Board Of Commissioners
4. Metropolitan Sewer District Little Miami
5. Muddy Creek Waste Water Treatment Plant
6. Fort Scott Development WWTP
7. Riverview Crossing WWTP
8. Westbrook Enterprises Westbrook Village
9. Indian Creek WWTP
10. Harrison WWTP
11. Haven Park West MHP WWTP

Fire Stations
1. Cincinnati Fire Station 18
2. Cincinnati Fire Station 37
3. Crosby Township Fire Station 28
Airports
1. Cincinnati Municipal Airport, Lunken Field
2. Horizons Heliport
3. Valley Asphalt Heliport
Care Facilities
1. Deupree Community
2. Hyde Park Health Care Center

Rail Facilities
1. NS Independent Bulk Transfer Terminal
2. Cargill Inc., Cincinnati
3. Westway Terminal Company, Inc, Cincinnati
4. Southside River Rail Terminal, Inc.
Oil Facilities
1. Chevron Products Company
Ferry Facilities
1. Anderson Ferry Boat Co., Cincinnati
Military
1. US Coast Guard
Emergency Planning Facility
1. A Better Child Care Corp
2. Generations Learning & Activity Center
3. Joy Childcare LLC
4. Montessori Center For Lifelong Learning

Figure 5-23: Hamilton County 100 Year Flood- Vulnerable Facilities (Cincinnati)

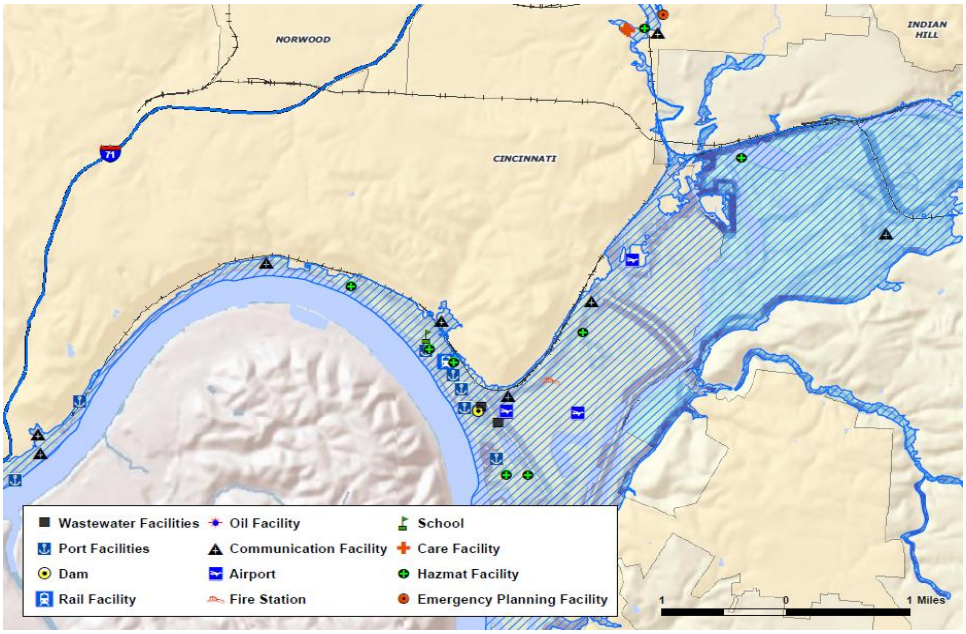


Figure 5-24: Hamilton County 100 Year Flood- Vulnerable Facilities (Sharonville)

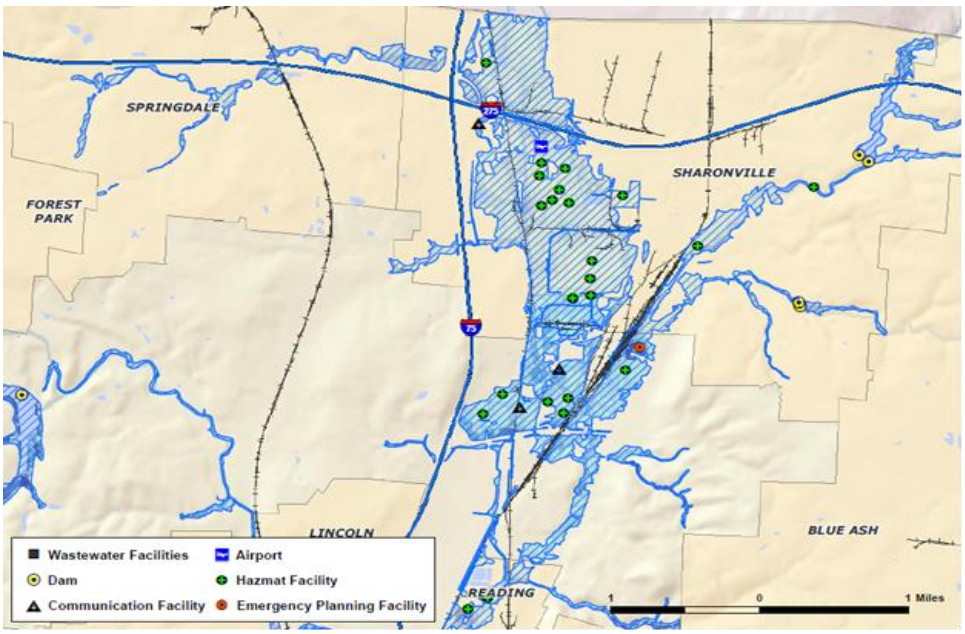


Figure 5-25: Hamilton County 100 Year Flood- Vulnerable Facilities (Harrison)

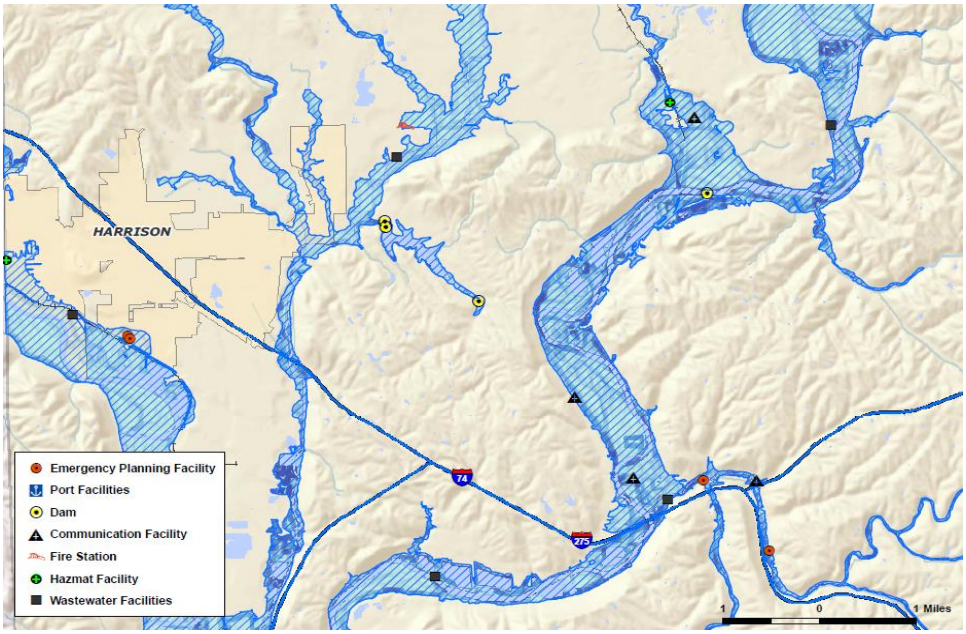
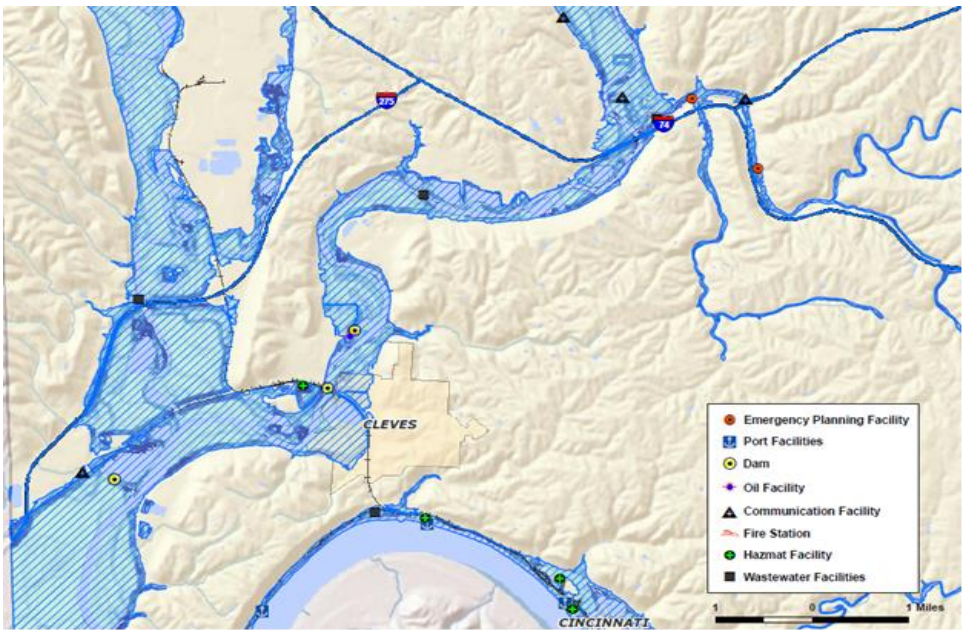


Figure 5-26: Hamilton County 100 Year Flood- Vulnerable Facilities (Cleves)

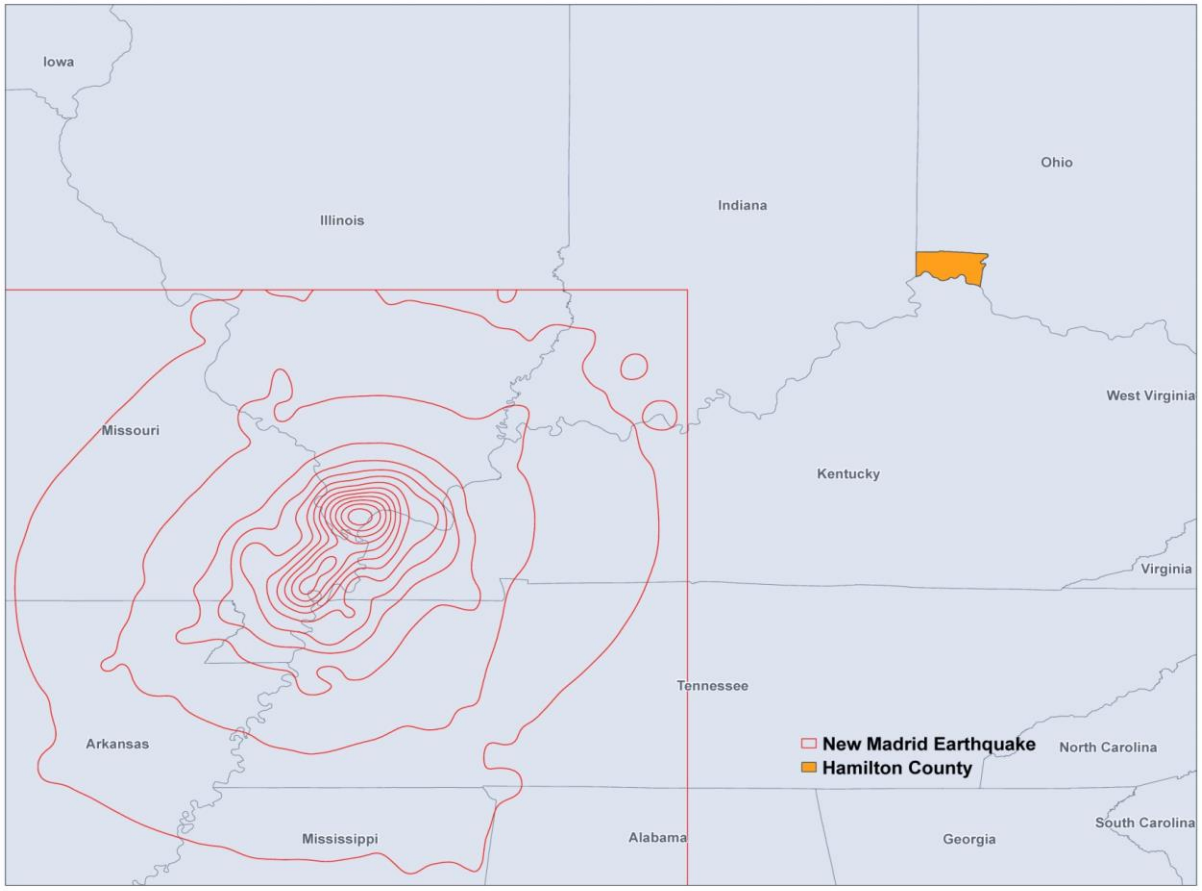


5.3.3 Earthquake Hazard

An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free, causing the ground to shake.

Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates, as is the case for seismic zones in the Midwestern United States. The most seismically active area in the Midwest is referred to as the New Madrid Seismic Zone. However, this zone is not of particular concern to Ohio (see Figure 5-27).

Figure 5-27: New Madrid Zone



Ground shaking from strong earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill and other unstable soil, and trailers or homes not tied to their foundations are at risk because they can be shaken off their mountings during an earthquake. When an earthquake occurs in a populated area, it may cause deaths, injuries, and extensive property damage.

The possibility of the occurrence of a catastrophic earthquake in the central and eastern United States is real, as evidenced by history and described throughout this section. The impacts of significant earthquakes affect large areas, terminating public services and systems needed to aid the suffering and displaced. These impaired systems are interrelated in the hardest struck zones. Power lines, water and sanitary lines, and public communication may be lost; and highways, railways, rivers, and ports may not allow transportation to the affected region. Furthermore, essential facilities, such as fire and police departments and hospitals, may be disrupted if not previously improved to resist earthquakes.

As with hurricanes, mass relocation may be necessary, but the residents who are suffering from the earthquake can neither leave the heavily impacted areas nor receive aid or even communication in the aftermath of a significant event.

Magnitude, which is determined from measurements on seismographs, measures the energy released at the source of the earthquake. Intensity measures the strength of shaking produced by the earthquake at a certain location and is determined from effects on people, human structures, and the natural environment. Tables 5-29 and 5-30 define earthquake magnitudes and their corresponding intensities.

http://earthquake.usgs.gov/learning/topics/mag_vs_int.php

Table 5-29: Abbreviated Modified Mercalli Intensity Scale

Mercalli Intensity	Description
I	Not felt except by a very few under especially favorable conditions.
II	Felt only by a few persons at rest, especially on upper floors of buildings.
III	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	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	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	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	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	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	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Table 5-30: Earthquake Magnitude vs. Modified Mercalli Intensity Scale

Earthquake Magnitude	Typical Maximum Modified Mercalli Intensity
1.0-3.0	I
3.0-3.9	II-III
4.0-4.9	IV-V
5.0-5.9	VI-VII
6.0-6.9	VII-IX

Summary Vulnerability Assessment

Tables 5-31 and 5-32 provides a summary of the estimated damages from the Hazus-MH earthquake model. The Hazus-MH earthquake global summary reports are available in Appendix I. The results are presented in the following table.

NOTE: Hazus-MH estimates the total number of essential facilities that may expect damage for each scenario; however, it does not specify which essential facilities may expect damage. Without the names of the facilities impacted, it was not possible to calculate a potential loss.

Table 5-31: Scenario #1 - Hazus-MH Earthquake Analysis for 5.5M Deterministic

Building Type	Number of Buildings	Total Economic Loss
Residential	157,372	$6,867,440,000
Non-Residential	18,964	$9,512,510,000
Essential Facilities	757	N/A
Totals	177,093	N/A

Table 5-32: Scenario #2 - Hazus-MH Earthquake Analysis for 500-Year Probabilistic

Building Type	Number of Buildings	Total Economic Loss
Residential	16,002	$143,830,000
Non-Residential	1,765	$122,700,000
Essential Facilities	757	N/A
Totals	18,524	N/A

Previous Occurrences for Earthquake Hazards

At least 200 earthquakes, 2.0M and greater, have occurred in Ohio for which reasonably accurate records exist. The last earthquake in Ohio causing physical impact—as of the date of this report—was on December 31, 2011, centered on Youngstown and measured 4.0 in magnitude. Approximately 4,700 individuals submitted felt reports to the United States Geological Survey (USGS) and minor damage occurred in the form of cracked plaster on buildings and glassware falling off shelves. This was the eleventh earthquake in a sequence that began at Youngstown on March 17, 2011. According to the Ohio Department of Natural Resources (DNR), the series of quakes resulted from hydraulic injection of gas-drilling wastewater into the earth.

The most recent naturally occurring earthquake in Ohio took place south of Marietta on September 4, 2011 and measured 2.6 in magnitude. USGS received a number of felt reports were received, but there was no physical damage.

The most damaging earthquake in Ohio occurred on March 8, 1937 in western Ohio near the town of Anna and measured 5.4 in magnitude. This occurred in the same location as an earthquake on March 2, 1937, and was the stronger of the two. In Anna—where most of the damage occurred—chimneys

toppled, foundations and plaster cracked, water wells were disturbed, and cemetery monuments were rotated. The earthquake caused building damage as far away as Fort Wayne, Indiana and was reportedly felt in Indiana, Illinois, Kentucky, Michigan, Missouri, West Virginia, Pennsylvania, and Southern Canada.

The most recent earthquake which impacted the state from outside the boundary region occurred on August 23, 2011 when a magnitude 5.8 earthquake in Virginia was felt across most of Ohio. Damages were reported in the epicentral region; however, none were identified in Ohio. Additionally, a set of 4.5 magnitude twin shocks occurring 12 seconds apart on December 9, 2003 in central Virginia were felt as far away as Marietta, though little physical damage was reported.

(The above history was abridged from Earthquakes in Ohio, Educational Leaflet No. 9, Revised Edition 2012 and from http://www.dnr.state.oh.us/geosurvey/html/eqcat03/tabid/8298/Default.aspx)

Table 5-33: Earthquakes Impacting Hamilton County

Location	Date	Magnitude	Lat/Long
Sidney, Ohio	06/18/1875	4.7	40.2N 84.0W
Lima, Ohio	09/19/1884	4.8	40.7N 84.1W
Portsmouth, Ohio	05/17/1901	4.3	38.7N 82.9W
Meigs County, Ohio	11/05/1926	3.6	39.1N 82.1W
Anna, Ohio	09/30/1930	4.2	40.3N 84.3W
Shelby County, Ohio	09/20/1931	4.7	40.4N 84.2W
Anna, Ohio	03/02/1937	4.9	40.4N 84.2W
Anna, Ohio	03/08/1937	5.4	40.4N 84.2W
Lake County, Ohio	01/31/1986	5.0	41.6N 81.1W
St. Marys, Ohio	07/12/1986	4.5	40.5N 84.3W
Ashtabula, Ohio	01/25/2001	4.5	41.8N 80.7W

According to the Ohio Department of Natural Resources (*Earthquake Statistics for Ohio*), there have been five earthquakes recorded with an epicenter in Hamilton County. Table 5-34 lists the details of each.

Table 5-34: Earthquake History of Hamilton County

Location	Date	Magnitude	Magnitude Type	Modified Mercalli Intensity	Felt Area (km)	Notes
Cincinnati	05/04/1925	2.5	MMI	II		Earthquake near Cincinnati
Cincinnati	10/08/1936	3.3	Felt area	III	1.8	Slight earthquake felt by many in downtown areas of Cincinnati and Middletown. Plates and chairs were moved by the vibration, which lasted approx. 5 seconds
Cincinnati	12/26/1936	2.9	MMI	III		Houses in Cincinnati area were shaken by a slight earthquake. Tremor lasted 10-15 seconds and vibrated chairs. It was accompanied by a rumbling noise
Cincinnati	12/26/1936	2.9	MMI	III		A second shock very similar to the one above was felt by residents in the area.
Cincinnati	10/17/1937	2.9	Felt area	III	0.15	Shock felt by many people in the suburbs of the area.

Geographic Location for Earthquake Hazard

Ohio earthquakes are shallow-focus events, occurring in the upper portion of the crust at depths of about 3 to 6 miles, in crystalline rocks of Precambrian age. According the Ohio Division of Geological Survey, three areas of Ohio appear to be particularly susceptible to earthquake activity: Shelby County and surrounding counties in the west; Lake County and offshore in Lake Erie in the northeast, and; Meigs and Portsmouth Counties in the south. Four earthquake events have occurred with epicenters in Hamilton County—one in 1925, two in 1936, and one in 1937—ranging in magnitude from 2.5 to 3.3.

Hazard Extent for Earthquake Hazard

The extent of an earthquake is countywide. One of the most critical sources of information that is required for accurate assessment of earthquake risk is soils data. Soils along rivers and other bodies of water have higher water tables and higher sand content. As a result, these areas are more susceptible to liquefaction and land shaking. Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking as a result of water filling the space between individual soil particles. This can cause buildings to tilt or sink into the ground, slope failures, lateral spreading, surface subsidence, ground cracking, and sand blows.

Risk Identification for Earthquake Hazard

Based on historical information, the probability of an earthquake hazard is low, and the potential impact of is significant; therefore, the overall risk of an earthquake hazard for Hamilton County is low.

Vulnerability Analysis for Earthquake Hazard

This hazard could impact the entire jurisdiction equally; therefore the entire county's population and all buildings are vulnerable to an earthquake and can expect the same impacts within the affected area. To accommodate this risk, this plan will consider all buildings within the county as vulnerable.

Facilities

All critical facilities are vulnerable to earthquakes. A critical facility would encounter many of the same impacts as any other building within the county. These impacts include structural failure and loss of facility functionality (e.g., a damaged police station will no longer be able to serve the community). Names and locations of essential and critical facilities, as well as community assets, are in Appendix G.

Building Inventory

Impacts similar to those discussed for critical facilities can be expected for the buildings within the county. These impacts include structural failure and loss of building function that could result in indirect impacts (e.g., damaged homes will no longer be habitable, causing residents to seek shelter).

Infrastructure

During an earthquake, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Because an extensive inventory of the infrastructure is not available to this plan, it is important to emphasize that any number of these structures could become damaged in the event of an earthquake. The impacts to these structures include broken, failed, or impassable roadways; broken or failed utility lines (e.g., loss of power or gas to community); and railway failure from broken or impassable railways. Bridges also could fail or become impassable, causing traffic risks. Typical scenarios are described to gauge the anticipated impacts of earthquakes in the county in terms of numbers and types of buildings and infrastructure.

Hazus-MH Earthquake Analysis

The Polis team reviewed existing geological information and recommendations for earthquake scenarios and ran two modeling scenarios. The first is a 5.5 magnitude arbitrary deterministic scenario with an epicenter in the center of Hamilton County. The second is a probabilistic scenario for a 500-year return period. This type of scenario is based on ground-shaking parameters derived from USGS's probabilistic seismic hazard curves. The analysis evaluates the average impacts of a multitude of possible earthquake epicenters with a magnitude that would be typical of that expected for a 500-year return period.

These analysis options were chosen because they are useful for prioritization of seismic reduction measures and for developing mitigation strategies.

5.5 Magnitude Deterministic Scenario

Building Damages

The results of the initial analysis, the 5.5 magnitude earthquake with an epicenter in the center of Hamilton County, are depicted in Tables 5-35 and 5-36 and Figure 5-28. Hazus-MH estimates that approximately 96,379 buildings will be at least moderately damaged. This is more than 33% of the total number of buildings in the region. It is estimated that 9,995 buildings will be damaged beyond repair.

The total building related losses totaled $16,380 million; 22% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which comprised more than 42% of the total loss.

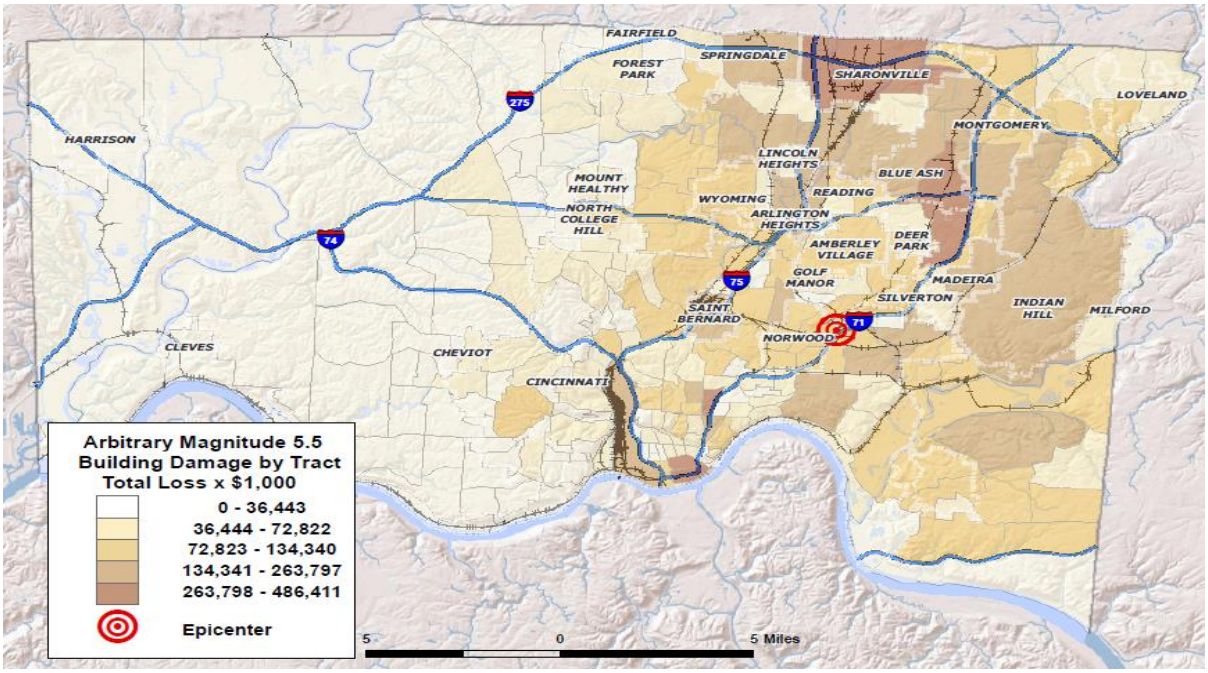
Table 5-35: Hamilton County 5.5 Magnitude Scenario- Damage Count by Building Occupancy

Occupancy Type	None	Slight	Moderate	Extensive	Complete
Agricultural	195	141	249	211	126
Commercial	3,039	2,758	4,645	3,400	2,008
Education	121	105	176	128	68
Government	84	77	745	110	60
Industrial	937	743	1,357	1,149	708
Other Residential	15,834	12,467	10,063	3,810	1,536
Single Family	92,194	63,837	45,610	14,703	5,346
Total	112,404	80,128	62,845	23,511	9,852

Table 5-36: Hamilton County 5.5 Magnitude Scenario- Building Economic Losses

Occupancy Type	Building Loss	Total Economic Loss
Single Family	$664,520,000	$4,172,900,000
Other Residential	$279,680,000	$2,694,540,000
Commercial	$802,060,000	$6,510,390,000
Industrial	$250,830,000	$1,989,610,000
Others	$146,170,000	$1,012,520,000
Total	$2,143,260,000	$16,379,950,000

Figure 5-28: Hamilton County 5.5 Magnitude Scenario- Building Economic Losses



Essential and Critical Facility Losses

Before the earthquake, the region had 18,509 care beds available for use. On the day of the earthquake, the model estimates that only 2,685 care beds (15%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 23% of the beds will be back in service. By day 30, 48% will be operational.

5.0 Magnitude 500-Year Probabilistic Scenario

Building Damages

The results of the 500-year probabilistic analysis are depicted in Tables 5-37 and 5-38 and Figure 5-29. Hazus-MH estimates that approximately 4,382 buildings will be at least moderately damaged. This is more than 2% of the total number of buildings in the region. It is estimated that 47 buildings will be damaged beyond repair.

The total building-related losses totaled $267 million; 32% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up more than 54% of the total loss

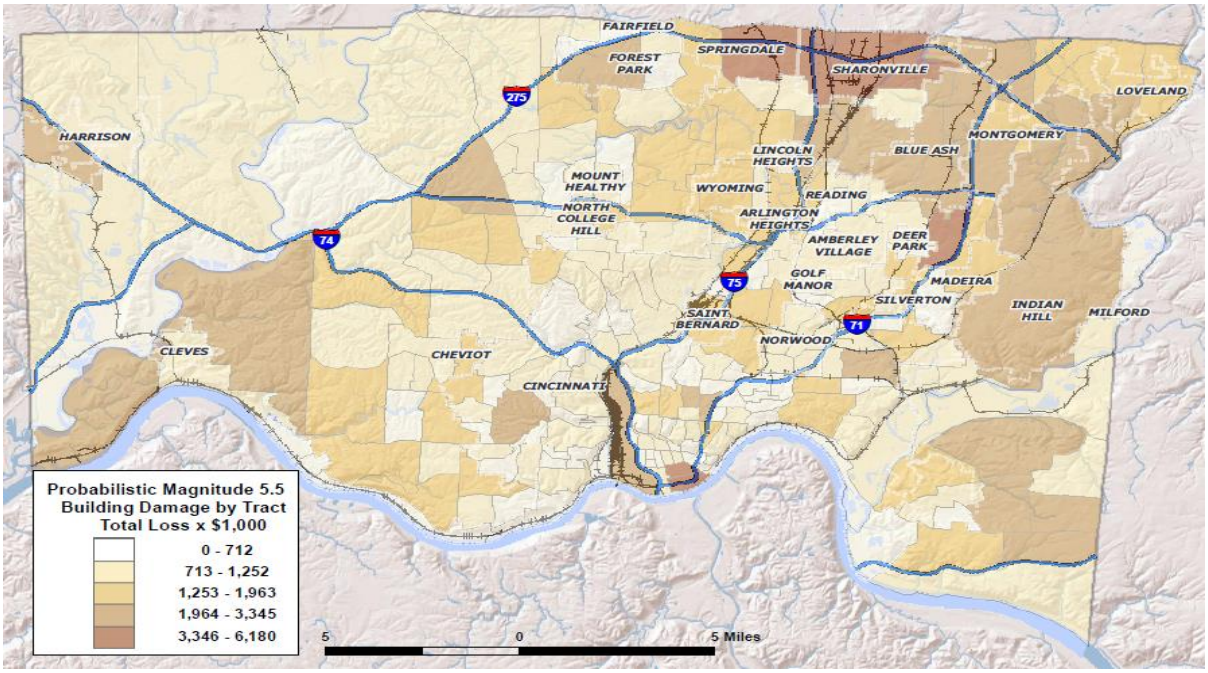
Table 5-37: Hamilton County 500 Year Probabilistic Scenario- Damage Count by Occupancy

Occupancy Type	None	Slight	Moderate	Extensive	Complete
Agricultural	845	51	22	4	0
Commercial	14,626	849	322	50	3
Education	550	33	13	2	0
Government	443	23	8	1	0
Industrial	4,508	261	106	16	1
Other Residential	40,884	2,127	623	70	6
Single Family	208,514	10,080	2,703	357	36
Total	270,370	13,424	3,797	500	46

Table 5-38: Hamilton County 500 Year Probabilistic Scenario- Building Economic Losses

Occupancy Type	Building Loss	Total Economic Loss
Single Family	$25,290,000	$97,530,000
Other Residential	$8,220,000	$46,300,000
Commercial	$14,200,000	$90,560,000
Industrial	$4,120,000	$17,970,000
Others	$2,990,000	$14,170,000
Total	$54,820,000	$266,530,000

Figure 5-29: Hamilton County 500 Probabilistic Scenario- Building Economic Losses



5.3.4 Severe Thunderstorms

Severe thunderstorms are defined as thunderstorms with one or more of the following characteristics: strong winds, large damaging hail, or frequent lightning. Severe thunderstorms most frequently occur in Ohio during the spring and summer but can occur any month of the year at any time of day. A severe thunderstorm's impacts can be localized or can be widespread in nature. A thunderstorm is classified as severe when it meets one or more of the following criteria:

- Hail of diameter 0.75 inches or higher
- Frequent and dangerous lightning
- Wind speeds equal to or greater than 58 miles an hour

Hail

Hail is a product of a strong thunderstorm. Hail usually falls near the center of a storm; however, strong winds occurring at high altitudes in the thunderstorm can blow the hailstones away from the storm center, resulting in damage in other areas near the storm. Hailstones range from pea-sized to baseball-sized, but hailstones larger than softballs have been reported on rare occasions.

Lightning

Lightning is a discharge of atmospheric electricity from a thunderstorm. It can travel at speed up to 140,000 mph and reach temperatures approaching 54,000 degrees. Lightning is often perceived as a minor hazard; in reality, lightning causes damage to many structures and kills, or severely injures, numerous people in the United States. It is estimated that there are 16 million lightning storms worldwide every year.

Severe Winds (Straight-Line Winds)

Straight-line winds from thunderstorms are a fairly common occurrence across Ohio. Straight-line winds can cause damage to homes, businesses, power lines, and agricultural areas, and may require temporary sheltering of individuals who are without power for extended periods of time.

Summary Vulnerability Assessment

Because thunderstorm hazards are wide-spread events, it was not possible to complete a GIS-modeled scenario.

From 2008 to 2012, NCDC reported 20 thunderstorm (hail, winds) events in Cincinnati with total property damage of $72,000, which indicates an average annual risk of $14,400 in building losses. There were no accurate, available records that detailed how many or what types of structures were damaged; therefore building counts and building occupancy types are not available.

Previous Occurrences for Thunderstorm Hazards – 5 Year

The NCDC database reported 60 hailstorms in Hamilton County since January 1, 2007. Hailstorms occur nearly every year in the late spring and early summer. All recorded events have had minimal impact, with hail 2.0 inches diameter or less. There have been no injuries or fatalities, and no significant property damage, reported for events in the past five years.

Note: NCDC data do not always provide detailed damage on a county-by-county basis. Therefore, some dollar estimates may be regional.

The Hamilton County hailstorms are identified in Figure 5-30 and Table 5-39. Additional details for NCDC events are included in Appendix C.

Figure 5-30: Hamilton County Hail Occurrences- 5 year

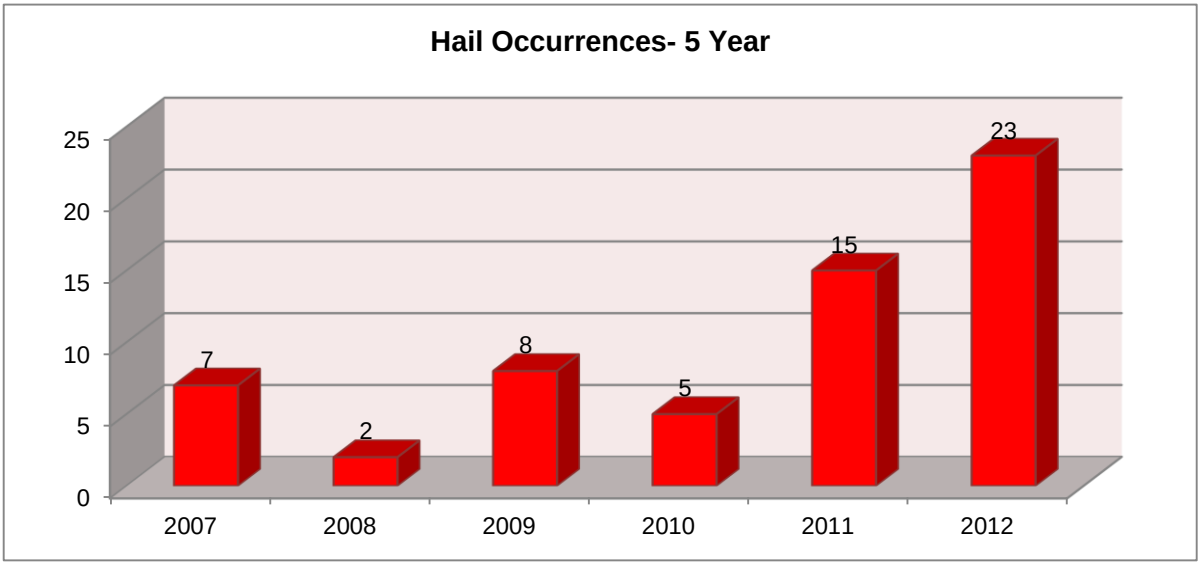


Table 5-39: Hamilton County Hail Occurrences- 5 year

Date	Location	Type	Size	Fatalities	Injuries	Property Damage
4/11/2007	Deer Park	Hail	0.88	0	0	$3,000
4/11/2007	Cincinnati	Hail	0.75	0	0	$2,000
6/2/2007	Delhi	Hail	0.88	0	0	$1,000
6/3/2007	Madeira	Hail	0.75	0	0	$1,000
7/19/2007	Cleves	Hail	0.88	0	0	$1,000
10/18/2007	Cincinnati	Hail	1.00	0	0	$3,000
11/5/2007	Sharonville	Hail	0.75	0	0	$1,000
6/4/2008	Cincinnati	Hail	0.88	0	0	$3,000
7/8/2008	Springdale	Hail	0.75	0	0	$1,000
2/11/2009	Delhi	Hail	0.75	0	0	$1,000
5/30/2009	Cincinnati	Hail	0.88	0	0	$3,000
5/30/2009	Montgomery	Hail	1.00	0	0	$5,000
5/30/2009	Newtown	Hail	0.88	0	0	$3,000
6/2/2009	Cincinnati	Hail	1.00	0	0	$0
6/2/2009	Delhi	Hail	1.00	0	0	$0
6/25/2009	Addyston	Hail	1.25	0	0	$0
6/26/2009	Anderson Township	Hail	1.25	0	0	$0
4/5/2010	Cincinnati	Hail	0.75	0	0	$0
5/5/2010	Cincinnati	Hail	0.75	0	0	$0
5/5/2010	Norwood	Hail	0.75	0	0	$0
7/17/2010	Cincinnati	Hail	1.00	0	0	$0
7/17/2010	Delhi	Hail	0.75	0	0	$0

Date	Location	Type	Size	Fatalities	Injuries	Property Damage
3/23/2011	Harrison	Hail	0.88	0	0	$0
4/25/2011	Cleves	Hail	1.25	0	0	$0
4/25/2011	Harrison	Hail	0.75	0	0	$0
5/22/2011	Forest Park	Hail	0.88	0	0	$0
5/22/2011	North Bend	Hail	1.00	0	0	$0
5/22/2011	Green	Hail	2.00	0	0	$0
5/22/2011	Colerain Township	Hail	1.00	0	0	$0
5/22/2011	Cincinnati	Hail	1.00	0	0	$0
6/10/2011	Addyston	Hail	0.75	0	0	$0
6/10/2011	Cleves	Hail	1.00	0	0	$0
6/10/2011	Delhi	Hail	0.88	0	0	$0
6/10/2011	Delhi	Hail	0.75	0	0	$0
6/10/2011	Harrison	Hail	1.00	0	0	$0
6/10/2011	North Bend	Hail	0.75	0	0	$0
8/8/2011	Anderson	Hail	0.88	0	0	$0
3/15/2012	Loveland	Hail	0.88	0	0	$0
3/15/2012	Loveland	Hail	1.00	0	0	$0
3/15/2012	Loveland	Hail	0.88	0	0	$0
3/15/2012	St. Bernard	Hail	0.75	0	0	$0
3/15/2012	Colerain Township	Hail	1.00	0	0	$0
3/30/2012	St. Bernard	Hail	0.75	0	0	$0
3/30/2012	St. Bernard	Hail	1.00	0	0	$0
4/1/2012	Deer Park	Hail	1.00	0	0	$0
4/1/2012	Harrison	Hail	1.00	0	0	$0
4/1/2012	Sharonville	Hail	1.00	0	0	$0
4/1/2012	Sharonville	Hail	0.75	0	0	$0
5/1/2012	Cincinnati	Hail	1.75	0	0	$0
5/1/2012	Deer Park	Hail	1.75	0	0	$0
5/1/2012	Green	Hail	1.00	0	0	$0
5/1/2012	Colerain Township	Hail	1.75	0	0	$0
5/1/2012	Wyoming	Hail	1.00	0	0	$0
7/1/2012	Loveland	Hail	0.88	0	0	$0
7/1/2012	Montgomery	Hail	1.00	0	0	$0
7/1/2012	Sharonville	Hail	0.88	0	0	$0
7/5/2012	Forest Park	Hail	1.00	0	0	$0
7/18/2012	Harrison	Hail	0.75	0	0	$0
7/18/2012	Madeira	Hail	1.25	0	0	$0
7/26/2012	Cincinnati	Hail	1.00	0	0	$0

** NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. These estimates, however, are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.*

Lightning occurs every year in Hamilton County; however, NCDC did not report any significant lightning strikes in Hamilton County in the last five years.

The NCDC database identified 67 wind storms reported since 2007, all with minimal impact. On July 18, 2012, thunderstorm winds in Cleves caused $20,000 in property damage as a result of downed trees falling into buildings. The following week, on July 26, 2012, Cincinnati reported $30,000 in property damages due to similar activity.

Occurrences of thunderstorm winds are identified in Figure 5-31. As shown in Table 5-40, wind storms historically have occurred year-round, with the greatest frequency and damage between May and July. The following table includes available top wind speeds for Hamilton County.

Figure 5-31: Hamilton County Thunderstorm Wind Occurrence- 5 Year

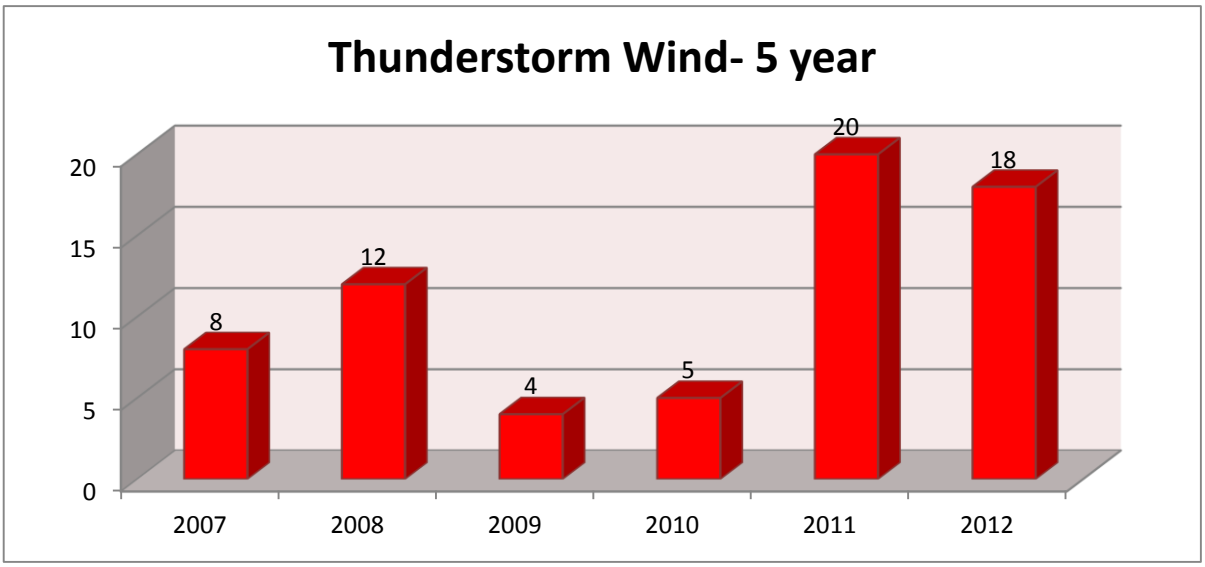


Table 5-40: Hamilton County Thunderstorm Wind Occurrence- 5 Year

Date	Location	Type	Wind Speed	Fatalities	Injuries	Property Damage
4/3/2007	Cleves	Tstm Wind	52 kts.	0	0	$1,000
4/11/2007	Silverton	Tstm Wind	52 kts.	0	0	$1,000
5/15/2007	Harrison	Tstm Wind	50 kts.	0	0	$1,000
6/2/2007	Cleves	Tstm Wind	50 kts.	0	0	$2,000
6/8/2007	Colerain Township	Tstm Wind	50 kts.	0	0	$3,000
7/4/2007	Newtown	Tstm Wind	50 kts.	0	0	$3,000
7/15/2007	Delhi	Tstm Wind	50 kts	0	0	$2,000
7/15/2007	Newtown	Tstm Wind	50 kts.	0	0	$3,000
1/29/2008	Cincinnati	Tstm Wind	50 kts.	0	0	$3,000
6/3/2008	Cincinnati	Tstm Wind	50 kts.	0	0	$8,000
6/4/2008	Cincinnati	Tstm Wind	56 kts.	0	0	$15,000
6/4/2008	Indian Hills	Tstm Wind	50 kts.	0	0	$5,000
6/20/2008	Evendale	Tstm Wind	50 kts.	0	0	$3,000
6/28/2008	Madeira	Tstm Wind	56 kts.	0	0	$3,000
6/28/2008	Newtown	Tstm Wind	56 kts.	0	0	$2,000
7/8/2008	Cincinnati	Tstm Wind	52 kts.	0	0	$20,000
7/20/2008	Cleves	Tstm Wind	50 kts.	0	0	$10,000
7/20/2008	Green	Tstm Wind	50 kts.	0	0	$5,000
7/22/2008	Cincinnati	Tstm Wind	52 kts.	0	0	$15,000
7/22/2008	North Bend	Tstm Wind	50 kts.	0	0	$8,000
2/11/2009	Amberley	Tstm Wind	50 kts.	0	0	$1,000
2/11/2009	Madeira	Tstm Wind	52 kts.	0	0	$1,000
6/26/2009	Reading	Tstm Wind	52 kts.	0	0	$6,000
6/26/2009	Cheviot	Tstm Wind	51 kts.	0	0	$3,000
6/2/2010	Norwood	Tstm Wind	50 kts.	0	0	$1,000
6/21/2010	Springfield	Tstm Wind	50 kts.	0	0	$1,000
6/21/2010	St. Bernard	Tstm Wind	50 kts.	0	0	$10,000
8/15/2010	Cincinnati	Tstm Wind	50 kts.	0	0	$2,000
10/26/2010	Cincinnati	Tstm Wind	60 kts.	0	0	$5,000
2/28/2011	Cincinnati	Tstm Wind	50 kts.	0	0	$3,000
3/23/2011	Indian Hills	Tstm Wind	50 kts.	0	1	$10,000
4/20/2011	Cincinnati	Tstm Wind	50 kts.	0	0	$1,000
4/20/2011	Norwood	Tstm Wind	63 kts.	0	0	$0
4/20/2011	Newtown	Tstm Wind	50 kts.	0	0	$5,000
4/20/2011	Cincinnati	Tstm Wind	50 kts.	0	0	$2,000
4/20/2011	Cincinnati	Tstm Wind	58 kts.	0	0	$0
5/13/2011	Blue Ash	Tstm Wind	50 kts.	0	0	$2,000
5/23/2011	Delhi	Tstm Wind	50 kts.	0	0	$1,000
5/23/2011	Cheviot	Tstm Wind	61 kts	0	0	$0
5/23/2011	Green	Tstm Wind	56 kts.	0	0	$0

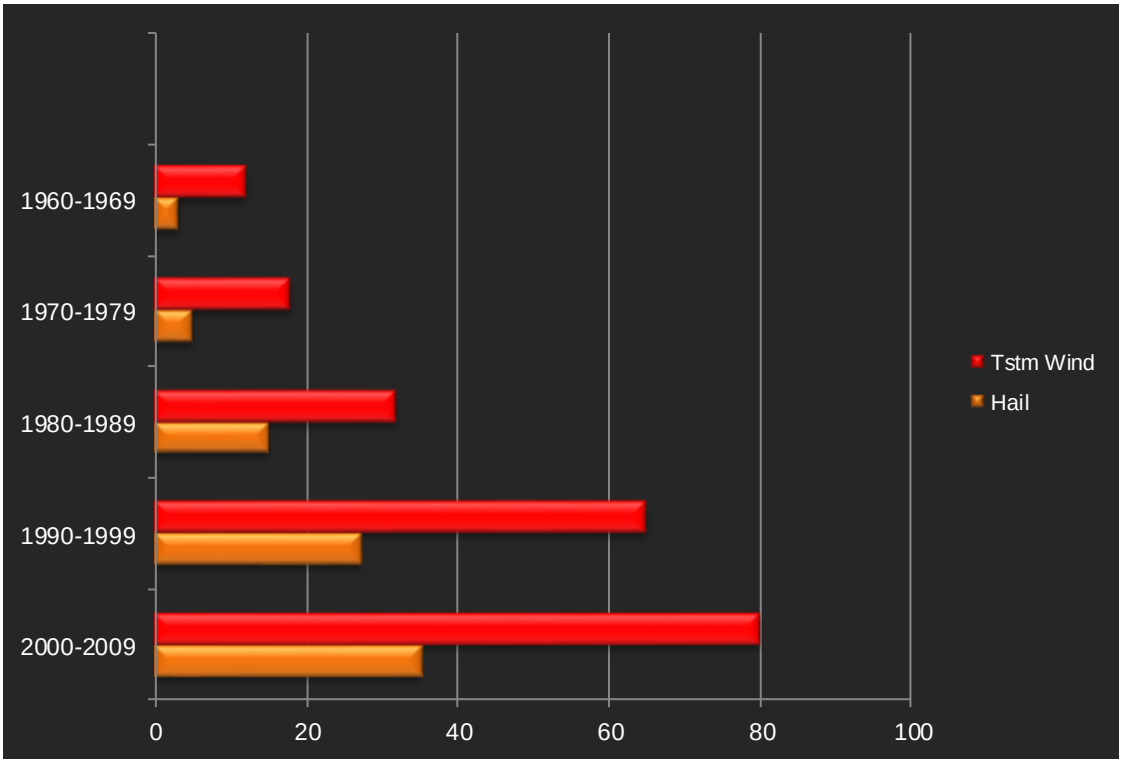
Date	Location	Type	Wind Speed	Fatalities	Injuries	Property Damage
5/23/2011	Cincinnati	Tstm Wind	50 kts.	0	0	$2,000
5/23/2011	Deer Park	Tstm Wind	52 kts.	0	0	$10,000
5/23/2011	Cincinnati	Tstm Wind	53 kts.	0	0	$0
5/25/2011	Cincinnati	Tstm Wind	53 kts.	0	0	$0
6/10/2011	Cleves	Tstm Wind	50 kts.	0	0	$2,000
6/10/2011	Cincinnati	Tstm Wind	55 kts.	0	0	$0
6/10/2011	Cincinnati	Tstm Wind	50 kts.	0	0	$0
8/3/2011	Cincinnati	Tstm Wind	50 kts.	0	0	$1,000
8/7/2011	Springfield	Tstm Wind	50 kts.	0	0	$3,000
3/30/2012	North College Hill	Tstm Wind	50 kts.	0	0	$2,000
3/30/2012	Silverton	Tstm Wind	50 kts.	0	0	$1,000
6/29/2012	Harrison	Tstm Wind	60 kts.	0	0	$0
6/29/2012	Madeira	Tstm Wind	50 kts.	0	0	$1,000
6/29/2012	Madeira	Tstm Wind	56 kts.	0	0	$2,000
6/29/2012	Cincinnati	Tstm Wind	50 kts.	0	0	$1,000
6/29/2012	Cincinnati	Tstm Wind	51 kts	0	0	$0
6/29/2012	Anderson	Tstm Wind	50 kts.	0	0	$1,000
7/18/2012	Cleves	Tstm Wind	50 kts.	0	0	$20,000
7/18/2012	Delhi	Tstm Wind	52 kts.	0	0	$2,000
7/18/2012	Green	Tstm Wind	55 kts.	0	0	$0
7/18/2012	Miami	Tstm Wind	50 kts.	0	0	$1,000
7/24/2012	Cincinnati	Tstm Wind	50 kts.	0	0	$10,000
7/26/2012	Cincinnati	Tstm Wind	50 kts.	0	0	$30,000
7/27/2012	North Bend	Tstm Wind	50 kts.	0	0	$3,000
7/27/2012	Delhi	Tstm Wind	55 kts.	0	0	$1,000
7/27/2012	Delhi	Tstm Wind	55 kts.	0	0	$1,000
7/27/2012	Cincinnati	Tstm Wind	50 kts.	0	0	$1,000

Previous Occurrences for Thunderstorm Hazards – 50 Year

There have been many occurrences of thunderstorm/wind events in Hamilton County during the past few decades. The NCDC database reported 370 thunderstorm hazards, inclusive of hail and wind events in Hamilton County since 1962. Although common, this type of storm can cause significant property damage.

NCDC recorded thunderstorm wind and hail events for Hamilton County are identified in Figure 5-32. Additional details for NCDC events are included in Appendix C.

Figure 5-32: Thunderstorm Wind and Hail Occurrences- 50 year



Geographic Location for Thunderstorm Hazard

The entire county has the same risk for occurrence of thunderstorms. They can occur at any location within the county.

Hazard Extent for Thunderstorm Hazard

The extent of the historical thunderstorms varies in terms of the extent of the storm, the wind speed, and the size of hail stones. Thunderstorms can occur at any location within the county.

Risk Identification for Thunderstorm Hazard

Based on historical information, the probability of a thunderstorm hazard is high. The planning team determined that the potential impact of a thunderstorm hazard is significant; therefore the overall risk of a hazmat hazard for Hamilton County is high.

Vulnerability Analysis for Thunderstorm Hazard

Severe thunderstorms are an equally distributed threat across the entire jurisdiction; therefore the entire county's population and all buildings are vulnerable to a severe thunderstorm, and the same impacts can be expected within the affected area. This plan will therefore consider all buildings within the county as vulnerable.

Facilities

All facilities are vulnerable to severe thunderstorms. An essential or critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural failure, damaging debris (trees or limbs), roofs blown off or windows broken by hail or high winds, fires caused by lightning, and loss of building functionality (e.g., a damaged police station will no longer be able to serve the community). Names and locations of critical and essential facilities, as well as community assets, are in Appendix G.

Building Inventory

Impacts similar to those discussed for critical facilities can be expected for the buildings within the county. These impacts include structural failure, damaging debris (trees or limbs), roofs blown off or windows broken by hail or high winds, fires caused by lightning, and loss of building functionality (e.g., a damaged home will no longer be habitable, causing residents to seek shelter).

Infrastructure

During a severe thunderstorm, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Because the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these structures could become damaged during a severe thunderstorm. The impacts to these structures include broken, failed, or impassable roadways; broken or failed utility lines (e.g., loss of power or gas to community); or railway failure from broken or impassable railways. Bridges could fail or become impassable, causing risk to traffic.

Potential Dollar Losses for Thunderstorm Hazard

A GIS analysis was not completed for thunderstorms because the widespread extent of such a hazard makes it difficult to accurately model outcomes. To determine dollar losses for a thunderstorm hazard, the available NCDC hazard information was condensed to include only thunderstorm hazards that occurred within the past 10 years.

It was determined that since 2002, Hamilton County has incurred $5,567,000 in damages relating to thunderstorms, including hail and high winds. There were no damages attributed to lightning in the past 10 years. Table 5-41 provides data regarding damages related to thunderstorm events.

Table 5-41: Hamilton County Thunderstorm Hazard Damages

Year	Tstm Wind Damages	Hail Damages
2002	$39,000	$5,024,000
2003	$26,000	$8,000
2004	$9,000	$0
2005	$25,000	$35,000
2006	$109,000	$0
2007	$23,000	$12,000
2008	$97,000	$4,000
2009	$11,000	$12,000
2010	$19,000	$0
2011	$27,000	$0
2012	$85,000	$0
Total	$472,000	$5,095,000

The historical data are erratic and not wholly documented or confirmed. As a result, potential dollar losses for a future event cannot be calculated precisely; however, based on averages in the last decade, it can be determined that Hamilton County incurs an annual risk of approximately $556,700 a year.

Vulnerability to Future Assets/Infrastructure for Thunderstorm Hazard

All future development within the county and all communities will remain vulnerable to these events.

Analysis of Community Development Trends

Preparing for severe storms will be enhanced if officials sponsor a wide range of programs and initiatives to address the overall safety of county residents. New structures need to be built with more-sturdy construction, and those structures already in place need to be hardened to lessen the potential impacts of severe weather. Community warning sirens to provide warning of approaching storms are also vital to preventing the loss of property and ensuring the safety of Hamilton County residents.

5.3.5 Winter Storm Hazard

Severe winter weather consists of various forms of precipitation and strong weather conditions. This may include one or more of the following: freezing rain, sleet, heavy snow, blizzards, icy roadways, extreme low temperatures, and strong winds. These conditions can cause human health risks such as frostbite, hypothermia, and death.

Ice (Glazing) and Sleet Storms

Ice or sleet, even in the smallest quantities, can result in hazardous driving conditions and can be a significant cause of property damage. Sleet can be easily identified as frozen raindrops. Sleet does not stick to trees and wires. The most damaging winter storms in Indiana have been ice storms. Ice storms are the result of cold rain that freezes on contact with objects having a temperature below freezing. Ice storms occur when moisture-laden gulf air converges with the northern jet stream causing strong winds and heavy precipitation. This precipitation takes the form of freezing rain coating power lines, communication lines, and trees with heavy ice. The winds will then cause the overburdened limbs and cables to snap; leaving large sectors of the population without power, heat, or communication. Falling trees and limbs can also cause building damage during an ice storm. In the past few decades numerous ice storm events have occurred in Ohio.

Snowstorms

Significant snowstorms are characterized by the rapid accumulation of snow, often accompanied by high winds, cold temperatures, and low visibility. A blizzard is categorized as a snowstorm with winds of 35 miles per hour or greater and/or visibility of less than one-quarter mile for three or more hours. The strong winds during a blizzard blow about falling and already existing snow, creating poor visibility and impassable roadways. Blizzards have the potential to result in property damage.

Blizzard conditions not only cause power outages and loss of communication, but also make transportation difficult. The blowing of snow can reduce visibility to less than one-quarter mile, and the resulting disorientation makes even travel by foot dangerous if not deadly.

Summary Vulnerability Assessment

Winter storms affect mostly humans, particularly special needs populations, and animals due to lack of mobility or isolation from supplies. Winter storms are also often accompanied by power loss. For this planning effort, it was not possible to analyze the number of lives or amount of property exposed to the impacts of winter storms.

Previous Occurrences for Winter Storm Hazard

The NCDC database identified 29 winter weather events for Hamilton County since January 1, 2007. The most recent winter storm event, on January 20, 2012, was the result of the combination of two low pressure systems—one from the Tennessee Valley and one from the Great Lakes. This resulted in a mix of snow, sleet, and freezing rain, as well as ice accumulations up to .25 inches across Hamilton County.

The NCDC winter weather events occurring in Hamilton County since 2007 are listed in Table 5-42.

Table 5-42: Winter Storm Hazard Occurrences- 5 Year

Start Date	End Date	Type	Injuries	Fatalities	Property Damage	Crop Damage
01/21/2007	01/211/2007	Winter Storm	0	0	$0	$0
02/06/2007	02/06/2007	Heavy Snow	0	0	$0	$0
02/13/2007	02/13/2007	Ice Storm	0	0	$0	$0
04/06/2007	04/08/2007	Frost/Freeze	0	0	$0	$540,000
12/04/2007	12/05/2007	Winter Weather	0	0	$0	$0
12/07/2007	12/07/2007	Winter Weather	0	0	$0	$0
12/15/2007	12/16/2007	Heavy Snow	0	0	$0	$0
01/01/2008	01/02/2008	Winter Weather	0	0	$0	$0
02/21/2008	02/22/2008	Winter Storm	0	0	$0	$0
02/22/2008	02/22/2008	Winter Weather	0	0	$0	$0
03/07/2008	03/08/2008	Winter Storm	0	0	$0	$0
12/16/2008	12/16/2008	Winter Weather	0	0	$0	$0
01/27/2009	01/28/2009	Heavy Snow	0	0	$0	$0
02/03/2009	02/03/2009	Heavy Snow	0	0	$0	$0
12/19/2009	12/19/2009	Winter Weather	0	0	$0	$0
01/07/2010	01/08/2010	Winter Weather	0	0	$0	$0
02/05/2010	02/06/2010	Heavy Snow	0	0	$0	$0
02/09/2010	02/10/2010	Heavy Snow	0	0	$0	$0
02/15/2010	02/16/2010	Heavy Snow	0	0	$0	$0
12/12/2010	12/13/2010	Winter Weather	0	0	$0	$0
12/16/2010	12/16/2010	Winter Storm	0	0	$0	$0
01/11/2011	01/12/2011	Winter Weather	0	0	$0	$0
01/20/2011	01/21/2011	Heavy Snow	0	0	$35,000	$0
02/01/2011	02/02/2011	Ice Storm	0	0	$0	$0
01/02/2012	01/02/2012	Winter Weather	0	0	$0	$0
01/20/2012	01/21/2012	Winter Storm	0	0	$0	$0
02/08/2012	02/08/2012	Winter Weather	0	0	$0	$0
02/10/2012	02/11/2012	Winter Weather	0	0	$0	$0
03/05/2012	03/05/2012	Winter Weather	0	0	$0	$0

Geographic Location for Winter Storm Hazard

Severe winter storms are regional in nature. Most of the NCDC data are calculated regionally or, in some cases, statewide.

Hazard Extent for Winter Storm Hazard

The extent of the historical winter storms varies in terms of storm location, temperature, and ice or snowfall. A severe winter storm can occur anywhere in Hamilton County.

Risk Identification for Winter Storm Hazard

Based on historical information, the probability of a winter storm hazard is high. The planning team determined that the potential impact of a winter storm hazard is significant; therefore the overall risk of a winter storm hazard for Hamilton County is high.

Vulnerability Analysis for Winter Storm Hazard

Winter storm impacts are equally distributed across the entire jurisdiction; therefore, the entire county is vulnerable to a winter storm and can expect the same impacts within the affected area.

Critical Facilities

All critical facilities are vulnerable to a winter storm. A critical facility will encounter many of the same impacts as other buildings within the jurisdiction. These impacts include loss of gas or electricity from broken or damaged utility lines, damaged or impassable roads and railways, broken water pipes, and roof collapse from heavy snow. A complete list of critical facilities, replacement cost, and a map of locations is included as Appendices F and G.

Building Inventory

The impacts to the general buildings within the county are similar to the damages expected to the critical facilities. These include loss of gas or electricity from broken or damaged utility lines, damaged or impassable roads and railways, broken water pipes, and roof collapse from heavy snow.

Infrastructure

During a winter storm, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, bridges, and ports. Since the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these structures could become damaged during a winter storm. Potential impacts include broken gas and/or electricity lines or damaged utility lines, damaged or impassable roads and railways, and broken water pipes.

Potential Dollar Losses for Winter Storm Hazard

A Hazus-MH analysis was not completed for winter storms because the widespread extent of such a hazard makes it difficult to accurately model outcomes. To determine dollar losses for a winter storm hazard, the available NCDC hazard information was condensed to include only winter storm hazards that occurred within the past ten years. It was determined that since 2007, Hamilton County has incurred an average of $131,000 annually in damages relating to winter storms, including sleet/ice and heavy snow.

Vulnerability for Future Assets/Infrastructure for Winter Storm Hazard

Any new development within the county will remain vulnerable to these events.

Analysis of Community Development Trends

Because the winter storm events are regional in nature, future development will be impacted equally across the county.

5.3.6 Extreme Temperatures

Extreme temperatures—both hot and cold—can have significant impact on human health and safety, commercial businesses, agricultures, and primary and secondary effects on infrastructure (e.g. burst pipes, power failures, etc.) Weather conditions described as extreme heat or cold vary across different areas of the country, based on the range of average temperatures within the region.

Extreme Heat Hazard Definition

Temperatures that hover 10 degrees Fahrenheit or more above the average high temperature for a region, and last for several weeks, constitute an extreme heat event (EHE). An extended period of extreme heat of three or more consecutive days is typically referred to as a heat wave. Most summers see EHEs in one or more parts of the U.S. East of the Rocky Mountains, they tend to combine both high temperatures and high humidity; although some of the worst heat waves have been catastrophically dry.

Extreme heat is the number one cause of weather-related fatalities in the US, with hundreds occurring each year. On average, extreme heat claims more than 1,500 lives annually—more than floods, lightning, tornados, and hurricanes combined.

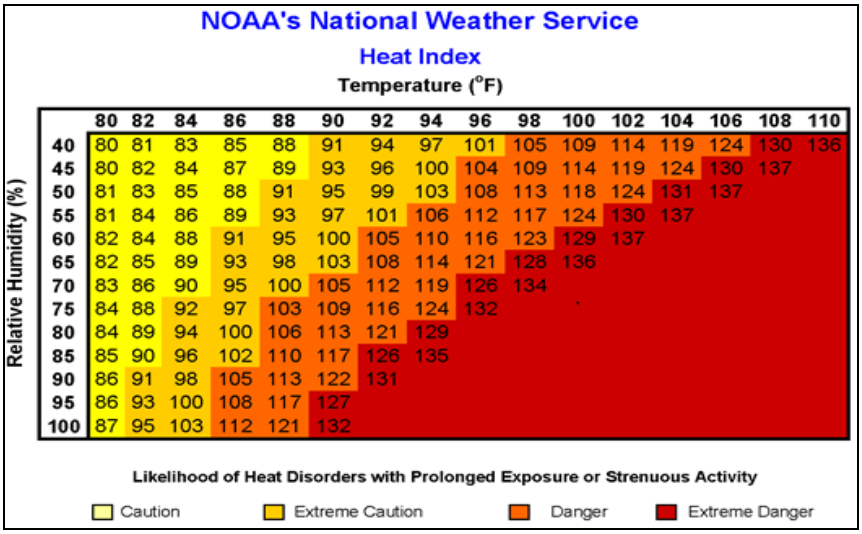
Prolonged exposure to extreme heat may lead to serious health problems, including heat stroke, heat exhaustion, or sunburn. Certain populations—such as seniors age 65 or older, infants and young children under five years of age, pregnant women, the homeless or poor, the overweight, and people with mental illnesses, disabilities, and chronic diseases—are at greater risk to the effects of extreme heat. Depending on severity, duration, and location, EHEs can also trigger secondary hazards, including dust storms, droughts, wildfires, water shortages, and power outages.

Criteria for EHE typically shift by location and time of year, and are dependent on the interaction of multiple meteorological variables (i.e. temperature, humidity, cloud cover.) While this makes it difficult to define EHEs using absolute, specific measures, there are ways to identify conditions. Some locations evaluate current and forecast weather to identify conditions with specific, weather-based mortality algorithms. Others identify and forecast conditions based on statistical comparison to historical meteorological baselines, e.g. the criterion for EHE conditions could be an actual or forecast temperature that is equal to or exceeds the 95th percentile value from a historical distribution for a defined time period.[1]

[1] Office of Atmospheric Programs. (2006). *Excessive Heat Events Guidebook.* Unites States Environmental Protection Agency. Washington, D.C.

Heat alert procedures are based primarily on Heat Index Values. The Heat Index—given in degrees Fahrenheit—is often referred to as the apparent temperature and is a measure of how hot it really feels when the relative humidity is factored with the actual air temperature. The National Weather Service Heat Index Chart can be seen in Figure 5-33.

Figure 5-33: National Weather Service Heat Index



Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Source: http://www.nws.noaa.gov/os/heat/index.shtml#heat_hazards

Each National Weather Service Forecast Office may issue the following heat-related products as conditions warrant:

- **Excessive Heat Outlooks**- issued when the potential exists for an EHE in the next 3-7 days. An Outlook provides information to those who need considerable lead time to prepare for the event, such as public utility staff, emergency managers, and public health officials.

- **Excessive Heat Watches**- issued when conditions are favorable for an EHE in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain. A Watch provides enough lead time so that those who need to prepare can do so, such as city officials who have excessive heat mitigation plans.

- **Excessive Heat Warnings/Advisories**- issued when an EHE is expected in the next 36 hours. These products are issued when an excessive heat event is occurring, is imminent, or has a very high probability of occurring. The warning is used for conditions posing a threat to life or property. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life and/or property.

Summary Vulnerability Assessment

Excessive heat affects mostly humans, particularly special needs populations, and animals. These events may be exacerbated by power loss. For this planning effort, it was not possible to analyze the number of lives or amount of property exposed to the impacts of extreme heat.

Previous Occurrences for Excessive Heat

Although the NCDC database does not include any reported past occurrences of excessive heat, residents of Hamilton County should be prepared for such an event in any given year.

Geographic Location for Excessive Heat Hazard

Excessive heat events are regional in nature. All areas of the state are vulnerable to the risk of excessive heat.

Hazard Extent for Excessive Heat Hazard

Excessive heat events typically occur in the summer months. The extent of EHEs varies in terms of the Heat Index and duration of the event.

Risk Identification for Excessive Heat Hazard

The planning team determined that although the probability of an excessive heat hazard is moderately high in Hamilton County, the impact of such an event is low, resulting in an overall calculated risk of moderately low.

Vulnerability Analysis for Excessive Heat Hazard

Unlike other natural hazard events, extreme heat events leave little to no physical damage to communities; however, they can lead to severe short and long-term health conditions, or even death. Extreme heat events can also impact environmental and economic vulnerabilities as a result of water shortages and drought.

Extreme Cold Hazard Definition

What constitutes an extreme cold event, and its effects, varies across different regions across the United States. In areas unaccustomed to winter weather, near freezing temperatures are considered “extreme cold.” Extreme cold temperatures are typically characterized by the ambient air temperature dropping to approximately 0 degrees Fahrenheit or below.

Exposure to cold temperatures—indoors or outdoors—can lead to serious or life-threatening health problems, including hypothermia, cold stress, frostbite or freezing of the exposed extremities, such as fingers, toes, nose, and earlobes. Certain populations—such as seniors age 65 or older, infants and young children under five years of age, individuals who are homeless or stranded, or those who live in a

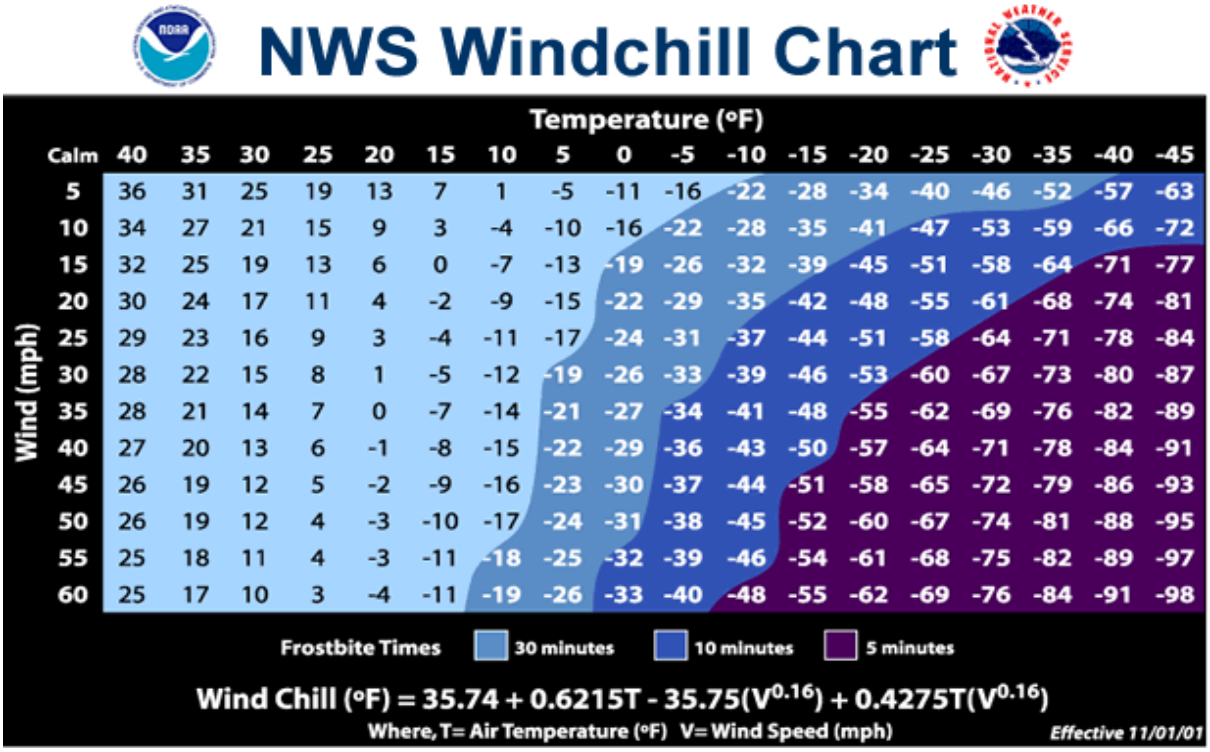
home that is poorly insulated or without heat (such as mobile homes)—are at greater risk to the effects of extreme cold.

Extremely cold temperatures often accompany a winter storm, so individuals may also have to cope with power failures and icy roads. Although staying indoors can help reduce the risk of vehicle accidents and falls on the ice, individuals are susceptible to indoor hazards. Homes may become too cold due to power failures or inadequate heating systems. The use of space heaters and fireplaces to keep warm increases the risk of household fires, as well as carbon monoxide poisoning.

The magnitude of extreme cold temperatures is generally measured through the Wind Chill Temperature (WCT) Index. Wind Chill Temperature is the temperature that is felt when outside and is based on the rate of heat loss from exposed skin by the effects of wind and cold. As the wind increases, the body is cooled at a faster rate causing the skin's temperature to drop.

In 2001, the NWS implemented a new WCT Index, designed to more accurately calculate how cold air feels on human skin. The index, shown in Figure 5-34, includes a frostbite indicator, showing points where temperature, wind speed, and exposure time will produce frostbite in humans.

Figure 5-34: NWS Wind Chill Temperature Index



Each National Weather Service Forecast Office may issue the following wind chill-related products as conditions warrant:

- **Wind Chill Watch**: Issued when there is a chance that wind chill temperatures will decrease to at least 24° F below zero in the next 24-48 hours
- **Wind Chill Advisory**: Issued when the wind chill could be life threatening if action is not taken. The criteria for this advisory are expected wind chill readings of 15° F to 24° F below zero
- **Wind Chill Warning**: Issued when wind chill readings are life threatening. Wind chill readings of 25° F below zero or lower are expected.

Summary Vulnerability Assessment

Excessive cold affects mostly humans, particularly special needs populations, and animals. These events may be exacerbated by power loss. For this planning effort, it was not possible to analyze the number of lives or amount of property exposed to the impacts of extreme cold.

Previous Occurrences for Extreme Cold

Although the NCDC database does not include any reported past occurrences of extreme cold, residents of Hamilton County should be prepared for such an event in any given year.

Geographic Location for Extreme Cold Hazard

Extreme cold events are regional in nature. All areas of the state are vulnerable to the risk of excessive cold.

Hazard Extent for Extreme Cold Hazard

Extreme cold events typically occur in the winter months. The extent of extreme cold varies in terms of the Wind Chill Temperature and duration of the event.

Risk Identification for Extreme Cold Hazard

The planning team determined that although the probability of an excessive cold hazard is moderately high in Hamilton County, the impact of such an event is low, resulting in an overall calculated risk of moderately low.

Vulnerability Analysis for Extreme Cold Hazard

Extreme cold can result in damages to buildings, utilities, and infrastructure, due to the strong winds that often accompany these events. Additionally, extreme cold events often lead to severe short and long term health conditions, or even death. Extreme cold events can occur within any area in the county; therefore, the entire county population and all buildings are vulnerable to extreme cold hazards.

5.3.7 Drought Hazard

The meteorological condition that creates a drought is below normal rainfall. However, excessive heat can lead to increased evaporation, which will enhance drought conditions. Droughts can occur in any month. Drought differs from normal arid conditions found in low rainfall areas. Drought is the consequence of a reduction in the amount of precipitation over an undetermined length of time (usually a growing season or more).

There are several common types of droughts including meteorological, hydrological, agricultural, and socioeconomic. Figure 5-35 on the following page describes the sequence of drought occurrence and impacts of drought types.

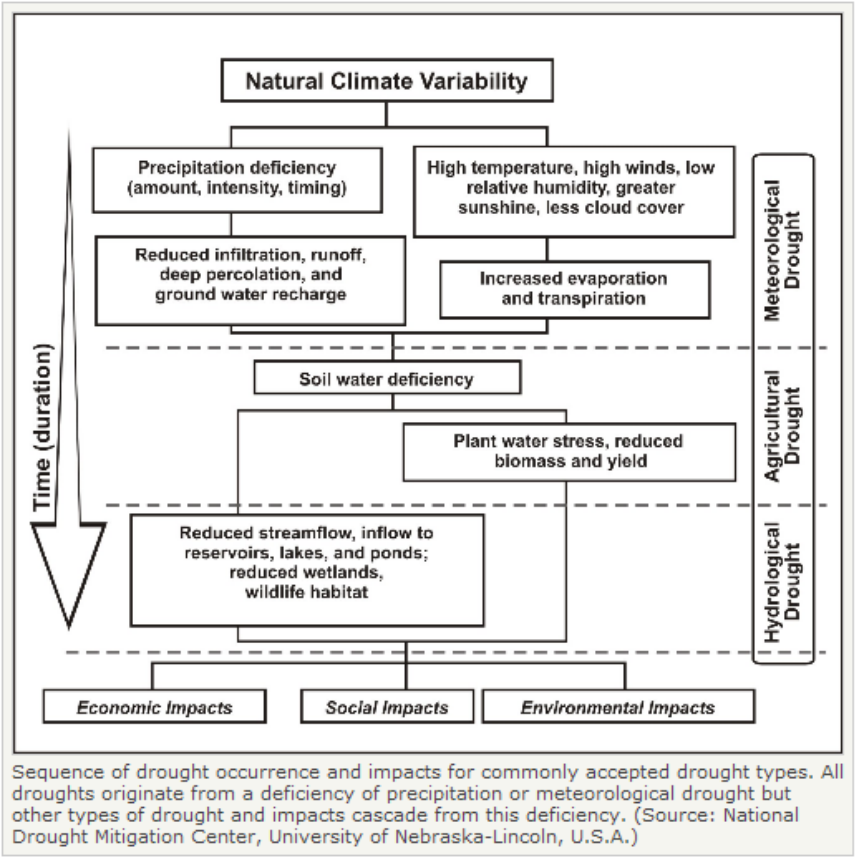
- **Meteorological:** Defined by the degree of dryness (as compared to an average) and the duration of the dry period. These are region-specific and only appropriate for regions characterized by year-round precipitation.

- **Hydrological:** Associated with the effects of periods of precipitation shortfalls (including snow) on surface or subsurface water supply, e.g. stream flow, reservoir and lake levels, and groundwater. Impacts of hydrological droughts do not emerge as quickly as meteorological and agricultural droughts. For example, deficiency on reservoir levels may not affect hydroelectric power production or recreational uses for many months.

- **Agricultural:** Links characteristics of meteorological or hydrological drought to agricultural impacts. An agricultural drought accounts for the variable susceptibility of crops during different stages of crop development from emergence to maturity.

- **Socioeconomic:** Links the supply and demand of some economic good, e.g. water, forage, food grains, and fish, with elements of meteorological, hydrological, or agricultural droughts. This type of drought occurs when demand for an economic good exceeds supply as a result of weather-related shortfall in water supply.

Figure 5-35: Sequence of Drought Occurrence and Impacts



Sequence of drought occurrence and impacts for commonly accepted drought types. All droughts originate from a deficiency of precipitation or meteorological drought but other types of drought and impacts cascade from this deficiency. (Source: National Drought Mitigation Center, University of Nebraska-Lincoln, U.S.A.)

The severity of a drought depends on location, duration, and geographical extent. Additionally, drought severity depends on the water supply, usage demands made by human activities, vegetation, and agricultural operations. Drought brings several different problems that must be addressed. The quality and quantity of crops, livestock, and other agricultural assets will be affected during a drought. Drought can adversely impact forested areas leading to an increased potential for extremely destructive forest and woodland fires that could threaten residential, commercial, and recreational structures.

Drought conditions are often accompanied by extreme heat, which is defined as temperatures that hover 10°F or more above the average high for the area and last for several weeks. Extreme heat can occur in humid conditions when high atmospheric pressure traps the damp air near the ground or in dry conditions, which often provoke dust storms.

The Palmer Drought Severity Index (PDSI), developed by W.C. Palmer in 1965, is a soil moisture algorithm utilized by most federal and state government agencies to trigger drought relief programs and responses. The PDSI—shown in Table 43—is based on the supply-and-demand concept of the water balance equation, taking into account more than just the precipitation deficit at specific locations. The objective of the PDSI is to provide standardized measurements of moisture, so that comparisons can be made between locations and periods of time—usually months. The PDSI is designed so that a -4.0 in

South Carolina has the same meaning in terms of the moisture departure from a climatological normal as a -4.0 does in Ohio.

Table 5-43: Palmer Drought Severity Classifications

Classification Rating	Classification Description
4.0 or greater	Extremely Wet
3.0 to 3.99	Very Wet
2.0 to 2.99	Moderately Wet
1.0 to 1.99	Slightly Wet
0.5 to 0.99	Incipient Wet Spell
0.49 to -0.49	Near Normal
-0.5 to -0.99	Incipient Dry Spell
-1.0 to -1.99	Mild Drought
-2.0 to -2.99	Moderate Drought
-3.0 to -3.99	Severe Drought
-4.0 or less	Extreme Drought

Summary Vulnerability Assessment

Droughts affect mostly humans, particularly special needs populations, and animals. These events may be exacerbated by power loss. For this planning effort, it was not possible to analyze the number of lives or amount of property exposed to the impacts of drought.

Previous Occurrences for Drought Hazard

The NCDC database reported 25 drought events that affected Ohio since 1994.[2] In 2005, the National Drought Mitigation Center (NDMC) began development of a comprehensive drought impact database, the Drought Impact Reporter (DIR). According to the DIR, Hamilton County is particularly vulnerable to eight categories of drought impacts. Table 5-44 depicts the categories and number of reported impacts since 2007.

[2] *NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.*

Table 5-44: Hamilton County Drought Impact Reports- 5 Year

Type of Impact	2007	2008	2009	2010	2011	2012
Agriculture	17	3	3	5	5	58
Business and Industry	0	0	0	1	2	16
Fire	7	0	0	2	0	5
Plants and Wildlife	5	3	0	9	1	10
Relief, Response, and Restrictions	11	5	0	1	2	19
Society and Public Health	9	0	0	4	2	11
Tourism and Recreation	0	0	0	0	1	3
Water Supply and Quality	10	2	1	3	0	7
Total	59	13	4	25	13	129

Geographic Location for Drought Hazard

Droughts are regional in nature. All areas of the United States are vulnerable to the risk of drought.

Hazard Extent for Drought

Droughts can be widespread or localized events. The extent of droughts varies both in terms of the extent of the heat and range of precipitation.

Risk Identification for Drought Hazard

Based on historical information, the probability of a drought is low. The planning team determined that the potential impact of a drought or an extended period of extreme heat is minimal; therefore, the overall risk of a drought hazard for Hamilton County is low.

Vulnerability Analysis for Drought Hazard

Drought impacts can be an equally distributed threat across the entire jurisdiction; therefore, the county is vulnerable to this hazard and can expect similar impacts within the affected area. The entire population and all buildings have been identified as at risk.

Critical Facilities

All critical facilities are vulnerable to drought. A critical facility will encounter many of the same impacts as any other building within the jurisdiction, which should involve only minor damage. These impacts include water shortages, fires as a result of drought conditions, and residents in need of medical care from the heat and dry weather. A complete list of critical facilities, replacement cost, and a map of locations is included as Appendices F and G.

Building Inventory

The buildings within the county can all expect the same impacts similar to those discussed for critical facilities. These impacts include water shortages, fires as a result of drought conditions, and residents in need of medical care from the heat and dry weather.

Infrastructure

During a drought the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. The risk to these structures is primarily associated with a fire that could result from the hot, dry conditions. Since the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these items could be impacted during a drought.

Vulnerability to Future Assets/Infrastructure for Drought Hazard

Future development will remain vulnerable to these events. Typically, some urban and rural areas are more susceptible than others. For example, urban areas are subject to water shortages during periods of drought. Excessive demands of the populated area place a limit on water resources. In rural areas, crops and livestock may suffer from extended periods of heat and drought. Dry conditions can lead to the ignition of wildfires that could threaten residential, commercial, and recreational areas.

Analysis of Community Development Trends

Because droughts are regional in nature, future development will be impacted across the county. Although urban and rural areas are equally vulnerable to this hazard, those living in urban areas may have a greater risk from the effects of a prolonged heat wave. According to FEMA, the atmospheric conditions that create extreme heat tend to trap pollutants in urban areas, adding contaminated air to the excessively hot temperatures and creating increased health problems. Furthermore, asphalt and concrete store heat longer, gradually releasing it at night and producing high nighttime temperatures. This phenomenon is known as the "urban heat island effect".

Local officials should address drought hazards by educating the public on steps to take before and during the event—for example, temporary window reflectors to direct heat back outside, staying indoors as much as possible, and avoiding strenuous work during the warmest part of the day.

5.3.8 Hazardous Materials Hazard

The State of Ohio has numerous active transportation lines that run through many of its counties. Active railways transport harmful and volatile substances between our borders every day. The transportation of chemicals and substances along interstate routes and railroads is commonplace in Ohio. The rural areas of Ohio have considerable agricultural commerce, creating a demand for fertilizers, herbicides, and pesticides to be transported along rural roads. Finally, Ohio is bordered by the Ohio River to the south and Lake Erie to the north. Barges transport chemicals and substances along these waterways daily. These factors increase the chance of hazardous material releases and spills throughout the State of Ohio.

The release or spill of certain substances can cause an explosion. Explosions result from the ignition of volatile products such as petroleum products, natural and other flammable gases, hazardous materials/chemicals, dust, and bombs. An explosion potentially can cause death, injury, and property damage. In addition, a fire routinely follows an explosion, which may cause further damage and inhibit emergency response. Emergency response may require fire, safety/law enforcement, search and rescue, and hazardous materials units.

Summary Vulnerability Assessment

The Polis Center used the E.P.A.'s ALOHA model to complete three plume analyses in Hamilton County. The summarized results are included in the following tables.

Table 5-45: Scenario #1 - Cincinnati

Building Type	Population Exposure	Number of Buildings	Estimated Losses/Exposure
Residential	24,483	9,793	$1,313,545,000
Non-Residential	0	1,526	$1,151,944,000
Critical Facilities	0	86	$889,910,000
Totals	24,483	11,408	$3,355,399,000

Table 5-46: Scenario #2 – St. Bernard

Building Type	Population Exposure	Number of Buildings	Estimated Losses/Exposure
Residential	27,260	10,904	$1,202,037,000
Non-Residential	0	865	$1,649,219,000
Critical Facilities	0	82	$367,037,500
Totals	27,260	11,851	$3,218,293,300

Table 5-47: Scenario #3 – Sharonville

Building Type	Population Exposure	Number of Buildings	Estimated Losses/Exposure
Residential	8,790	3,516	$669,886,000
Non-Residential	0	494	$1,105,031,000
Critical Facilities	0	78	$210,563,000
Totals	8,790	4,088	$1,985,480,000

Previous Occurrences for Hazardous Materials Hazards

Hamilton County has not experienced a significantly large-scale hazardous material incident at a fixed site or during transport that resulted in multiple deaths or serious injuries, although there have been many minor releases that have put local firefighters, hazardous materials teams, emergency

management, and local law enforcement into action to try to stabilize these incidents and prevent or lessen harm to Hamilton County residents.

Geographic Location for Hazardous Materials Hazard

The hazardous material hazards are countywide and primarily are associated with the transport of materials by highway, railroad, and/or river barge.

Hazard Extent for Hazardous Materials

The extent of the hazardous material (referred to as hazmat) hazard varies in terms of the quantity of material being transported as well as the specific content of the container.

Risk Identification for Hazardous Materials Hazard

To calculate the probability, impact, and risk of each hazard to the entire county, the incorporated as well as the unincorporated areas were averaged to determine the overall risk to the county. Based on historical information, the probability of a hazmat hazard is medium. The planning team determined that the potential impact of a hazmat release is minimal; therefore the overall risk of a hazmat hazard for Hamilton County is low.

Vulnerability Analysis for Hazardous Materials

Hazardous material impacts are an equally distributed threat across the entire jurisdiction; therefore the entire county is vulnerable to a hazardous material release and can expect the same impacts within the affected area. The main concern during a release or spill is the population affected. This plan will therefore consider all buildings located within the county as vulnerable.

Facilities

All facilities and communities within the county are at risk. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural failure due to fire or explosion and loss of function of the facility (e.g., a damaged police station will no longer be able to serve the community). Names and locations of critical and essential facilities, as well as community assets, are in Appendix G.

Building Inventory

During a hazardous material release, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, bridges, and ports. The impacts to these structures include broken, failed, or impassable roadways; broken or failed utility lines (e.g., loss of power or gas to community); and railway failure from broken or impassable railways. Bridges could fail or become impassable, causing risk to traffic.

In terms of numbers and types of buildings and infrastructure, typical scenarios are described to gauge the anticipated impacts of hazardous material release events in the county.

GIS Hazardous Materials Analysis

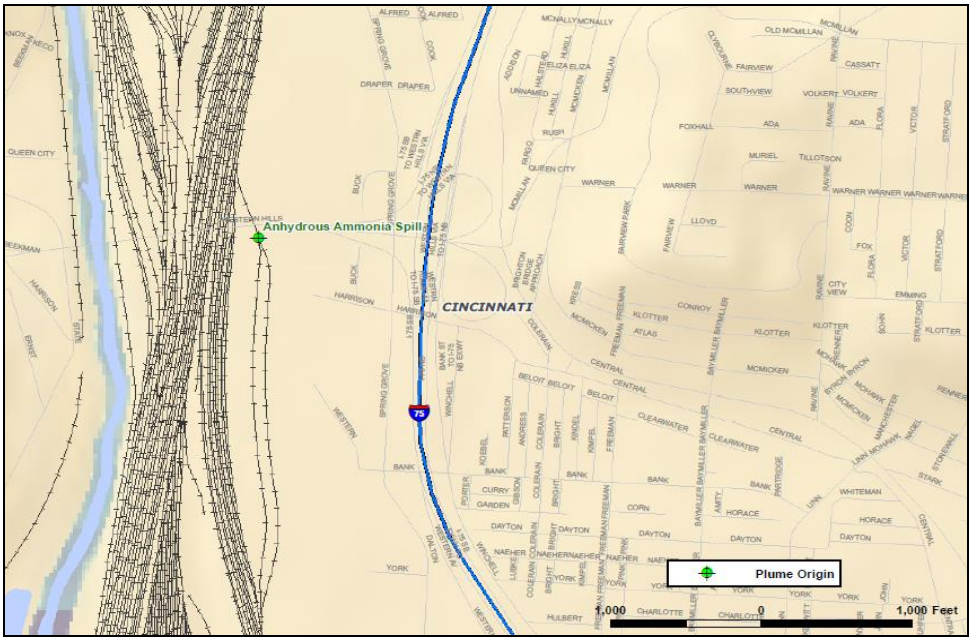
The U.S. EPA's ALOHA (Areal Locations of Hazardous Atmospheres) was used to develop models for this risk assessment. ALOHA is a computer program designed especially by use for people responding to chemical accidents, as well as for emergency planning and training. The ALOHA models assess the area of impact for three potential scenarios involving Anhydrous Ammonia at railroads in Cincinnati, St. Bernard, and Sharonville. Anhydrous Ammonia is a common chemical used in industrial operations and can be found in either liquid or gas form. Rail and truck tankers commonly haul Anhydrous Ammonia to and from facilities.

Anhydrous ammonia is a clear colorless gas with a strong odor. Contact with the unconfined liquid can cause frostbite. Though the gas is generally regarded as nonflammable, it can burn within certain vapor concentration limits with strong ignition. The fire hazard increases in the presence of oil or other combustible materials. Vapors from an anhydrous ammonia leak initially hug the ground, and prolonged exposure of containers to fire or heat may cause violent rupturing and rocketing. Long-term inhalation of low concentrations of the vapors or short-term inhalation of high concentrations has adverse health effects. Anhydrous ammonia is generally used as a fertilizer, a refrigerant, and in the manufacture of other chemicals.

Hazardous Materials Scenario 1: Cincinnati

For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area was chosen due to its proximity to the residential and commercial locations. The geographic area covered in this analysis is depicted in Figure 5-36.

Figure 5-36: Scenario 1: Geographic Location of Chemical Release



The ALOHA atmospheric modeling parameters, depicted in Figure 5-37, were based upon a westerly wind speed of 5 mph. The temperature was 68°F with 75% humidity and 5 tenths of cloud covered skies.

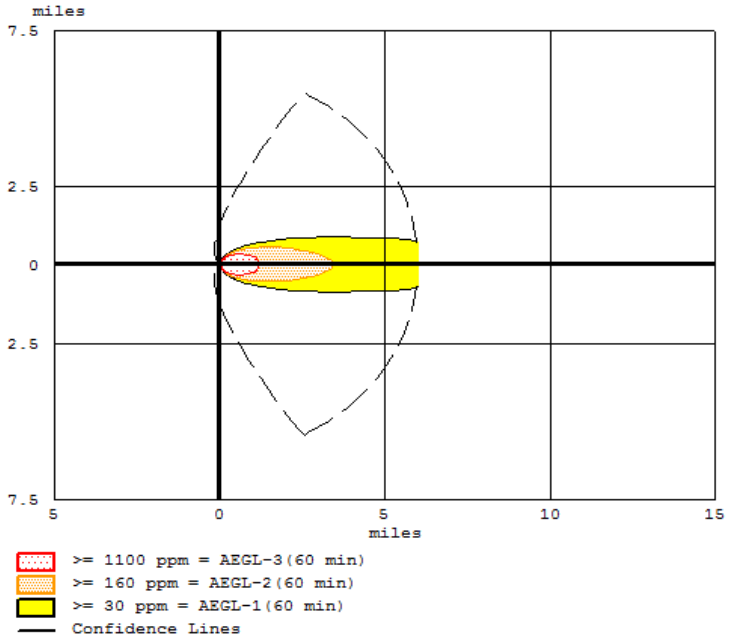
The source of the chemical spill is a horizontal, cylindrical-shaped tank. The diameter of the tank was set to 10.4 feet and the length set to 53 feet (33,500 gallons). At the time of its release, it was estimated that the tank was 85% full. The Anhydrous Ammonia in this tank is in its liquid state.

This release was based on a leak from a 2.5 inch-diameter hole, 12 inches above the bottom of the tank. According to the ALOHA parameters, approximately 7,750 pounds of material would be released per minute. The image in Figure 5-38 depicts the plume footprint generated by ALOHA.

Figure 5-37: ALOHA Plume Modeling Parameters

```
SITE DATA:
  Location: CINCINNATI, OHIO
  Building Air Exchanges Per Hour: 0.40 (unsheltered single storied)
  Time: August 15, 2012  1434 hours EDT (user specified)

CHEMICAL DATA:
  Chemical Name: AMMONIA                  Molecular Weight: 17.03 g/mol
  AEGL-1(60 min): 30 ppm   AEGL-2(60 min): 160 ppm   AEGL-3(60 min): 1100 ppm
  IDLH: 300 ppm      LEL: 160000 ppm      UEL: 250000 ppm
  Ambient Boiling Point: -28.8° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 5 miles/hour from W at 10 meters
  Ground Roughness: open country          Cloud Cover: 5 tenths
  Air Temperature: 68° F                  Stability Class: B
  No Inversion Height                     Relative Humidity: 75%

SOURCE STRENGTH:
  Leak from hole in horizontal cylindrical tank
  Flammable chemical escaping from tank (not burning)
  Tank Diameter: 10.4 feet                Tank Length: 53 feet
  Tank Volume: 33500 gallons
  Tank contains liquid                    Internal Temperature: 68° F
  Chemical Mass in Tank: 72.5 tons        Tank is 85% full
  Circular Opening Diameter: 2.5 inches
  Opening is 12 inches from tank bottom
  Release Duration: 35 minutes
  Max Average Sustained Release Rate: 7,740 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 139,200 pounds
  Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:
  Model Run: Heavy Gas
  Red   : 1.2 miles --- (1100 ppm = AEGL-3(60 min))
  Orange: 3.4 miles --- (160 ppm = AEGL-2(60 min))
  Yellow: greater than 6 miles --- (30 ppm = AEGL-1(60 min))
```

Figure 5-38: Plume Footprint Generated by ALOHA



Acute Exposure Guideline Levels (AEGLs) are intended to describe the health effects on humans due to once-in-a-lifetime or rare exposure to airborne chemicals. The National Advisory Committee for AEGLs is developing these guidelines to help both national and local authorities, as well as private companies, deal with emergencies involving spills or other catastrophic exposures. As the substance moves away from the source, the level of substance concentration decreases. Each color-coded area depicts a level of concentration measured in parts per million (ppm). The image in Figure 5-39 depicts the plume footprint generated by ALOHA in ArcGIS.

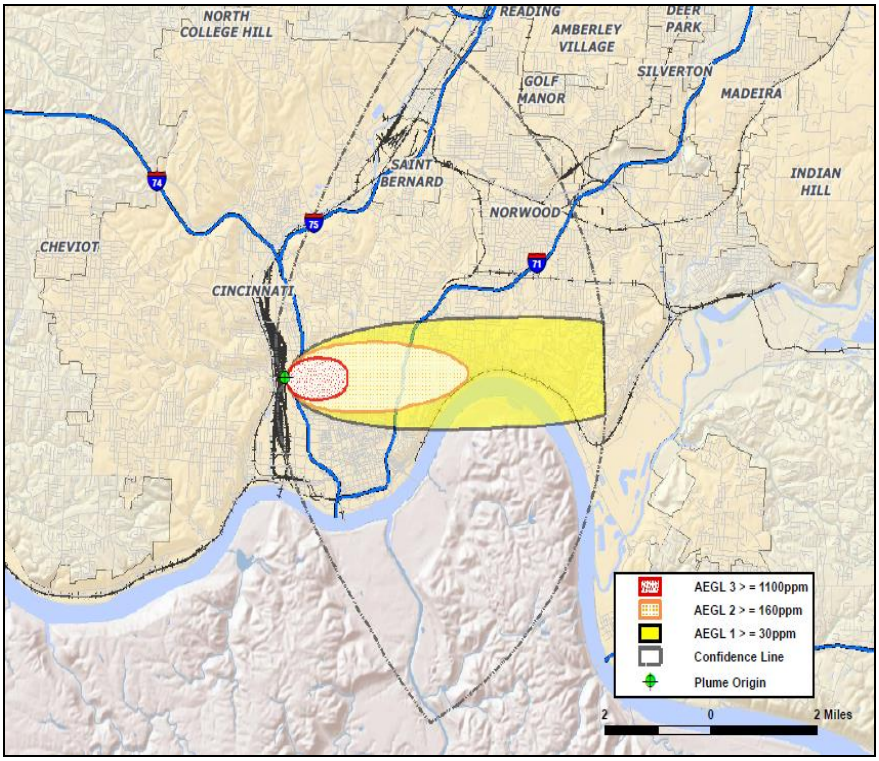
- **AEGL 3:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death. The red buffer (>=1100 ppm) extends no more than 4.8 miles from the point of release after one hour.

- **AEGL 2:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. The orange buffer (>=160 ppm) extends no more than six miles from the point of release after one hour.

- **AEGL 1:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure. The yellow buffer (>=30 ppm) extends more than six miles from the point of release after one hour.

- **Confidence Lines:** The dashed lines depict the level of confidence in which the exposure zones will be contained. The ALOHA model is 95% confident that the release will stay within this boundary.

Figure 5-39: ALOHA Plume Footprint Overlaid in ArcGIS

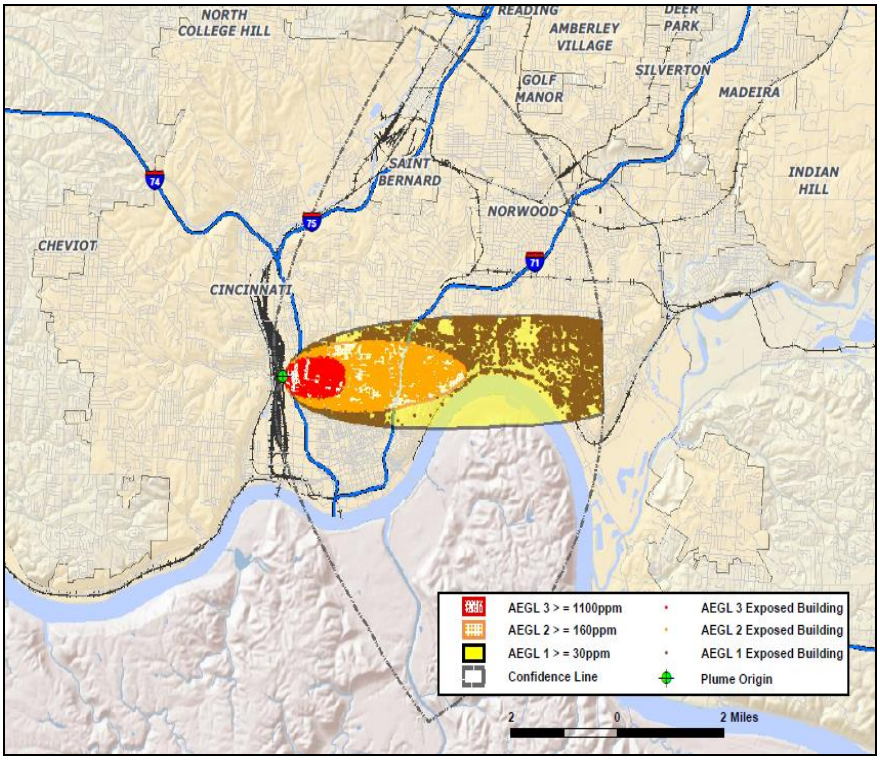


Results

By summing the building inventory within all AEGL exposure levels (Level 3: > =1100 ppm, Level 2: > = 160 ppm and Level 1: > = 30 ppm.), the GIS overlay analysis predicts that as many as 11,319 buildings could be exposed at a replacement cost of $2,465,489. The overlay was performed against parcels provided by Hamilton County that were joined with Assessor records showing property improvement. The location of buildings affected by the plume footprint is depicted in Figure 5-40. If this event were to occur, approximately 24,483 people would be affected.

The Assessor records often do not contain values for many critical facilities because those parcels are not taxable. For purposes of analysis, only buildings on taxable properties are included.

Figure 5-40: Hamilton County Building Inventory Classified By Plume Footprint



Building Inventory Exposure

The results of the analysis against the Building Inventory points are depicted in Tables 5-48 through 5-51. Table 5-48 summarizes the results of the chemical spill by combining all AEGL levels. Tables 5-49 through 5-51 summarize the results of the chemical spill for each level separately.

Table 5-48: Estimated Exposure for all AEGL Levels (all ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	24,483	9,793	$1,313,545,000
Commercial	0	1,056	$444,711,000
Industrial	0	184	$210,157,000
Agriculture	0	0	$0
Religious	0	106	$54,981,000
Government	0	137	$310,857,000
Education	0	43	$131,238,000
Total	24,483	11,319	$2,465,489,000

Table 5-49: Estimated Exposure for AEGL Level 3 (>=1100 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	3,950	1,580	$136,484,000
Commercial	0	122	$33,922,000
Industrial	0	52	$49,125,000
Agriculture	0	0	$0
Religious	0	4	$2,126,000
Government	0	16	$2,962,000
Education	0	0	$0
Total	3,950	1,774	$224,618,000

Table 5-50: Estimated Exposure for AEGL Level 2 (>=160 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	7,373	2,949	$449,383,000
Commercial	0	470	$238,792,000
Industrial	0	86	$108,481,000
Agriculture	0	0	$0
Religious	0	56	$27,657,000
Government	0	56	$172,951,000
Education	0	16	$64,482,000
Total	7,373	3,633	$1,061,746,000

Table 5-51: Estimated Exposure for AEGL Level 1 (>=30 ppm)

Occupancy	Population	Building Counts	Building Exposure (thousands)
Residential	13,160	5,264	$727,678,000
Commercial	0	464	$171,997,000
Industrial	0	46	$52,551,000
Agriculture	0	0	$0
Religious	0	46	$25,198,000
Government	0	65	$134,944,000
Education	0	27	$66,757,000
Total	13,160	5,912	$1,179,125,000

Essential Facilities Exposure

There are 86 essential and critical facilities located within the limits of the chemical spill plume. The affected facilities are identified in Table 5-52. Figure 5-41 and Figure 5-42 shows the geographic location of some essential and critical facilities.

Table 5-52: Vulnerable Facilities within Plume Footprint

Airport
1. Christ Hospital
Care Facilities
1. Beechwood Home
2. Dual Manor Health Care Center
3. Lincoln Crawford Nursing/Rehab
4. Oak Pavilion Nursing Center
5. St. Margaret Hall - Nursing Home
6. Christ Hospital
7. Regency Hospital
8. Empress Home I
9. Empress Home Ii
10. Saint Margaret Hall Inc.
Hazmat Facilities
1. Deaconess Hospital
2. Duke Energy
3. F L Emmert Company
4. Frisch's Restaurants Inc.
5. Bethesda Oak Campus
6. Christ Hospital
7. Cincinnati Bell Wireless - UC
8. Kao Brands
9. Koi Warehouse, Inc.-Burbank
10. Liquid Transfer Term Ohio, Inc.
11. Porter Guertin Co.
12. Frisch's Restaurants Inc.
Electric Facility
1. U.C. Power Plant
Fire Station
1. Cincinnati Station 1
2. Cincinnati Station 19
3. Cincinnati Station 23

School Facilities
1. Aldersgate Christian High
2. Rothenberg Prep Elementary
3. St. Francis Desales School - Cincinnati
4. Mercy Montessori Center
5. Purcell-Marian High
6. St. Ursula Academy
7. Christ Emmanuel Christian Academy
8. Dohn Community High
9. Life Skills Center Of Cincinnati
10. Frederick Douglass Elementary
11. Hoffman-Parham Elementary
12. Parham Elementary
13. Summit Country Day High
14. Springer School & Center
15. W.E.B. Dubois High
16. King Academy Community
17. Corryville Catholic School
18. Mt Auburn International Academy
19. Hillcrest South Jr. High
20. Schiel Primary School for Arts Enrichment
21. William H Taft Elementary
22. Hughes Center High
23. Cardinal Pacelli Elementary
24. Riverview East Elementary
25. Academy Of World Languages Elementary
26. Cincinnati Speech & Reading Intervention
27. Frederick Douglass Elementary
28. Hughes Stem High School
29. Seven Hills School

Communication Facilities
1. 810 Delta Ave
2. 45 West Daniels St
3. 1601 Madison
4. 615 Elsinore Place
5. 311 Straight St
6. 3534 Eastern Ave
7. 2523 Essex Pl
8. 421 Wilkinson St
9. 2223 Fowler St
10. Cincinnati Bell, 240 Calhoun St
11. Cincinnati Bell, 2139 Auburn Ave
12. Cincinnati Bell, 3435 Golden Ave
13. Cincinnati Bell, 490 East McMillan
14. Cincinnati Bell, 861-A Beecher St
15. Cincinnati Bell, 318 College Dr.
16. Cincinnati Bell, 810 Delta Ave
17. Cincinnati Bell, 45 West Daniels
18. Cincinnati Bell, 1601 Madison
19. Cincinnati Bell, 615 Elsinore Place
20. Cincinnati Bell, 311 Straight St
21. 3534 Eastern Ave
22. 2523 Essex Pl
23. 421 Wilkinson St
24. 2223 Fowler St
25. 240 Calhoun Street
26. 2139 Auburn Ave
27. 3435 Golden Avenue
28. 490 East McMillan
29. 861-A Beecher St
30. 318 College Dr.

Figure 5-41: Vulnerable Facilities within Plume Footprint

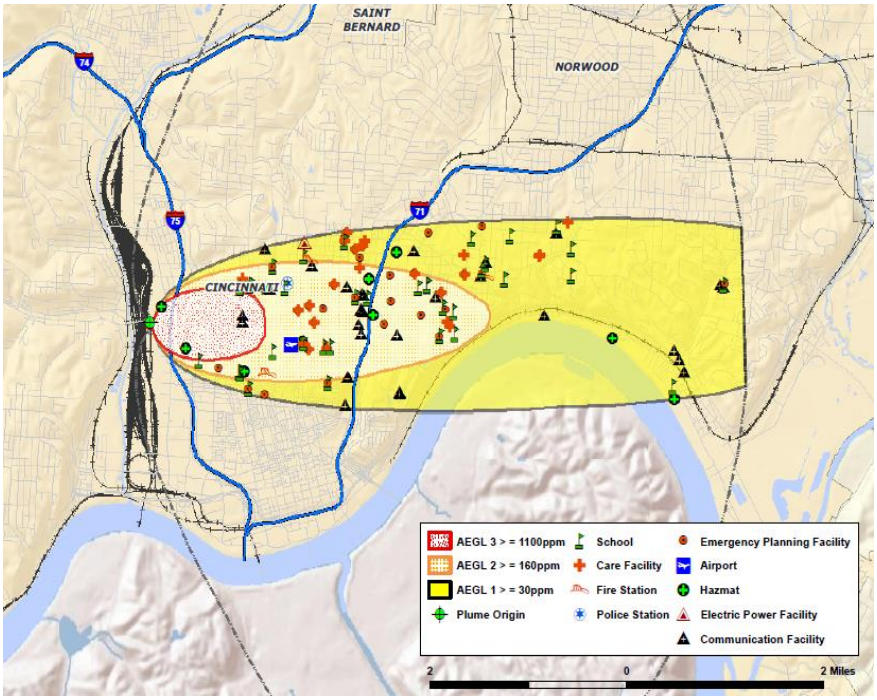
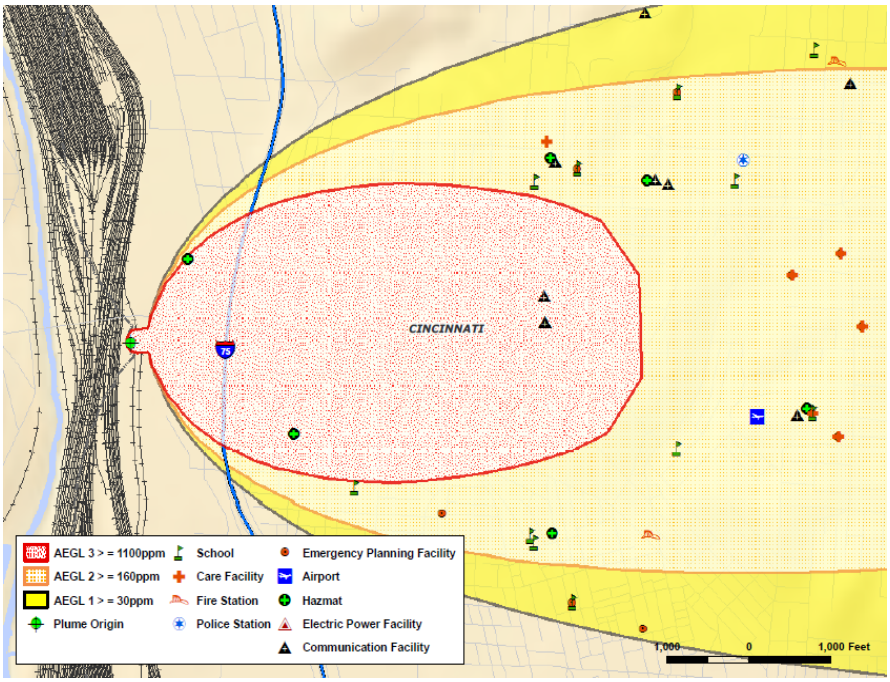


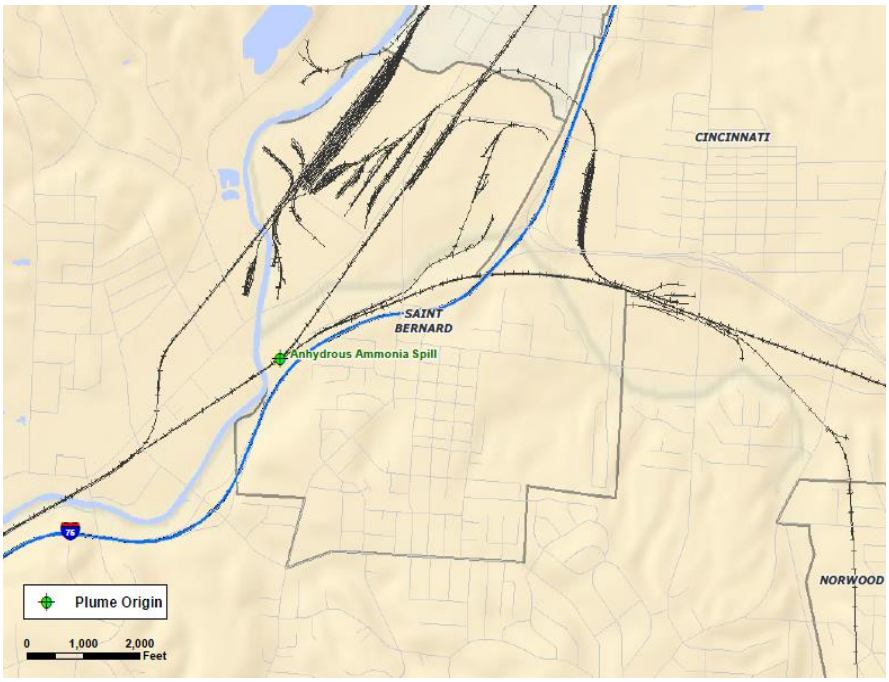
Figure 5-42: Vulnerable Facilities at Greatest Risk



Hazmat Scenario 2: St. Bernard

For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area was chosen due to its proximity to the residential and commercial locations. The geographic area covered in this analysis is depicted in Figure 5-43.

Figure 5-43: Location of Chemical Release



The ALOHA atmospheric modeling parameters, depicted in Figure 5-44, were based upon a westerly wind speed of 5 mph. The temperature was 68°F with 75% humidity and 5 tenths of cloud covered skies.

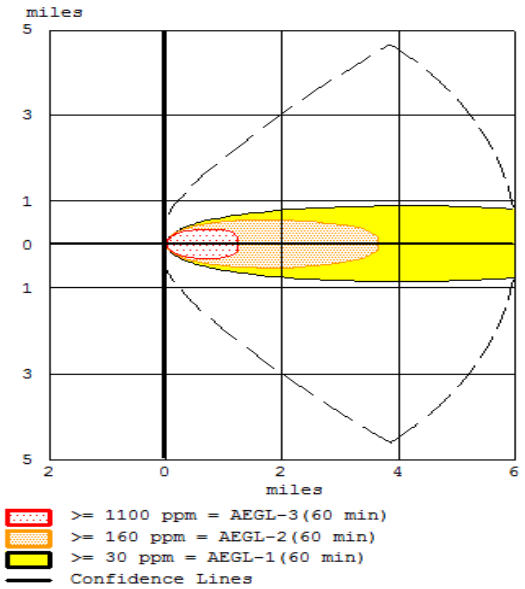
The source of the chemical spill is a horizontal, cylindrical-shaped tank. The diameter of the tank was set to 10.4 feet and the length set to 53 feet (33,500 gallons). At the time of its release, it was estimated that the tank was 85% full. The Anhydrous Ammonia in this tank is in its liquid state.

This release was based on a leak from a 2.5 inch-diameter hole, 12 inches above the bottom of the tank. According to the ALOHA parameters, approximately 7,750 pounds of material would be released per minute. The image in Figure 5-45 depicts the plume footprint generated by ALOHA.

Figure 5-44: ALOHA Plume Modeling Parameters

```
SITE DATA:
  Location: SAINT BERNARD, OHIO
  Building Air Exchanges Per Hour: 0.39 (unsheltered single storied)
  Time: October 2, 2012  0912 hours EDT (user specified)

CHEMICAL DATA:
  Chemical Name: AMMONIA                  Molecular Weight: 17.03 g/mol
  AEGL-1(60 min): 30 ppm   AEGL-2(60 min): 160 ppm   AEGL-3(60 min): 1100 ppm
  IDLH: 300 ppm      LEL: 160000 ppm      UEL: 250000 ppm
  Ambient Boiling Point: -28.9° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 5 miles/hour from W at 10 meters
  Ground Roughness: open country          Cloud Cover: 5 tenths
  Air Temperature: 68° F                  Stability Class: C
  No Inversion Height                     Relative Humidity: 75%

SOURCE STRENGTH:
  Leak from hole in horizontal cylindrical tank
  Flammable chemical escaping from tank (not burning)
  Tank Diameter: 10.4 feet                Tank Length: 53 feet
  Tank Volume: 33500 gallons
  Tank contains liquid                    Internal Temperature: 68° F
  Chemical Mass in Tank: 72.5 tons        Tank is 85% full
  Circular Opening Diameter: 2.5 inches
  Opening is 12 inches from tank bottom
  Release Duration: 35 minutes
  Max Average Sustained Release Rate: 7,750 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 139,200 pounds
  Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:
  Model Run: Heavy Gas
  Red   : 1.2 miles --- (1100 ppm = AEGL-3(60 min))
  Orange: 3.7 miles --- (160 ppm = AEGL-2(60 min))
  Yellow: greater than 6 miles --- (30 ppm = AEGL-1(60 min))
```

Figure 5-45: Plume Footprint Generated by ALOHA



Acute Exposure Guideline Levels (AEGLs) are intended to describe the health effects on humans due to once-in-a-lifetime or rare exposure to airborne chemicals. The National Advisory Committee for AEGLs is developing these guidelines to help both national and local authorities, as well as private companies, deal with emergencies involving spills or other catastrophic exposures. As the substance moves away from the source, the level of substance concentration decreases. Each color-coded area depicts a level of concentration measured in parts per million (ppm). The image in Figure 5-46 depicts the plume footprint generated by ALOHA in ArcGIS.

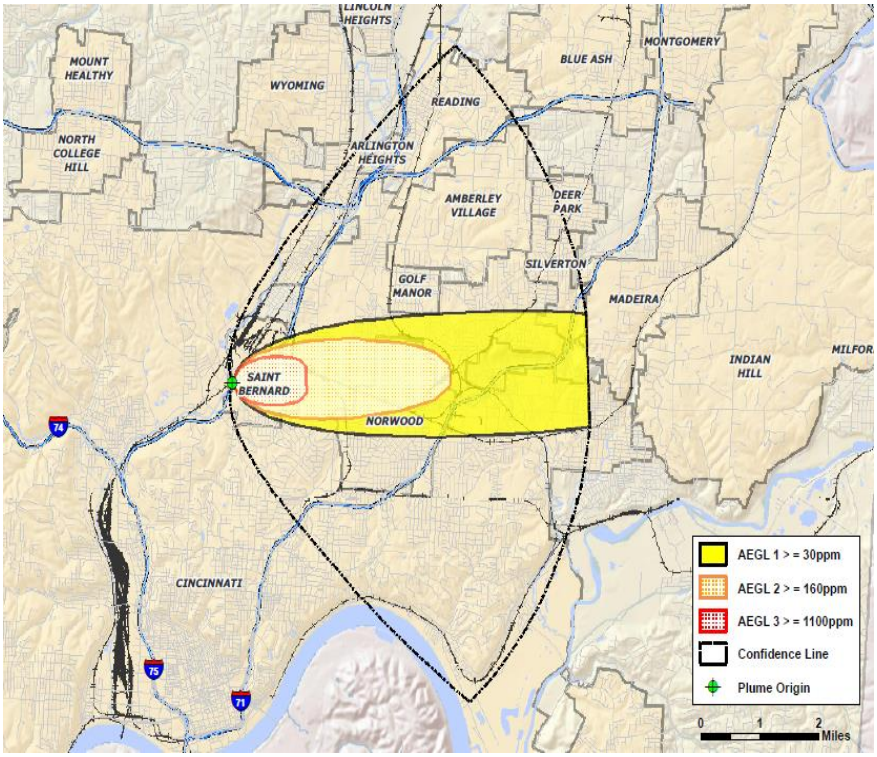
- **AEGL 3:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death. The red buffer (>=1100 ppm) extends no more than 4.8 miles from the point of release after one hour.

- **AEGL 2:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. The orange buffer (>=160 ppm) extends no more than six miles from the point of release after one hour.

- **AEGL 1:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure. The yellow buffer (>=30 ppm) extends more than six miles from the point of release after one hour.

- **Confidence Lines:** The dashed lines depict the level of confidence in which the exposure zones will be contained. The ALOHA model is 95% confident that the release will stay within this boundary.

Figure 5-46: ALOHA Plume Footprint Overlaid in ArcGIS

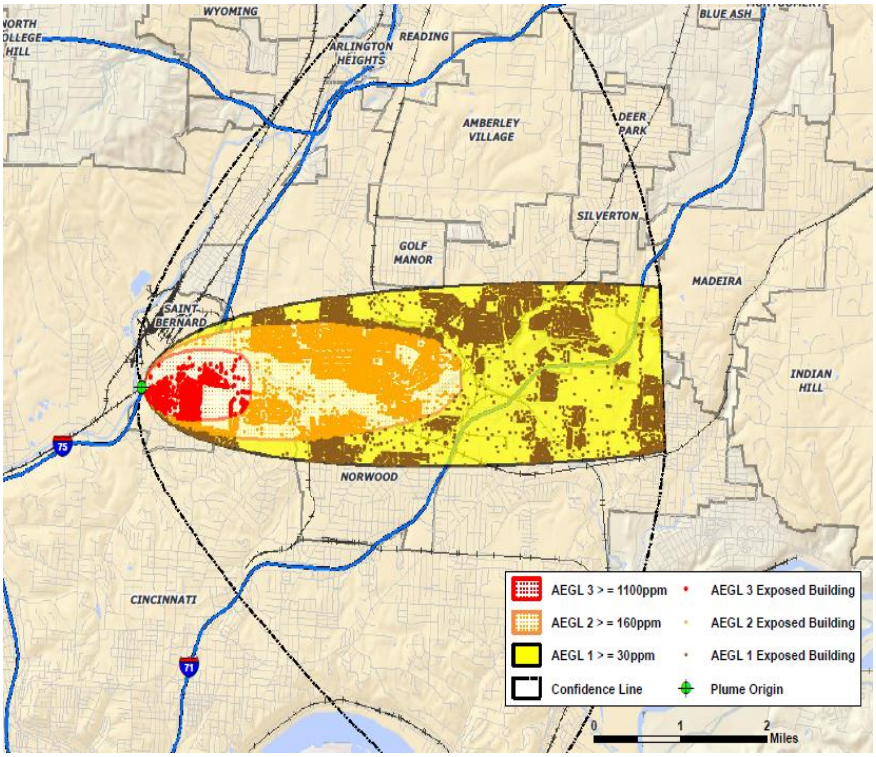


Results

By summing the building inventory within all AEGL exposure levels (Level 3: > =1100 ppm, Level 2: > = 160 ppm and Level 1: > = 30 ppm.), the GIS overlay analysis predicts that as many as 11,769 buildings could be exposed at a replacement cost of $2,851,256 The overlay was performed against parcels provided by Hamilton County that were joined with Assessor records showing property improvement. The location of buildings affected by the plume footprint is depicted in Figure 5-46. If this event were to occur, approximately 27,260 people would be affected.

The Assessor records often do not contain values for many critical facilities because those parcels are not taxable. For purposes of analysis, only buildings on taxable properties are included.

Figure 5-46: Hamilton County Building Inventory Classified By Plume Footprint



Building Inventory Exposure

The results of the analysis against the Building Inventory points are depicted in Tables 5-53 through 5-56 Table 5-53 summarizes the results of the chemical spill by combining all AEGL levels. Tables 5-54 through 5-56 summarize the results of the chemical spill for each level separately.

Table 5-53: Estimated Exposure for all AEGL Levels (all ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	27,260	10,904	$1,202,037,000
Commercial	0	478	$474,134,000
Industrial	0	219	$980,548,000
Agriculture	0	5	$5,855,000
Religious	0	51	$47,582,000
Government	0	91	$80,126,000
Education	0	21	$60,973,000
Total	27,260	11,769	$2,851,256,000

Table 5-54: Estimated Exposure for AEGL Level 3 (>=1100 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	23	9	$732,000
Commercial	0	1	$881,000
Industrial	0	0	$0
Agriculture	0	0	$0
Religious	0	0	$0
Government	0	0	$0
Education	0	0	$0
Total	23	10	$1,613,000

Table 5-55: Estimated Exposure for AEGL Level 2 (>=160 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	13,828	5,531	$564,128,000
Commercial	0	212	$110,221,000
Industrial	0	108	$342,253,000
Agriculture	0	0	$0
Religious	0	20	$11,685,000
Government	0	33	$38,923,000
Education	0	9	$23,849,000
Total	13,828	5,913	$1,091,059,000

Table 5-56: Estimated Exposure for AEGL Level 1 (>=30 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	13,410	5,364	$637,177,000
Commercial	0	265	$363,032,000
Industrial	0	111	$638,295,000
Agriculture	0	5	$5,855,000
Religious	0	31	$35,897,000
Government	0	58	$41,203,000
Education	0	12	$37,124,000
Total	13,410	5,846	$1,758,584,000

Essential and Critical Facilities Exposure

There are 82 vulnerable facilities within the limits of the chemical spill plume. The affected facilities are identified in Table 5-57. Their geographic locations are depicted in Figures 5-47 and 5-48.

Table 5-57: Vulnerable Facilities within Plume Footprint

Emergency Planning Facilities
1. Hamilton County Learning Center
2. Kiddy Kare Learning Center Inc
3. Loving Arms Day Care Center Inc
4. Small World Preschool & Day Care
5. Under The Sea Childcare LLC
6. Youthland Academy Of Norwood
Fire Stations
1. Cincinnati Fire Station 8
2. Norwood Station 82
3. Madisonville Station 49
4. St Bernard Station 91
School Facilities
1. Holy Trinity School
2. Norwood View Elementary
3. Norwood Middle
4. Norwood High
5. Nativity School
6. St Bernard Elementary
7. St Bernard-Elmwood Place High
8. Shroder High
9. P.A.C.E. High
10. Horizon Science Academy Cincinnati
11. St. Aloysius Educational Center
12. Bond Hill Academy Elementary
13. Pleasant Ridge Montessori School

Schools (continued)
14. T.C.P. World Academy Elementary
15. Seven Hills School
16. John P Parker Elementary
17. Brown Mackie College
18. ITT Technical Institute
Police Stations
1. Norwood Police Department
2. Saint Bernard Police Department
Rail Facilities
1. USCO Distribution
Dams
1. Eastwood Industrial
Bus Facility
1. Access Services & MV Transportation
Wastewater Facility
1. Procter & Gamble
Care Facilities
1. Victoria Retirement Community
2. Victory Park Nursing Home
3. Bethesda Care - Norwood
4. Braxton Cann Medical Center VFC Clinic -
5. Centerpoint Health - Madison Road
6. Concentra Urgent Care- Wesley Avenue
7. DCA of Norwood, LLC
8. Indian Spring of Oakely

Care Facilities (continued)
9. Pleasant Ridge Care Center -
10. Norwood City Health Department
11. Norwood Health Center
12. Public Safety Medical Services
13. St. Bernard Health Department
14. Take Care Clinic (Walgreens) - Norwood
15. Tri-Health Senior Link - Clinic
16. Tri-state Urgent Care - Oakley/Hyde Park
17. Able Manor Home
18. Bridgewell Hospital
19. Victoria Retirement Community
20. 4515 Tower St
21. 3040 Forrer Ave
22. 4950 Para Dr
23. 6000 Plainfield Rd
24. 5945 Montgomery Road
25. 4900 Franklin Ave
26. 5361 Kennedy Ave

Care Facilities (continued)
27. 5945 Montgomery Rd
28. 4925 Para Dr
29. 1010 Laidlaw Ave
30. 6000 Plainfield Rd
31. Eagle Ct
32. 3301-3399 Highland Ave
33. 2064-2098 Foraker Ave
34. 3010 Duck Creek Rd
35. 4773 Poplar St
36. 4613-4623 Red Bank Rd
37. 112 McCelland Ave
38. 4515 Tower Ave
39. 5945 Montgomery Rd
40. 5917 Prentice St
41. 1703 Dale Road
42. 4612 Paddock Rd
43. 2250 Park Ave
44. 5030 Duck Creek Rd
45. 202 McClelland Ave
46. 4620 Reading Rd

Figure 5-47: Critical Facilities within Plume Footprint

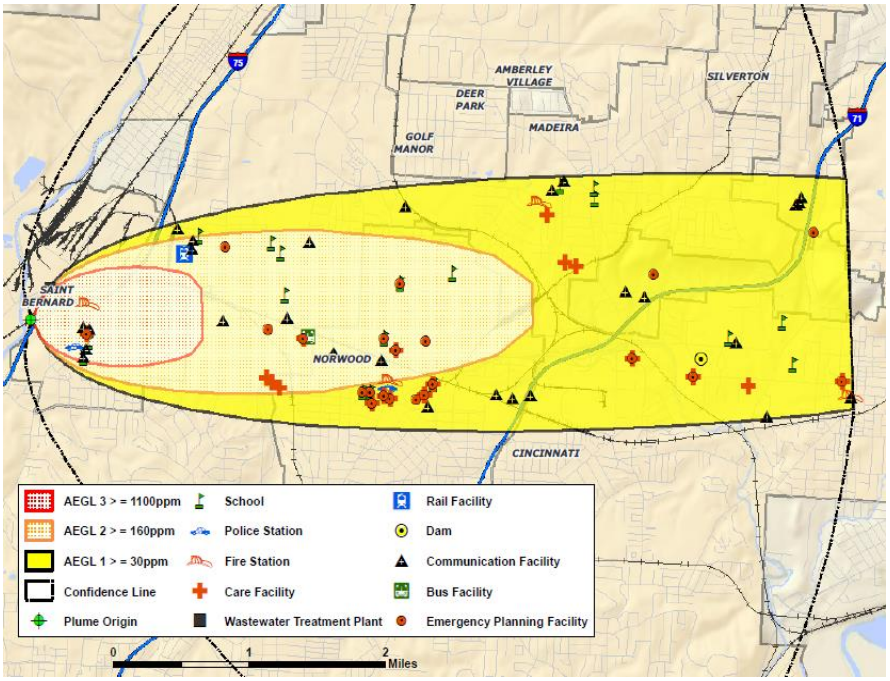
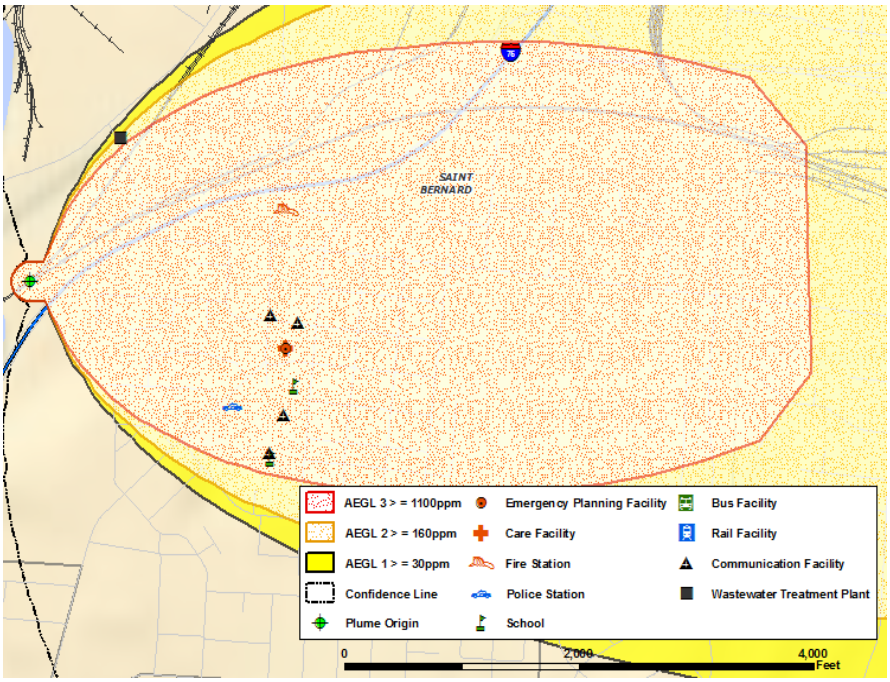


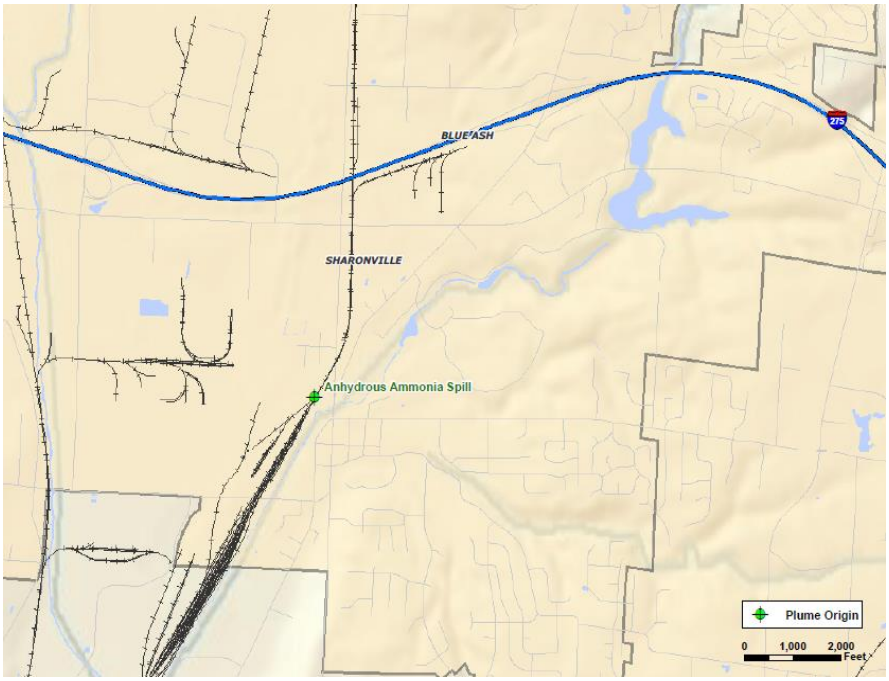
Figure 5-48: Critical Facilities at Greatest Risk



Hazmat Scenario 3: Sharonville

For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area was chosen due to its proximity to the residential and commercial locations. The geographic area covered in this analysis is depicted in Figure 5-49.

Figure 5-49: Location of Chemical Release



Analysis

The ALOHA atmospheric modeling parameters, depicted in Figure 5-50, were based upon a westerly wind speed of 5 mph. The temperature was 68°F with 75% humidity and 5 tenths of cloud covered skies.

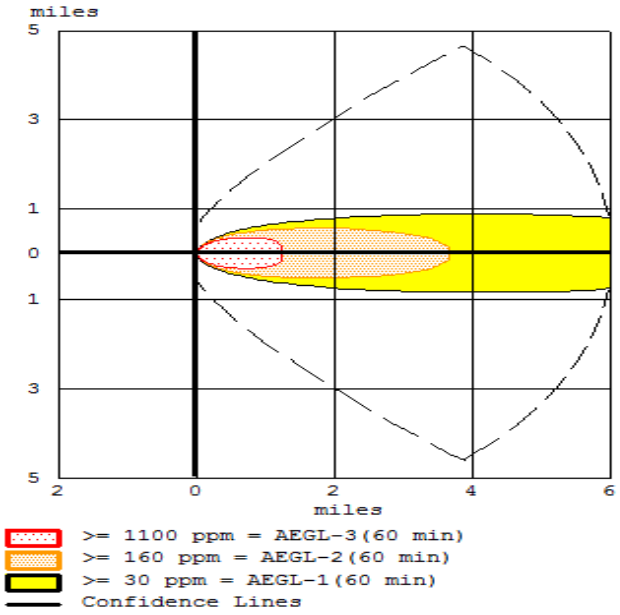
The source of the chemical spill is a horizontal, cylindrical-shaped tank. The diameter of the tank was set to 10.4 feet and the length set to 53 feet (33,500 gallons). At the time of its release, it was estimated that the tank was 85% full. The Anhydrous Ammonia in this tank is in its liquid state.

This release was based on a leak from a 2.5 inch-diameter hole, 12 inches above the bottom of the tank. According to the ALOHA parameters, approximately 7,750 pounds of material would be released per minute. The image in Figure 5-51 depicts the plume footprint generated by ALOHA.

Figure 5-50: ALOHA Plume Modeling Parameters

```
SITE DATA:
  Location: SHARONVILLE, OHIO
  Building Air Exchanges Per Hour: 0.39 (unsheltered single storied)
  Time: October 3, 2012  0912 hours EDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: AMMONIA                  Molecular Weight: 17.03 g/mol
  AEGL-1(60 min): 30 ppm   AEGL-2(60 min): 160 ppm   AEGL-3(60 min): 1100 ppm
  IDLH: 300 ppm      LEL: 160000 ppm      UEL: 250000 ppm
  Ambient Boiling Point: -29.0° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 5 miles/hour from W at 10 meters
  Ground Roughness: open country          Cloud Cover: 5 tenths
  Air Temperature: 68° F                  Stability Class: C
  No Inversion Height                     Relative Humidity: 75%

SOURCE STRENGTH:
  Leak from hole in horizontal cylindrical tank
  Flammable chemical escaping from tank (not burning)
  Tank Diameter: 10.4 feet                Tank Length: 53 feet
  Tank Volume: 33500 gallons
  Tank contains liquid                    Internal Temperature: 68° F
  Chemical Mass in Tank: 72.5 tons        Tank is 85% full
  Circular Opening Diameter: 2.5 inches
  Opening is 12 inches from tank bottom
  Release Duration: 35 minutes
  Max Average Sustained Release Rate: 7,750 pounds/min
     (averaged over a minute or more)
  Total Amount Released: 139,200 pounds
  Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:
  Model Run: Heavy Gas
  Red   : 1.3 miles --- (1100 ppm = AEGL-3(60 min))
  Orange: 3.7 miles --- (160 ppm = AEGL-2(60 min))
  Yellow: greater than 6 miles --- (30 ppm = AEGL-1(60 min))
```

Figure 5-51: Plume Footprint Generated by ALOHA



Acute Exposure Guideline Levels (AEGLs) are intended to describe the health effects on humans due to once-in-a-lifetime or rare exposure to airborne chemicals. The National Advisory Committee for AEGLs is developing these guidelines to help both national and local authorities, as well as private companies, deal with emergencies involving spills or other catastrophic exposures. As the substance moves away from the source, the level of substance concentration decreases. Each color-coded area depicts a level of concentration measured in parts per million (ppm). The image in Figure 5-52 depicts the plume footprint generated by ALOHA in ArcGIS.

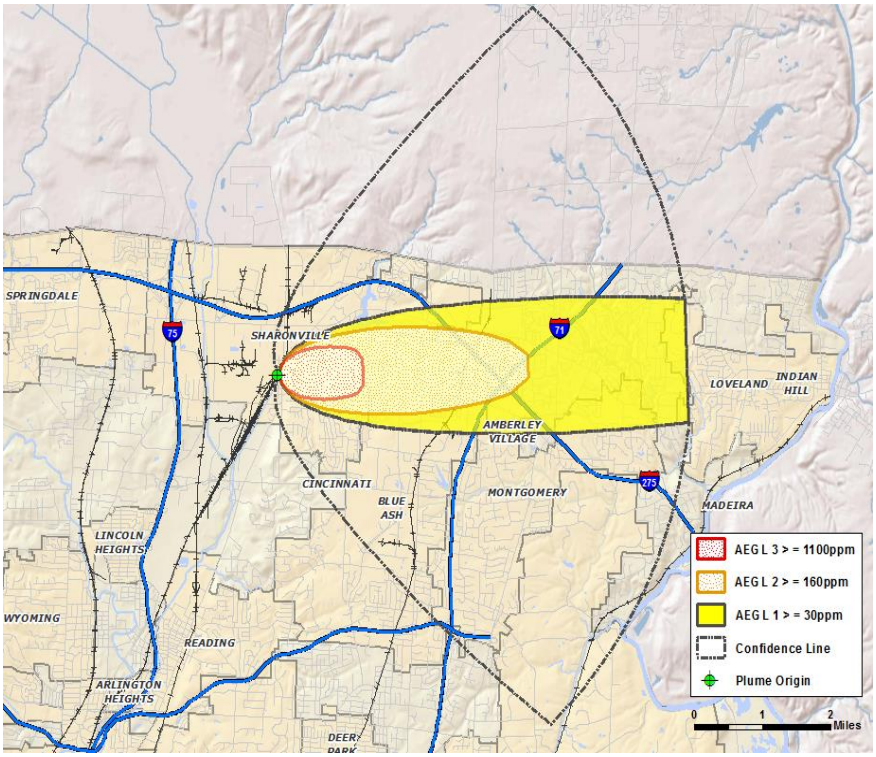
- **AEGL 3:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death. The red buffer (>=1100 ppm) extends no more than 4.8 miles from the point of release after one hour.

- **AEGL 2:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. The orange buffer (>=160 ppm) extends no more than six miles from the point of release after one hour.

- **AEGL 1:** Above this airborne concentration of a substance, it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure. The yellow buffer (>=30 ppm) extends more than six miles from the point of release after one hour.

- **Confidence Lines:** The dashed lines depict the level of confidence in which the exposure zones will be contained. The ALOHA model is 95% confident that the release will stay within this boundary.

Figure 5-52: ALOHA Plume Footprint Overlaid in ArcGIS

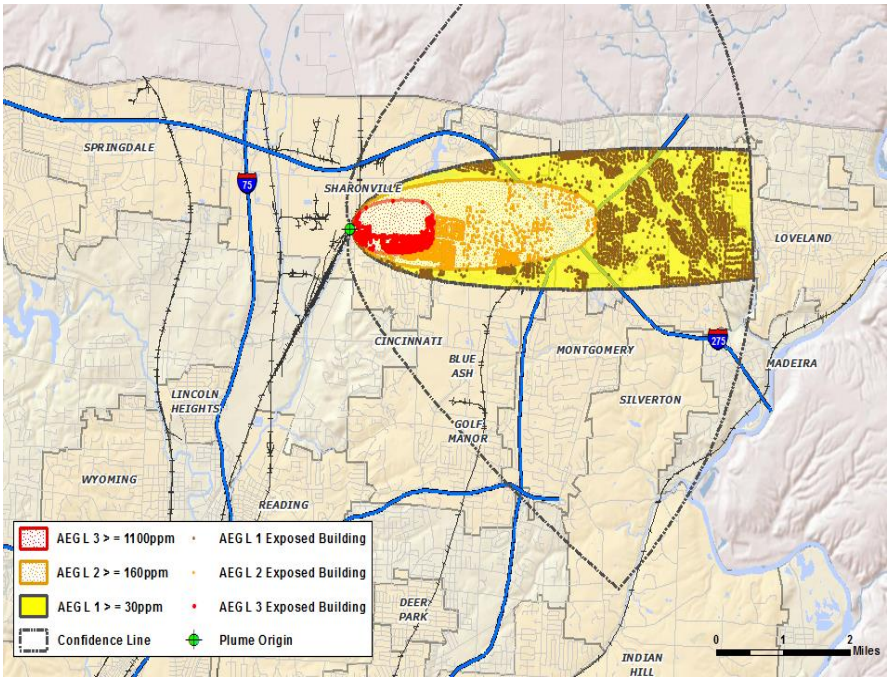


Results

By summing the building inventory within all AEGL exposure levels (Level 3: > =1100 ppm, Level 2: > = 160 ppm and Level 1: > = 30 ppm.), the GIS overlay analysis predicts that as many as 4,010 buildings could be exposed at a replacement cost of $1,774,917. The overlay was performed against parcels provided by Hamilton County that were joined with Assessor records showing property improvement. The location of buildings affected by the plume footprint is depicted in Figure 5-53. If this event were to occur, approximately 8,790 people would be affected.

The Assessor records often do not contain values for many critical facilities because those parcels are not taxable. For purposes of analysis, only buildings on taxable properties are included.

Figure 5-53: Hamilton County Building Inventory Classified By Plume Footprint



Building Inventory Exposure

The results of the analysis against the Building Inventory points are depicted in Tables 5-58 through 5-61. Table 5-58 summarizes the results of the chemical spill by combining all AEGL levels. Tables 5-59 through 5-61 summarize the results of the chemical spill for each level separately.

Table 5-58: Estimated Exposure for all AEGL Levels (all ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	8,790	3,516	$669,886,000
Commercial	0	204	$353,876,000
Industrial	0	199	$599,154,000
Agriculture	0	1	$91,000
Religious	0	22	$27,434,000
Government	0	53	$45,359,000
Education	0	15	$79,118,000
Total	8,790	4,010	$1,774,917,000

Table 5-59: Estimated Exposure for AEGL Level 3 (>=1100 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	1,090	436	$47,682,000
Commercial	0	14	$5,655,000
Industrial	0	0	$0
Agriculture	0	0	$0
Religious	0	4	$2,478,000
Government	0	3	$7,412,000
Education	0	4	$5,591,000
Total	1,090	461	$68,819,000

Table 5-60: Estimated Exposure for AEGL Level 2 (>=160 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	1,338	535	$106,175,000
Commercial	0	104	$156,826,000
Industrial	0	145	$404,464,000
Agriculture	0	0	$0
Religious	0	3	$792,000
Government	0	25	$27,457,000
Education	0	1	$1,012,000
Total	1,338	813	$696,726,000

Table 5-61: Estimated Exposure for AEGL Level 1 (>=30 ppm)

Occupancy	Population	Building Counts	Building Exposure
Residential	6,363	2,545	$516,029,000
Commercial	0	86	$191,395,000
Industrial	0	54	$194,690,000
Agriculture	0	1	$91,000
Religious	0	15	$24,163,000
Government	0	25	$10,490,000
Education	0	10	$72,515,000
Total	6,363	2,736	$1,009,373,000

Essential and Critical Facilities Exposure

There are 78 vulnerable facilities within the limits of the chemical spill plume. The affected facilities are identified in Table 5-62. Their geographic locations are depicted in Figures 5-54 and 5-55.

Table 5-62: Vulnerable Facilities within Plume Footprint

Emergency Planning Facility
1. A Child's Frontier
2. All About Kids Childcare & Learning
3. Kinder Garden School
4. Kindercare Learning Center
5. Kindercare Learning Center #1561
Care Facility
1. Bethesda Care - Blue Ash
Fire Station
1. Loveland/Symmes Station 61
2. Sharonville Station 87
3. Sycamore Station 93
Communication Facility
1. 7745 E Kemper Rd
2. 6170 Interstate Cir
3. 11355 Swing Rd
4. 11680 Grooms Rd
5. 11465 Deerfield Rd
6. 11399 Tamarco Dr
7. 11260 Williamson Rd
8. 11268 Williamson Rd
9. 5600 Cornell Rd
10. 11432-11448 Brooks Creek Dr
11. 11352 Reed-Hartmann Hwy
12. 7315 Cornell Rd
13. 11745 Solzman Rd

Communication (continued)
14. 11080 Thornview Dr
15. 122 Commerce Dr
Rail Facility
1. Commonwealth, Inc.-Cincinnati
Wastewater Facility
1. Timber Ridge Apartments
Dam
1. Sharonville Retention Dam
2. Sharon Lake Dam
3. Paulmeadows Lake Dam
4. Burger Lake Dam
5. Cornell Park Dam
6. Gate Of Heaven Cemetery Lake Dam
7. Kreis Dam - Sharon Lake
School
1. Symmes Elementary
2. Sycamore High
3. St. Michael Catholic School
4. Sharonville Elementary
5. Schilling School For Gifted Children
6. Cincinnati Hills Christian Academy Elem
7. Cincinnati Hills Christian Academy Middle Sch
8. Cincinnati Hills Christian Academy High Sch
9. Stewart Elementary

Hazardous Material Facilities
1. Schmitt Marble Inc.
2. Da-Lite Screen Co. Inc. Polacoat Div.
3. Da-Lite Screen Co. Inc. Polacoat Div.
4. Fibre Glass - Evercoat
5. Feintool Cincinnati Inc.
6. J. W. Harris Co. Inc.
7. Trans-Acc Inc.
8. Flint Ink Corp. Drew Graphics Div.
9. GKN Aerospace
10. Archway Sales, Inc
11. Cincinnati Bell Technology Solutions
12. Moore Wallace North America, Rr Donnelle
13. Nash Finch Company Cincinnati Distribution
14. Da-Lite Screen Co
15. Duke Energy
16. Procter & Gamble Co
17. Time Warner Cable OH2
18. Cincinnati Bell Telephone - Evendale
19. Cincinnati Bell Telephone - Lvldohev
20. Cincinnati Bell Telephone - Montgomery
21. Environmental Protection Lockheed Martin
22. Equistar Chemicals LP
23. Fedex Express Corporation Oxda
24. Fedex Express-Cvgrc
25. Feintool Cincinnati Inc

Hazmat (continued)
26. Franklynn Industries, Inc.
27. Green Bay Packaging, Inc. Cincinnati Div
28. Hewlett Packard Co - Blue Ash
29. Hewlett-Packard Blue Ash Data Center
30. JPs Technologies, Inc.
31. Trans-Acc, Inc.
32. Woodlawn Rubber Co

Figure 5-54: Critical Facilities within Plume Footprint

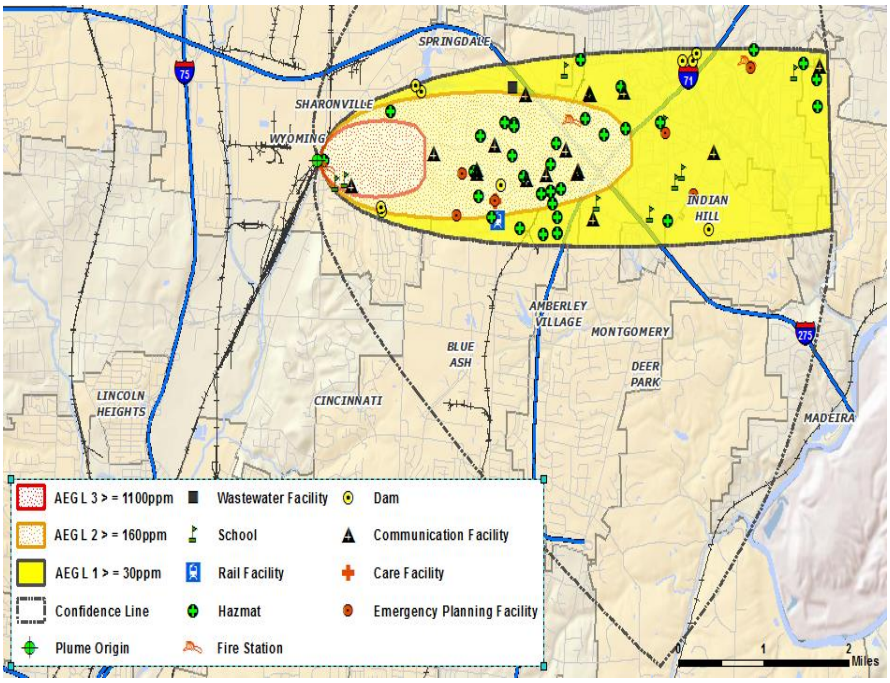
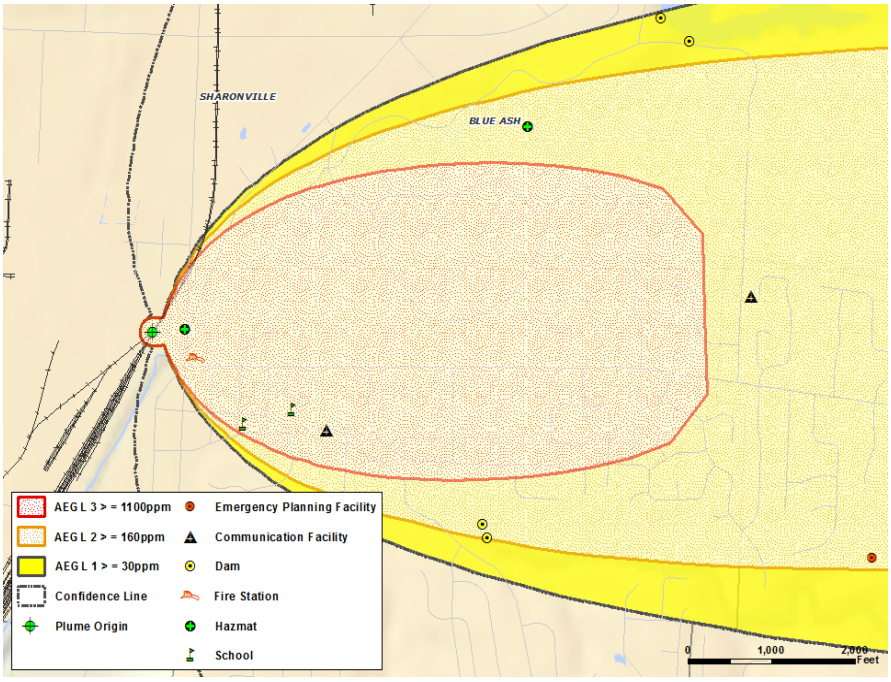


Figure 5-55: Critical Facilities at Greatest Risk



5.3.9 Fire Hazard

Fires constitute a much larger problem than is generally known. Deaths and injuries from all natural disasters combined—floods, hurricanes, tornados, earthquakes, etc.—are just a fraction of the annual casualties from fire. For example, deaths from natural disasters average just under 200 per year, versus approximately 4,000 deaths from fires.[3]

This plan will identify four major categories of fires within the county: tire/scrap fires, structural fires, wildfires, and arson.

Tire Fires

The State of Ohio generates more than 12 million scrap tires annually. Many of those scrap tires end up in approved storage sites that are carefully regulated and controlled by federal and state officials. Scrap tires, however, sometimes are dumped intentionally in unapproved locations throughout the State. There are four registered scrap tire transporters in Hamilton County; however, there are no licensed locations for tire disposal and storage. The number of unlicensed locations cannot be readily determined. These illegal sites are owned by private residents who continually have been dumping waste and refuse, including scrap tires, at those locations for many years.

Tire disposal sites can be fire hazards, in large part, because of the enormous number of scrap tires typically present at one site. This large amount of fuel renders standard firefighting practices nearly useless. Flowing and burning oil released by the scrap tires can spread the fire to adjacent areas. Tire fires differ from conventional fires in the following ways:

- Relatively small tire fires can require significant fire resources to control and extinguish.
- Those resources often cost much more than Hamilton County government can absorb, compared to standard fire responses.
- There may be significant environmental consequences of a major tire fire. Extreme heat can convert a standard vehicle tire into approximately 2 gallons of oily residue that may leak into the soil or migrate to streams and waterways.

Structural Fires

Lightning strikes, poor building construction, and building condition are the main causes for most structural fires in Ohio. Hamilton County has structural fires each year countywide.

Wildfires

Each year in Ohio, an average of 1,000 wildfires burn 4,000 to 6,000 acres of forest and grassland within Ohio's forest fire protection district. The fire protection district includes all 185,000 acres of Ohio's 20

[3] U.S. Fire Administration/National Fire Data Center. (2009) *Fire in the United States 2003-2007.* 15th ed. FEMA. FA-325

State Forests, as well as privately owned lands within the district boundaries, and corresponds mostly to the state's unglaciated hill country. Ohio's wildfire seasons occur primarily in the spring—March, April, and May—before vegetation has "greened-up", and in the fall—October and November—when leaf drop occurs. During these times, especially when weather conditions are warm, windy, and with low humidity, cured vegetation is particularly susceptible to burning. When combined, fuel, weather, and topography, present an unpredictable danger to unwary civilians and firefighters in the path of a wildfire.

Arson

It is important to note that arson is a contributing factor to fire-related incidents within the county. According the United States Fire Administration, an estimated average of 316,000 intentional fires are reported to fire departments in the United States each year, causing injuries to 7,825 firefighters and civilians. In addition to needless injury and death, an estimated $1.1 billion in direct property loss occurs annually.[4]

Summary Vulnerability Assessment

There is currently no accurate, available historical data for wildfires in Hamilton County. Between 2008 and 2012, the county recorded 6,896 structural fires at a loss of $88,162,113. This loosely translates to an average annual risk of approximately 1,380 buildings and $17,632,423 in buildings losses. Data about building occupancy type was not available, so it is unclear how many historically damaged buildings have been residential or essential facilities.

Previous Occurrences for Fire Hazard

The US Fire Administration reports the nation fire death rate in 2009 was 11.0 deaths per million, while the Ohio rate is slightly lower at 10.7 deaths per million.

The Division of State Fire Marshal provided the following reports (Tables 5-63 and 5-64 of Hamilton County fires from 2008 to 2012.

[4] U.S. Fire Administration. (2010). *Community Arson Prevention: National Arson Awareness Media Kit*. FEMA.

Table 5-63: Hamilton County Arson Fires

Year	Structure Fires	Vehicle Fires	Outside Fires	Total Fires	Dollar Loss	Civilian		Fire Service		% of All Fires
						Injuries	Deaths	Injuries	Deaths	
2008	194	165	33	392	$11,529,536	11	1	8	2	11.4%
2009	199	163	25	387	$6,504,331	14	3	7	0	12.6%
2010	221	165	38	436	$8,309,044	17	1	3	0	12.0%
2011	222	149	38	409	$7,445,499	23	3	17	0	14.2%
2012	210	167	44	421	$6,185,159	20	1	9	0	13.1%

Table 5-64: Hamilton County All Fires

Year	Structure Fires	Vehicle Fires	Other Fires	Total Fires	Dollar Loss	Civilian		Fire Service	
						Injuries	Deaths	Injuries	Deaths
2008	1,361	544	1,547	3,452	$22,189,280	88	13	23	2
2009	1,341	574	1,148	3,063	$13,781,322	61	4	19	0
2010	1,446	538	1,647	3,631	$18,651,630	77	5	12	0
2011	1,364	549	961	2,874	$20,028,992	57	7	25	0
2012	1,384	562	1,269	3,215	$13,510,889	61	3	17	0

Geographic Location for Fire Hazard

Fire hazards occur countywide and therefore affect the entire county. Communities with older wooden structures or structures in close proximity to one another are more vulnerable to structural fires.

Hazard Extent for Fire Hazard

The extent of the fire hazard varies in terms of the severity of the fire and the type of material being ignited. All communities in Hamilton County are equally affected by fire.

Risk Identification for Fire Hazard

The planning team determined that the probability of a fire hazard is medium and the potential impact is fairly minimal; therefore the overall risk of a fire hazard for Hamilton County is medium.

Vulnerability Analysis for Fire Hazard

This hazard impacts the entire jurisdiction equally; therefore the entire population and all buildings within the county are vulnerable to fires and can expect the same impacts within the affected area.

Names and locations of all essential facilities, critical facilities, and community assets are in Appendix G. Because of the difficulty predicting which communities are at risk, the entire population and all buildings have been identified at risk.

Facilities

All facilities are vulnerable to fire hazards. An essential or critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural damage from fire and water damage from efforts extinguishing fire. Names and locations of critical and essential facilities, as well as community assets, are found in Appendix G.

Building Inventory

Impacts to the general buildings within the county are similar to the damages expected to the critical facilities. These impacts include structural damage from fire and water damage from efforts to extinguish the fire.

Infrastructure

During a fire the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these items could become damaged during a fire. Potential impacts include structural damage resulting in impassable roadways and power outages.

Vulnerability to Future Assets/Infrastructure for Fire Hazard

Any future development in Hamilton County will be vulnerable to these events.

Analysis of Community Development Trends

Fire-hazard events may occur anywhere within the county; because of this, future development will be impacted.

5.3.10 Landslide Hazard

Landslides are a serious geologic hazard common to almost every state in the United States. It is estimated that nationally they cause up to $2 billion in damages and from 25 to 50 deaths annually. Globally, landslides cause billions of dollars in damage and thousands of deaths and injuries each year.

The term landslide is a general designation for a variety of downslope movements of earth materials. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly. Gravity is the force driving landslide movement. Factors that allow the force of gravity to overcome the resistance of earth material to landslide movement include: saturation by water, steepening of slopes by erosion or construction,

alternate freezing or thawing, earthquake shaking, and volcanic eruptions. There are three main types of landslides that occur in Ohio: 1) rotational slump, 2) earthflow, and 3) rockfall.

Rotational slumps are characterized by the movement of a mass of weak rock or sediment as a block unit along a curved slip plane. These slumps are the largest type of landslide in Ohio, commonly involving hundreds of thousands of cubic yards of material and extending for hundreds of feet. Rotational slumps may develop comparatively slowly and commonly require several months or even years to reach stability; however, on occasion, they may move rapidly, achieving stability in only a few hours.

Earthflows involve rock, sediment, or weathered surface materials moving downslope in a mass. While earthflows are the most common form of downslope movement in Ohio, they are comparatively smaller than rotational slumps. Characteristically, earthflows involve a weathered mass of rock or sediment that flow downslope as a jumbled mass, forming a hummocky topography of ridges and swales. Earthflows are most common in weathered surface materials and do not necessarily indicate weak rock. The rate of movement of an earthflow is generally quite slow.

Rockfalls are extremely rapid, and potentially dangerous, downslope movement of earth materials. Large blocks of massive bedrock may suddenly become detached from a cliff or steep hillside and travel downslope in a free fall and rolling, bounding, or sliding manner until a position of stability is achieved. Most rockfalls in Ohio involve massive beds of sandstone or limestone. Surface water seeps into joints or cracks in the rock, increasing its weight and causing expansion of joints in freezing temperatures, prying blocks of rock away from the main cliff. Weak and easily eroded clay or shale beneath the massive bed is an important contributing factor to rockfall.

Landslides are typically associated with periods of heavy rainfall or rapid snow melt, and tend to worsen the effects of flooding that often accompany these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides.

Summary Vulnerability Assessment

The University of Cincinnati conducted a landslide analysis. The summarized results are included in the following table.

Table 5-65: Landslide Analysis

Building Type	Number of Buildings	Estimated Losses/Exposure
Residential	1,346	$279,851,500
Non-Residential	610	$19,740,730
Critical Facilities	10	$2,150,000
Totals	1,900	$301,742,230

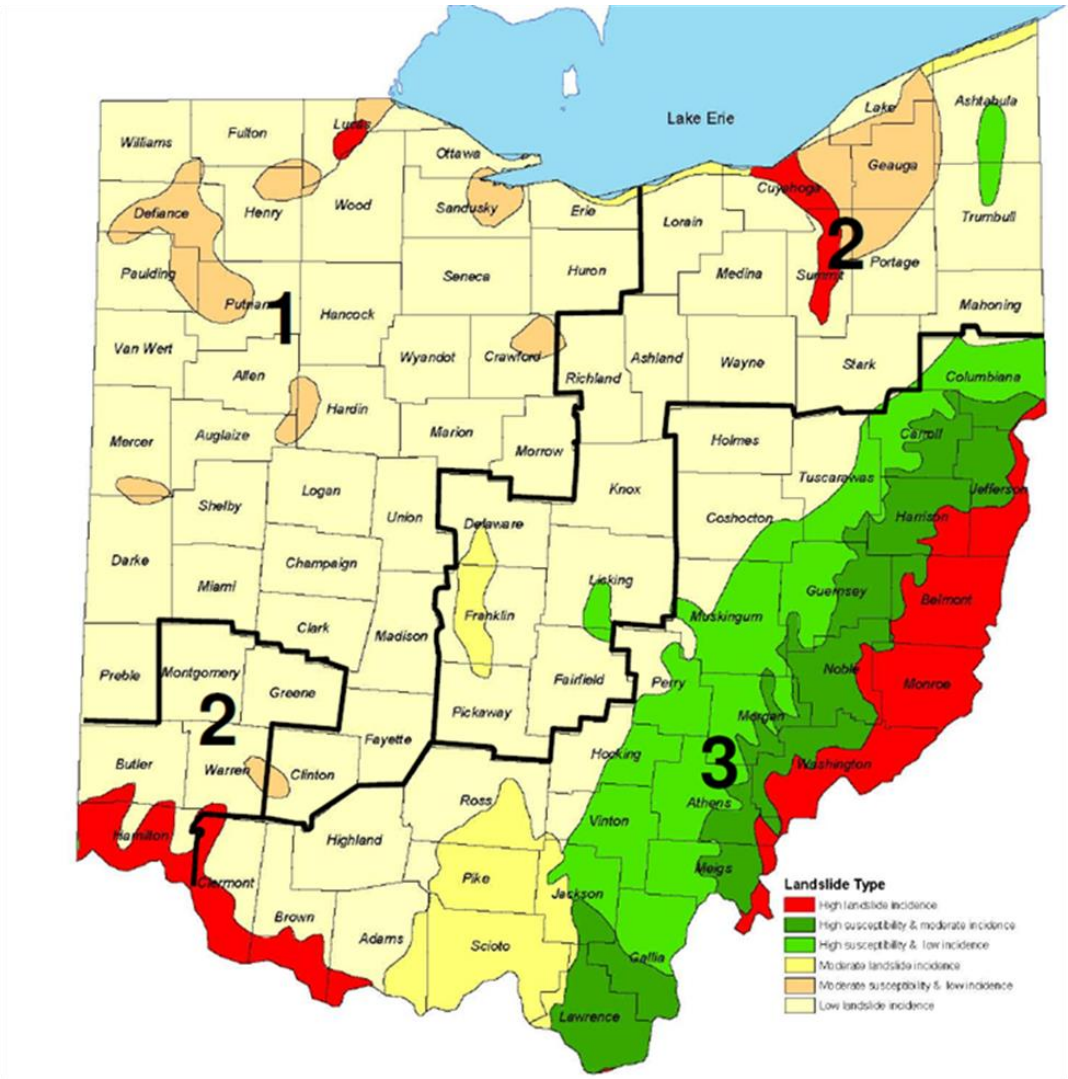
Previous Occurrences of Landslides

Landslides are a significant problem in several areas of Ohio. The Cincinnati area has one of the highest per-capita costs due to landslide damage of any city in the United States. Landslide occurrences have significantly increased since 2011, especially along the Columbia Parkway. For example, in 2009, there were three reports to the City's Customer Service system of landslides, and one in 2010. By comparison, there were 18 reports of landslides affecting the Columbia Parkway in 2011. Additionally, record rainfalls led to multiple landslides in January and May 2012.

Geographic Location for Landslide Hazard

Hamilton County is a region of high landslide susceptibility and hazard potential. The areas susceptible to landslides are located along streams and steep valleys that contain weak silts and clays, and where other unconsolidated glacial sediments are concentrated. The majority of bedrock slope failures are in the shale-dominated Kope Formation, and to a lesser degree in the Miamitown Shale. Figure 5-56 depicts landslide incidence and susceptibility in Ohio.

Figure 5-56: Ohio Landslide Incidence and Susceptibility



Hazard Extent for Landslide Hazards

The extent of the landslide hazard is closely related to development near the regions that are at risk. The hazard extent of landslides is spread throughout the entire county in various concentrated areas.

Risk Identification for Landslide Hazards

Based on historical information, the probability of a landslide hazard is medium. The planning team determined that the potential impact of a landslide hazard is minimal; therefore the overall risk of a landslide hazard for Hamilton County is medium.

Vulnerability Analysis for Landslides

Because of the steep slopes, soil types, and rapid growth within Hamilton County, there is an increased vulnerability to landslides. As vegetation is removed from steep slopes or these slopes are surcharged by development, the threat of landslides or slumps increases proportionally. As a result, the entire population and all buildings have been identified as at risk.

Essential Facilities

Any facility built above an underground mine or karst landscape could be vulnerable to land subsidence. An essential or critical facility will encounter many of the same impacts as any other building within the affected area. These impacts include damages ranging from cosmetic to structural. Buildings may sustain minor cracks in walls due to a small amount of settling, while in more severe cases the failure of building foundations causes cracking of critical structural elements. Table 4-5 lists the types and numbers of all the essential facilities in the area. Critical and essential facilities, as well as community assets, are included in Appendix G.

Building Inventory

The buildings within areas highly susceptible to landslides can all anticipate the same impacts, similar to those discussed for critical facilities. These impacts include damages ranging from cosmetic to structural. Buildings may sustain minor cracks in walls due to a small amount of settling, while in more severe cases the failure of building foundations causes cracking of critical structural elements.

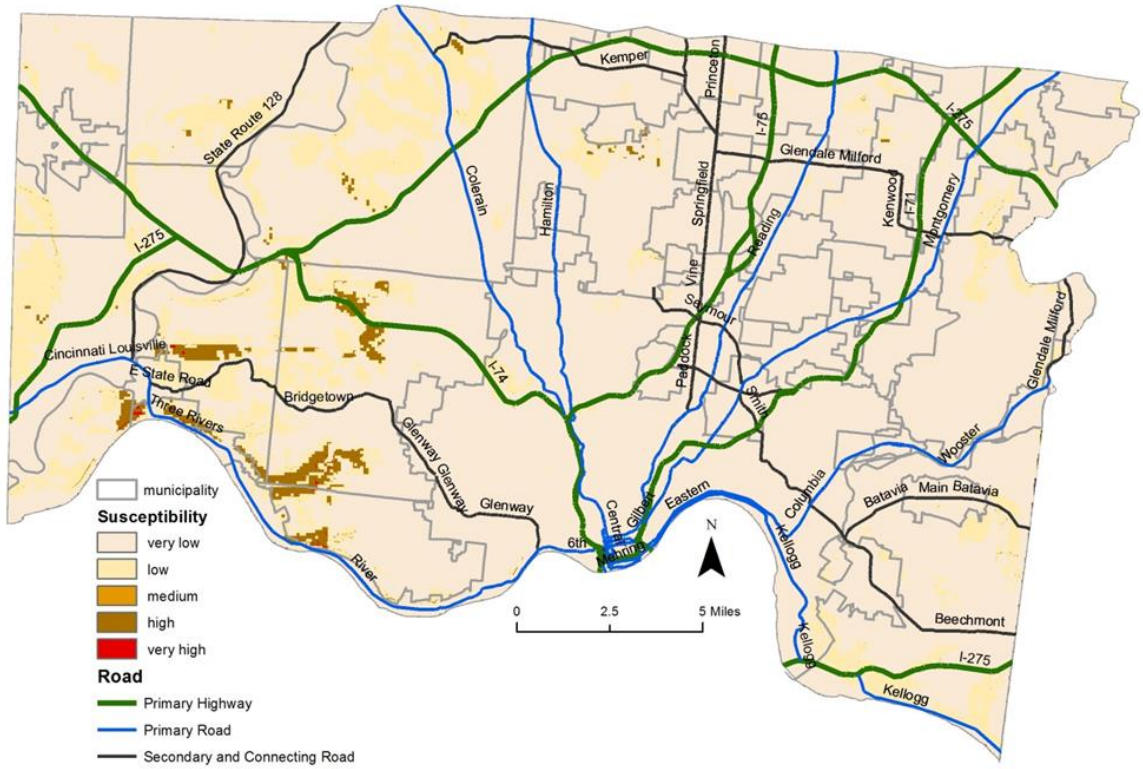
Infrastructure

In the areas of Hamilton County that are highly susceptible to landslides, potential impacts to infrastructure include: broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); and railway failure from broken or impassable railways. In addition bridges could fail or become impassable causing risk to traffic. These impacts may lead to protracted closures and costly repairs. The debris flows from landslides may also disturb natural habitats and ecosystems and accelerate surface erosion and sediment transport in watersheds.

Landslide Analysis

The University of Cincinnati completed a landslide analysis that consisted of three parts: 1) preparation of a landslide susceptibility map of Hamilton County; 2) identification of highways and roads with high landslide susceptibility within Hamilton County, and; 3) assessment of buildings and critical infrastructure with high landslide susceptibility. The complete detailed version of the analysis is located in Appendix H. Figure 5-57 shows the areas of high landslide susceptibility and roads passing through the areas. Engineers, contractors, and local residents will benefit from susceptibility maps in designing and executing future development plans. Municipal planners will also benefit from identification of roads that have high landslide susceptibility in order to restrict development in those areas.

Figure 5-57: Landslide Susceptibility to Roads



Building Damage for Landslide Hazard

It is estimated that 1,956 buildings across 12 municipalities within Hamilton County are vulnerable to damages as a result of landslides. Total building losses for building in areas with high landslide susceptibility are $299,592,330. Table 5-66 details building damages for landslide hazards and Figure 5-58 depicts building damages across Hamilton County,

Table: 5-66: Building Damages for Landslide Hazard

Municipality	Number of Buildings Damaged	Total Building Damage
Green Township	980	$173,968,940
Miami Township	349	$57,827,780
North Bend	292	$39,885,610
Delhi Township	91	$14,015,340
Addyston	85	$5,585,320
Cincinnati	76	$2,374,100
Cleves	39	$2,746,350
Colerain Townshp	33	$2,874,550
Crosby Township	5	$286,700
Whitewater Township	3	$27,640
Blue Ash	2	$0
Springfield Township	1	$0
Total	1,956	$299,592,330

Figure 5-58: Landslide Building Damage in Hamilton County

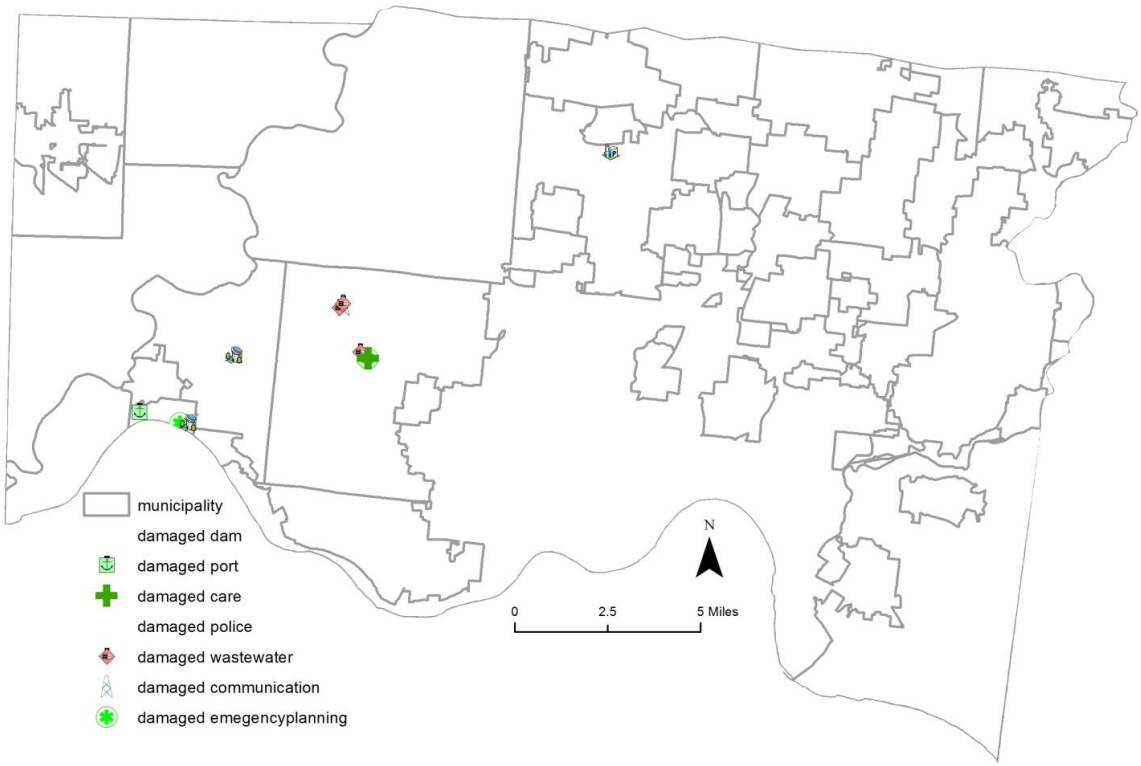
Essential Facility Vulnerability

There are 10 essential/critical facilities located within areas of high landslide susceptibility: two EPFs, one police station, one care facility, and one communication facility. Table 5-67 and Figure 5-59 depict essential and critical facilities in areas of high landslide susceptibility.

Table 5-67: Critical Facilities in Areas of High Landslide Susceptibility

Facility Type	Facility Name
Emergency Planning	Rainbow Day Care Center
Police Station	Hamilton County Park Rangers
Care	The Little Clinic of Ohio, LLC - Kroger
Communication	Cincinnati Bell (6416 Harrison Ave)
Wastewater	Canterbury Row Condo. Asso. WWTP
Wastewater	Northcrest Apartments WWTP
Wastewater	Sky Ridge Condominiums WWTP
Dam	Eagles Cliff Lake Dam
Dam	Un-Named Dam No. 10
Port	Consolidated Terminal Logistics Contract

Figure 5-59: Essential and Critical Facilities in Areas of High Landslide Susceptibility



Infrastructure Vulnerability

The analysis identified 63.63 miles of roadways across 12 municipalities that are vulnerable to damage as a result of landslide hazards. Table 5-68 and Figure 5-60 depicts roadways susceptible to damages in Hamilton County.

Table 5-68: Roadways Susceptible to Damages in Hamilton County

Municipality	Potentially Damaged Road Length (miles)
Green Township	24.51
Miami Township	12.89
Colerain Township	5.43
North Bend	4.72
Delhi Township	4.30
Cincinnati	3.96
Whitewater Township	2.36
Springfield Township	2.30
Addyston	2.08
Crosby Township	0.42
Cleves	0.34
Greenhills	0.32
Total	

Figure 5-60: Hamilton County Roadways Susceptible to Landslide Damage

Vulnerability to Future Assets/Infrastructure for Landslides

All future community assets and infrastructure in areas with high susceptibility to landslides will remain vulnerable to damages. In areas with higher levels of population the vulnerability is greater than in open areas with no infrastructure demands.

Analysis of Community Development Trends

Planning team discussed mitigation strategies to lessen the impacts of landslides by restricting new development in vulnerable areas. Some of the most vulnerable areas include Huffman Court in Cincinnati and Lawyers Pointe in Anderson Township, as a result of slide in glacial materials. Landslides traveling as long, thin sheets are also a regular occurrence along Columbia Parkway. Mt. Adams is a prominent topographic feature in Cincinnati and is home to the one of the most expensive landslide remediation projects in the history of the U.S at a cost of $44.5 million.

5.3.11 Dam/Levee Failure Hazard

Dams are structures that retain or detain water behind a large barrier. When full, or partially full, the difference in elevation between the water above the dam and below creates large amounts of energy, creating the potential for failure. The same potential exists for levees when they serve their purpose, which is to confine flood waters within the channel area of a river and exclude that water from land or communities land-ward of the levee. Dams and levees can fail due to 1) water heights or flows above the capacity for which the structure was designed; or 2) deficiencies in the structure such that it cannot hold back the potential energy of the water. If a dam or levee fail, issues of primary concern include loss of human life/injury, downstream property damage, lifeline disruption (of concern would be transportation routes and utility lines required to maintain or protect life), and environmental damage.

Many communities view both dams and levees as permanent and infinitely safe structures. This sense of security may well be false, leading to significantly increased risks. Both downstream of dams and on floodplains protected by levees, security leads to new construction, added infrastructure, and increased population over time. Levees in particular are built to hold back flood waters only up to some maximum level, often the 100-year (1% annual probability) flood event. When that maximum is exceeded by more than the design safety margin, the levee will be overtopped or otherwise fail, inundating communities in the land previously protected by that levee. It has been suggested that climate change, land-use shifts, and some forms of river engineering may be increasing the magnitude of large floods and the frequency of levee failure situations.

In addition to failure that results from extreme floods above the design capacity, levees and dams can fail due to structural deficiencies. Both dams and levees require constant monitoring and regular maintenance to assure their integrity. Many structures across the U.S. have been under-funded or otherwise neglected, leading to the recognition that certain structures are unsafe or, rarely, can lead to actual failure. The threat of dam or levee failure may require substantial commitment of time, personnel, and resources. Since dams and levees deteriorate with age, minor issues become larger compounding problems, and the risk of failure increases.

Summary Vulnerability Assessment

This planning effort did not include inundation mapping for Hamilton County's dams. An inundation map is required to accurately determine the numbers and replacement costs of facilities that reside downstream of dams.

To determine the following loss estimation, The Polis Center identified the largest five high-hazard dams without Emergency Action Plans or inundation maps. Analysts identified a downstream area within five miles of the dam and ran a Hazus-MH 100-year flood model to estimate potential losses to structures in that area. It is important to note that this is not an engineered study and does not include damages related to velocity.

Table 5-69: Dam Vulnerability Assessment

Dam Name	Building Type	Building Count	Building Losses
Sharonville Retention Dam	Non-Residential	16	$ 115,520.00
	Residential	32	$ 202,230.00
Foumile Lake Dam	Non-Residential	33	$ 3,673,520.00
	Residential	123	$ 2,950,640.00
West Fork of Mill Creek Lake Dam	Non-Residential	8	$ 144,340.00
	Residential	78	$ 103,800.00
Eagles Lake Dam	Non-Residential	32	$ 696,000.00
	Residential	70	$ 387,420.00
Heimann Pond Dam	Non-Residential	14	$ 466,480.00
	Residential	46	$ 71,580.00
Totals	Non-Residential	103	$ 5,095,860.00
	Residential	349	$ 3,715,670.00

Previous Occurrences for Dam and Levee Failure

According to the Hamilton County planning team, there are no records or local knowledge of any dam or certified levee failure in the county.

Geographic Location for Dam and Levee Failure

The National Inventory of Dams (NID) identified 38 dams in Hamilton County. Table 5-70 summarizes the NID information.

Table 5-70: National Inventory of Dams Information for Hamilton County

Dam Name	River	Location	Hazard	EAP
Apple Hill Farm Lake Dam	Tributary to Little Miami River	Cincinnati	Low	No
Basin 'A	Ohio River- Offstream	Miami	Significant	No
Basin 'B	Ohio River- Offstream	Miami	Significant	No
Chateau Lakes No. 1 Dam	Tributary to Taylor Creek	Green	Significant	No
Chateau Lakes No. 2 Dam	Tributary to Taylor Creek	Green	Significant	No
Coldstream Country Club Dam No. 1	Tributary to Eightmile Creek	Anderson	Low	No
Coldstream Country Club Dam No. 2	Tributary to Eightmile Creek	Anderson	Low	No
Crest Hills Lake Dam	Tributary to Mill Creek	Sycamore	Significant	No
Crossings of Springdale Lake No.1 Dam	Tributary to Mill Creek	Springfield	Significant	No
Eagles Lake Dam	Tributary to Taylor Creek	Green	High	No
Fourmile Lake Dam	Fourmile Creek	Anderson	High	No
Heimann Pond Dam	Tributary to Little Miami River	Symmes	High	No
Hermitage Club Lake Dam	Tributary to Little Miami River	Anderson	High	No
Joseph Green Pond Dam	Tributary to Jordan Creek	Addyston	Low	No
Kemper Meadow Dam	Tributary to Pleasant Run	Springfield	Significant	Yes
Kenridge Lake Dam	North Branch Sycamore Creek	Sycamore	Significant	No
Lake Cindy Dam	Tributary to Muddy Creek	Green	Low	No
Lake Gloria Dam	Tributary to West Fork Mill Creek	Colerain	Low	No
Lincoln Heights Upground Reservoir	Offstream	Sycamore	High	No
Mallard Cove Lake Dam	Tributary to Muddy Creek	Green	Significant	No
Miami View Golf Club Pond No. 1 Dam	Tributary to Great Miami River	Whitewater	Low	No
Miami View Golf Club Pond No. 2 Dam	Tributary to Great Miami River	Whitewater	Significant	No
Miami-Whitewater Forest Lake Dam	Tributary to Dry Fork Whitewater River	Crosby	Significant	No
Muddy Creek WWTP Lagoon	Ohio River	Cincinnati	High	No
New Waterstone Lake Dam	Tributary to Polk Run	Symmes	Low	Yes
Ominplex Dam	Pleasant Run	Springfield	Low	No
Paulmeadows Lake Dam	Tributary to Polk Run	Symmes	Significant	No

Dam Name	River	Location	Hazard	EAP
Peter Lake Dam	Tributary to Dry Run	Anderson	Significant	No
Roell Lake Dam	Tributary to Muddy Creek	Delhi	Low	No
Sharon Lake Dam	Tributary to Sharon Lake	Sharonville	High	No
Sharonville Retention Dam	Tributary to Sharon Creek	Sharonville	High	No
Stenger Lake Dam	Tributary to West Fork	Green	High	No
Strimple Creek Dam	Strimple Creek	Whitewater	Low	Yes
Tanager Woods Lake Dam	Tributary to Polk Run	Symmes	Significant	No
Tumlin Lake Dam	Tributary to Sand Run	Whitewater	Low	No
Wasmer Lake Dam	Tributary to Banklick Creek	Colerain	Low	No
West Fork of Mill Creek Dam	West Fork of Mill Creek	Cincinnati	High	Yes
Wright Farm West Detention Basin Dam	Pleasant Run	Springfield	High	Yes

Table 5-71: Additional Dams Impacting Hamilton County

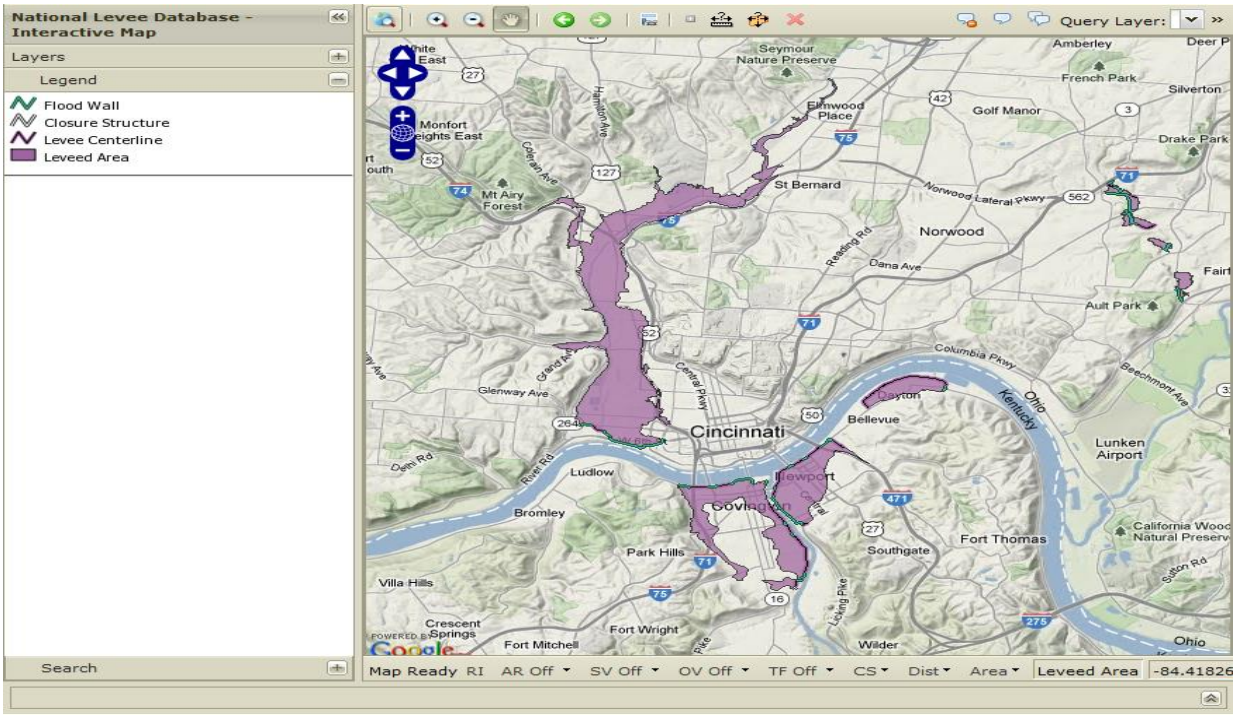
Dam Name	River	Location	EAP
Brookville Dam	Whitewater River	Brookville, IN	Yes
Caesar Creek Dam	Caesar Creek	Waynesville, OH	Yes
William Harsha Dam	Little Miami River	Batavia, OH	Yes
West Fork Dam	Mill Creek	Cincinnati, OH	Yes

The National Levee Database identified seven levees in Hamilton County. Table 5-72 summarizes the NLD information. Figure 5-61 depicts the leveed areas of Hamilton County.

Table 5-72: National Levee Database Information for Hamilton County

Segment Name	Location	Length (miles)
Duck Creek, OH- Phase IV B, Section 2 & Phase IV C	Cincinnati	0.16
Duck Creek, OH- Phase IV B, Section 1, Alignment B	Cincinnati	0.03
Duck Creek, OH- Phase IV B Section 1, Alignment A	Cincinnati	0.26
Duck Creek, OH- Phase IIa	Cincinnati	0.00
Duck Creek, OH- Phase III	Cincinnati	0.03
Duck Creek, OH- Phase II	Cincinnati	0.00
Cincinnati LFPP	Cincinnati	0.23

Figure 5-61: Leveed Areas in Hamilton County



Hazard Extent for Dam and Levee Failure

When dams are assigned the low (L) hazard potential classification, it means that failure or incorrect operation of the dam will result in no human life losses and no economic or environmental losses. Losses are principally limited to the owner's property. Dams assigned the significant (S) hazard classification are those dams in which failure or incorrect operation results in no probable loss of human life; however it can cause economic loss, environment damage, and disruption of lifeline facilities. Dams classified as significant hazard potential dams are often located in predominantly rural or agricultural areas, but could be located in populated areas with a significant amount of infrastructure. Dams assigned the high (H) hazard potential classification are those dams in which failure or incorrect operation has the highest risk to cause loss of human life and significant damage to buildings and infrastructure.

The ODNR-Dam Safety Program assigns the hazard potential for dams and levees as Class I, Class II, Class III, and Class IV. An EAP is required by the State of Ohio for all dams and levees identified as Class I, II, or III under the state classification system. Table 5-73 describes each hazard and provides the corresponding federal classification. Table 5-74 describes each levee hazard classification.

Table 5-73: Ohio Dam Hazard Classifications

Ohio Classification	Federal Classification	Description
Class I	High	Probable loss of life, serious hazard to health, structural damage to high value property (i.e. homes, industries, major public utilities)
Class II	High	Flood water damage to homes, businesses, industrial structures (no loss of life envisioned), damage to state and interstate highways, railroads, only access to residential areas.
Class III	Significant	Damage to low value, non-residential structures, local roads, agricultural crops, and livestock.
Class IV	Low	Losses restricted mainly to the dam

Table 5-74: Ohio Levee Hazard Classifications

Hazard Classification	Description
Class I	Probable loss of human life, structural collapse of at least one residence or one commercial or industrial business
Class II	Disruption of a public water supply or wastewater treatment facility, or other health hazards; flooding of residential, commercial, industrial, or publicly owned structures; damage or disruption to major roads and access to critical facilities; damage or disruption to railroads or public utilities
Class III	Property losses including but not limited to rural buildings, not otherwise described; damage or disruption to local roads
Class IV	Levee having a height of not more than three feet; losses restricted mainly to the levee, owner's property and rural lands.

According to National Inventory of Dams, 11 dams are classified as high hazard, and two have an Emergency Action Plan (EAP).

Accurate mapping of the risks of flooding behind levees depends on knowing the condition and level of protection the levees actually provide. FEMA and the U.S. Army Corps of Engineers are working together to make sure that flood hazard maps clearly reflect the flood protection capabilities of levees, and that the maps accurately represent the flood risks posed to areas situated behind them. Levee owners—usually states, communities, or in some cases private individuals or organizations—are responsible for ensuring that the levees they own are maintained according to their design. In order to be considered creditable flood protection structures on FEMA's flood maps, levee owners must provide documentation to prove the levee meets design, operation, and maintenance standards for protection against the one-percent-annual chance flood.

Risk Identification for Dam/Levee Failure

Based on historical information, the probability of dam/levee failure is low. The planning team determined that the potential impact of dam/levee failure is minimal; therefore, the overall risk of dam/levee failure for Hamilton County is low.

Vulnerability Analysis for Dam and Levee Failure

Inundation maps are required to assess the impacts of dam and levee failures on communities. In order to be considered creditable flood protection structures on FEMA's flood maps, levee owners must provide documentation to prove the levee meets design, operation, and maintenance standards for protection against the "one-percent-annual chance" flood.

Vulnerability to Future Assets/Infrastructure for Dam and Levee Failure

The county recognizes the importance of maintaining its future assets, infrastructure, and residents. Inundation maps can highlight the areas of greatest vulnerability in each community.

In June 2013, Hamilton County held two meetings for public officials and dam owners focused on issues related to Dam Safety in Hamilton County and Ohio. The letter of invitation and sign-in sheets from the meeting are included in Appendix A.

Section

6

MITIGATION STRATEGIES

The goal of mitigation is to reduce the future impacts of a hazard, including property damage, disruption to local and regional economies, and the amount of public and private funds spent to assist with recovery. The goal of mitigation is to build disaster-resistant communities. Mitigation actions and projects should be based on a well-constructed risk assessment, provided in Section 5 of this plan. Mitigation should be an ongoing process, adapting over time to accommodate a community's needs.

6.1 Community Capability Assessment

The capability assessment identifies current activities used to mitigate hazards. The capability assessment identifies the policies, regulations, procedures, programs, and projects that contribute to the lessening of disaster damages. The assessment also provides an evaluation of these capabilities to determine whether the activities can be improved to more effectively reduce the impact of future hazards. The following sections identify existing plans and mitigation capabilities within all of the communities listed in Section 2 of this plan.

6.1.1 National Flood Insurance Program (NFIP)

As of March 2013, 31 jurisdictions within Hamilton County are members of the NFIP. Table 6-1 identifies each community and the date each participant joined the NFIP. Those communities located within the floodplain boundary that have chosen not to participate in the program include: Indian Hills, North College Hill, and Sharonville. FEMA does not include townships in the NFIP Community Status Book Report.

Hazus-MH identified approximately 2377 households within the Hamilton County Special Flood Hazard Area; 2013 households in Hamilton County paid flood insurance in 2012. As of December 31, 2012, 1,409 claims were filed totaling $16,696,724.93. The average claim was $11,850

None of the jurisdictions within Hamilton County have chosen to participate in the NFIP'S Community Rating System (CRS). The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions, meeting the three goals of the CRS: 1) reduce flood losses; 2) facilitate accurate insurance ratings; and 3) promote the awareness of flood insurance.

Table 6-1: Additional Information on Communities Participating in the NFIP

Name	Type	Participation Date	FIRM Date
Addyston	Village	03/01/74	08/15/83
Amberley	Village	N/A	09/30/80
Arlington Heights	Village	02/01/74	12/18/86
Blue Ash	City	02/21/75	08/01/80
Cheviot	City	06/07/74	05/17/04
Cincinnati	Village	06/28/74	10/15/82
Cleves	Village	07/23/76	02/01/84
Elmwood Place	Village	02/01/74	12/18/84
Evendale	Village	03/01/74	09/29/86
Fairfax	City	01/31/75	11/15/79
Forest Park	Village	N/A	05/17/04
Glendale	Village	N/A	05/17/04
Greenhills	Village	01/25/74	09/01/93
Hamilton County	County	04/14/78	06/01/82
Harrison	City	02/15/74	04/03/85
Lincoln Heights	Village	02/01/74	05/17/04
Lockland	Village	02/15/74	09/04/86
Loveland	City	02/01/74	09/01/78
Madeira	City	02/07/75	11/15/79
Mariemont	Village	02/08/74	05/17/04
Milford	City	02/08/74	01/16/81
Montgomery	City	06/28/74	06/25/76
Mt. Healthy	City	06/07/74	12/15/78
Newtown	Village	02/01/74	12/15/83
North Bend	Village	03/15/74	10/18/83
Reading	City	02/08/74	12/18/86
Springdale	City	08/14/81	12/05/90
St. Bernard	City	05/10/74	09/19/84
Terrace Park	Village	02/08/74	01/05/84
Woodlawn	Village	02/01/74	09/04/86
Wyoming	City	02/01/74	03/02/79

6.1.2 Plans and Ordinances

The Rural Zoning Commission Zoning Inspectors serve the residents of Hamilton County by enforcing the Zoning Resolution. Their activities include the following:

- Investigate complaints and abate zoning violations
- Provide updated zoning violation status reports to Township Officials
- Maintain records of zoning violation notices and abatement actions
- Review actual construction for compliance with issued zoning certificate
- Monitor continued compliance of new and existing Specific Planned Unit Developments
- Assist in contract services for Symmes, Green and Harrison townships

Hamilton County underwent floodplain map modernization beginning in August 2005 and ending with a Letter of Final Determination in August 2009. These maps were adopted by the county on February 17, 2010 and became effective on that date. The county currently has Flood Damage Prevention Regulations adopted by the county commissioners.

Table 6-2: Community Plans and Ordinances

Community	Planning Commission	Comp Plan	Floodplain Regulations	Building Codes[1]	Zoning Ordinance	Capital Budget[2]	Public Works Budget[2]
Hamilton County	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Blue Ash	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Chevoit	YES	NO	NO	YES	YES	(none)	Limited in-kind wages only.
Cincinnati	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Deer Park	YES	YES	NO	YES	YES	(none)	Limited in-kind wages only.
Fairfield	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Forest Park	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Harrison	YES	YES	NO	YES	YES	(none)	Limited in-kind wages only.
Loveland	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Madeira	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Milford	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Montgomery	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Mount Healthy	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
North College Hill	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Norwood	YES	YES	NO	YES	YES	(none)	Limited in-kind wages only.
Reading	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Sharonville	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Silverton	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Springdale	YES	NO	YES	YES	YES	(none)	Limited in-kind wages only.
St. Bernard	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Wyoming	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Addyston	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Amberley Village	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.

Community	Planning Commission	Comp Plan	Floodplain Regulations	Building Codes[1]	Zoning Ordinance	Capital Budget[2]	Public Works Budget[2]
Arlington Heights	YES	YES	NO	YES	YES	(none)	Limited in-kind wages only.
Cleves	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Elmwood Place	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Evendale	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Fairfax	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Glendale	YES	YES	NO	YES	YES	(none)	Limited in-kind wages only.
Golf Manor	YES	NO	NO	YES	YES	(none)	Limited in-kind wages only.
Indian Hill	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Lincoln Heights	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Lockland	YES	YES	NO	YES	YES	(none)	Limited in-kind wages only.
Mariemont	YES	NO	YES	YES	YES	(none)	Limited in-kind wages only.
Newton	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
North Bend	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Terrace Park	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.
Woodlawn	YES	YES	YES	YES	YES	(none)	Limited in-kind wages only.

[1] All jurisdictions within the state now follow the State Building Code. (Ohio Administrative Code 4101:1.)

[2] Budget that would allow the jurisdiction to devote financial resources towards hazard mitigation activities.

The county and various jurisdictions have Floodplain Managers that are charged with enforcing floodplain regulations, routinely monitoring the floodplains and providing community assistance such as encouraging owners to maintain flood insurance. Hamilton County adopted Flood Damage Prevention Regulations by passing a resolution, which is available to the public on the county website at http://www.hamiltoncountyohio.gov/pubworks/hcpw_sfha.asp.

6.2 Mitigation Goals

In Section 5 of this plan, the risk assessment identified Hamilton County as prone to nine hazards. The MHMP planning team members understand that although hazards cannot be eliminated altogether, the many communities within Hamilton County can work toward building disaster-resistant communities. Following are a list of goals, objectives, and actions. The goals represent long-term, broad visions of the overall vision the county would like to achieve for mitigation. The objectives are strategies and steps that will assist the communities in attaining the listed goals.

Goal 1: Lessen the impacts of hazards to new and existing infrastructure, residents, and responders

Objective A: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.

Objective B: Equip public facilities and communities to guard against damage caused by secondary effects of hazards.

Objective C: Minimize the amount of infrastructure exposed to hazards.

Objective D: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the community.

Objective E: Improve emergency sheltering in the community.

Goal 2: Create new or revise existing plans/maps for the community

Objective A: Support compliance with the NFIP.

Objective B: Review and update existing, or create new, community plans and ordinances to support hazard mitigation.

Objective C: Conduct new studies/research to profile hazards and follow up with mitigation strategies.

Goal 3: Develop long-term strategies to educate community residents on the hazards affecting their county

Objective A: Raise public awareness on hazard mitigation.

Objective B: Improve education and training of emergency personnel and public officials.

6.3 Mitigation Actions and Projects

Upon completion of the risk assessment and development of the goals and objectives, the planning committee was provided a list of the six mitigation measure categories from the *FEMA State and Local Mitigation Planning How to Guides*. The measures are listed as follows:

- **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. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and stormwater management regulations.

- **Property Protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or removal from the hazard area. Examples include acquisition, elevation, structural retrofits, storm shutters, and shatter-resistant glass.

- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

- **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses, preserve or restore 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.

- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.

- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

MHMP members were presented with the task of individually listing potential mitigation activities using the FEMA evaluation criteria. The MHMP members presented their mitigation ideas to the team. The evaluation criteria (STAPLE+E) involved the following categories and questions.

Social:

- Will the proposed action adversely affect one segment of the population?
- Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?

Technical:

- How effective is the action in avoiding or reducing future losses?
- Will it create more problems than it solves?
- Does it solve the problem or only a symptom?
- Does the mitigation strategy address continued compliance with the NFIP?

Administrative:

- Does the jurisdiction have the capability (staff, technical experts, and/or funding) to implement the action, or can it be readily obtained?
- Can the community provide the necessary maintenance?
- Can it be accomplished in a timely manner?

Political:

- Is there political support to implement and maintain this action?
- Is there a local champion willing to help see the action to completion?
- Is there enough public support to ensure the success of the action?
- How can the mitigation objectives be accomplished at the lowest cost to the public?

Legal:

- Does the community have the authority to implement the proposed action?
- Are the proper laws, ordinances, and resolution in place to implement the action?
- Are there any potential legal consequences?
- Is there any potential community liability?
- Is the action likely to be challenged by those who may be negatively affected?
- Does the mitigation strategy address continued compliance with the NFIP?

Economic:

- Are there currently sources of funds that can be used to implement the action?
- What benefits will the action provide?
- Does the cost seem reasonable for the size of the problem and likely benefits?
- What burden will be placed on the tax base or local economy to implement this action?
- Does the action contribute to other community economic goals such as capital improvements or economic development?
- What proposed actions should be considered but be “tabled” for implementation until outside sources of funding are available?

Environmental:

- How will this action affect the environment (land, water, endangered species)?
- Will this action comply with local, state, and federal environmental laws and regulations?
- Is the action consistent with community environmental goals?

Implementation of the mitigation plan is critical to the overall success of the mitigation planning process. The first step is to decide, based upon many factors, which action will be undertaken first. In order to pursue the top priority first, an analysis and prioritization of the actions is important. Some actions may occur before the top priority due to financial, engineering, environmental, permitting, and site control issues. Public awareness and input of these mitigation actions can increase knowledge to capitalize on funding opportunities and monitoring the progress of an action.

The planning team prioritized mitigation actions based on a number of factors. A rating of high, medium, or low was assessed for each mitigation item and is listed next to each item in Table 6-6. The factors were the STAPLE+E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria listed in Table 6-3.

Table 6-3: STAPLE+E Planning Factors

Category	Criteria
S – Social	Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the community's social and cultural values.
T – Technical	Mitigation actions are technically most effective if they provide a long-term reduction of losses and have minimal secondary adverse impacts.
A – Administrative	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
P – Political	Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.
L – Legal	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
E – Economic	Budget constraints can significantly deter the implementation of mitigation actions. It is important to evaluate whether an action is cost-effective, as determined by a cost benefit review, and possible to fund.
E – Environmental	Sustainable mitigation actions that do not have an adverse effect on the environment, comply with federal, state, and local environmental regulations, and are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

6.3.1 Completed Strategies

Development of the 2013 Hamilton County Multi-Hazard Mitigation Plan update resulted in hazard mitigation strategies for the county and its' communities. Hamilton County officials recognize the significance of these strategies and how such actions can protect their county. Table 6-5 documents the 2013 strategies that have been completed or are currently in process.

6.3.2 Strategies by Community

The planning team initially reviewed the mitigation strategies of the 2007 Hamilton County Multi-Hazard Mitigation Plan. Those mitigation strategies undertaken and completed in the past five years are documented in Table 6-4. Those 2007 strategies that are on- going, and not yet completed, are in Table 6-5.

The Hamilton County planning team used the 2007 Hamilton County Multi-Hazard Mitigation Plan to initiate the discussion and prioritization of mitigation strategies for the 2013 plan. MHMP members were presented with the task of considering potential mitigation activities for each of their jurisdiction by using the FEMA evaluation criteria. The team then prioritized the strategies based on a number of factors. Assuming funding is available, high priority strategies will be implemented within one year, medium priority strategies within three years, and low priority strategies within five years. The public was encouraged to actively participate in this discussion. The priority is listed next to each strategy documented in Table 6-6.

Table 6-6 describes the new mitigation projects developed by community representatives and categorized by jurisdiction for the 2013 MHMP update.

Note: Start and end dates are estimated and will be contingent upon available funding and the duration of grant application review.

Table 6-4: 2007 Hamilton County Mitigation Strategies (COMPLETED)

2007 Mitigation Item	Hazards Addressed	Jurisdictions	Comments
Distribute weather radios	Tornado, Earthquake, Thunderstorm, Flood, Winter Storm, Drought, Fire	Hamilton County and all participating jurisdictions	Weather radios have been distributed in the past five years however this is a continuous need.
Relocation of homes	Flood	Hamilton County and all participating jurisdictions	FEMA flood-prone home buy-outs
Storm Water Repair grant	Floods, Flash Flooding, Severe Storms	Forest Park	Has provided financial support to homeowners with storm water drainage problems
Upgrade existing and install warning sirens	All Hazards	Hamilton County and all participating jurisdictions	This project was completed countywide in 2012
Storm sewer upgrade	Flood, Flash Flooding, Landslide	St Bernard	
Mitigate the Fernald Enrichment Plant	Hazmat	Hamilton County	Buildings have been razed and contaminated ground removed.
Mitigation of railroad overpass at SR 747	Hazmat , Severe Storms, Winter Storms	Springdale	Pass has been constructed (~2010).
Develop independent fuel depot	Floods, Tornado, Earthquakes, Winter Storms	Evendale	After Hurricane Ike the community recognized the need for accessible fuel.
Storm water repair grant	Floods, Flash Flooding, Severe Storms	Green Hills	Provides financial support to homeowners with storm water drainage problems.

Table 6-5: 2007 Hamilton County Mitigation Strategies (ONGOING)

Priority*	2007 Mitigation Item	Hazards Addressed	Jurisdiction	Comments
9	Develop a county wide program to purchase repetitive loss properties	Flood	Hamilton County and all participating jurisdictions	FEMA continues to work with the Hamilton County communities to buy-out repetitive loss properties.
10	Improve storm water management	Severe Storms, Flood	Silverton	MSD is actively working on this project
11	Develop innovative PSAs to educate land owners	Flood	Hamilton County and all participating jurisdictions	The jurisdictions will work with landowners throughout the county to implement this project. Local resources/funding are being used to design and implement the needs based programs. Project is in progress.
12	Clean up dumping along railroad lines	Hazmat	Loveland	Funding through a CORF grant has been initiated
13	Seek funding to acquire NOAA weather radios in all critical facilities	Flood	Hamilton County and all participating jurisdictions	County has received weather radios in previous grants and distributed throughout the county. The county requests funding for more radios to distribute to critical facilities. Will propose Storm-Ready. FEMA funding
46	Conduct a commodity flow allocation study for rail and road transportation	Hazmat	Hamilton County and all participating jurisdictions	The Hamilton County EMA is currently developing a commodity flow study that will address all modes of transportation.
47	Restructure the intersection of Plainfield and Montgomery Roads	Severe Storms, Winter Storms	Deer Park	Funded through the Ohio Transportation Improvement Program (TIP).
48	Update tree trimming ordinances	Tornado, Severe Winds, Winter Weather	Arlington Heights, Reading	
49	Implement city band emergency radio	All Hazards	Milford	
50	Acquire Gator Bags	Drought	Montgomery	Local funding; projected end date 2016
80	Establish public education programs	All Hazards	Norwood	
81	Restructure the intersection of Plainfield and Montgomery Roads	Severe Storms, Winter Storms	Silverton	Funded through the Ohio Transportation Improvement Program (TIP).
82	Evaluation of backflow devices for sanitary systems	Flood	Glendale	
83	Develop program to monitor locations of buy-outs	Flood	Hamilton County	
84	Develop partnership with Clean Ohio to identify green space in county	Severe Storms, Floods	Hamilton County	FEMA awarded planning grant

*Priorities are listed for Tables 6-4 and 6-5 from priority 1 through 84.

Table 6-6: Hamilton County Mitigation Strategies (NEW)

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
1	Institute a buy-out plan for flood prone structures	Goal: Create new or revise existing plans/maps for the community Objective: Support compliance with the NFIP	Flood, Flash Flood	Hamilton County, Arlington Heights, Cincinnati, Harrison, Loveland, Reading, Addyston, Cleves, Fairfax, North Bend	6/1/2014	12/31/2018	Community Leaders, County EMA	FEMA, local resources
2	Procure generators and transfer switches for schools, public facilities, and critical facilities	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Drought, Hazmat, Fire	Hamilton County, Arlington Heights, Cheviot, Cincinnati, Forest Park, Indian Hills, Lincoln Heights, Madeira, Mariemont, Milford, Montgomery, North Bend, North College Hill, Norwood, Sharonville, Silverton, Wyoming, Cleves, Golf Manor, Terrace Park, Woodlawn	6/1/2014	6/30/2015	Community Leaders, County EMA	Local resources, FEMA
3	Retrofit/harden fire stations	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the community	Tornado, Thunderstorm, Flood, Earthquake, Winter Storm, Drought, Fire, Subsidence	Hamilton County, Milford, Norwood	6/1/2014	12/31/2019	Community Leaders, County EMA	HMGP or Community Development Grants
4	Water main/ hydrant replacement	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Fire, Drought, Extreme Temperatures	Glendale	6/1/2014	5/31/2016	Community Leaders, County EMA	Local utility companies, community grants
5	Install portable computers in emergency vehicles	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county	All Hazards	St Bernard	6/12014	5/31/2016	St. Bernard Fire or Police Department	Public/private partnership, local resources

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
6	Bury existing power lines	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Tornado, Earthquake, Thunderstorm, Winter Storm	Hamilton County and all participating jurisdictions	7/1/2014	6/30/2016	Community Leaders, County EMA	Local and corporate resources
7	Trim trees to minimize the amount/duration of power outages	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Tornado, Severe Winds, Winter Weather	Hamilton County and all participating jurisdictions	7/1/2014	Ongoing	Community Leaders, County EMA	FEMA Public Assistance Grants
8	Re-engineer Dawson Road	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Severe Storms, Flood, Winter Weather	Madeira	3/1/2014	12/31/2017	Community Leaders, County EMA	FEMA, ODNR
14	Develop an enhanced county-wide emergency notification communication system	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county	All Hazards	Hamilton County, Blue Ash, Cincinnati, Forest Park, Harrison, Lincoln Heights, Mariemont, Montgomery, Norwood, Sharonville, Addyston, Cleves, Golf Manor, Green Hills, Newtown, Terrace Park, Woodlawn	5/1/2016	12/31/2018	Community Leaders, County EMA	Local resources
15	Develop a continuity of operations plan	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies	All Hazards	Hamilton County	1/1/2016	1/31/2018	County EMA	Local resources, FEMA, OCRA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
16	Develop and implement a public education programs on disaster awareness	Goal: Develop long-term strategies to educate community residents on the hazards affecting their county Objective: Raise public awareness on hazard mitigation	Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Drought, Hazmat, Fire	Hamilton County, Cheviot, Deer Park, Forest Park, Lincoln Heights, Madeira, Mariemont, North Bend, Silverton, Springdale, Wyoming, Addyston, Cleves, Evendale, Fairfax, Green Hills, Woodlawn	1/1/2016	Ongoing	Community Planners, County EMA	Local resources
17	Develop ordinance requiring new development and mobile homes to bury electric and telephone lines	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Tornado, Earthquake, Thunderstorm, Winter Storm,	Hamilton County and all participating jurisdictions	1/1/2016	1/1/2017	Community Planners, County EMA	Local resources
18	Conduct an upgrade study on storm/sewer line mitigation options	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Tornado, Flood, Flash Flood, Severe Storms	Hamilton County, Indian Hills, Madeira	1/1/2016	12/31/2018	Community Leaders, County EMA	ODOT, ODNR, FEMA, FHWA
19	Develop/upgrade county-wide storm water drainage plans to guide surface water through proper channels	Goal: Create new or revise existing plans/maps for the community Objective: Support compliance with the NFIP	Severe Storms, Flood, Flash Flood	Hamilton County, Arlington Heights, Deer Park, Lincoln Heights, Loveland, Madeira, Milford, Reading, Cleves, Woodlawn	3/1/2016	12/31/2019	Community Leaders, County EMA	FEMA, OCRA
20	Build/establish shelters with generators for smaller jurisdictions and mobile home parks	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the community	Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat,	Hamilton County, Cincinnati, Deer Park, Evendale, Harrison, Lincoln Heights, Loveland, Mt Healthy, Silverton, Springdale, Cleves	1/1/2016	12/31/2018	Community Leaders, County EMA	FEMA
21	Conduct an engineering study to improve the safety of high-hazard and accident prone roads	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Winter Storms, Flash Flooding, Hazmat	Hamilton County, Blue Ash, Cleves	1/1/2016	12/31/2018	Community Leaders, County EMA	ODNR, EPA, FEMA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
22	Improve stream maintenance after severe weather	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Severe Storms, Floods, Flash Flooding	Hamilton County, Blue Ash, Milford	3/1/2016	12/31/2018	Community Leaders, County EMA	ODNR, FEMA
23	Equip existing facilities as safe rooms/shelters	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the community	All Hazards	Mariemont, Milford, Addyston, Evendale, Golf Manor, Lockland	1/1/2016	12/31/2018	Community Leaders, County EMA	FEMA, OCRA
24	Acquire transfer switches/ generators for all shelters	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in the community	Tornado, Flood, Earthquake, Thunderstorm, Winter Storm	Hamilton County, Arlington Heights, Harrison, Reading, St Bernard, Addyston, Amberley, Fairfax, Green Hills, Lockland, Newtown	1/1/2016	1/1/2017	Community Leaders, County EMA	Local resources, FEMA, OCRA
25	Conduct engineering studies on flood mitigation	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies	Severe Storms, Flood, Flash Flooding	Hamilton County, Cincinnati, Deer Park, Fairfax, Madeira, Silverton, Woodlawn	3/1/2016	12/31/2018	Community Leaders, County EMA	FEMA, OCRA
26	Conduct an engineering study to mitigate landslides and erosion issues	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards	Landslide, Earthquake, Severe Storms, Flood, Flash Flood	Hamilton County, Arlington Heights, Cincinnati, Loveland, Reading, Fairfax, Madeira	3/1/2016	12/31/2018	Community Leaders, County EMA	Community Development Grants, OCRA, FEMA
27	Develop landslide mapping and incorporate into CAGIS	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies	Flood, Landslide, Severe Storms,	Hamilton County	3/1/2016	12/31/2018	County EMA, CAGIS	FEMA, FHWA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
28	Conduct an upgrade study on storm/sewer line mitigation options	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies	Tornado, Flood, Flash Flood, Severe Storms	Hamilton County, Indian Hills, Glendale, Lockland	3/1/2016	12/31/2018	County EMA, Community Leaders	Local resources
29	Develop an emergency action plan (EAP) for all dams in the area	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies	Dams/Levees, Floods	Addyston	5/1/2016	4/28/2017	County EMA, Village of Addyston	FEMA
30	Enhance snow removal equipment and supplies	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Winter Weather	Hamilton County, Arlington Heights, Cheviot, Forest Park, Lincoln Heights, Mariemont, Mt Healthy, North College Hill, Norwood, Reading, Sharonville, Golf Manor, Green Hills, Woodlawn	1/1/2016	12/31/2018	Community Leaders, County EMA	USDOT, FHWA, ODOT, FEMA
31	Develop and implement a water conservation plan	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Drought, Extreme Heat	Hamilton County, Arlington Heights, Reading	1/1/2016	5/31/2018	Community Leaders, County EMA	ODOT, ODNR, FEMA, FHWA, USDA
32	Develop and implement safety education for residents and businesses using natural gas	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies	Earthquake, Flood, Tornado	Arlington Heights, Cheviot, Indian Hills, Madeira. Milford, Reading, Springdale, Addyston, Cleves, Evendale	1/1/2016	Ongoing	Community Leaders, County EMA	ODNR, FEMA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
33	Conduct a study to improve internal communication structure	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county	All Hazards	Cheviot	1/1/2016	1/1/2018	Community Leaders, County EMA	Community development grants, FEMA, Local resources
34	Establish a mutual aid response agreements within the county	Goal: Develop long-term strategies to educate the community residents on the hazards affecting their county Objective: Improve education and training of emergency personnel and public officials	Hazmat	Hamilton County, Mariemont, Addyston, Cleves, Evendale, Fairfax, Newtown, Terrace Park	1/1/2016	12/31/2016	County EMA, Community Leaders	Local resources
35	Conduct a study to re-engineer the rail road crossings	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Hazmat, Winter Weather	Hamilton County, Cincinnati, Cleves, Norwood, Sharonville, Silverton, Springdale	6/1/2016	12/31/2019	Community Leaders, County EMA	ODOT, EPA, FHWA
36	Require manufactured homes to have tie-downs	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazard	Tornado, Earthquake, Thunderstorm, Flood, Winter Storm,	Hamilton County, Cincinnati, Mt Healthy,	6/1/2016	12/31/2017	Community Leaders, County EMA	Local resources
37	Obtain additional smoke detectors for community distribution	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Fire	Hamilton County, Norwood, Glendale	6/1/2016	12/31/2017	Community Leaders, County EMA	Local resources, OCRA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
38	Acquire training, equipment and resources to handle small hazardous materials spills	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Hazmat, Fire	Lincoln Heights, Mariemont, Milford, Mt Healthy, North College Hill, Norwood, St Bernard, Addyston,	1/1/2016	12/31/2018	Community Leaders, County EMA	Local resources
39	Conduct an engineering study on the Lockland 'tunnel'	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Hazmat	Lockland	6/1/2016	12/31/2019	Community Leaders, County EMA	Public/private partnership, FHWA, ODOT, FEMA
40	Provide enhanced training for emergency responders	Goal: Develop long-term strategies to educate the community residents on the hazards affecting their county Objective: Improve education and training of emergency personnel and public officials	All Hazards	Hamilton County	1/1/2016	12/31/2018	Community Leaders, County EMA	Community grants, local resources
41	Harden bridges	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Flood, Severe Storms, Winter Storms, Tornado, Earthquake	Montgomery, Addyston, Cleves,	4/1/2016	3/31/2019	Community Leaders, County EMA	FEMA
42	Implement industrial site buffering	Goal: Create new or revise existing plans/maps for the community Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Hazmat	Addyston, Lockland, North Bend	6/1/2016	12/31/2018	Community Leaders, County EMA	EPA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
43	Procure anchors to brace large residential propane tanks	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Earthquake, Landslide	Hamilton County	1/1/2016	5/31/2017	County EMA	FEMA
44	Expand inventory of emergency equipment	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	All Hazards	Glendale	1/1/2016	12/31/2018	Community Leaders, County EMA	Local resources
45	Draft building ordinances to ensure safe building standards	Goal: Create new or revise existing plans/maps for the community Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Tornado, Severe Winds, Winter Weather, Fire, Earthquake	Mariemont	1/1/2016	12/31/2017	Community Leaders, County EMA	Local resources
51	Implement Nixle via public education	Goal: Develop long-term strategies to educate the community residents on the hazards affecting their county Objective: Raise public awareness on hazard mitigation	All Hazards	Milford	1/1/2018	12/31/2019	Community Leaders, County EMA	Local resources
52	Conduct a study to improve/redesign problematic intersections and traffic signage	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Winter Weather, Severe Storms, Flash Flood	Hamilton County	4/1/2018	12/31/2020	County EMA	FEMA, ODOT, FHWA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
53	Conduct a study to evaluate inertial valves	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Flood	Hamilton County, Milford, Glendale	3/1/2018	12/31/2019	Community Leaders, County EMA	FEMA
54	Conduct a study to evaluate the structural integrity of Bethesda Hospital	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Severe Storms, Tornado, Earthquake	Montgomery	4/1/2018	12/31/2020	Bethesda Hospital, Montgomery City Council	FEMA
55	Conduct a study on winter snow maintenance of older homes	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies	Winter Weather, Extreme Temperatures	Forest Park, Green Hills	1/1/2018	12/31/2020	Community Leaders, County EMA	FEMA, community grants, local resources
56	Conduct a study to address the capacity of Mill Creek	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies	Severe Storms, Flood, Flash Flood	Arlington Heights	1/1/2018	12/31/2021	Community Leaders, County EMA	FEMA, OCRA
57	Acquire communication radios for emergency personnel	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county	All Hazards	Springdale, Fairfax	1/1/2018	6/30/2019	Community Leaders, County EMA	FEMA, NOAA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
58	Obtain additional NOAA weather radios	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county	All Hazards	Addyston, Amberley, Cheviot, Fairfax, Glendale, Lincoln Heights, Madeira, Mt Healthy, Newtown, North College Hill, Silverton, St Bernard, Terrace Park, Village of Indian Hills, Woodlawn	1/1/2018	6/30/2019	Community Leaders, County EMA	FEMA, NOAA
59	Develop fire ordinances	Goal: Create new or revise existing plans/maps for the community Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Fire	Addyston	1/1/2018	12/31/2019	Addyston Fire Department	Local resources
60	Develop ordinances to require improved building standards and floodplain ordinances	Goal: Create new or revise existing plans/maps for the community Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Severe Storms, Winter Storms, Tornado, Earthquake, Flood	Cleves, North Bend	1/1/2018	12/31/2018	Community Leaders, County EMA	Local resources
61	Conduct an study regarding industrial vulnerability	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Hazmat	Wyoming	1/1/2018	12/31/2020	Community Leaders, County EMA	FEMA, EPA, USDA, OCRA
62	Conduct a study to address ‘large scale gridlock/chaos’ resulting from power outages	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Severe Storms, Winter Storms, Tornado	Sharonville	6/1/2018	12/31/2020	Community Leaders, County EMA	FEMA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
63	Institute a Local Emergency Planning Committee	Goal: Develop long-term strategies to educate the community residents on the hazards affecting their county Objective: Improve education and training of emergency personnel and public officials	All Hazards	Addyston	6/1/2018	12/31/2020	Community Leaders, County EMA	Local resources
64	Acquire storage and organizational equipment for municipal facilities	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	All Hazards	Lincoln Heights	4/1/2018	3/31/2019	Community Leaders, County EMA	Local resources
65	Conduct a study to determine which public buildings have back-up power	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	All Hazards	Springdale	4/1/2016	12/31/2017	Community Leaders, County EMA	Local resources
66	Conduct a study to evaluate the engineering and potential use of the golf course pond levee	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Flood, Dam/Levee Failure	Amberley	5/1/2018	4/28/2020	Community Leaders, County EMA	FEMA, OCRA
67	Expand inventory of water rescue equipment	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Flood, Flash Flooding	Hamilton County	4/1/2018	3/31/2020	County EMA	Local resources

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
68	Install a stream gauge monitor	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Flood	Hamilton County	5/1/2018	4/28/2019	County EMA	USGS, FEMA
69	Develop a plan for animal protection and subsistence	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies	Drought, Extreme Heat, Flood, Winter Storm	Hamilton County, Addyston	1/1/2018	12/31/2018	Community Leaders, County EMA	Local resources
70	Conduct a study to address the carcinogenic properties of Flint Ink	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Hazmat	Woodlawn	6/1/2018	5/28/2020	Community Leaders, County EMA	EPA, OCRA
71	Develop a database of special needs populations	Goal: Create new or revise existing plans/maps for the community Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Tornado, Flood, Winter Storm, Drought, Hazmat	Hamilton County	1/1/2018	12/31/2019	County EMA	Local resources
72	Develop safety standards and emergency plans	Goal: Create new or revise existing plans/maps for the community Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies	Hazmat	Mariemont	1/1/2018	12/31/2019	Community Leaders, County EMA	FEMA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
73	Coordinate volunteer management in a plan	Goal: Develop long-term strategies to educate the community residents on the hazards affecting their county Objective: Improve education and training of emergency personnel and public officials	All Hazards	Hamilton County	6/1/2018	5/28/2019	Community leaders	Local resources
74	Obtain an ARC GIS license to better map the community	Goal: Develop long-term strategies to educate the community residents on the hazards affecting their county Objective: Improve education and training of emergency personnel and public officials	All Hazards	Montgomery	1/1/2018	12/31/2018	Community Leaders, County EMA	Local resources
75	Secure funding to reinstate former staffing levels for inspections and public education	Goal: Develop long-term strategies to educate community residents on the hazards affecting their county Objective: Improve education and training of emergency personnel and public officials	Fire, Hazmat	Norwood	6/1/2018	5/28/2020	Community Leaders, County EMA	FEMA, DHS
76	House a county-wide Hazmat response unit	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Hazmat	Hamilton County	6/1/2018	5/28/2020	County EMA	Local resources
77	Conduct a study to evaluate the potential concerns of dams located in adjacent communities	Goal: Create new or revise existing plans/maps for the community Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation	Flood	Hamilton County	6/1/2018	5/28/2020	County EMA	FEMA

Priority	Mitigation Item	Goals and Objectives	Hazards Addressed	Jurisdictions Covered	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
78	Install lightning detectors at community parks	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards	Severe Storms	Hamilton County	6/1/2018	5/28/2020	County EMA	FEMA
79	Remove fuel tanks at municipal site	Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing	Hazmat	Lincoln Heights	6/1/2018	5/28/2020	Community Leaders, County EMA	Local resources

6.4 Multi-Jurisdictional Mitigation Strategy

As a part of the multi-hazard mitigation planning requirements, at least two identifiable mitigation action items have been addressed for each hazard listed in the risk assessment and for each jurisdiction covered under this plan.

Each of the participating communities within and including Hamilton County was invited to participate in a series brainstorming session in which goals, objectives, and strategies were discussed and prioritized. Each participant in this session was armed with possible mitigation goals and strategies provided by FEMA, as well as information about mitigation projects discussed in neighboring communities and counties. All potential strategies and goals that arose through this process are included in this plan. The county planning team used FEMA's evaluation criteria to gauge the priority of all items. A final draft of the disaster mitigation plan was presented to all members to allow for final edits and approval of the priorities and strategies.

As a result of the planning process, the data, information, maps, and tables will be integrated as appropriate into other planning efforts to include zoning, floodplain management, and land use planning. Many of the planning team members, representing the county as well as participating jurisdictions, will integrate these data as part of their roles as floodplain enforcers, zoning officers, and community administrators. Existing plans by community can be found in Table 6-2.

Section

7

PLAN MAINTENANCE

7.1 Monitoring, Evaluating, and Updating

Throughout the past five-year planning cycle, Hamilton County Emergency Management Agency and the MHMP planning committee continued to monitor, evaluate, and update the plan.

Additionally, a meeting will be held in June 2016 to address the next five-year update of this plan, which will be required in 2018. Members of the planning committee are readily available to engage in email correspondence between annual meetings. If the need for a special meeting, due to new developments or a declared disaster occurs in the county, the team will meet to update mitigation strategies. Depending on grant opportunities and fiscal resources, mitigation projects may be implemented independently by individual communities or through local partnerships.

The committee will then review the county goals and objectives to determine their relevance to changing situations in the county. In addition, state and federal policies will be reviewed to ensure they are addressing current and expected conditions. The committee will also review the risk assessment portion of the plan to determine if this information should be updated or modified. The parties responsible for the various implementation actions will report on the status of their projects, and will include which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies should be revised.

Updates or modifications to the MHMP during the five-year planning process will require a public notice and a meeting prior to submitting revisions to the individual jurisdictions for approval. The plan will be updated via written changes, submissions as the committee deems appropriate and necessary, and as approved by the county commissioners.

The GIS data used to prepare the plan was obtained from existing county GIS data as well as data collected as part of the planning process. This updated Hazus-MH GIS data has been returned to the county for use and maintenance in the county's system. As newer data becomes available, this updated data will be used for future risk assessments and vulnerability analyses.

7.2 Implementation through Existing Programs

The results of this plan will be incorporated into ongoing planning efforts since many of the mitigation projects identified as part of this planning process are ongoing. Hamilton County and its incorporated jurisdictions will update the zoning plans and ordinances listed in Table 6-2 as necessary and as part of regularly scheduled updates. Each community will be responsible for updating its own plans and ordinances.

7.3 Continued Public Involvement

Continued public involvement is critical to the successful implementation of the MHMP. Comments from the public on the MHMP will be received by the EMA director and forwarded to the MHMP planning committee for discussion. Education efforts for hazard mitigation will be ongoing through the EMA. The public will be notified of periodic planning meetings through notices in the local newspaper or press releases.

Once adopted, a copy of this plan will be maintained in each jurisdiction and in the Hamilton County EMA Office in Cincinnati, Ohio.

Annex: Community Snapshots

Table of Contents

Note: Start and end dates in the mitigation strategies tables for each community are estimated and will be contingent upon available funding and the duration of grant application review.

ADDYSTON

The planning team for Addyston is headed by Stephen Ober, Miami Township Fire Chief. This meeting included representatives from municipalities of Miami Township and Cleves, as these communities are working cooperatively in this mitigation process. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the township and municipalities.

Name	Agency/Title
Stephen Ober	Miami Township Fire Chief
Danny Stacy	Village of Cleves Mayor
Jack Rininger	Miami Township Trustee
Tim Benter	INEOS ABS, Health, Environment & Safety
Daniel Pillow	Village of Addyston Mayor
Bary Lusby	Hamilton County EMA

Community Overview

Addyston was established in 1891 along the banks of the Great Miami River. It is located in the southwest corner of Hamilton County, Ohio, about 10 miles west of Cincinnati.

Topography

Addyston has a total area of .91 square miles, of which .85 square miles is land and .06 square miles is water. The community sits between the Great Miami River and the Ohio River at an elevation of 472 feet.

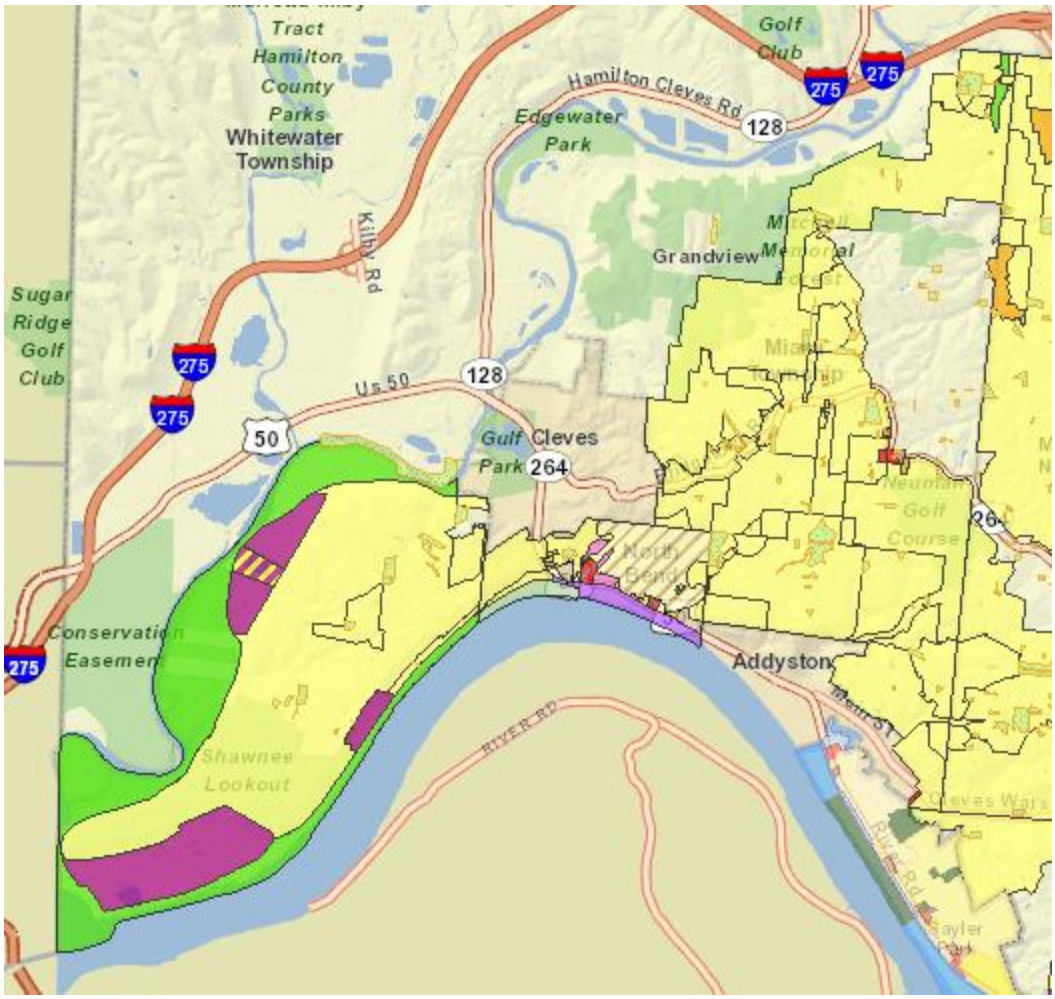
Demographics

The 2010 Census reports the Addyston population at 938, with 372 households, and 228 families residing in the village. The reported population density is 1,103 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 334 households in Addyston. Of these, 310 (92.8%) are primarily English-speaking. In the 24 households in which English is not the primary language—22 Spanish and 2 Other Indo-European—at least one person 14 years of age or older speaks English fluently.

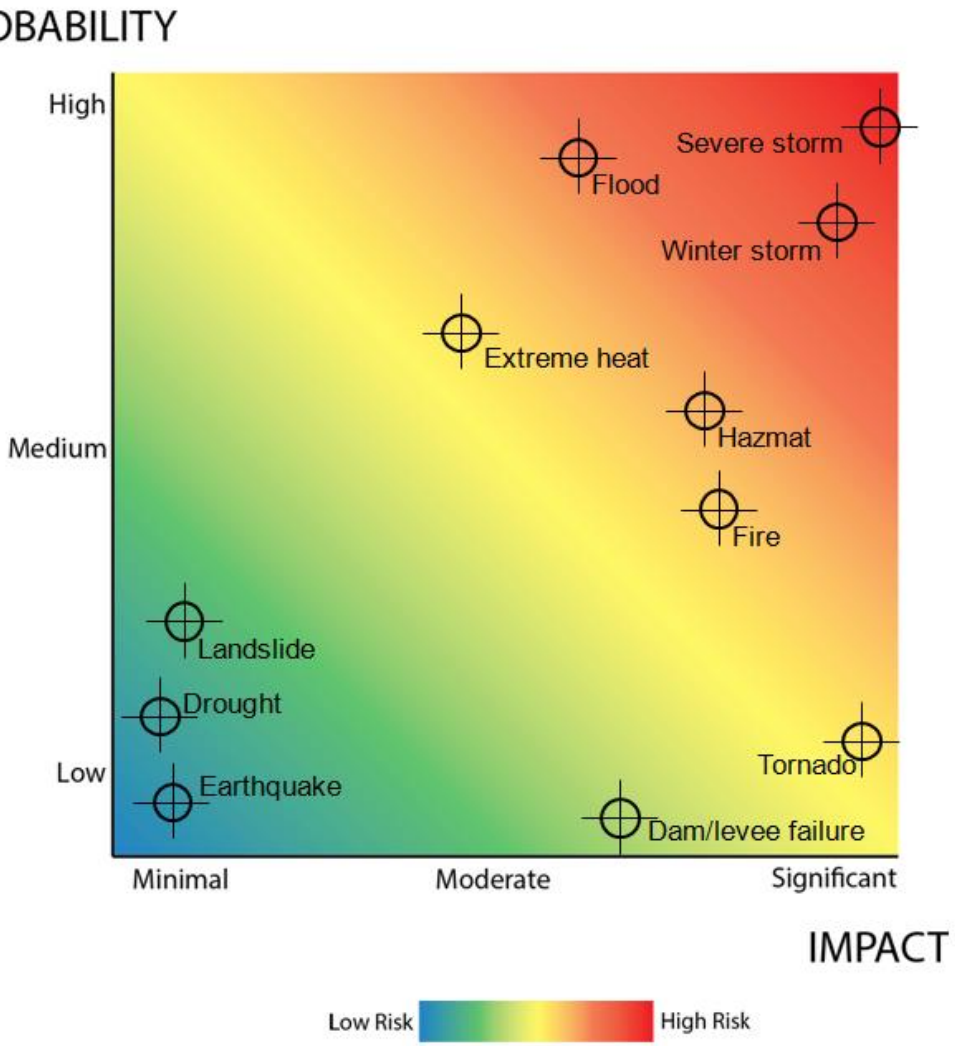
Land Use and Zoning



- Residential - Single Family
- Residential - Multi Family
- Mobile Home Park
- Medium Density Residence – Single Family
- High Density Residence - Multi Family
- Riverfront
- Riverfront Recreation
- Office
- Retail
- Highway Commercial
- Light Industry
- Light Industry
- Heavy Industry
- Heavy Industry
- Extraction
- Solid Waste

Risk Matrix

The Addyston planning team determined the risks to their community are severe storms and winter storms. Because Addyston sits at a low elevation near two rivers, flooding is a concern. Hazardous materials spills and fires could also create a significant impact to the community.



Mitigation Strategies

Many of the mitigation strategies for Addyston concern the effects flooding and storms. The proximity of this community to the Ohio River dictates additional concerns, including landslides and erosion.

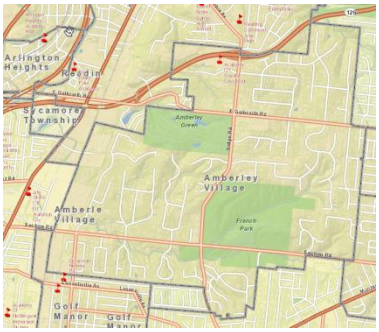
Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Institute a buyout plan for repetitive loss properties	Flood	2014	2018	County EMA	FEMA, local resources
Procure backup generators and/or transfer switches	All Hazards	2016	2017	County EMA	FEMA, local resources
Establish emergency shelters/safe rooms for residents	All Hazards	2016	2018	County EMA	FEMA
Obtain additional NOAA weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Equip shelters with backup power	All Hazards	2014	2015	County EMA	Local resources
Implement programs to educate the community on the hazards affecting the county	All Hazards	2016	Ongoing	Community planners, County EMA	Local resources
Expand the mutual aid agreements with the surrounding communities	All Hazards	2016	2017	Community leaders, County EMA	Local resources
Enhance the local communication system	All Hazards	2016	2018	County EMA	Local resources
Enhance tree trimming and removal in emergency situations	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Implement industrial site buffering	HazMat	2016	2018	County EMA	EPA

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Procure equipment to handle hazardous materials spills	HazMat	2016	2018	County EMA	Local resources
Develop an emergency action plan (EAP) for all dams in the area	Dams/Levees, Floods	2016	2017	County EMA, Village of Addyston	FEMA
Harden bridges	Landslide, Floods, Earthquake	2016	2019	County EMA	FEMA
Develop fire ordinances	Fire	2018	2019	Addyston Fire Department	Local resources
Conduct public education for residents and businesses using natural gas	Severe Storms, Tornado, Earthquake, Fire	2016	Ongoing	County EMA	ODNR, FEMA
Develop animal protection plans	Drought, Extreme Heat	2018	2019	County EMA	Local resources
Institute a Local Emergency Planning Committee	All Hazards	2018	2020	County EMA	Local resources

AMBERLEY

The planning team for Amberley is headed by Steve Rasfeld, Village Administrator. Other members of the planning team include representatives from local safety departments. The following table lists the Amberley representatives involved in the planning process, which included reviewing strategies to mitigate potential hazards unique to the community of Amberley.

Name	Agency/Title
Wes Braun	Amberley Village
Dana Schratt	Hamilton County EMA
Rich Wallace	Amberley Police/Fire Chief
Steve Rasfeld	Amberley Village



Community Overview

Amberley, founded in 1940, is located in the center of the I-275 circle with easy access to major highways and downtown Cincinnati. Amberley has been named a Tree City USA; preserving and enhancing the natural assets of this community is a high priority.

Topography

Per the 2010 US Census, Amberley comprises 3.5 square miles with no significant water bodies. This community is located in one of the higher elevations of Hamilton County at 803 feet.

Demographics

The 2010 U.S. Census reports the population of Amberley to be 3,585, with 1,385 households, and 1,084 families residing in the village. The reported population density was 1,024.3 inhabitants per square mile.

Language

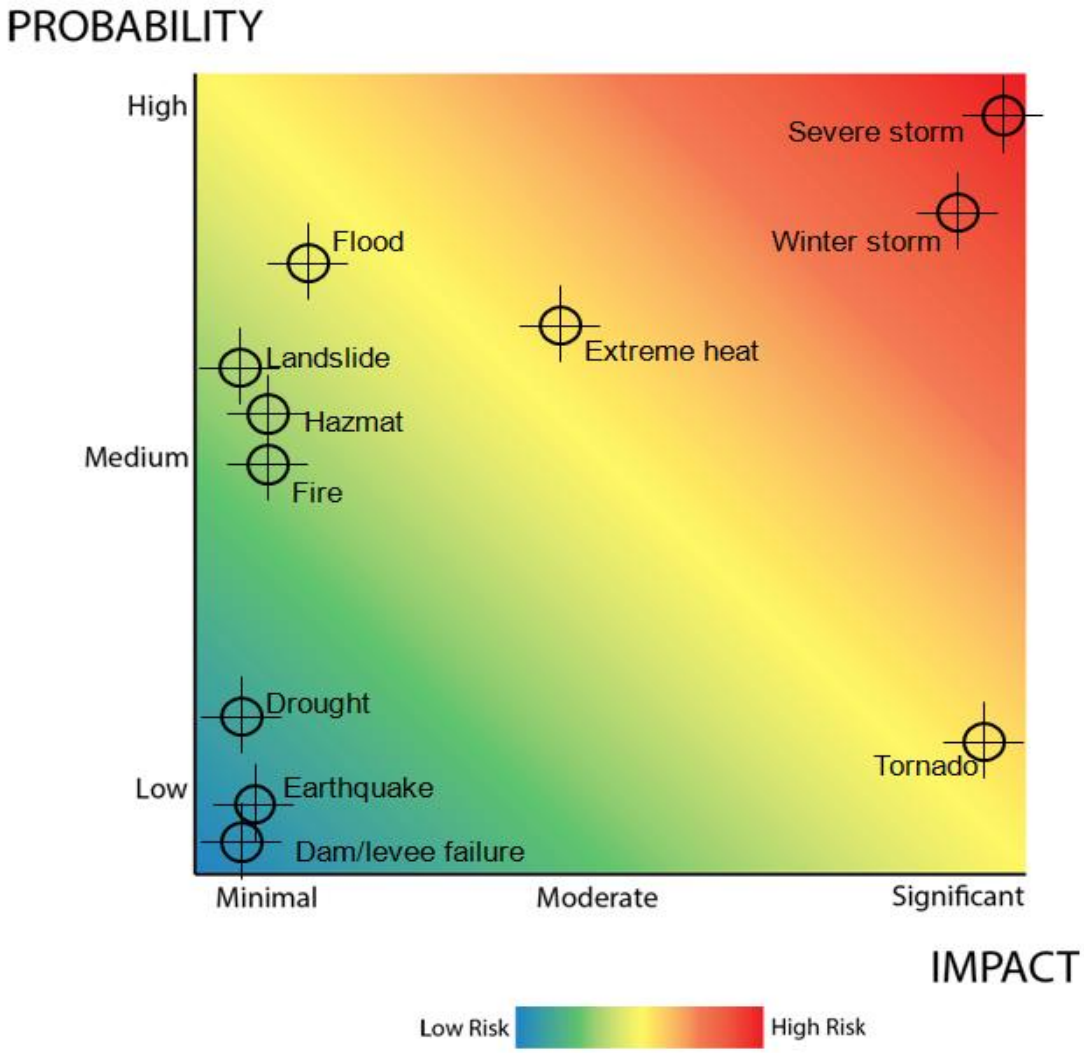
According to the 2011 American Community Survey, there are approximately 1,479 households in Amberley. Of these, 1,324 (89.5%) are primarily English-speaking. In households where English is not the primary language, 147 (9.9% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that only eight households do not have any members 14 years of age or older who speak English—all of which speak Asian or Pacific Island languages.

Economy and Industry

Amberley is a residential community comprised of older homes. Currently there is no significant industrial base; however the community leaders of Amberley have encouraged the development of a 27 acre commercial site that is available for future development.

Risk Matrix

The Amberley planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

As a residential community, Amberley quickly addresses public safety issues in the community.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Community 'Safe Phone' alert system	All Hazards	2014	On Going	Village of Amberly	Local and corporate resources
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Procure generators and transfer switches for shelter facilities	All Hazards	2014	2015	County EMA	Local resources. FEMA
Obtain additional NOAA weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Enhance tree trimming and removal in emergency situations	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Conduct a study to evaluate the engineering and potential use of the golf course pond levee	Flood	2018	2019	County EMA	Local and corporate resources

Amberley is committed to keeping the community a safe place through the use of public education, community newsletters, school crisis intervention plans and use of community volunteers.

ANDERSON TOWNSHIP

The planning team for Anderson Township is headed by Mark Ober, Anderson Township Fire Chief, and consists of representatives from local administrative departments. The following table identifies participants in the community planning process, which included reviewing strategies to mitigate potential hazards unique to Anderson Township.

Name	Agency/Title
Mark Ober	Anderson Township Fire Chief
Steve Sievers	Anderson Township Ass Administrator Operations
Paul Drury	Anderson Township Planning and Zoning
Dana Schratt	Hamilton County EMA

Community Overview

Anderson Township is one of twelve townships in Hamilton County, Ohio. It is located in the southeastern corner of the county, along the Ohio River. Two municipalities are located within the original boundaries of Anderson Township: part of the city of Cincinnati, and the village of Newtown. The township is considered one of the Cincinnati area's most desirable locations in which to reside.

Topography

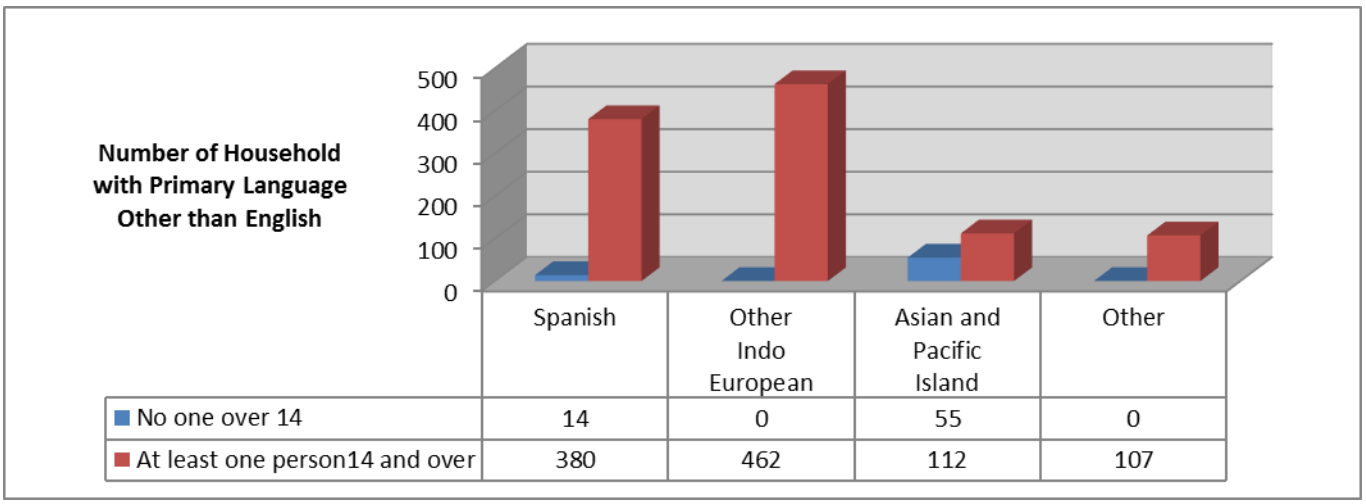
Anderson Township has a total area of 31.2 square miles—30.3 square miles of land and 0.8 square miles of water. At an elevation of 725 feet, the terrain is composed of rolling hills with steep, wooded hillsides leading down toward the Little Miami and Ohio Rivers.

Demographics

The 2010 U.S. Census reports the population of Anderson Township to be 43,446, with 15,629 households. The reported population density is 1,400 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 15,317 households in Anderson Township. Of these, 14,187 (92.6%) are primarily English-speaking. In households where English is not the primary language, 1061 (6.9% of the total households) include at least one person 14 years of age or older who speaks English fluently. The table below depicts the number of households with a primary language other than English.



Economy

The U.S. Census reports approximately 1,600 businesses (including Newtown). Significant employers include Mercy Hospital, Senco Products, Beechmont Automotive, and Forest Hills School District. The Ohio River area is a significant economic asset to Anderson Township.

Land Use and Zoning

The majority of the land in Anderson Township is residential.

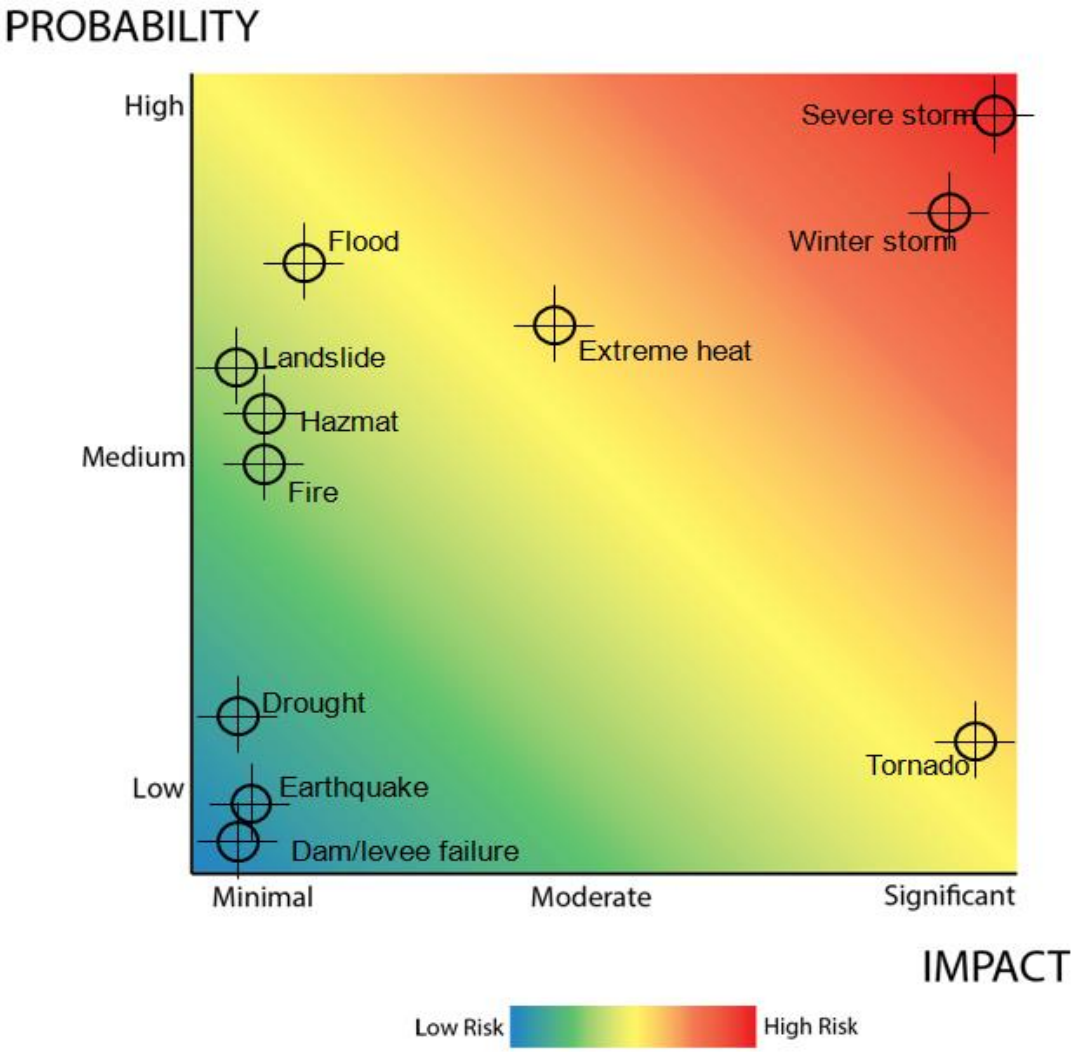
Land Use Distribution

Land Use	Anderson Township	Hamilton County
Agriculture	7.1%	10.3%
Commercial / Office	1.9%	3.9%
Single Family Residential	41.5%	35.4%
Multi Family Residential	0.8%	3.5%
Industrial	2.0%	5.8%
Public / Institutional	25.8%	16.7%
Parks & Recreation	4.4%	3.7%
Vacant	10.8%	15.4%
Not Available	5.8%	5.3%

Source: http://www.andersontownship.org/

Risk Matrix

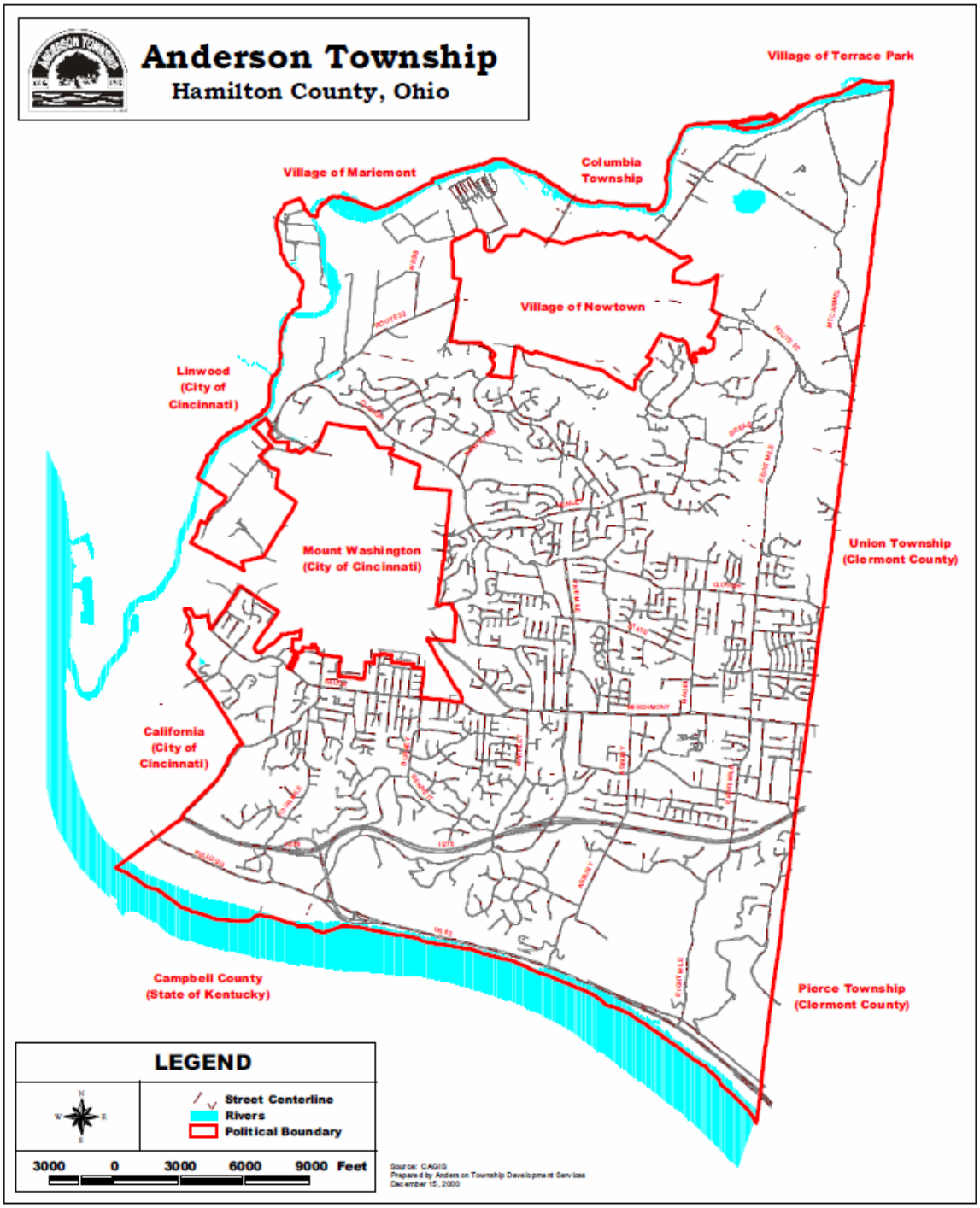
Consistent with Hamilton County, the planning team recognized severe storms and winter storms as being significant risks to the community of Anderson Township.



Mitigation Strategies

Due to the proximity of the Ohio River, Anderson Township recognizes the probability of flooding in their community.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Complete a storm water study at the OH52 basin	Flood, Flash Flooding, Landslide	Completed			
Distribute NOAA weather radios	Tornado, Thunderstorm, Flood, Earthquake, Drought, Winter Storm	2018	2019	County EMA	FEMA, NOAA
Bury power lines	Severe Storms, Winter Storms, Tornado	2014	2016	County EMA	Local and corporate resources
Obtain back-up generators/transfer switches for critical facilities	All Hazards	2014	2015	County EMA	Local resources. FEMA
Conduct a study to evaluate thoroughfare and county road traffic	Flood, Landslide	2016	2018	County EMA	FEMA, NOAA


Anderson Township
Hamilton County, Ohio
Village of Terrace Park
Village of Mariemont
Columbia Township
Village of Newtown
Linwood (City of Cincinnati)
Mount Washington (City of Cincinnati)
Union Township (Clermont County)
California (City of Cincinnati)
Campbell County (State of Kentucky)
Pierce Township (Clermont County)
LEGEND
Street Centerline
Rivers
Political Boundary
3000 0 3000 6000 9000 Feet
Source: CAGIS
Prepared by Anderson Township Development Services
December 15, 2000

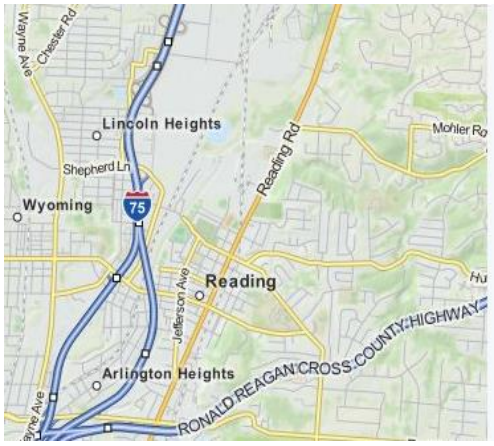
ARLINGTON HEIGHTS

The planning team for Arlington Heights is headed by Kevin Kaiser, Fire Chief for the Reading Fire Department. This mitigation meeting also included representatives from the City of Reading as these two communities are working cooperatively in this process. Other members of the planning team include representatives from public works, safety, and fire departments. The following table lists representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Arlington Heights.

Name	Agency/Title
Patrick Ross	Reading Safety Service Director
Ken Harper	Arlington Heights Police Chief
Jeff McLemore	Arlington Heights Service Director
Scott Snow	Reading Police Chief
Todd Owens	Reading Fire Department
Terry Zimmerman	Reading Police Department
Ken Wietmarscher	Reading Public Works
Darrell A. Courtney	City of Reading
Kevin Knizner	City of Reading
Robert “Bo” Bemmes	Mayor of Reading
Kevin Kaiser	Reading Fire Chief
Dana Schratt	Hamilton County EMA

Community Overview

Settled in 1883, Arlington Heights is located in Hamilton County, Ohio, just three miles north of Cincinnati. Most of Arlington Heights is located between the north and southbound lanes of I-75 (Mill Creek Expressway), thus the nickname ‘Village Between the Lanes’.



Topography

According to the U.S. Census Bureau, Arlington Heights has a total area of .27 square miles, of which all is land with no significant bodies of water. The village is situated at an elevation of 554 feet above sea level.

Demographics

The U.S. Census reports the Arlington Heights population was 745 in 2010, with 329 households, and 180 families residing in the village. The reported population density for Arlington Heights is 2,759 residents per square mile.

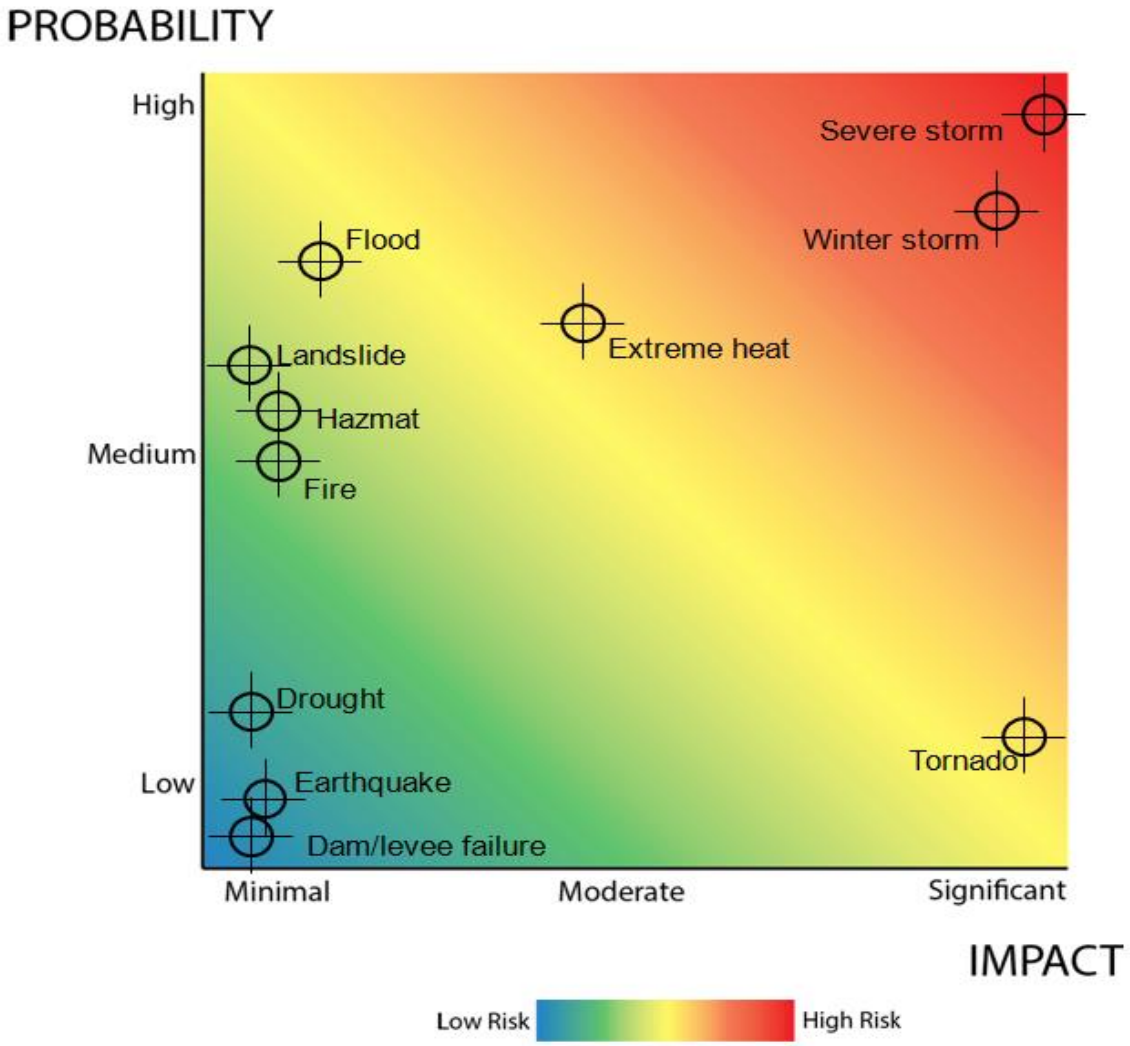
Language

According to the 2011 American Community Survey, there are approximately 306 households in Arlington Heights. Of these, 299 (97.7%) are primarily English-speaking. Of the households in which English is not the primary language—four Spanish and three Asian and Pacific—there is at least one member of each 14 years of age or older who speaks English fluently.

Land Use and Zoning

Risk Matrix

The Arlington Heights planning team agreed severe storms and winter storms pose the greatest threat to their community. The location of Arlington Heights, between two lanes of I-75, makes it vulnerable to hazardous materials spills.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Update tree trimming ordinances	Tornado, Severe Winds, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Identify and equip local shelters with generators and transfer switches	All Hazards	2014	2015	County EMA	Local resources. FEMA
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Institute a buy-out plan for flood prone structures	Flood	2014	2018	County EMA	FEMA, local resources
Procure generators and transfer switches for schools, public facilities, and the senior center	All Hazards	2014	2015	County EMA	Local resources. FEMA
Mitigate the erosion issues at Clark Road	Landslide, Earthquake, Severe Storms, Flood, Flash Flood	2016	2018	County EMA	Community Development Grants, OCRA, FEMA
Improve storm water drainage	Severe Storms, Flood, Flash Flood	2016	2019	County EMA	FEMA, OCRA
Develop and implement a water conservation plan	Drought, Extreme Heat	2016	2018	County EMA	ODOT, ODNR, FEMA, FHWA, USDA
Trim trees to minimize the amount/duration of power outages	Tornado, Severe Winds, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Enhance snow removal equipment and supplies	Winter Weather	2016	2014	County EMA	USDOT, FHWA, ODOT, FEMA

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Mitigate the erosion issues at Hunt Road and the fire station	Landslide, Earthquake, Severe Storms, Flood, Flash Flood	2016	2018	County EMA	Community Development Grants, OCRA, FEMA
Conduct a study to address the capacity of Mill Creek	Severe Storms, Flood, Flash Flood	2018	2020	Community Leaders of Arlington Heights	Community Development Grants,
Develop and implement safety education for residents and businesses using natural gas	Earthquake, Flood, Tornado	2016	Ongoing	Community Planners, County EMA	Local Resources

BLUE ASH

The planning team for Blue Ash is headed by Richard Brown, Blue Ash Fire Chief. This mitigation meeting included local leaders including representatives from safety departments. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the City of Blue Ash.

Name	Agency/Title
Richard R. Brown	Blue Ash Fire Chief
Steve Schueler	Lieutenant, Blue Ash Police Department
Chris Theders	Blue Ash Assistant Fire Chief
Gordon Perry	Blue Ash Dept of Public Works
David Watlz	Blue Ash City Manager
Bary Lusby	Hamilton County EMA

Community Overview

The City of Blue Ash is located about 12 miles northeast of Cincinnati strategically positioned at the convergence of I-75, I-71 and I-275. This location has attracted numerous small businesses and corporate headquarters drawing almost 50,000 workers into Blue Ash each workday.

Topography

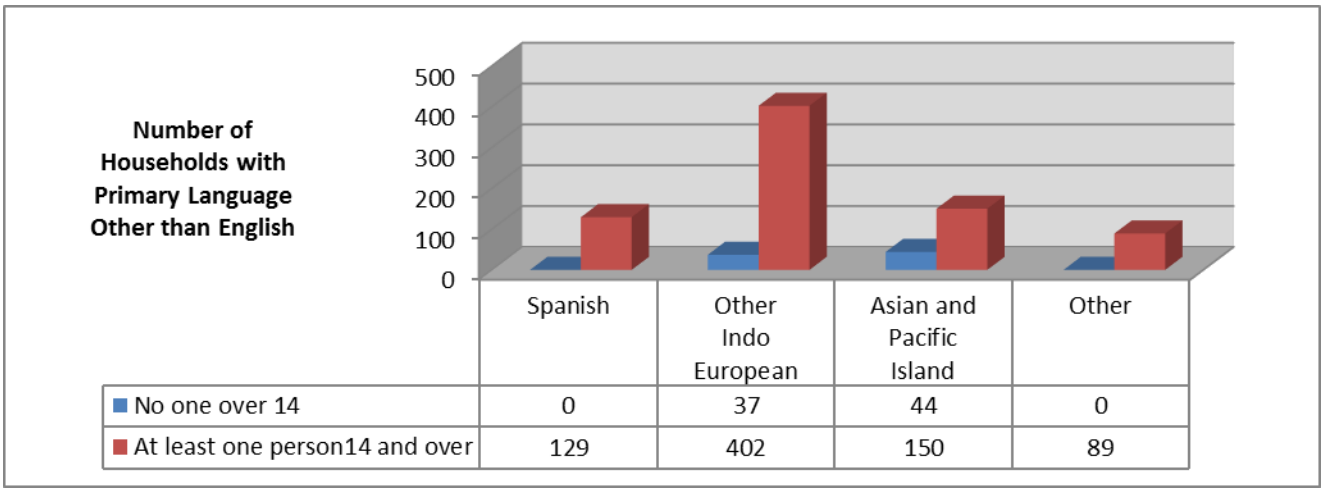
The City of Blue Ash is comprised of 7.59 square miles, with 7.58 square miles of land and just 0.1 square miles of water area. Blue Ash is located northeast of Cincinnati at an elevation of 846 feet.

Demographics

The 2010 Census reports the City of Blue Ash population at 12,114, with 5,015 households, and 3,404 families residing in the city. The current population density is 1,598 inhabitants per square mile.

Language

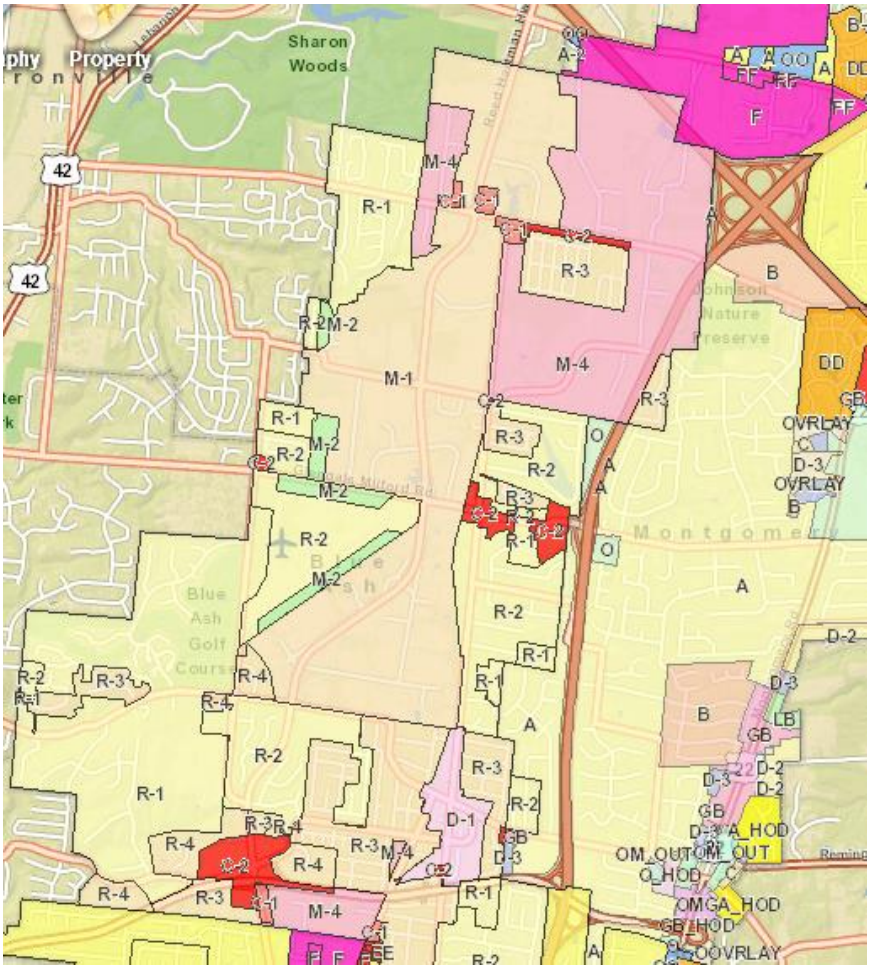
According to the 2011 American Community Survey, there are approximately 4,882 households in Blue Ash. Of these, 4,031 (82.6%) are primarily English-speaking. Of the households in which English is not the primary language, 770 (15.8% of the total households) include at least one person 14 years of age or older who speaks English fluently. The table below depicts the number of households with a primary language other than English.



	Spanish	Other Indo European	Asian and Pacific Island	Other
No one over 14	0	37	44	0
At least one person14 and over	129	402	150	89

Land Use and Zoning

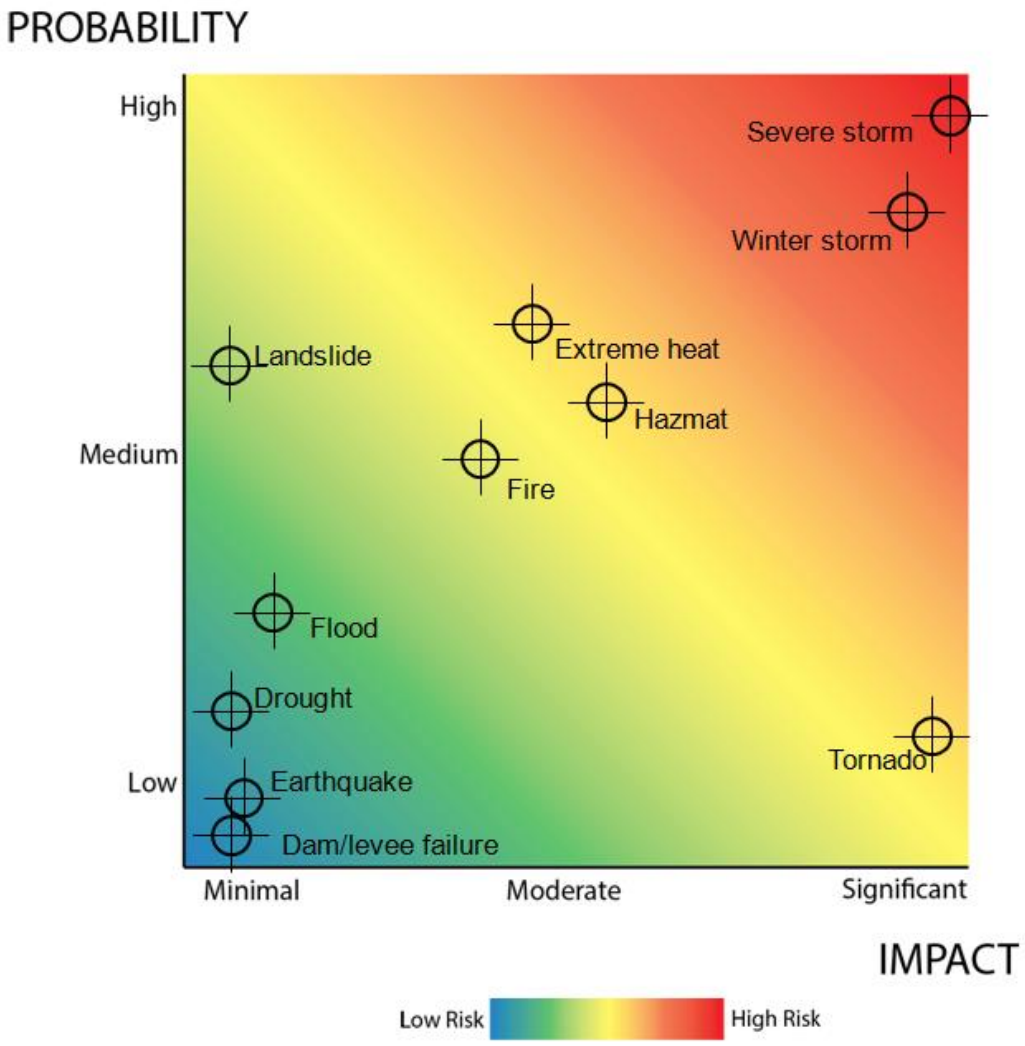
The land use of Blue Ash has been carefully monitored by the community leaders and is currently comprised of 35% residential, 35% business, and 30% public/other land use. The past several years have seen increased development in Blue Ash, including the significant projects of the Cooper Creek Event Center and Blue Ash Airport Park.



Risk Matrix

The City of Blue Ash planning team determined the greatest risks to their community are severe storms and winter storms. Due to lack of water bodies and a higher elevation, the probability of a flood is less, but the impact of a hazardous materials spill or fire would be greater than those reported for Hamilton County.

On April 9, 1999, Blue Ash experienced an F4 tornado that caused four deaths.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Conduct a study to improve the safety of Plainfield and Hunt Road	Winter Storms, Flash Flooding, HazMat	2016	2018	County EMA	ODNR, EPA, FEMA
Conduct an engineering study regarding the safety of the Ronald Reagan and I71	Winter Storms, Flash Flooding, HazMat	2016	2018	County EMA	ODNR, EPA, FEMA
Improve stream maintenance after severe weather	Severe Storms, Floods, Flash Flooding	2016	2018	County EMA	ODNR, FEMA
Procure enhanced communication system	All Hazards	2016	2018	County EMA	Local Resources
Improve tree trimming	Severe Storms, Winter Weather, Tornado	2014	Ongoing	County EMA	FEMA Public Assistance Grants

CHEVIOT

The planning team for the City of Cheviot is headed by Robert Klein, Cheviot Fire Chief. Other members of the planning team include representatives from local departments. The following table lists Cheviot representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Cheviot.

Name	Agency/Title
Robert Klein	Cheviot Fire Chief
Kevin Gannon	Cheviot Fire Department
Tom Braun	Cheviot City Administration
Brent Craig	Cheviot Public Works
Dana Schratt	Hamilton County EMA

Community Overview

The City of Cheviot located in southwestern Ohio, is approximately seven miles northwest of downtown Cincinnati. Founded around a large natural spring in 1796, Cheviot was incorporated as a village in 1901, and eventually became a city in 1932. Originally a farming community, today Cheviot is a thriving residential suburb of Cincinnati.

Topography

According to the U.S. Census the City of Cheviot has a total area of 1.17 square miles, all of it land. The city is situated at an elevation of 906 feet above sea level.

Demographics

The U.S. Census reports the Cheviot population was 8,375 in 2010 with 3,779 households, and 1,931 families residing in the city. The reported population density is 7,158 inhabitants per square mile.

Language

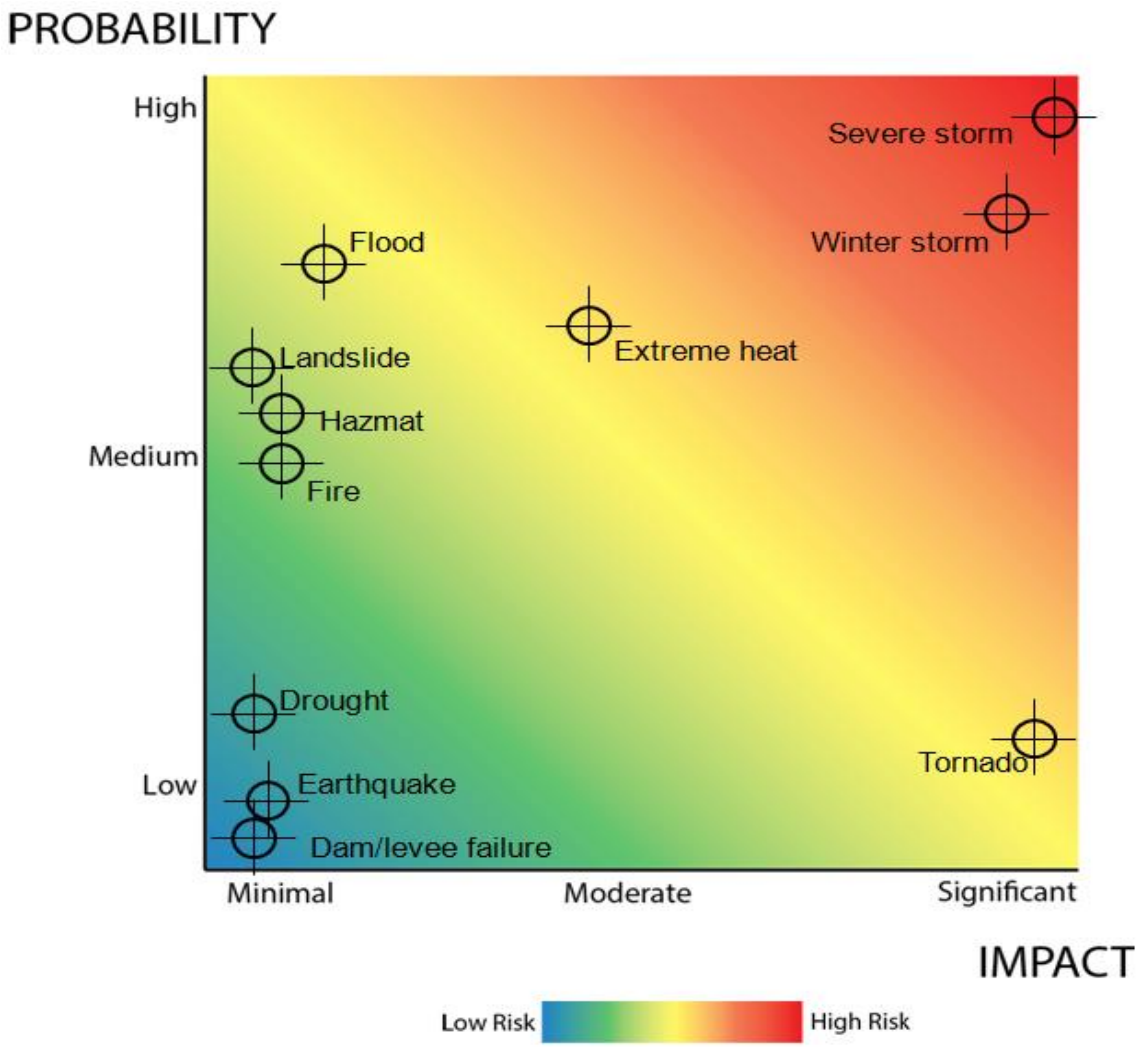
According to the 2011 American Community Survey, there are approximately 3,870 households in Cheviot. Of these, 3,604 (93.1) are primarily English-speaking. Of the households in which English is not the primary language, 212 (5.5% of the total households) include at least one person 14 years of age or older who speaks English fluently. The households in which no members age 14 years or older speak English consist of the following: nine Spanish, nine Other Indo European, and 36 other.

Economy

The City of Cheviot has designated a CRA Community Reinvestment Area to provide economic development in the business district. Property tax abatements of up to 50% provide encouragement for the renovation of existing commercial buildings.

Risk Matrix

The Cheviot planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

The planning team for the City of Cheviot is particularly aware of the need to improve public education regarding safety and security in their community. Although some services are currently offered by various departments, there are areas where the expansion of public awareness would benefit the community.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Purchase backup generators and transfer switches	All Hazards	2014	2015	County EMA	Local resources, FEMA
Develop marketing materials to educate public on preparedness and survival.	Extreme Heat, Tornado, Flood, Earthquake, Severe storm, Winter Storm, Hazmat	2016	Ongoing	Community planners, County EMA	Local Resources
Conduct a study to improve internal communication structure	All Hazards	2016	2018	County EMA	Community Development Grants, FEMA, Local resources
Update snow removal equipment	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA
Conduct community education and outreach for residents and business owners with natural gas	Landslide, Earthquake, Tornado	2016	Ongoing	County EMA	ODNR, FEMA
Distribute weather radios to the public	Tornado, Severe Winds, Winter Weather	2018	2019	County EMA	FEMA, NOAA
Trim trees to minimize the amount/duration of power outages	Tornado, Severe Winds, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants

CINCINNATI

The planning team for the City of Cincinnati is headed by Bary Lusby, Emergency Management Director for Hamilton County. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to Cincinnati.

Name	Agency/Title
Anson Turley	Cincinnati District Chief
Christine Grimmelsman	Cincinnati MMRS Planner
Bary Lusby	Hamilton County EMA

Community Overview

Cincinnati is the county seat and the largest city in Hamilton County, Ohio. Chartered as a village in 1802, Cincinnati quickly expanded and became a city in 1819. With the introduction of steam navigation, the Ohio River became a lifeline to much of southern Ohio. The city continued to expand with the introduction of railroads linked to the river. Cincinnati is now the third largest city in Ohio.

Topography

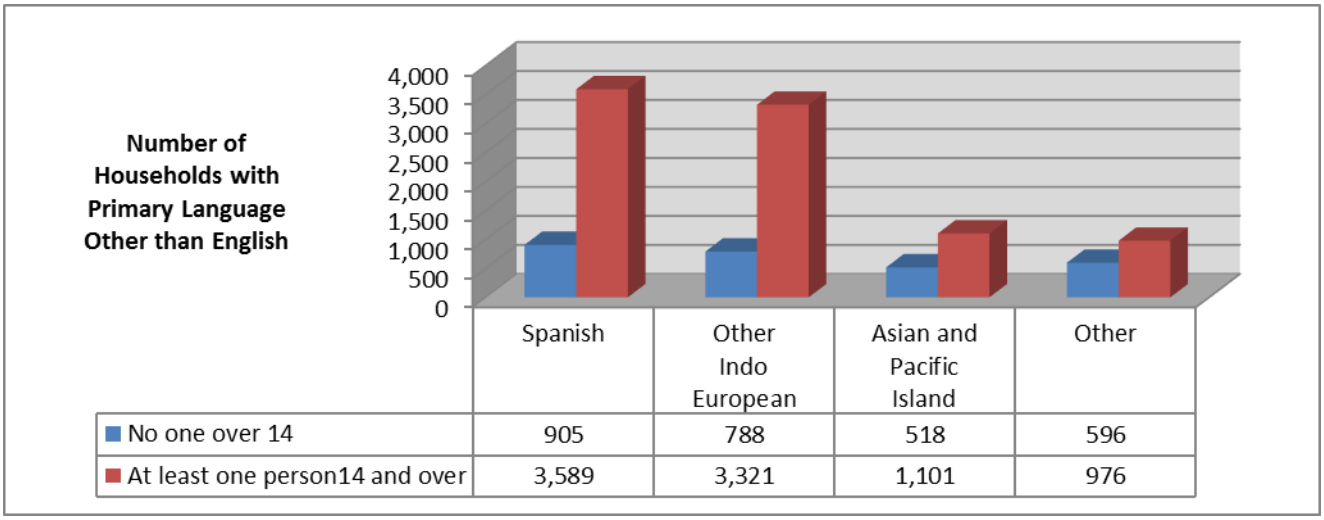
Cincinnati is comprised of 79.54 square miles, with 77.94 square miles of land and 1.6 square miles of water. The northern area of the city is comprised of hills and bluffs, while the southern side of Cincinnati becomes a steep sided valley on the north bank of the Ohio River. The city is at the Ohio-Kentucky border. Cincinnati sits at an elevation of 482 feet.

Demographics

The 2010 Census reports Cincinnati population at 296,943, with 133,420 households, and 62,319 families living in the city. The reported population density is 3,810 inhabitants per square mile. The 2000 Census reported 331,285 residents, representing a population decrease of over 10%. Cincinnati's core metro area spans parts northern Kentucky. Two thirds of all Americans live within a day's drive of Cincinnati.

Language

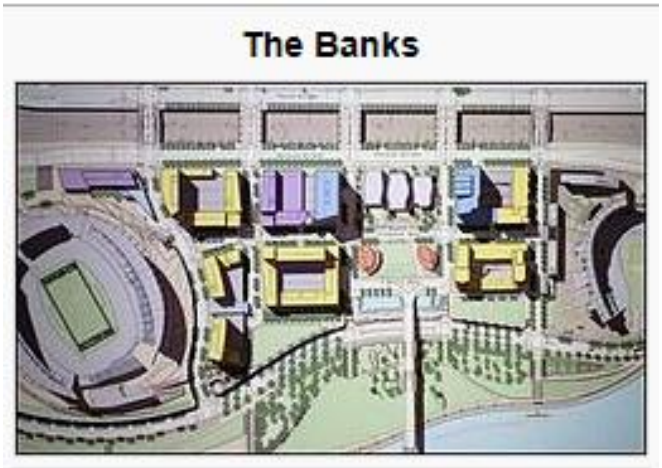
There are approximately 131,892 households in Cincinnati. Of these, 120,098 (91.1%) are primarily English-speaking. In households where English is not the primary language, 8,987 (7.5% of the total households) include at least one person 14 years of age or older who speaks English fluently. The table below depicts the number of households with a primary language other than English.



	Spanish	Other Indo European	Asian and Pacific Island	Other
No one over 14	905	788	518	596
At least one person14 and over	3,589	3,321	1,101	976

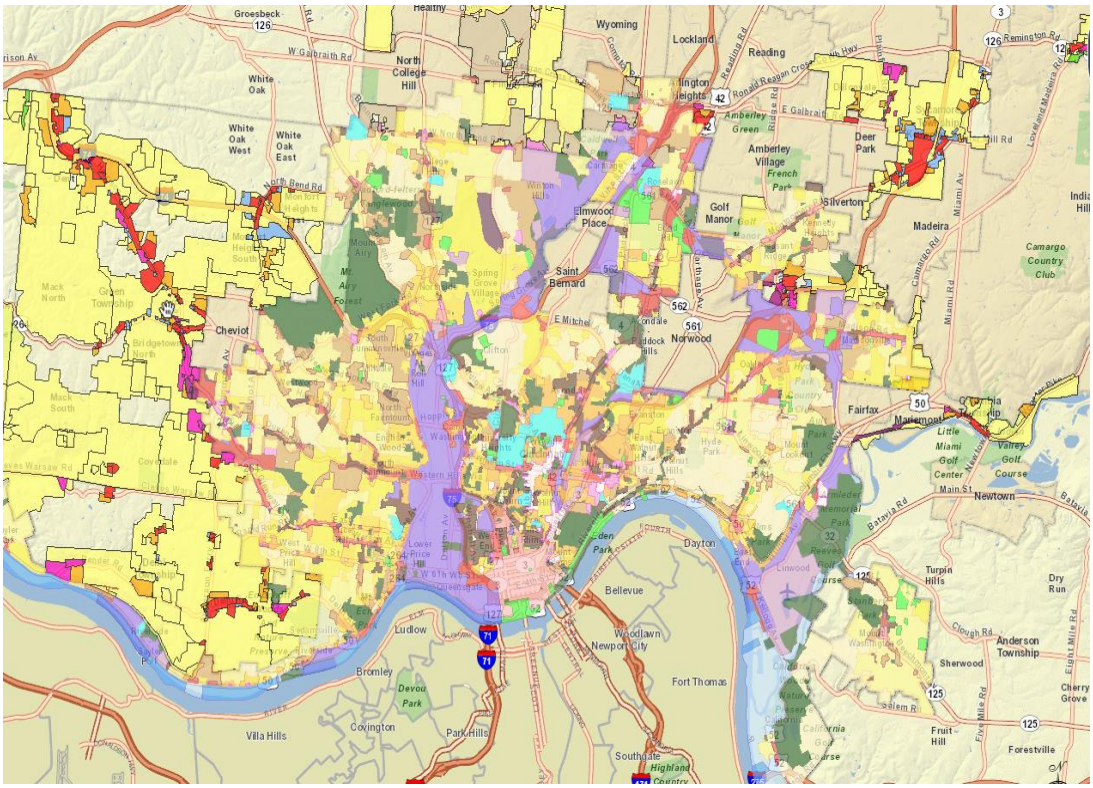
Economy

Cincinnati is home to many large corporations including Procter & Gamble, Kroger's, and American Financial Group. There are also thousands of small and medium businesses which make up a vital component of economy. The largest employer in the area is the University of Cincinnati which employs over 15,000 workers. The City of Cincinnati and Hamilton County are working on a joint project to develop a new riverfront area called The Banks



Land Use and Zoning

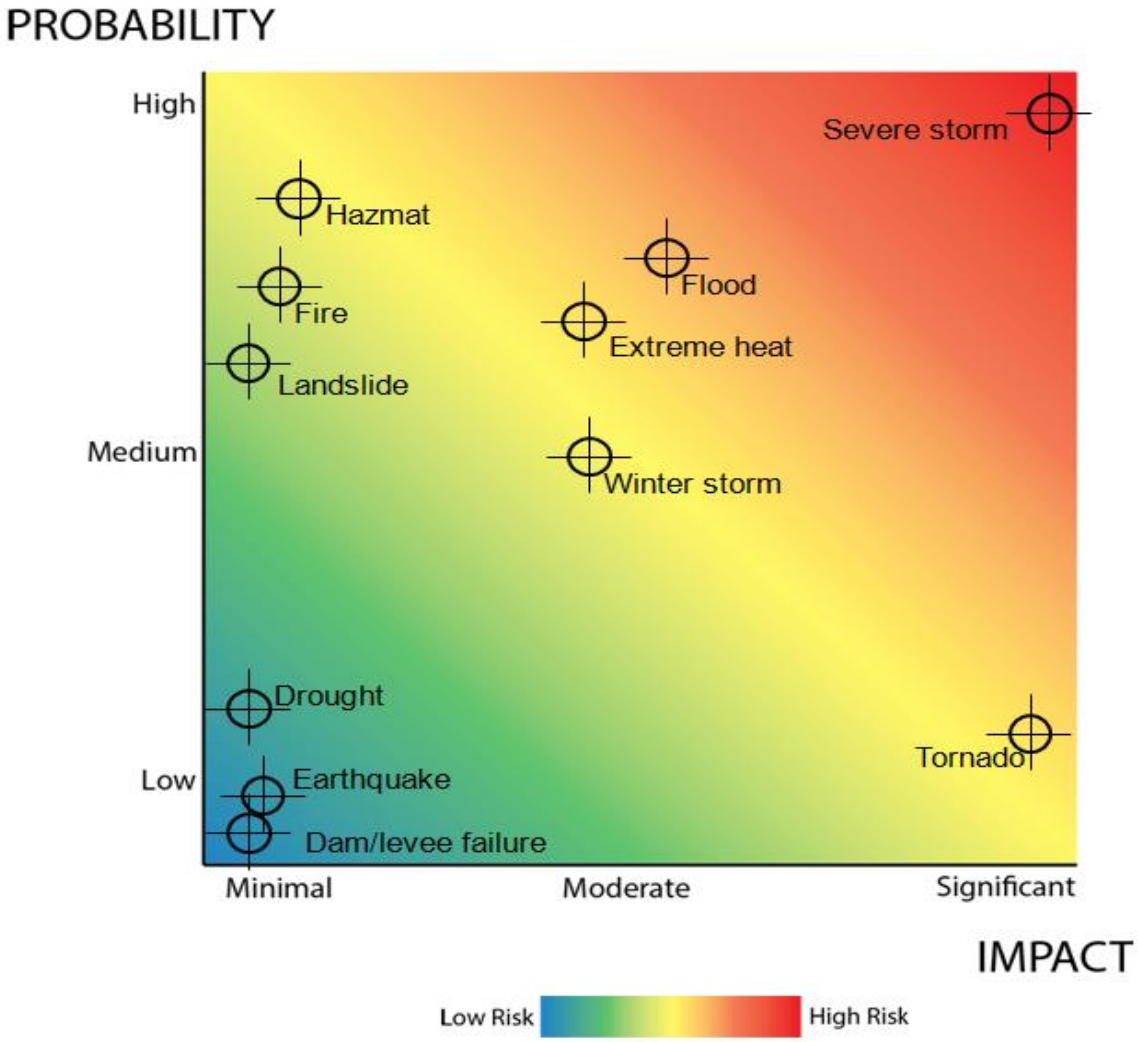
Aware of a decreasing population, community leaders are continually looking for ways to encourage population growth in their community. Projects like The Banks will encourage local residency and provide additional jobs.



- Residential - Single Family
- Residential - Multi Family
- Mobile Home Park
- Medium Density Residence – Single Family
- High Density Residence - Multi Family
- Riverfront
- Riverfront Recreation
- Office
- Retail
- Highway Commercial
- Light Industry
- Light Industry
- Heavy Industry
- Heavy Industry
- Extraction
- Solid Waste

Risk Matrix

The Cincinnati planning team determined the greatest risk to their community is severe storms. Although winter storms are also recognized as a threat, the impact of flooding in Cincinnati is a primary concern.



Mitigation Strategies

In 1937 Cincinnati experienced one of the worst floods in U.S. history. After that incident city built protective flood walls, but flooding continues to be a problem for Cincinnati.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Institute a buy-out plan for repetitive loss properties	Floods	2014	2018	County EMA	FEMA, Local Resources
Procure enhanced communication system	All Hazards	2016	2018	County EMA	Local Resources
Procure backup generators and/or transfer switches	All Hazards	2014	2015	County EMA	FEMA, Local Resources
Establish emergency shelters/safe rooms for residents of trailer parks	All Hazards	2016	2018	County EMA	FEMA
Conduct an engineering study to mitigate recurrent flooding at Luken Airport	Flood, Severe Storms	2016	2018	County EMA	FEMA
Improve railroad crossings	HazMat	2016	2018	County EMA	Local Resources, ODOT
Address recurrent hillside flooding along River Road	Flood, Severe Storms	2016	2018	County EMA	FEMA
Conduct an engineering study to mitigate landslides along Columbia Parkway	All Hazards	2016	2018	County EMA	Community Development Grants, OCRA, FEMA
Develop anchoring ordinances for manufactured homes	Severe Storms, Tornado,	2016	2017	County EMA	Local resources

CLEVES

The planning team for the Village of Cleves is headed by Stephen Ober, Miami Township Fire Chief. This meeting included representatives from the municipalities of Miami Township and Addyston, as these communities are working cooperatively in this mitigation process. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the township and municipalities.

Name	Agency/Title
Stephen Ober	Miami Township Fire Chief
Danny Stacy	Village of Cleves Mayor
Jack Rininger	Miami Township Trustee
Tim Benter	INEOS ABS, Health, Environment & Safety
Daniel Pillow	Village of Addyston Mayor
Bary Lusby	Hamilton County EMA

Community Overview

Cleves was established in 1818 along the banks of the Great Miami River. It is located in the southwest corner of Hamilton County, Ohio, about 16 miles from Cincinnati.

Topography

The Village of Cleves has a total area of 1.58 square miles, with no significant bodies of water. The community sits between the Great Miami River and the Ohio River at an elevation of 495 feet.

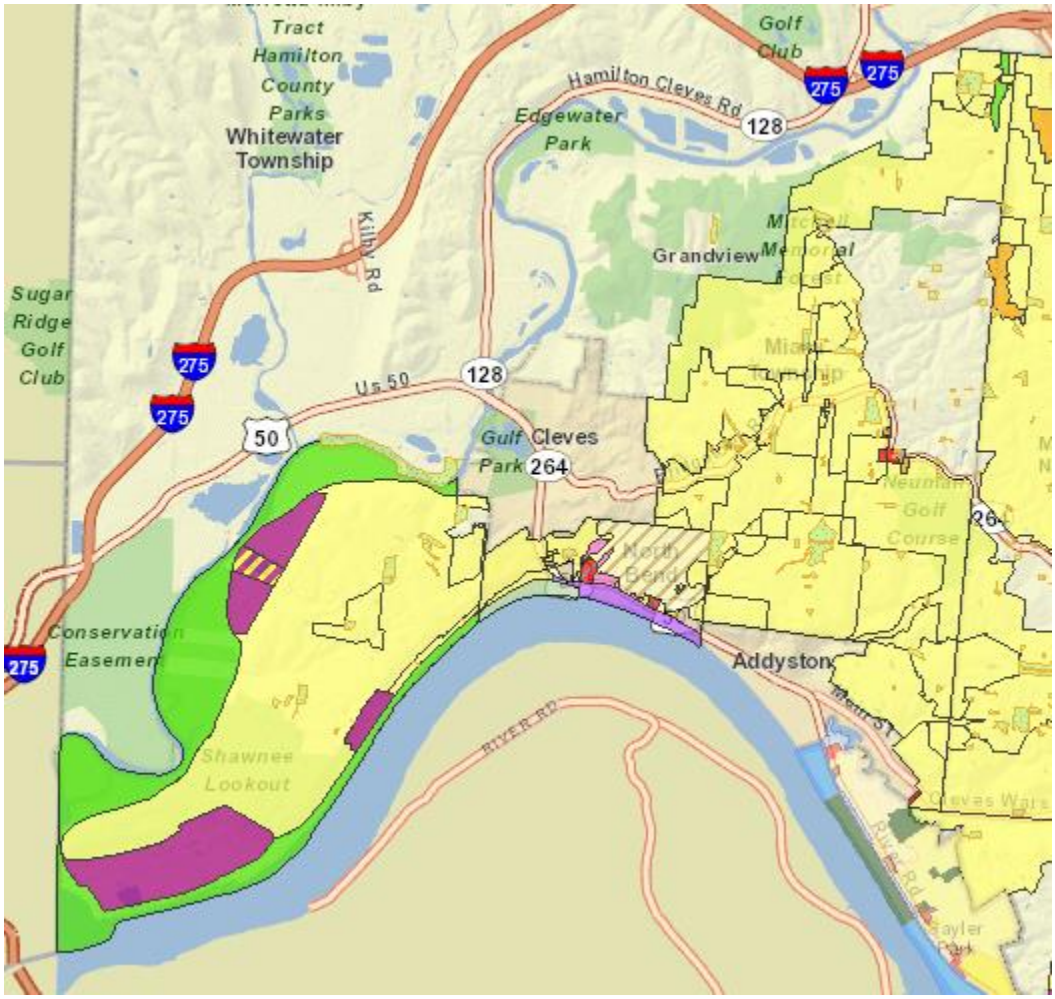
Demographics

The 2010 Census reports the Cleves population at 3,234, with 1,079 households, and 823 families residing in the village. The reported population density is 2,047 inhabitants per square mile.

Language

The American Community Survey does not include data for Cleves primary household language. The 2010 Decennial Census did not collect data regarding household language usage.

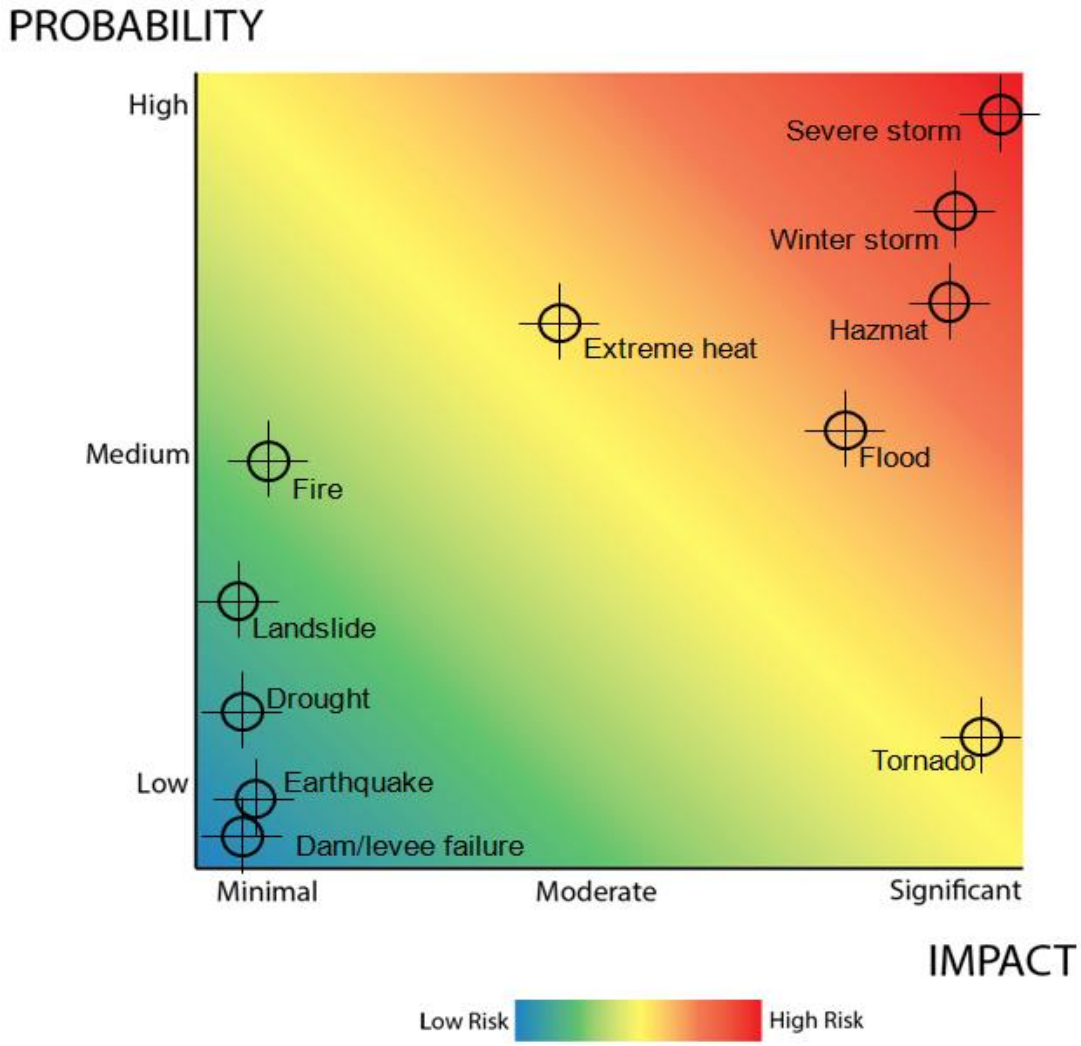
Land Use and Zoning



- Residential - Single Family
- Residential - Multi Family
- Mobile Home Park
- Medium Density Residence – Single Family
- High Density Residence - Multi Family
- Riverfront
- Riverfront Recreation
- Office
- Retail
- Highway Commercial
- Light Industry
- Light Industry
- Heavy Industry
- Heavy Industry
- Extraction
- Solid Waste

Risk Matrix

The Cleves planning team determined the risks to their community are severe storms and winter storms. Because Cleves sits at a low elevation near two rivers, flooding is a concern. Hazardous materials spills could also create a significant impact to this community.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Institute a buyout plan for repetitive loss properties	Flood	2014	2016	County EMA	Local resources, FEMA
Upgrade storm water drainage systems	Flood	2016	2019	County EMA	FEMA
Procure backup generators and/or transfer switches for municipal buildings	All Hazards	2014	2015	County EMA	FEMA, Local Resources
Raise flood prone streets	Floods	2016	2018	County EMA	ODOT, Local resources
Establish emergency shelters for residents	All Hazards	2016	2018	County EMA	FEMA
Implement programs to educate the community on the hazards affecting the county	All Hazards	2016	Ongoing	Community Planners for Cleves, County EMA	Local Resources
Expand the mutual aid agreements with the surrounding communities	All Hazards	2016	2017	County EMA, Community leaders of Cleves	Local resources
Enhance the local communication system	All Hazards	2016	2018	County EMA	Local Resources
Enhance tree trimming and removal in emergency situations	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA Public Assistance Grants

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Conduct an engineering study to redesign and rebuild the Cooper Road entry into US 50	HazMat	2016	2018	County EMA	ODNR, EPA, FEMA
Harden bridges	Landslide, Floods, Earthquake	2016	2019	County EMA	FEMA
Develop ordinances to require improved building standards and floodplain ordinances	Severe Storms, Winter Storms, Tornado, Earthquake, Flood	2018	2019	County EMA	Local resources
Conduct public education for residents and businesses using natural gas	Severe Storms, Tornado, Earthquake, Fire	2016	Ongoing	County EMA	ODNR, FEMA

COLERAIN TOWNSHIP

The planning team for Colerain Township is headed by Frank Birkenhauer, Township Administrator. Frank heads the three man 'mitigation team' for the community. The other members of the planning team, listed below, have been involved in the planning process which included reviewing strategies to mitigate potential hazards unique to Colerain Township.

Name	Agency/Title
Frank Birkenhauer	Colerain Township Administrator
Mark Denny	Colerain Township Police Department
Frank Cook	Colerain Township Fire Department
Dana Schratt	Hamilton County EMA

Community Overview

Colerain Township is one of the largest of twelve townships of Hamilton County, Ohio. It is located in the northern part of the county. The only municipality in Colerain Township is a small part of the city of North College Hill in the far southeast.

Topography

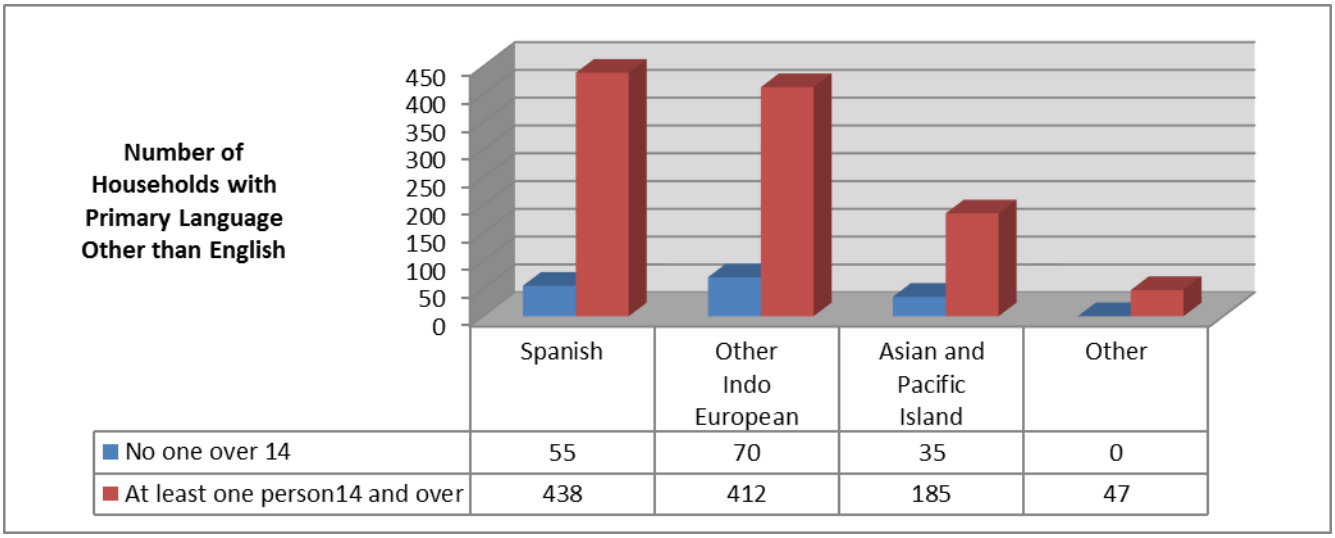
Per the 2010 US Census, Colerain Township comprises 43.2 sq. miles with 42.9 sq. miles of land and 0.3 sq. miles of water. Located in the northern part of the county this jurisdiction has an elevation of 853 feet with wooded hills sloping down toward the flood plain of the Miami River.

Demographics

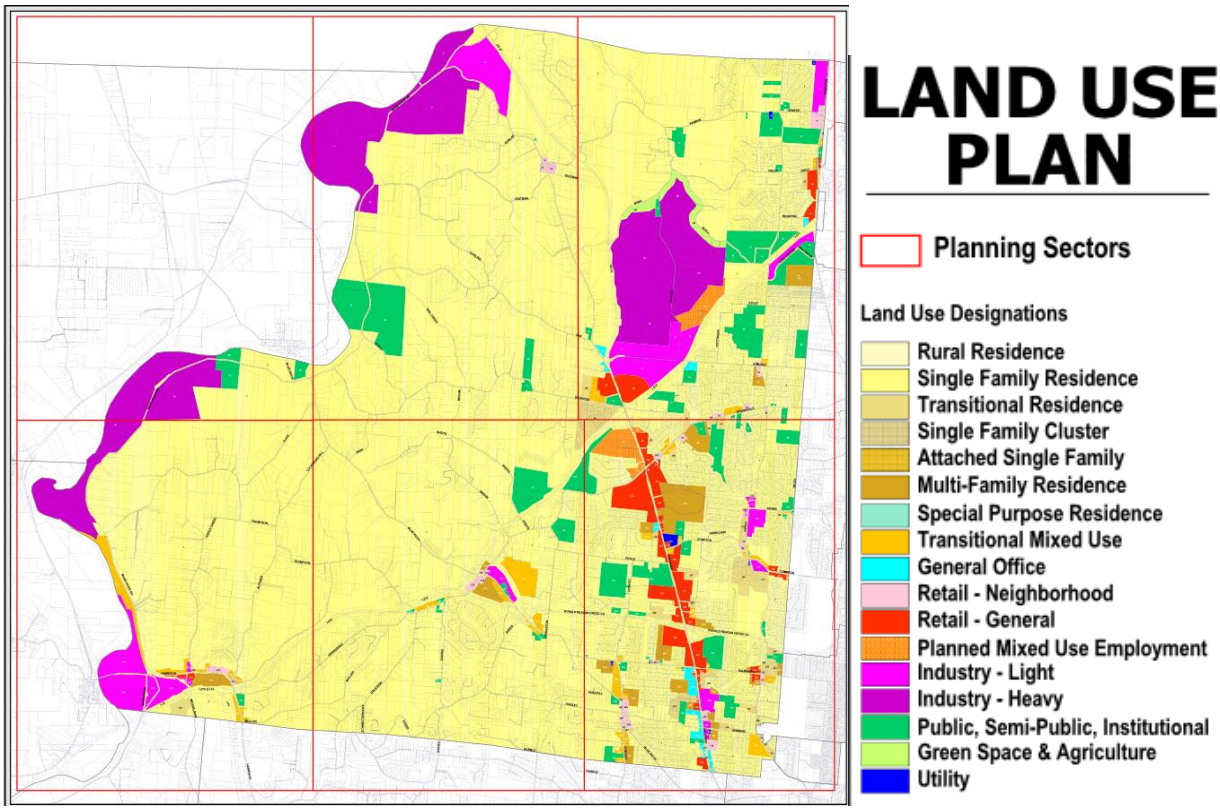
The 2010 Census reports the Colerain Township population at 58,499, making it the most populous township in Ohio. There are 22,418 households and 16,644 families residing in this community. The reported population density is 1,404 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 22,011 households in Colerain Township. Of these, 20,769 (94.4%) are primarily English-speaking. In households where English is not the primary language, 1,082 (5.2% of the total households) include at least one person 14 years of age or older who speaks English fluently. The table below depicts the number of households with a primary language other than English.

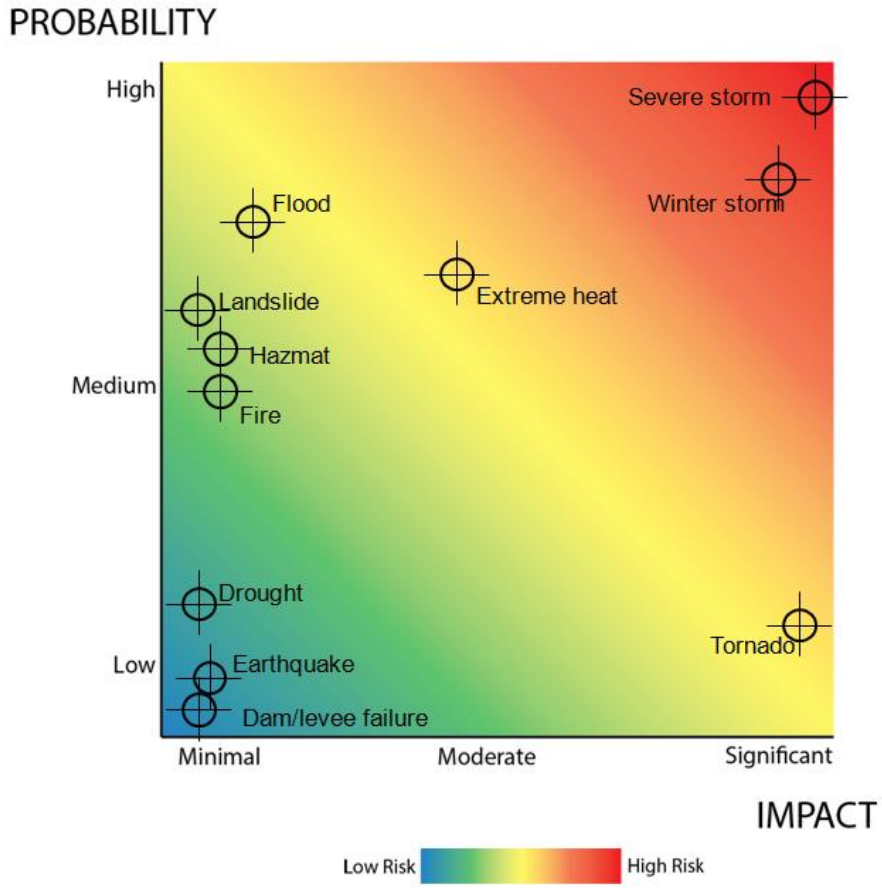


Land Use and Zoning



Risk Matrix

The Colerain Township planning team determined the risks to their community are consistent with those reported for Hamilton County. Historically, severe storms and winter storms have had the greatest impact to their community.



Mitigation Strategies

Colerain Township is aware of the probability of flooding in their jurisdiction and is working towards a "Green Infrastructure" approach to floodplain and storm water management.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Pursue "Green Infrastructure" management techniques	Severe Storms, Floods	On Going	On Going		
Fuel Depot project	HazMat	2018	2020	County EMA	Local resources
Buy-out plan for repetitive loss properties	Floods	2014	2018	County EMA	Local resources, FEMA
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Enhance the current emergency communication system	Severe Storms, Winter Storms, Tornado	2016	2018	County EMA	Local resources
Procure backup generator and transfer switch for the community center	All Hazards	2014	2015	County EMA	FEMA, Local resources
Require anchoring of manufactured homes and exterior attachments	Severe Storms, Tornado	2016	2017	County EMA	Local resources

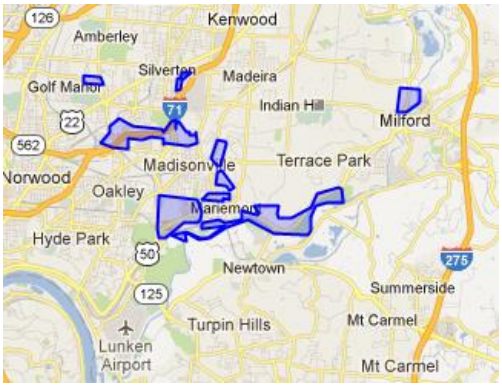
COLUMBIA TOWNSHIP

The planning team for Columbia Township is headed by Mike Lemon, Administrator for Columbia Township. This mitigation meeting included representatives from Columbia Township along with representatives from the Village of Fairfax. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the Columbia Township.

Name	Agency/Title
Mike Lemon	Columbia Township Administrator
John Servizzi	Columbia Township
Jennifer Kaminer	Village of Fairfax Administrator
Dana Schratt	Hamilton County EMA

Community Overview

Columbia Township is one of the twelve townships of Hamilton County, Ohio. Located in the eastern part of the county, the township has been fragmented by the annexation and/or the incorporation of Cincinnati, Fairfax, Indian Hill, Madiera, Mariemont, Milford, Norwood and Silverton. The township now consists of twelve discontinuous areas. Since the founding in 1791, Columbia Township has diminished from being one of the largest townships in Ohio to being one of the smallest.



Topography

Columbia Township is comprised of only 2.7 square miles, with 2.5 square miles of land and 0.2 square miles of water area. This township sets at an elevation of 571 feet.

Demographics

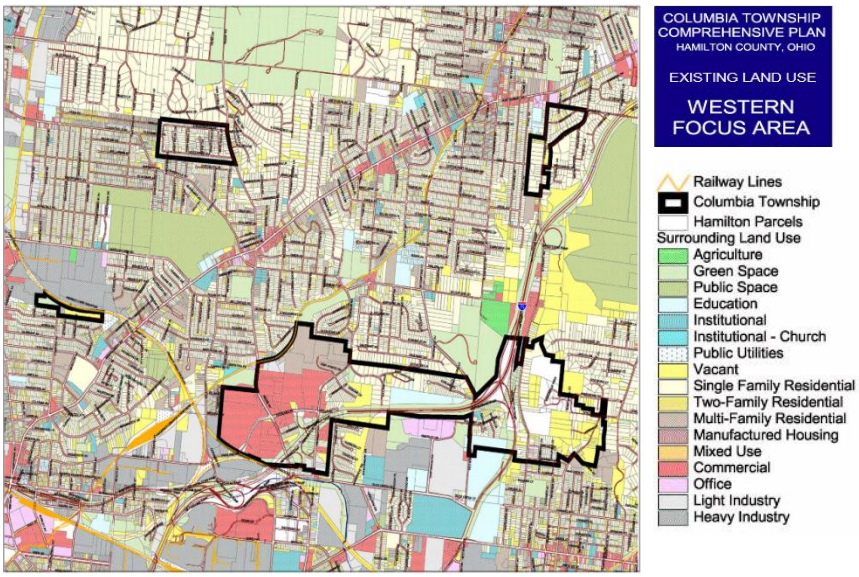
The 2010 Census reports the Columbia Township population at 4532, with 1,884 households, and 1,263 families residing in the township. The reported population density is 1,700 inhabitants per square mile.

Language

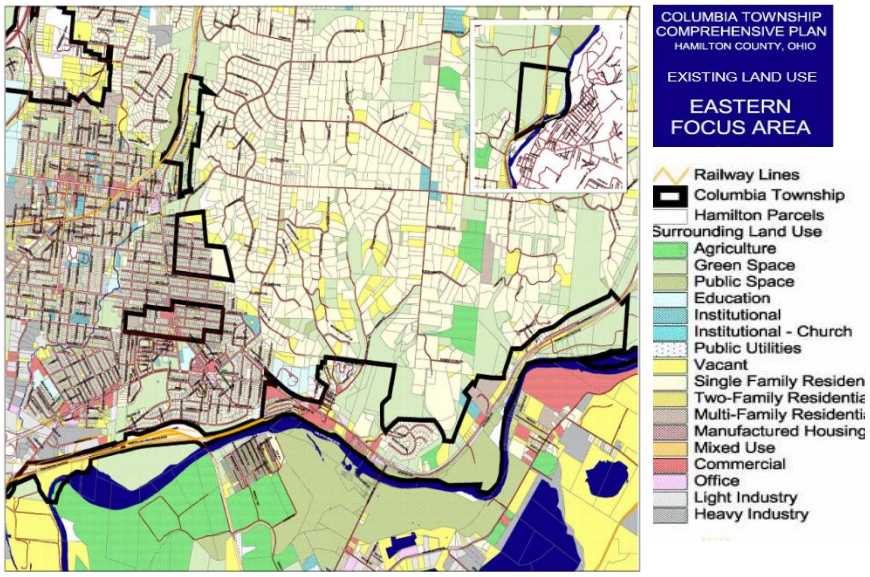
According to the 2011 American Community Survey, there are approximately 1,813 households in Columbia Township. Of these, 1,735 (95.7%) are primarily English-speaking. In households where English is not the primary language, 68 (3.8% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that only 10 households do not have any members 14 years of age or older who speak English—all of which speak Other Indo European languages.

Land Use and Future Development

In 2005 Columbia Township drafted a Comprehensive Land Use Plan to provide direction on planning, analysis and recommendations for the future growth of the community. Most of the land in Columbia Township is land unsuitable for development, especially along the banks of the Little Miami River.



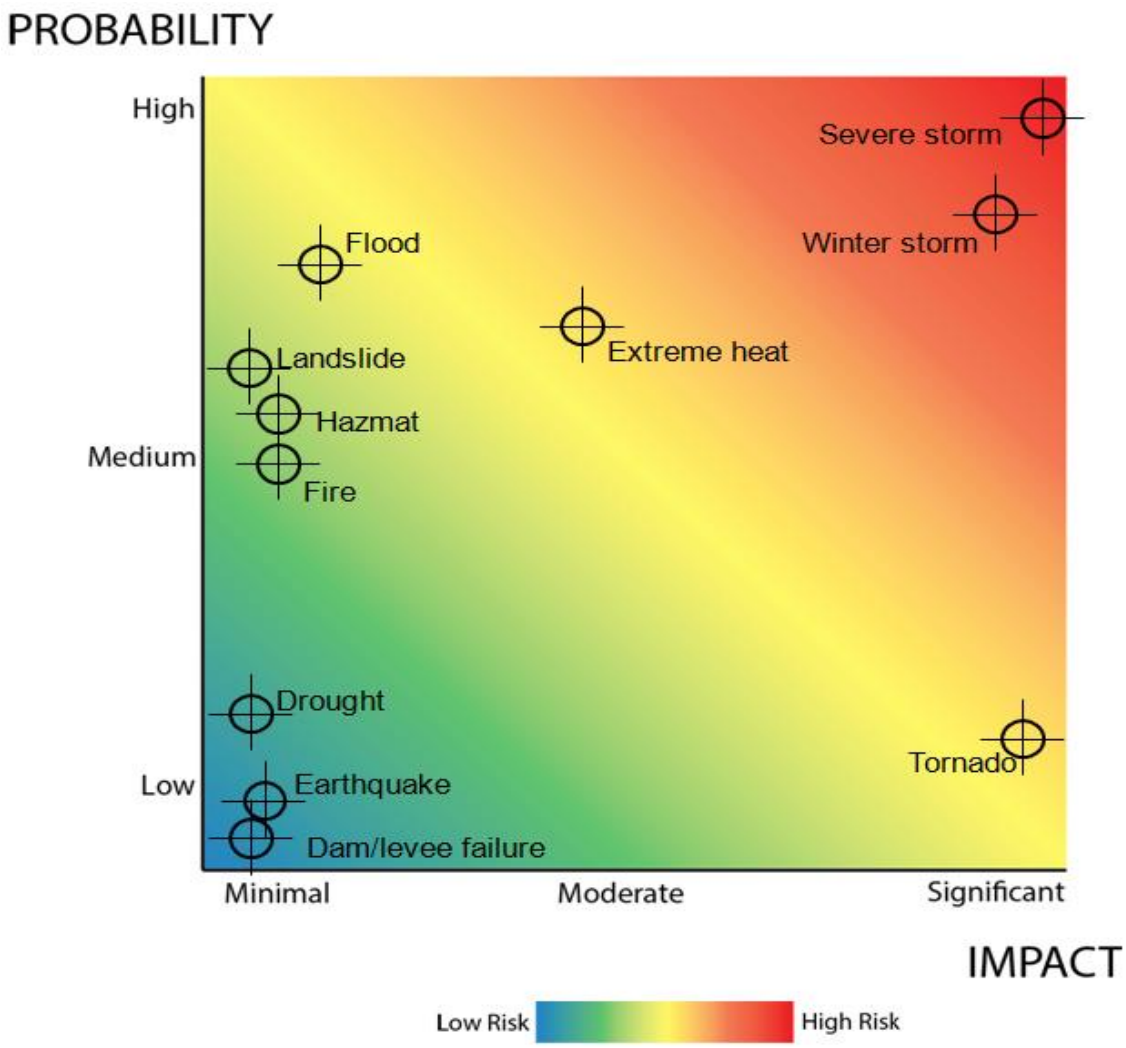
Source: Columbia Township Comprehensive Plan 2005



Source: Columbia Township Comprehensive Plan 2005

Risk Matrix

The Columbia planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

With the township being so diversified, the mitigation needs are varied. There are parts of the jurisdiction that are more concerned with the impacts from flooding.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Institute a buy-out plan for repetitive loss properties	Floods	2014	2018	County EMA	Local resources, FEMA
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Conduct an engineering study to re-engineer storm water runoff from nearby Indian Hills	Floods, Severe Storms	2016	20185	County EMA	Local resources, FEMA
Procure generators for shelter facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Enhance tree trimming and removal in emergency situations	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA, OCRA
Acquire and distribute NOAA's radios	Tornado, Severe Winds, Winter Weather	2018	2019	County EMA	FEMA, NOAA
Implement new plans for public education including distribution of monthly newsletter	All Hazards	2016	Ongoing	Community Planners for Columbia Township, County EMA	Local resources
Establish a mutual aid response agreements with adjacent communities	Flood, Tornado, Winter Weather, Fire, HazMat	2016	2017	County EMA, Community Leaders of Columbia Township	Local resources

CROSBY TOWNSHIP

The planning team for Crosby Township is headed by Warren Strunk, Crosby Township Trustee. Other members of the planning team include representatives from local departments. The following table lists representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Crosby Township.

Name	Agency/Title
Warren Strunk	Crosby Township Trustee
Jim Niehaus	Crosby Township Trustee
Bruce Downard	Crosby Township Fire Chief
Chris Dole	Crosby Township Trustee President
Bary Lusby	Hamilton County EMA

Community Overview

Crosby Township is one of the twelve townships of Hamilton County, Ohio, located in the western part of the county bordered on the east by the Great Miami River. There are no formally organized villages in the township. Crosby Township was originally formed when Whitewater Township was split. Crosby Township area was eventually sub-divided to form Morgan (Butler County) and Harrison Townships.

Topography

The township is comprised of 20.2 square miles, of which, 20.0 square miles is land and .2 square miles is water. The township is situated at an elevation of 607 feet above sea level. The terrain is hilly from the Great Miami River in the southeast and becomes more regular in the north and west.

Demographics

The 2010 Census reports the Crosby Township population at 2,753, with 1,082 households, and 796 families residing in the township. The reported population density was 138 inhabitants per square mile.

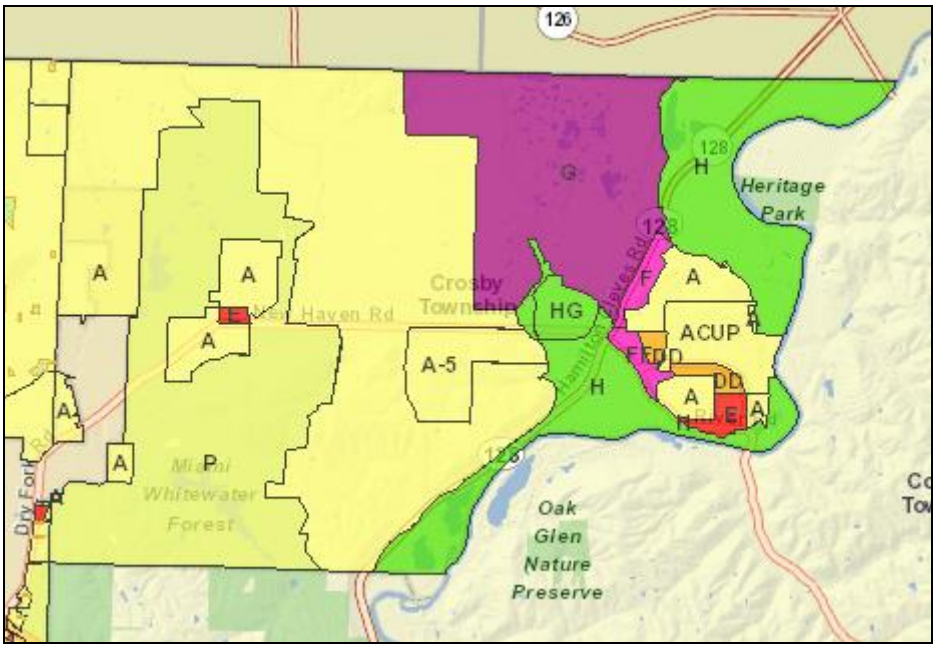
Language

According to the 2011 American Community Survey, there are approximately 997 households in Crosby Township. Of these, 984 (98.7%) are primarily English-speaking. In the remaining 13 households there is at least one person 14 years of age or older who speaks English fluently.

Industry

The most significant industrial component of Crosby Township is the former site of the Fernald Feed Materials Production Center. This facility was used to refine uranium from 1951 through 1984. The site was closed when it was discovered the plant was releasing uranium dust into the atmosphere, causing major radioactive contamination of the surrounding areas. The site has been declared permanently unfit for human habitation.

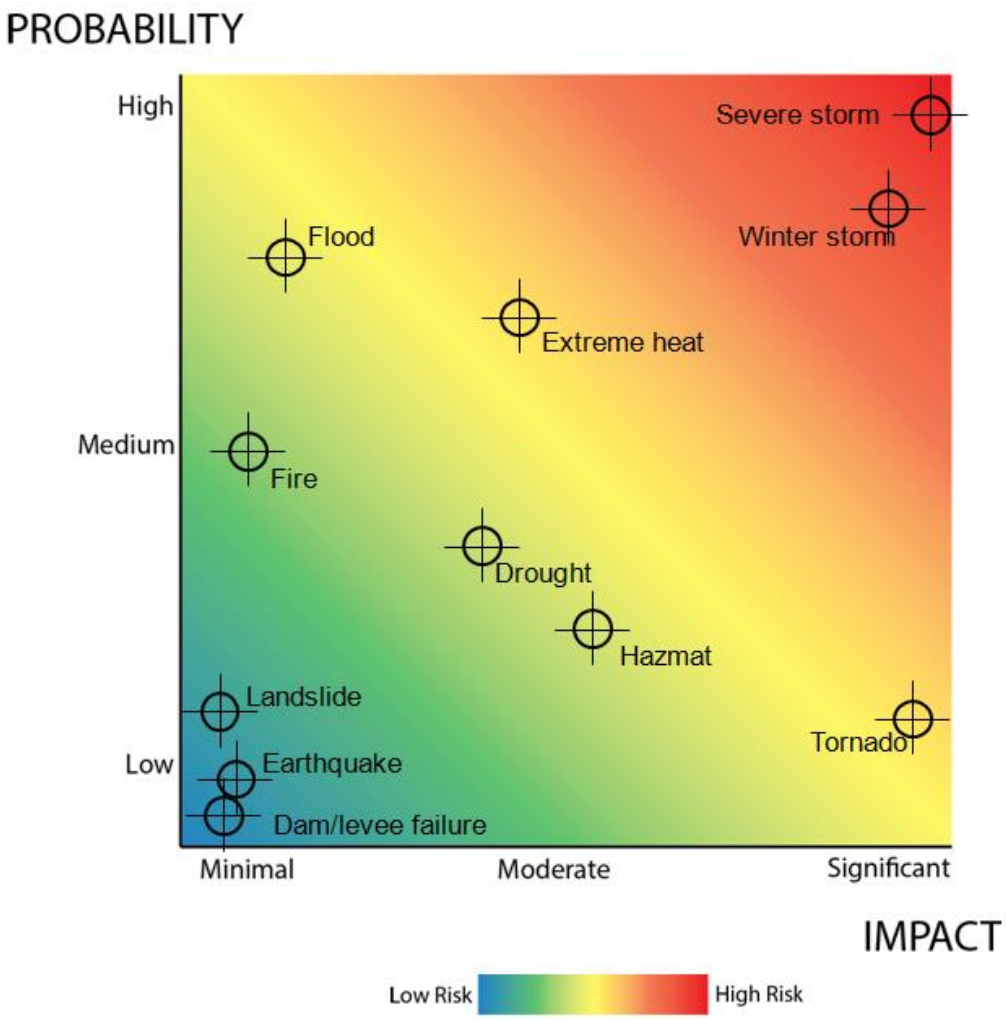
Land Use and Zoning



- Residential - Single Family
- Residential - Multi Family
- Mobile Home Park
- Medium Density Residence – Single Family
- High Density Residence - Multi Family
- Riverfront
- Riverfront Recreation
- Office
- Retail
- Highway Commercial
- Light Industry
- Light Industry
- Heavy Industry
- Heavy Industry
- Extraction
- Solid Waste

Risk Matrix

The Crosby Township planning team determined the greatest risks to their community are storms. Droughts and hazardous materials spills are a greater concern in this part of Hamilton County, while landslides do not present a significant risk to the residents of Crosby Township.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Mitigate the Fernald Enrichment Plant	HazMat	Completed	.		
Acquire flood prone properties thru FEMA buy back	Flood	2014	2018	County EMA	Local resources, FEMA
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Procure backup generator for Crosby Elementary	All Hazards	2014	2015	County EMA	Local resources, FEMA
Conduct a risk analysis study to evaluate high risk intersections	HazMat	2016	2018	County EMA	ODNR, EPA, FEMA
Enhance tree trimming to minimize the amount of power outages	Tornado, Severe Winds, Winter Weather	2014	Ongoing	County EMA	FEMA, OCRA
Acquire and distribute NOAA weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Provide animal protection	Winter Storms, Flood, Drought, Extreme Heat	2018	2019	County EMA	Local resources

DEER PARK

The planning team for the City of Deer Park is headed by Michael J. Berens, Safety – Service Director for the City of Deer Park. This meeting included representatives from both Silverton and Deer Park as these two communities are working cooperatively in this mitigation process. Other members of the planning team include representatives from local public service and public safety. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Deer Park.

Name	Agency/Title
Michael Berens	Deer Park Safety – Service Director
Denny Meador, Jr.	Deer Park Silverton Joint Fire District
Mike Schlie	Deer Park Police
Chris Brinkman	Deer Park Service
Rick Lehmkuhl	Silverton Public Works
CJ Kim	University of Cincinnati
Dana Schratt	Hamilton County EMA

Community Overview

The City of Deer Park is centrally located in Hamilton County, Ohio with easy access to Cincinnati. Settled in 1886 as a residential community, Deer Park was incorporated as a village in 1912. Deer Park became a city in 1952.

Topography

Deer Park is located in northeastern Hamilton County and has a total area of .87 square miles, of which all is land with no significant bodies of water. This community sits at an elevation of 869 feet.

Demographics

The 2010 Census reports the Deer Park population at 5,736, 2,618 households, and 1,398 families residing in the city. The reported population density was 6,593 inhabitants per square mile.

Language

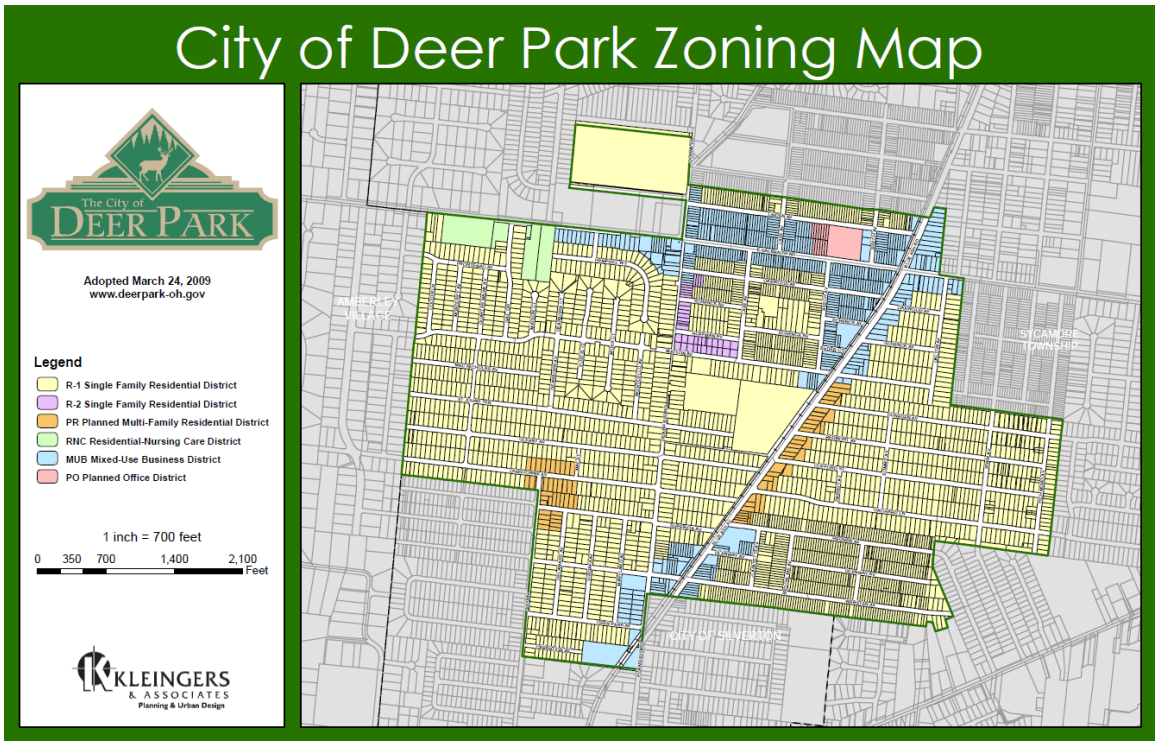
According to the 2011 American Community Survey, there are approximately 2,501 households in Deer Park. Of these, 2,421 (96.8%) are primarily English-speaking. In households where English is not the primary language, 56 (2.2% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that only 24 households do not have any members 14 years of age or older who speak English—all of which speak Asian or Pacific Island languages.

Economy and Industry

Only 1.4% of the parcels (13 acres) in Deer Park are zoned for industrial land use. These parcels are primarily concentrated along Blue Ash Road and considered light industry.

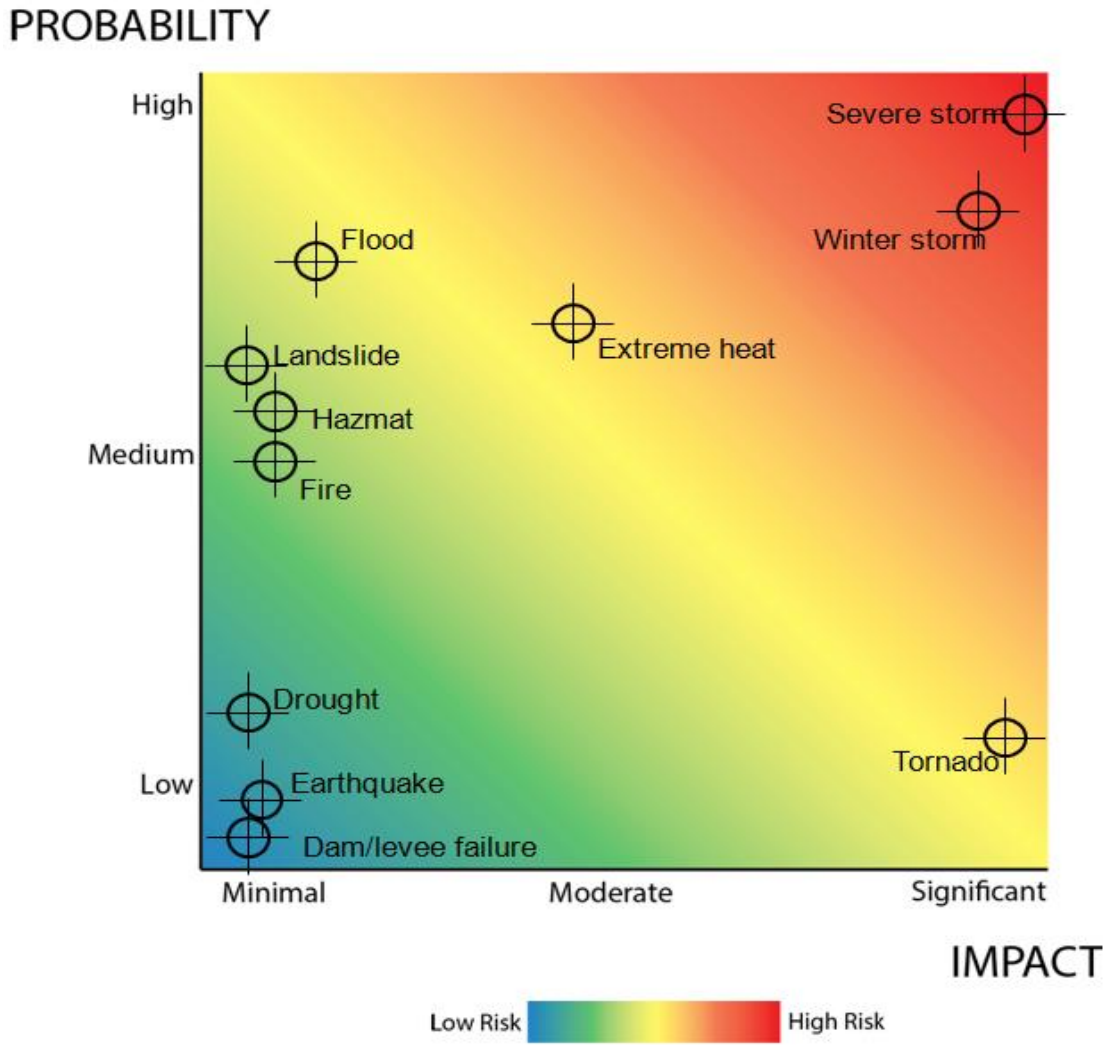
Land Use and Zoning

The majority of land within Deer Park is residential, with 79.8% of parcels as single family and 7.5% as multi-family dwellings. The community is especially proud of Chamberlin Park, a 10 acre park located in the geographic center of Deer Park.



Risk Matrix

The Deer Park planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

The community leaders recognize the need for improved sheltering to protect the Deer Park residents. Previous shelters have been acquired by the Cincinnati Public Schools.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Restructure the intersection of Plainfield and Montgomery Roads	Severe Storms, Winter Storms	On Going			Ohio Transportation Improvement Program (TIP).
Improve storm water management	Severe Storms, Flood	2013	2019	County EMA	FEMA, OCRA
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Procure backup generators/transfer switches for municipal facilities, schools and community centers	All Hazards	2014	2015	County EMA	Local resources, FEMA
Construct new shelters with backup generators	All Hazards	2016	2018	County EMA	FEMA
Develop a public education program to inform residents of potential hazards and emergency plans	All Hazards	2016	2018	County EMA, Community Planners for Deer Park	Local resources
Acquire weather radios for municipal facilities	All Hazards	2018	2019	County EMA	FEMA, NOAA
Conduct an engineering study on flood mitigation at Stewart Road and US 71	Severe Storms, Flood	2016	2018	County EMA	FEMA, OCRA
Trim trees to minimize the amount/duration of power outages	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA, OCRA

DELHI TOWNSHIP

The planning team for Delhi Township is headed by William Zoz, Delhi Fire Chief. Other members of the planning team include representatives from local departments, including police, fire, and public works. The following table lists Delhi Township representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Delhi Township.

Name	Agency/Title
William Zoz	Delhi Fire Chief
Ron Ripperger	Delhi Public Works
Jesse More	Delhi Township Fire Department
Pete Landrum	Delhi Township Administrator
Jim Howarth	Deli Police Department
Dana Schraff	Hamilton County EMA

Community Overview

Delhi Township is one of the twelve townships of Hamilton County, Ohio. It is located in the southwestern part of the county bordering the Ohio River.

Nicknamed the "Floral Paradise of Ohio", this area once prided itself on the many greenhouses and agricultural economy. In recent years Delhi Township has become known as a quiet residential community.

Topography

Delhi Township has an area of 10.1 square miles. The hilly terrain slopes down toward the Ohio River floodplain, and its landscape is marked by a numerous ravines caused by streams.

Demographics

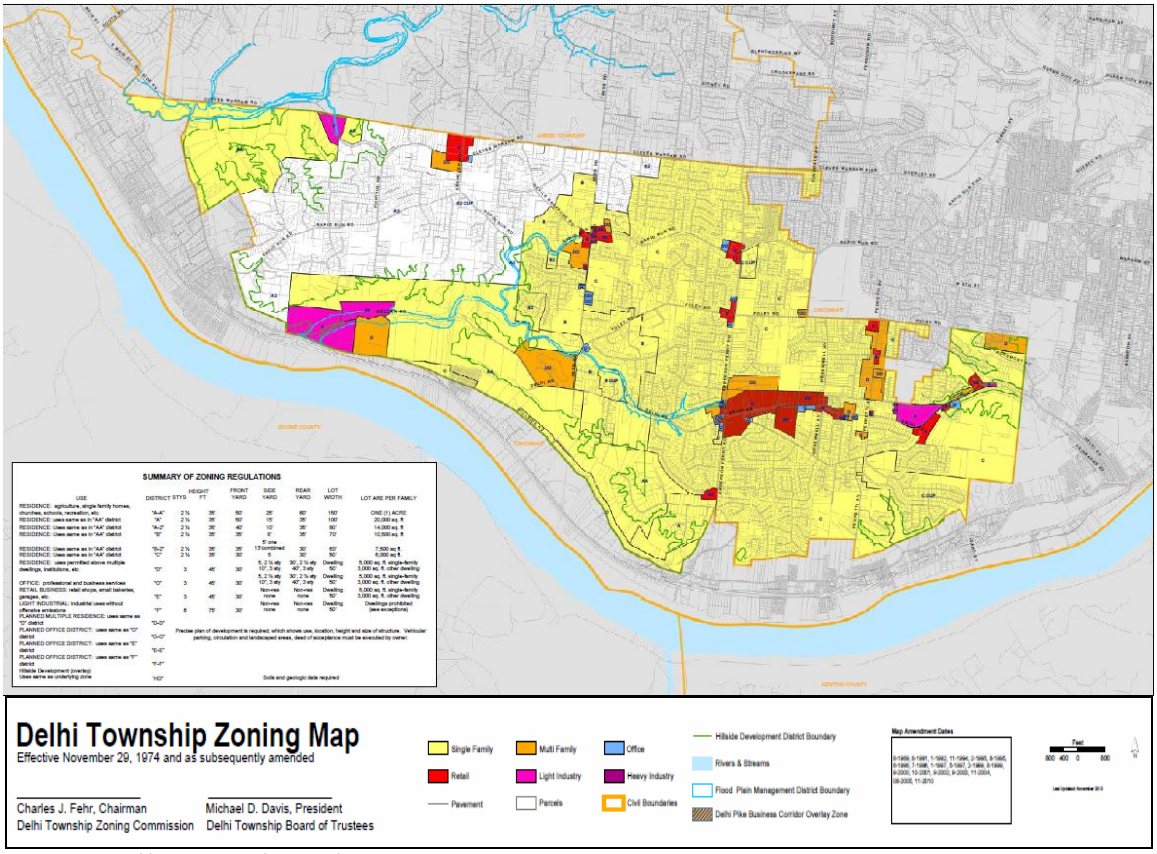
The U.S. Census documents the Delhi Township 2010 population at 29,510, with 10,574 households, and 7,781 families. The reported population density was 2,900 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 10,131 households in Delhi Township. Of these, 9,432 (93.1%) are primarily English-speaking. In households where English is not the primary language, 673 (6.6% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that only 26 households—eight Asian and Pacific Island and 28 Other—do not have any members 14 years of age or older who speak English.

Land Use and Zoning

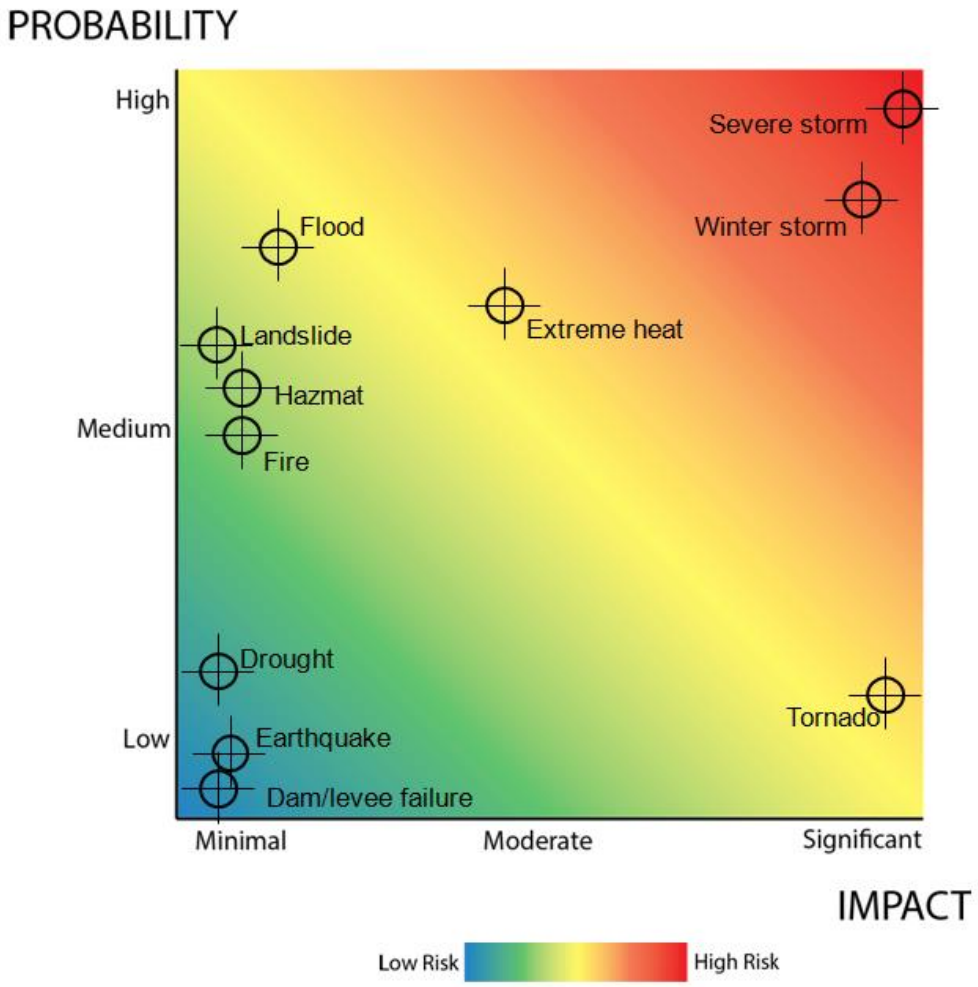
The township operates over 100 acres (40 ha) of park property. The Delhi parks are a vital component of this jurisdiction and host to numerous community events throughout the year.



Source: http://delhi.oh.us/devsvc/zoning_map.html

Risk Matrix

The Delhi Township planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

Due to the proximity of the Ohio River, Delhi Township residents recognize the probability of flooding in their community. The impact of flooding is vital to a significant percent of the population.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding SourceS)
Institute buy-out plan for flood prone structures	Flood, Flash Flooding, Landslide	Completed			
County project addressing Upper Road Slide	Flood, Flash Flooding, Landslide	On Going			
Acquire repetitive loss properties.	Flood	2014	2018	County EMA	Local resources, FEMA
Bury power lines	Severe Storms, Winter Storms, Tornado	2014	2016	County EMA	Local and corporate resources
Obtain back-up generators/transfer switches for critical facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Expand inventory of water rescue equipment	Flood, Flash Flooding	2016	2018	County EMA	Community Grants, local resources
Develop a local enhanced communication system	All Hazards	2016	2018	County EMA	Local resources
Obtain transfer switches for schools	All Hazards	2014	2015	County EMA	Local resources, FEMA
Procure anchors to brace large residential propane tanks	Earthquake, Landslide	2016	2017	County EMA	FEMA
Provide enhanced training for emergency responders	All Hazards	2016	2018	County EMA	Local resources
Perform a storm water drainage analysis	Severe Storms	2016	2019	County EMA	FEMA
Conduct a study to evaluate landslide	Flood, Landslide	2016	2018	County EMA	FEMA, OCRA, Community Development Grants

EVENDALE

The planning team for the Village of Evendale is headed by Michael Hauck, Chief of the Evendale Fire Department. This mitigation meeting included local leaders including representatives from safety departments. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the Village of Evendale.

Name	Agency/Title
Michael Hauck	Evendale Fire Chief
John Ramz	Evendale Councilman
Donald Mercer	Evendale Building Department
Jim Bothe	Evendale Director of Services
James Jeffers	Evendale Engineer
Neil Korte	Evendale Chief of Police
Jack Cameron	Evendale Administrative Assistant
Dana Schratt	Hamilton County EMA

Community Overview

The Village of Evendale is a northern suburb of Hamilton County located about 12 miles northeast of downtown Cincinnati. Strategically positioned inside of I-275, this location has attracted numerous small businesses and corporate headquarters.

Topography

The Village of Evendale is comprised of 4.74 square miles, and no significant water bodies. Evendale is located northeast of Cincinnati at an elevation of 594 feet.

Demographics

The 2010 Census reports the Village of Evendale population at 2,767, with 1,063 households, and 877 families residing in the community. The current population density is 584 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 1,039 households in Evendale. Of these, 932 (89.7%) are primarily English-speaking. In households where English is not the primary language, 102 (9.8% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that only five households do not have any members 14 years of age or older—all of which speak Other Indo European languages.

Economy and Industry

Two significant components of the Evendale economy are GE Aviation and Formica Corporation. These, along with other corporate headquarters in the Evendale provide a primary source of tax revenue for the community.

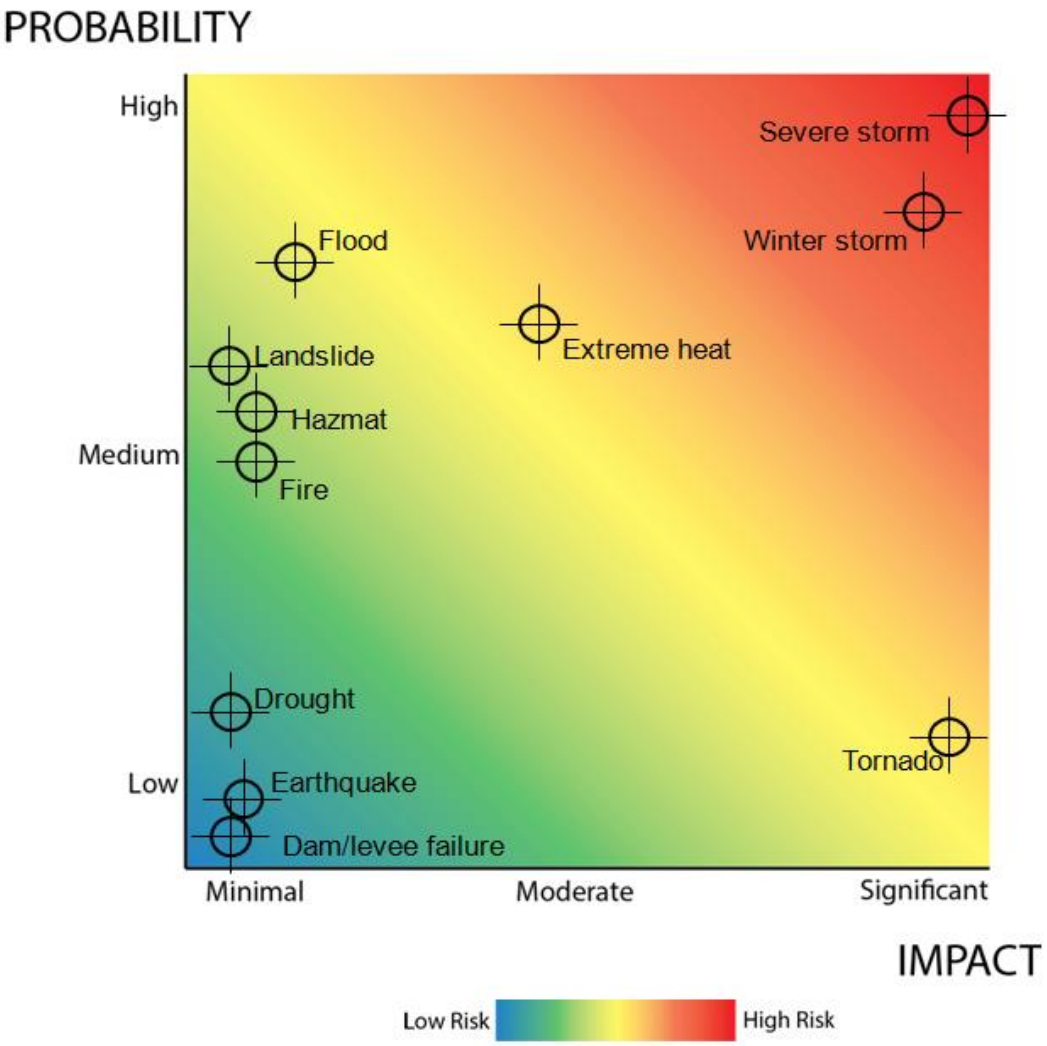
Land Use and Zoning

The community leaders of Evendale recognize the financial value of commercial land and have directed such development away from the residential areas of the village, as shown in the aerial photo below.

Source: http://www.evendaleohio.org/Pages/EvendaleOH_EcDev/Business.pdf

Risk Matrix

The Village of Evendale planning team determined the greatest risks to their community are severe storms and winter storms.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Develop independent fuel depot	Floods, Tornado, Earthquakes, Winter Storms	Completed			
Bury power lines	Tornado, Earthquake, Thunderstorm, Winter Storm	2014	2016	County EMA	Local and corporate resources
Conduct a study to evaluate the shelter facilities in the Village of Evendale	All Hazards	2016	2018	County EMA, Community Leaders of Evendale	FEMA
Enhance the community recreation center for sheltering	All Hazards	2016	2018	County EMA, Community Leaders of Evendale	FEMA
Implement programs to educate the community on the hazards affecting the village	All Hazards	2016	Ongoing	County EMA, Community Planners for Evendale	Local and corporate resources
Develop mutual aid agreements with neighboring communities to enact storm water management practices	Severe Storms, Floods, Flash Flooding	2016	2017	County EMA, Community Leaders of Evendale	Local resources
Conduct adult education programs regarding natural gas safety	Tornado, Earthquakes	2016	Ongoing	County EMA,	ODNR, FEMA

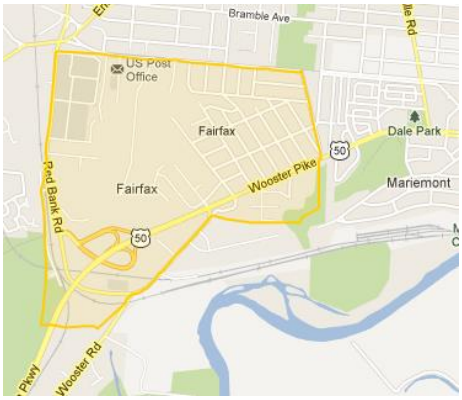
FAIRFAX

The planning team for the Village of Fairfax is headed Jennifer Kaminer, Administrator for the Village of Fairfax. This mitigation meeting included representatives from the Village of Fairfax along with representatives from Columbia Township. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to Fairfax.

Name	Agency/Title
Mike Lemon	Columbia Township Administrator
John Servizzi	Columbia Township
Jennifer Kaminer	Village of Fairfax Administrator
Dana Schratt	Hamilton County EMA

Community Overview

The Village of Fairfax is located in the southern part of Hamilton County, adjacent to Cincinnati. Prior to annexation, Fairfax was a part of Columbia Township.



Topography

According to the United States Census Bureau, the village of Fairfax has a total area of 0.76 square miles, all of it land. This township sets at an elevation of 564 feet.

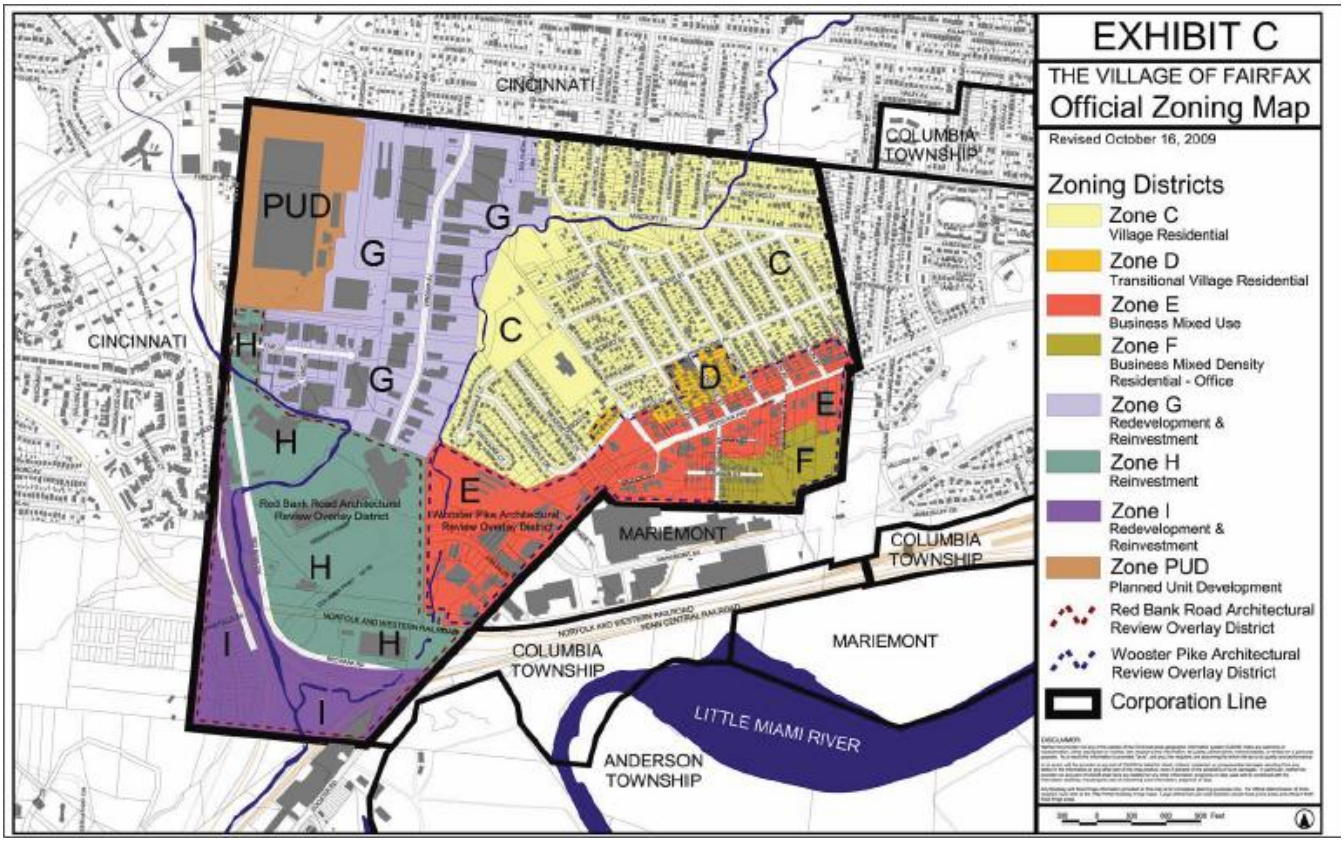
Demographics

The 2010 Census reports the Fairfax population at 1,699 people, 709 households, and 455 families residing in the village. The reported population density is 2,235 inhabitants per square mile.

Language

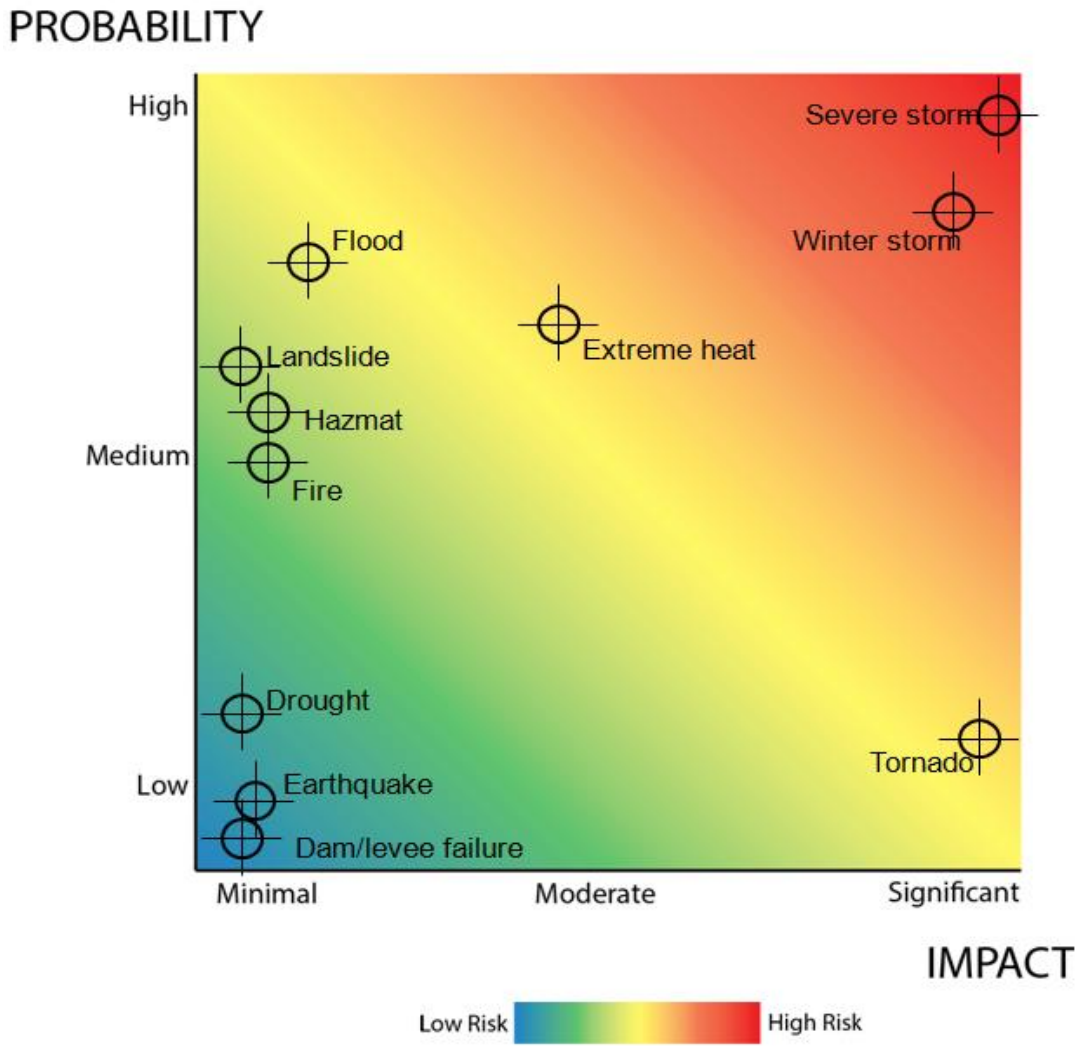
According to the 2011 American Community Survey, there are approximately 697 households in Fairfax. Of these, 634 (90.1%) are primarily English-speaking. In households where English is not the primary language, 54 (7.7% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that only nine households—three Other Indo European and six Asian and Pacific Island—do not have any members 14 years of age or older who speak English.

Land Use and Zoning



Risk Matrix

The Fairfax planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Institute a buy-out plan for repetitive loss properties	Floods	2014	2018	County EMA	FEMA, Local resources
Develop mitigation efforts for hill slides at Whiskey Creek and Eleanor Street	Landslide	2016	2018	County EMA	Community Development Grants, OCRA, FEMA
Bury power lines	2016	2014	2016	County EMA	Local and corporate resources
Acquire communication radios for emergency personnel	All Hazards	2016	2018	County EMA	Local resources
Conduct a study for flood mitigation along Wooster Pike and US50	Floods, Severe Storms	2016	2018	County EMA	FEMA, OCRA
Procure generators and transfer switches for shelter facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Acquire and distribute NOAA radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Implement new plans for public education including distribution of monthly newsletter	All Hazards	2016	Ongoing	Community Planners for Fairfax, County EMA	Local resources
Establish a mutual aid response agreements with adjacent communities	Flood, Tornado, Winter Weather, Fire, HazMat	2016	2017	County EMA, Community Leaders of Fairfax	Local resources

FOREST PARK

The planning team for the City of Forest Park is headed by Mike Rupp, Forest Park Assistant Fire Chief, along with other local leaders representing safety departments. This mitigation meeting also included representatives from the Village of Greenhills as these two communities are working cooperatively in this process. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the City of Forest Park.

Name	Agency/Title
Mike Rupp	Forest Park Assistant Fire Chief
Christopher Anderson	Forest Park Community Development Director
Alfie Jones	Forest Park Fire Chief
Steve Gallenstein	Forest Park Public Works
Andrew Levandusky	Forest Park Deputy Finance Director
Rafic Nakouzi	Forest Park Building Director
Dave Busking	Forest Park Public Works
Sally Huffman	Forest Park Clerk of Council
Ron Silber	Forest Park IT Administrator
Evonne Kovach	Greenhills Municipal Manager
Tony Spaeth	Greenhills Fire Chief
Bary Lusby	Hamilton County EMA

Community Overview

The City of Forest Park is located about 14 miles north of downtown Cincinnati. Forest Park is currently the third largest city in Ohio.

Topography

The City of Forest Park is comprised of 6.48 square miles of land with no significant water bodies. Forest Park is located in the northern side of Hamilton County at an elevation of 837 feet.

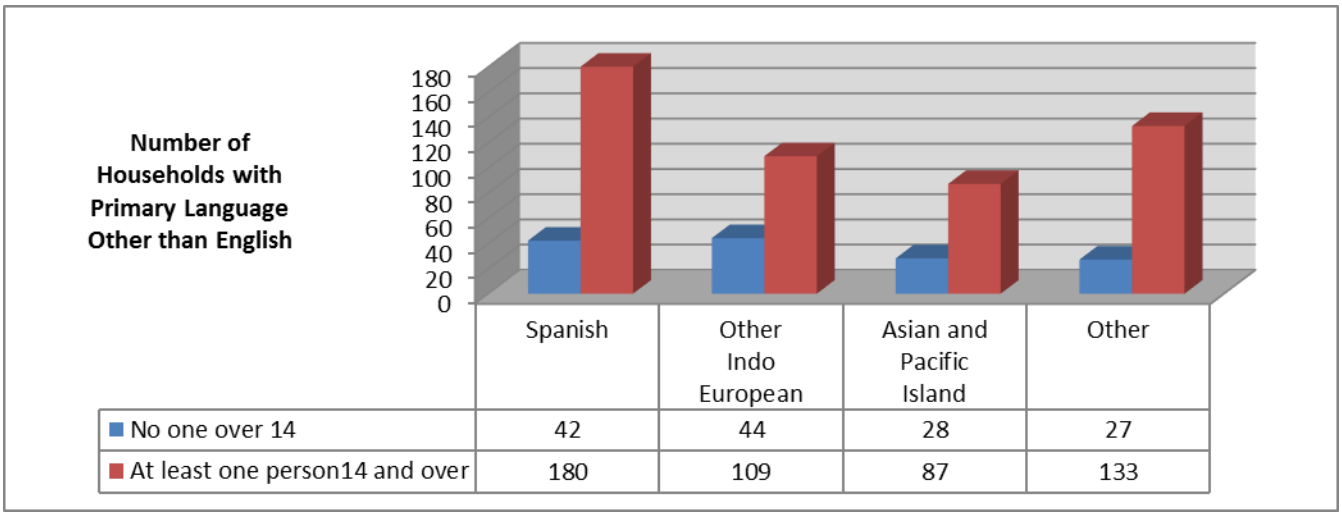
Demographics

The 2010 Census reports the City of Forest Park population at 18,720, with 7,212 households, and 4,924 families residing in the city. The current population density is 2,889 inhabitants per square mile.

Language

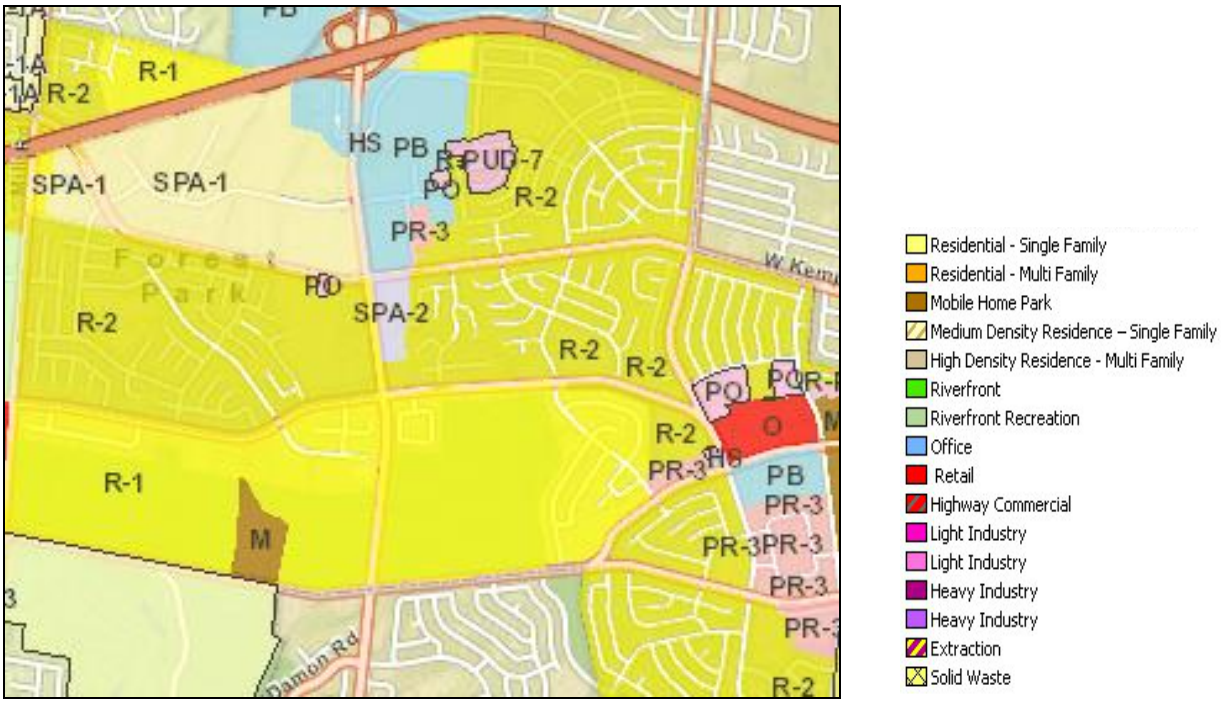
According to the 2011 American Community Survey, there are approximately 7,038 households in Forest Park. Of these, 6,388 (90.2%) are primarily English-speaking. In households where English is not the

primary language, 509 (7.2% of the total households) include at least one person 14 years of age or older who speaks English fluently. The table below depicts the number of households with a primary language other than English.



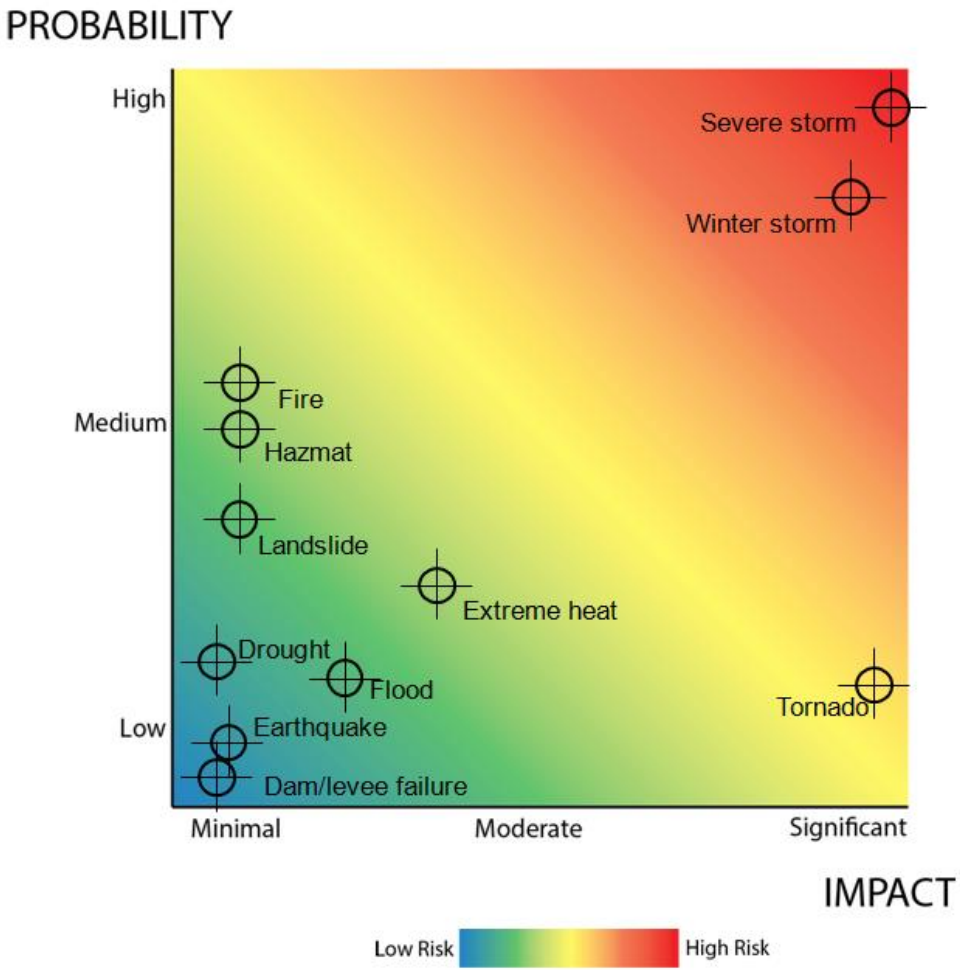
	Spanish	Other Indo European	Asian and Pacific Island	Other
No one over 14	42	44	28	27
At least one person14 and over	180	109	87	133

Land Use and Zoning



Risk Matrix

The City of Forest Park planning team determined the greatest risks to their community are severe storms and winter storms. Due to lack of water bodies and high elevation the probability of a flood is less likely than those reported for Hamilton County.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Storm water repair grant	Floods, Flash Flooding, Severe Storms	Completed			
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Develop a public education program to inform residents of potential hazards and emergency plans	All Hazards	2016	Ongoing	Community Planners for Forest Park, County EMA	Local resources
Procure backup generators and transfer switches for fire station	All Hazards	2014	2015	County EMA	Local resources, FEMA
Enhance communication system	All Hazards	2016	2018	County EMA	Local resources
Trim trees to minimize the amount/duration of power outages	Severe Storms, Tornado, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Increase and improve snow removal equipment	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA
Conduct a study on winter snow maintenance of older homes	Winter Weather	2018	2020	County EMA	FEMA, community grants, local resources

GLENDALE

The planning team for the Village of Glendale is headed by Loretta Rokey, Village Administrator. Other members of the planning team include representatives from local departments, including police, fire, and utilities. The following table lists Glendale representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Glendale.

Name	Agency/Title
Dave Warman	Glendale Chief of Police
Kevin Hardwick	Glendale Assistant Fire Chief
Loretta Rokey	Glendale Village Administrator
Craig Walsh	Glendale Police Department, Sgt
Ed Frambes	Hamilton County EMA
Tom Alderfer	Glendale Public Works, Foreman
Kevin Bell	Utilities, Chief Operator
Phyllis DePeel	Finance / Personal Assistant
Dick Weber	Glendale Code Enforcement Officer

Community Overview

The Village of Glendale is located in the north central area of Hamilton County, Ohio and is considered a northern suburb of Cincinnati. The community prides itself as the only village in Ohio designated a National Historic Landmark by the US Department of the Interior.

Topography

Per the 2010 US Census, Glendale comprises 1.69 sq miles with no significant water bodies. This community is located in one of the highest elevations of Hamilton County at 630 feet.

Demographics

The 2010 Census reports the Glendale population at 2,155, with 969 households. The median age in the village was 49.6 years. About 20% of residents were under the age of 18; while 58% were 45 years of age or older.

Language

According to the 2011 American Community Survey, there are approximately 947 households in Glendale. Of these, 852 (90.0%) are primarily English-speaking. In households where English is not the primary language, 84 (8.9% of the total households) include at least one person 14 years of age or older

who speaks English fluently. It is estimated that only 11 households—four Spanish and seven Asian and Pacific Island—do not have any members 14 years of age or older who speaks English.

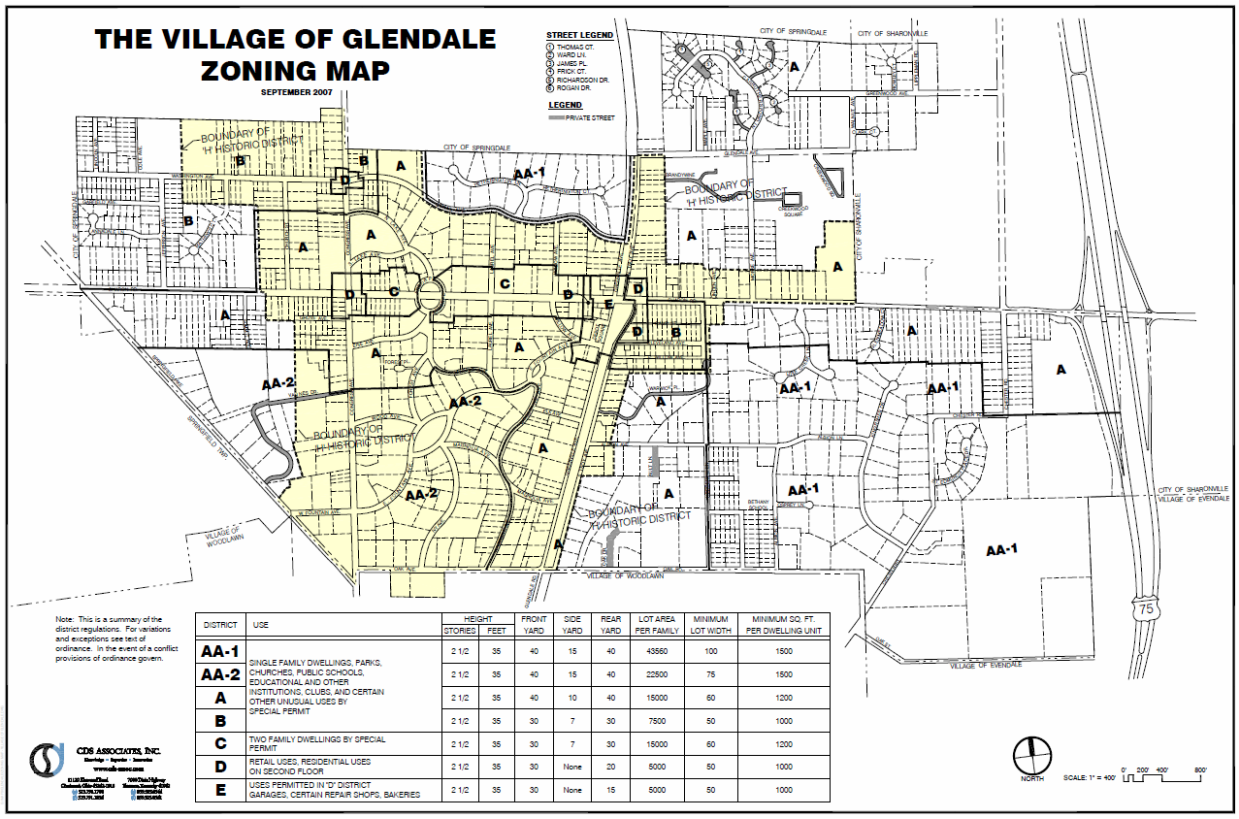
Economy and Industry

Glendale is a residential community comprised of older homes. There is no significant industry in Glendale. Glendale operates its own wastewater treatment plant and water plant (derived from local artesian wells). The Glendale Fire Department includes Chief David Moore along with a staff of about 50 volunteers.

The C&O-B&O Railroad right-of-way runs through the center of Glendale, with about 140 trains per day pass through this community

Land Use and Future Development

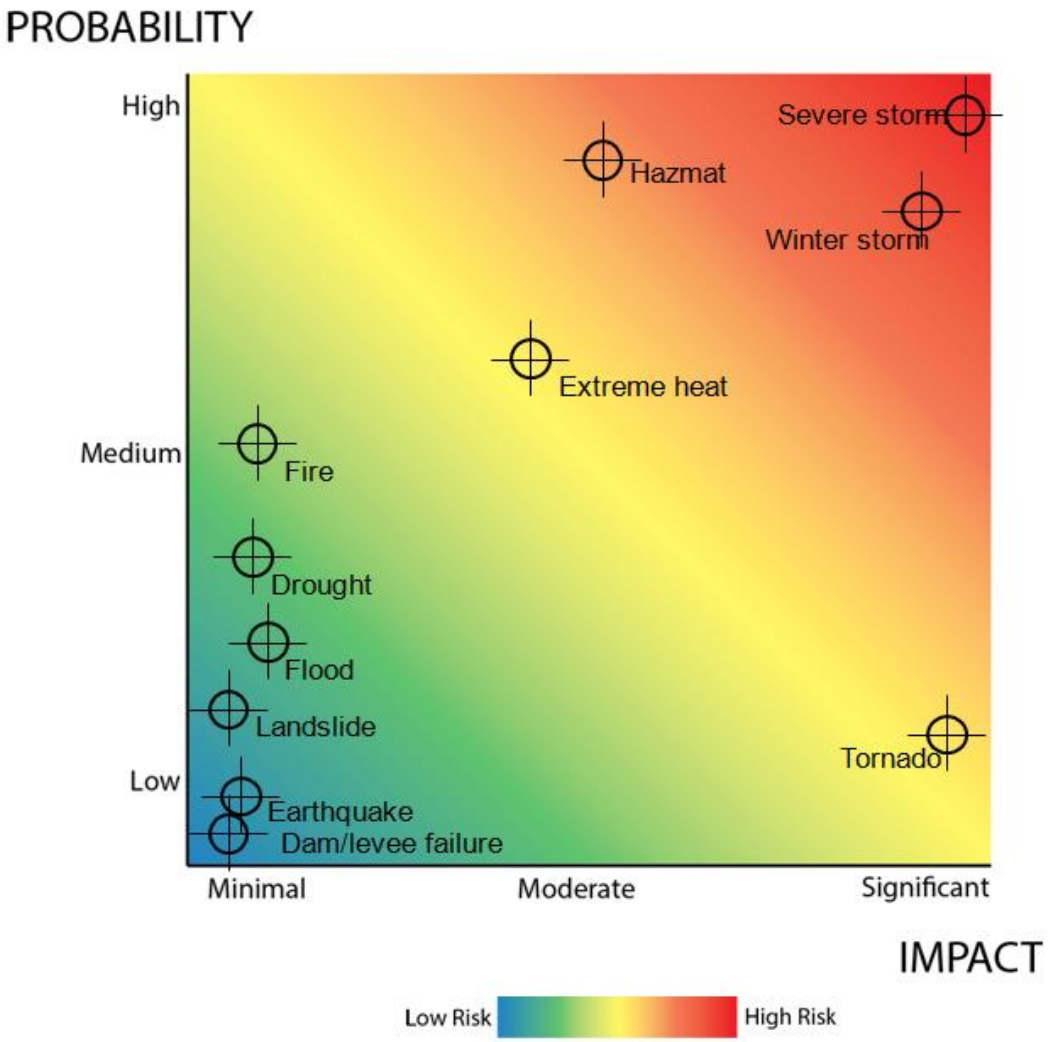
While allowing for unique business opportunities, the Glendale economic leaders work to preserve the existing character of their village. The Glendale Planning and Historic Preservation Commission will oversee all new development in the village.



DISTRICT	USE	HEIGHT STORIES	HEIGHT FEET	FRONT YARD	SIDE YARD	REAR YARD	LOT AREA PER FAMILY	MINIMUM LOT WIDTH	MINIMUM SQ. FT. PER DWELLING UNIT
AA-1	SINGLE FAMILY DWELLINGS, PARKS, CHURCHES, PUBLIC SCHOOLS, EDUCATIONAL AND OTHER INSTITUTIONS, CLUBS, AND CERTAIN OTHER UNUSUAL USES BY SPECIAL PERMIT	2 1/2	35	40	15	40	43560	100	1500
AA-2		2 1/2	35	40	15	40	22500	75	1500
A		2 1/2	35	40	10	40	15000	60	1200
B		2 1/2	35	30	7	30	7500	50	1000
C	TWO FAMILY DWELLINGS BY SPECIAL PERMIT	2 1/2	35	30	7	30	15000	60	1200
D	RETAIL USES, RESIDENTIAL USES ON SECOND FLOOR	2 1/2	35	30	None	20	5000	50	1000
E	USES PERMITTED IN 'D' DISTRICT GARAGES, CERTAIN REPAIR SHOPS, BAKERIES	2 1/2	35	30	None	15	5000	50	1000

Risk Matrix

The planning team recognized severe storms and strong winds as their primary concern. The planning team also determined that due to lack of water and the high elevation of their community, flooding was less probable in their community than the entire county, while the risk of drought was greater. This community is also aware of the increased risk of a hazardous materials spill due to the numerous trains running through Glendale.



Mitigation Strategies

As a Tree City USA, Glendale has many large deciduous trees. Power outages are common in high winds when tree limbs fall on power lines. The opportunity to bury power lines would minimize the impact of power outages to this community.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Establish public education programs	All Hazards	On Going			
Evaluation of backflow devices for sanitary systems	Flood	On Going			
Water main/ hydrant replacement	Fire	2014	2016	County EMA	Local utility companies, community grants
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Expand inventory of emergency equipment	All Hazards	2016	2018	County EMA	Local resources
Obtain additional NOAA weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Study to evaluate storm sewer capacity	Flood, Flash Flooding	2016	2018	County EMA	ODOT, ODNR, FEMA, FHWA
Distribution of smoke detectors	Fire	2016	2017	County EMA, Red Cross	Local resources, OCRA
Conduct a study to evaluate inertial valves	Flood	2018	2019	County EMA	FEMA

Glendale is committed to keeping the community a safe place through the use of public education, community newsletters, school crisis intervention plans and use of community volunteers.

GOLF MANOR

The planning team for the Village of Golf Manor is headed by Gregory Ballman, Chief of the Golf Manor Fire Department. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the Village of Golf Manor.

Name	Agency/Title
Gregory Ballman	Golf Manor Fire Chief
James Puthoff	Golf Manor Fire Department
Dana Schratt	Hamilton County EMA

Community Overview

The Village of Golf Manor is located in north central Hamilton County and is almost completely surrounded by the Cincinnati neighborhoods of Pleasant Ridge and Roselawn.

Topography

The Village of Golf Manor is comprised of only .57 square miles, with no significant water bodies. Golf Manor is located eight miles northeast of Cincinnati at an elevation of 659 feet.

Demographics

The 2010 Census reports the Village of Golf Manor population at 3,611, with 1,614 households, and 897 families residing in the community. The current population density is 6,335 inhabitants per square mile.

Language

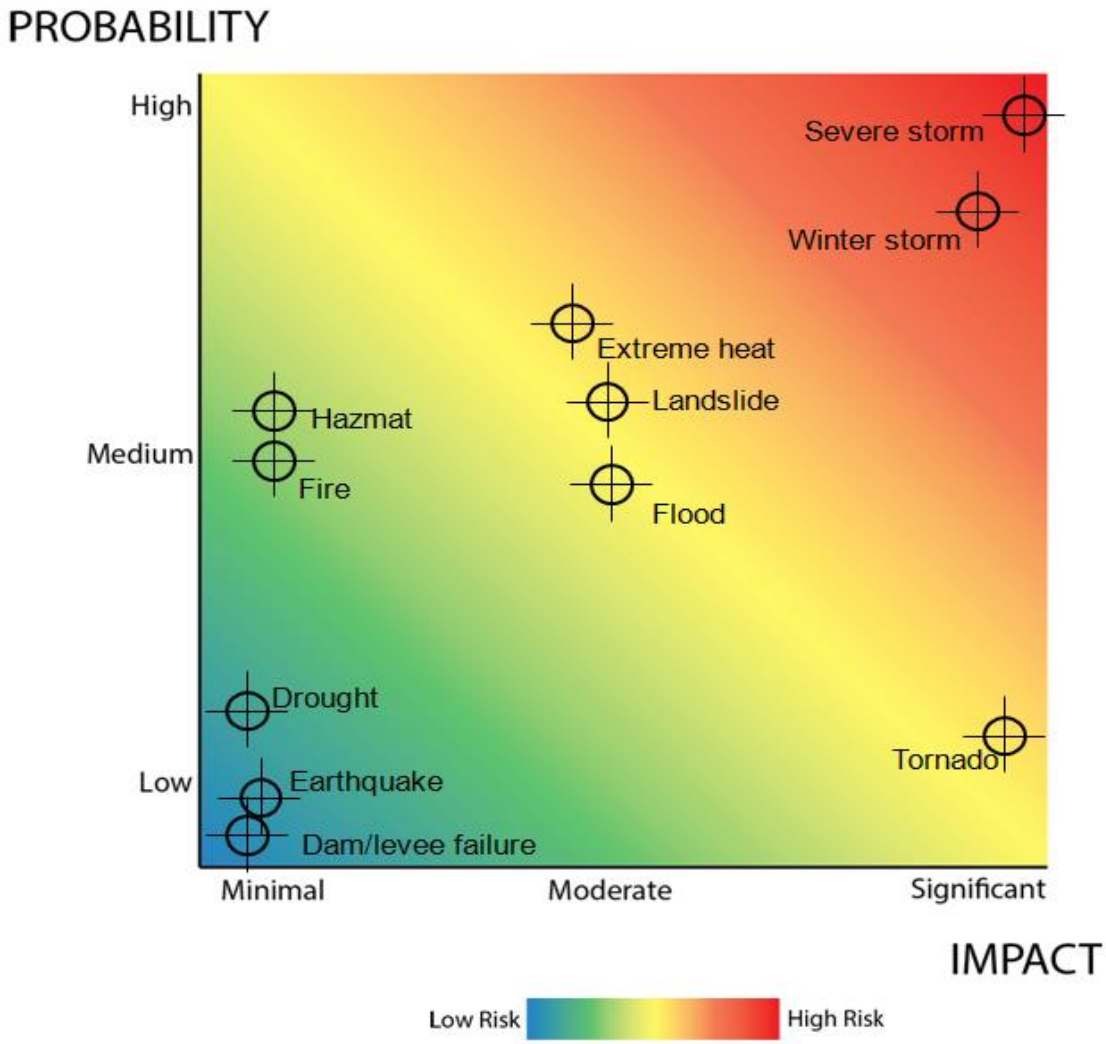
According to the 2011 American Community Survey, there are approximately 1,581 households in Golf Manor. Of these, 1,497 (94.7%) are primarily English-speaking. In households where English is not the primary language, 74 (4.7% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that only 10 households do not have any members 14 years of age or older who speaks English—all of which speak Other Indo European languages.

Economy and Industry

Currently, 67 corporations conduct business in Golf Manor.

Risk Matrix

The Village of Golf Manor agreed with the hazard analysis of Hamilton County, however with no significant bodies of water and a comfortable elevation, the risk of flooding is less probable than in other parts of the county.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Earthquake, Thunderstorm, Winter Storm	2014	2016	County EMA	Local and corporate resources
Procure back-up generators and transfer switches for all critical facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Enhance the communication system	All Hazards	2016	2018	County EMA	Local resources
Retrofit community buildings for sheltering	All Hazards	2016	2018	County EMA	FEMA, OCRA
Increase salt storage	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA

GREENHILLS

The planning team for the Village of Greenhills is headed by Mike Rupp, Forest Park Assistant Fire Chief. This mitigation meeting also included representatives from the City of Forest Park as these two communities are working cooperatively in this process. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the Village of Greenhills.

Name	Agency/Title
Mike Rupp	Forest Park Assistant Fire Chief
Evonne Kovach	Green Hills Municipal Manager
Tony Spaeth	Green Hills Fire Chies
Christopher Anderson	Forest Park Community Development Director
Alfie Jones	Forest Park Fire Chief
Steve Gallenstein	Forest Park Public Works
Andrew Levandusky	Forest Park Deputy Finance Director
Rafic Nakouzi	Forest Park Building Director
Dave Busking	Forest Park Public Works
Sally Huffman	Forest Park Clerk of Council
Ron Silber	Forest Park IT Administrator
Bary Lusby	Hamilton County EMA

Community Overview

The Village of Greenhills is located about 13 miles north of downtown Cincinnati. It was built by the federal government in the 1930's as a planned community. It was originally designed as a suburban community with woodlands and natural landscape, providing low income families the opportunity to live in a safe environment with large green spaces. Although many of the Greenhills residents are direct descendants of the original settlers, Greenhills has become a vibrant community with a dense population.

Topography

The Village of Greenhills is comprised of 1.25 square miles of land with no significant water bodies. Forest Park is located in the northern side of Hamilton County at an elevation of 804 feet.

Demographics

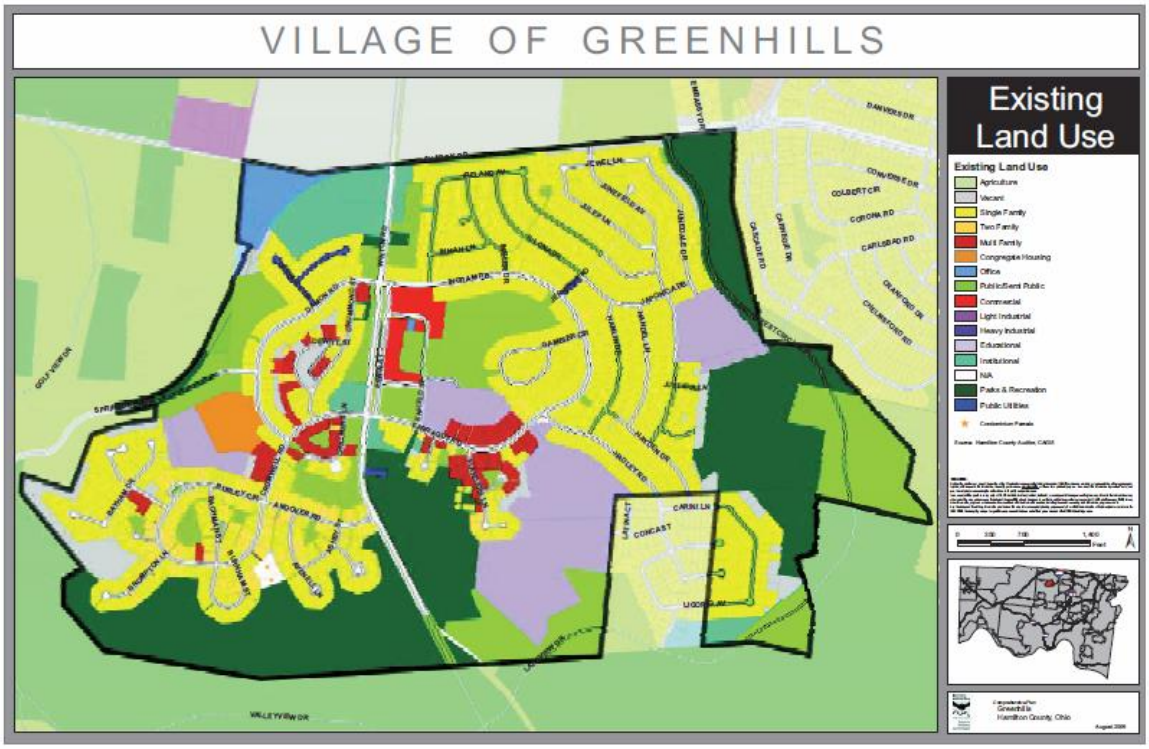
The 2010 Census reports the Village of Greenhills population at 3,615, with 1,499 households, and 968 families residing in the village. The current population density is 2,892 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 1,438 households in Greenhills. Of these, 1,364 (94.9%) are primarily English-speaking. In households where English is not the primary language, 66 (4.6% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that only eight households do not have any members 14 years of age or older who speaks English—all of which speak Other Indo-European languages.

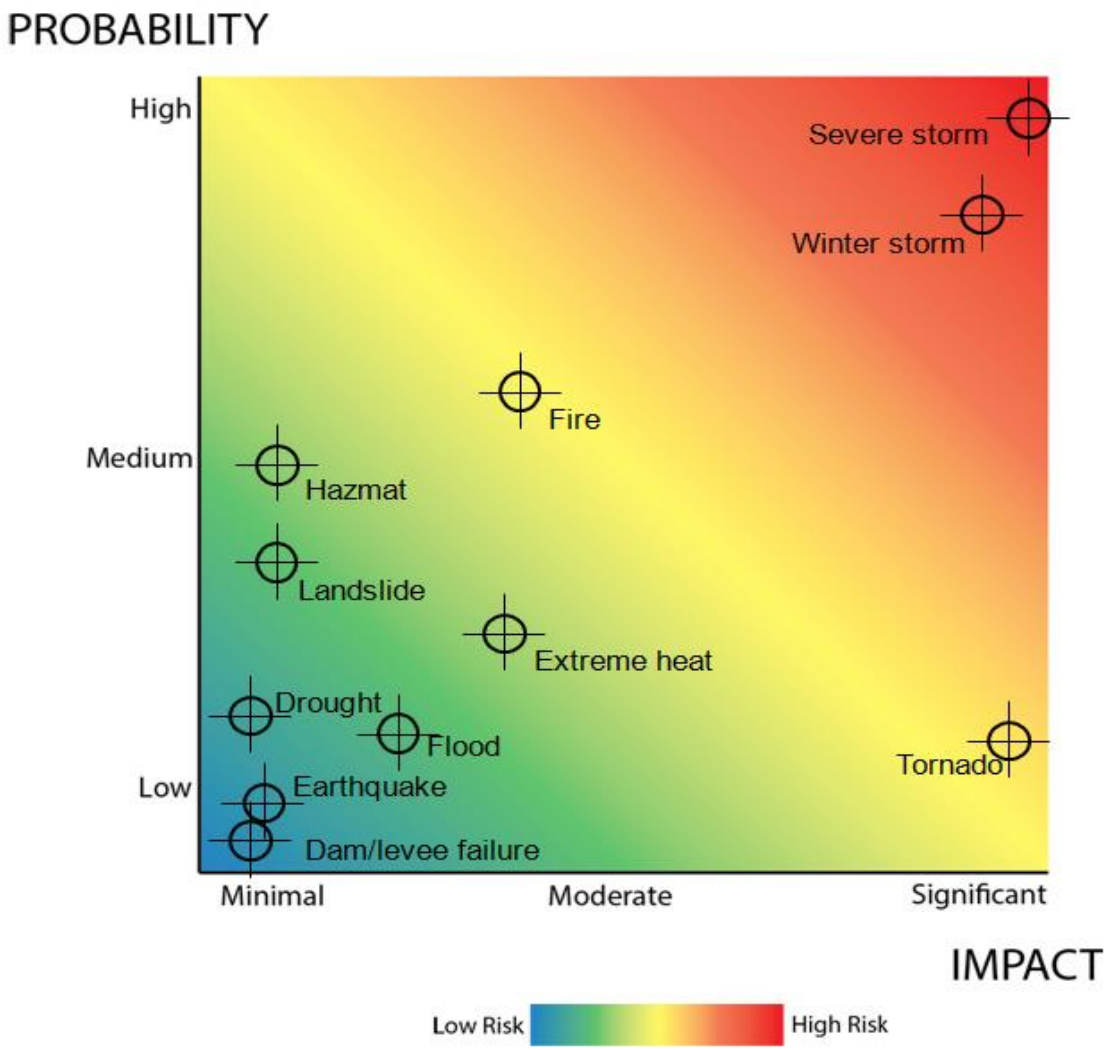
Land Use and Future Development

Greenhills is considered a planned community. Land use conflicts are less frequent in planned communities since they are carefully designed. The Village of Greenhills is in the process of developing a new zoning code.



Risk Matrix

The Village of Greenhills planning team determined the greatest risks to their community are severe storms and winter storms. Due to lack of water bodies and high elevation the probability of a flood is less likely than those reported for Hamilton County. Local leaders also believe fires would have a significant impact to Greenhills.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source)s)

Storm water repair grant	Floods, Flash Flooding, Severe Storms	Completed			
Bury power lines	Tornado, Earthquake, Thunderstorm, Winter Storm	2014	2016	County EMA	Local and corporate resources
Develop a public education program to inform residents of potential hazards and emergency plans	All Hazards	2016	Ongoing	Community Planners for Greenhills, County EMA	Local resources
Procure backup generators and transfer switches for fire stations and schools	All Hazards	2014	2015	County EMA	Local resources, FEMA
Enhance communication system	All Hazards	2016	2018	County EMA	Local resources
Trim trees to minimize the amount/duration of power outages	Severe Storms, Tornado, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Increase and improve snow removal equipment	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA
Conduct a study on winter snow maintenance of older homes	Winter Weather	2018	2020	County EMA	FEMA, community grants, local resources

GREEN TOWNSHIP

The planning team for Green Township is headed by Doug Witsken, Green Township Fire Chief. Other members of the planning team include representatives from police, fire and administrative departments. The following table lists the Green Township representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to Green Township.

Name	Agency/Title
Doug Witsken	Green Township Fire Chief
Raymond Gemmell	Green Township Fire and EMS
Joe Lambing	Director of Public Services
Kevin Celarek	Green Township Administrator
Adam Goetzman	Green Township Dir of Planning and Development
Bart West	Green Township Police Department
Ed Frambes	Hamilton County EMA

Community Overview

Green Township is one of the twelve townships of Hamilton County, Ohio. Although it was originally founded as a rural farming area, Green Township quickly developed as Cincinnati's west side. The cities of Cheviot and Cincinnati were once a part of Green Township.

Topography

This township encompasses 27.9 sq mi of rolling hills with no significant water bodies. Green Township sets above the Ohio River basin at an elevation of 892 feet northwest of downtown Cincinnati.

Demographics

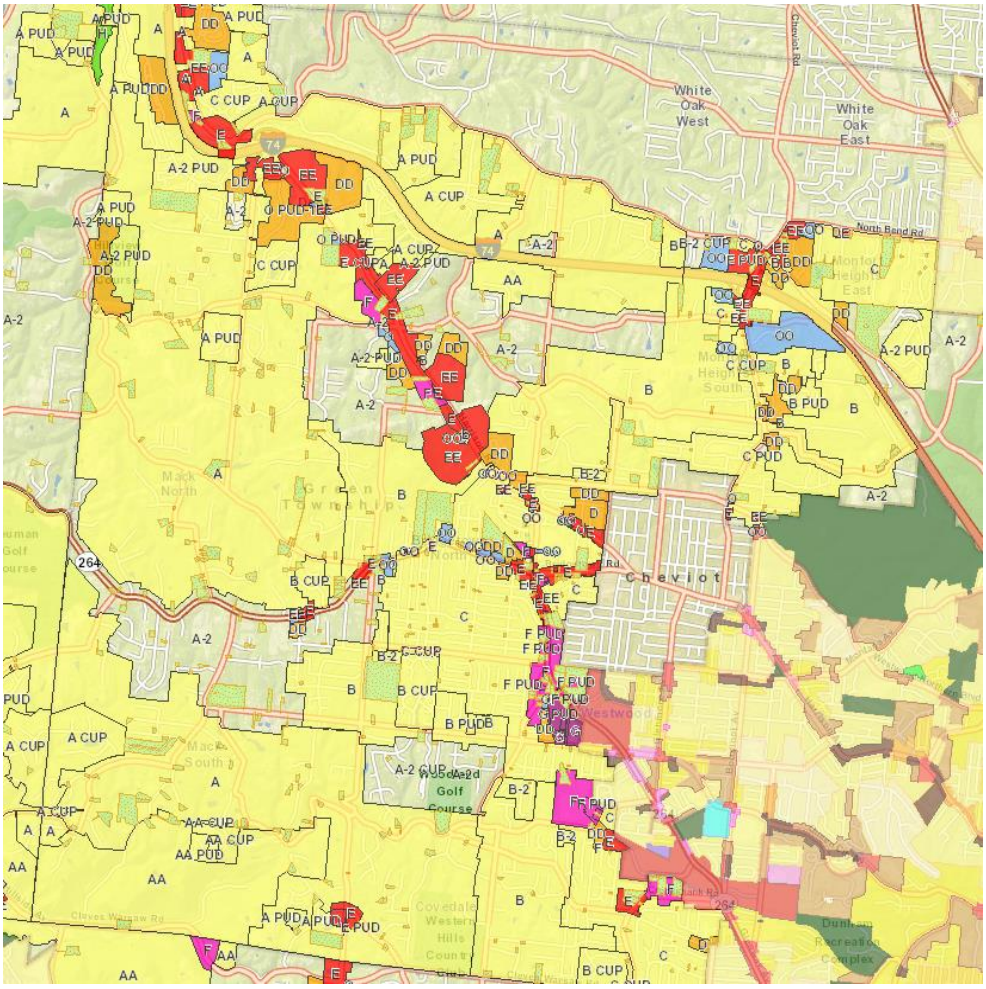
The 2010 Census reports the Green Township population at 58,370, with 23,291 households, and 16,243 families residing in the community. The reported population density is 1997 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 22,488 households in Green Township. Of these, 20,982 (93.3%) are primarily English-speaking. In households where English is not the primary language, 1,421 (6.3% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that 85 households—71 Other Indo European

and 14 Asian and Pacific Island—do not have any members 14 years of age or older who speak English fluently.

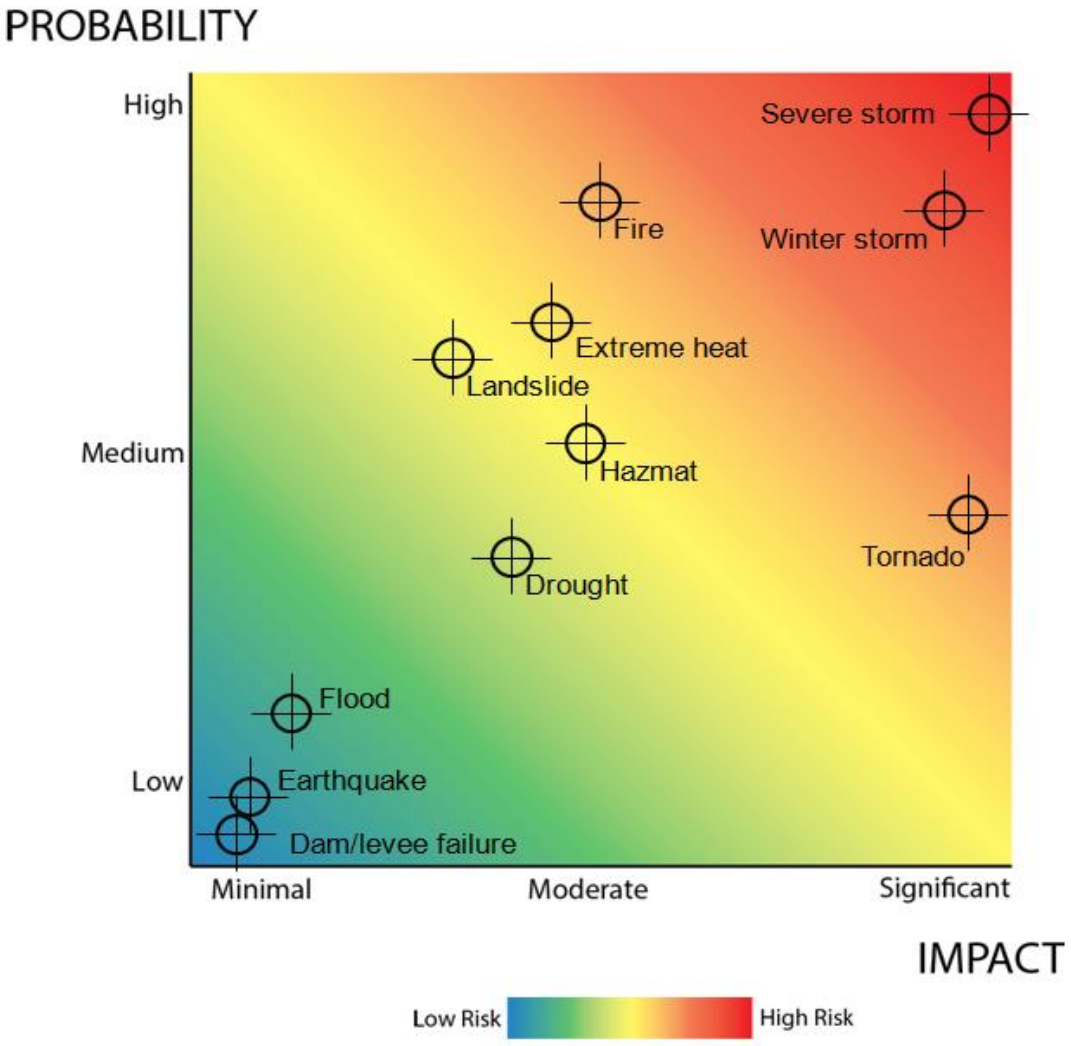
Land Use and Zoning



- Residential - Single Family
- Residential - Multi Family
- Mobile Home Park
- Medium Density Residence – Single Family
- High Density Residence - Multi Family
- Riverfront
- Riverfront Recreation
- Office
- Retail
- Highway Commercial
- Light Industry
- Light Industry
- Heavy Industry
- Heavy Industry
- Extraction
- Solid Waste

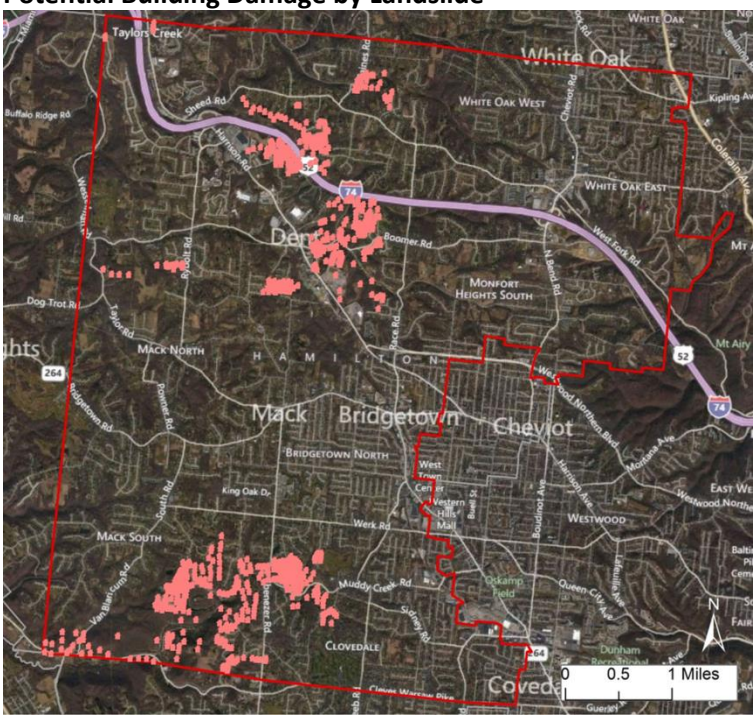
Risk Matrix

The Green Township planning team determined the risks to their community are severe storms, winter storms and particularly high winds. They believe the impact of fires, landslide, drought and hazardous materials spills is greater in their community than the risk reported by Hamilton County.

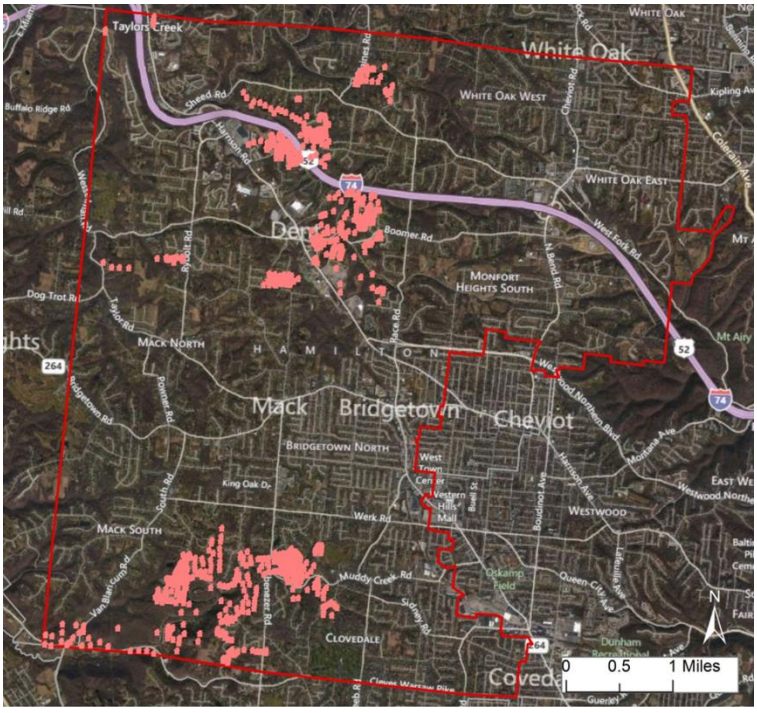


This community also voiced concerns over the potential for an aircraft accident. The populated areas of Green Township are directly under a common flight path from the Cincinnati Airport. Although the probability of such an incident is very low, the impact could be devastating to this community.

Potential Building Damage by Landslide



Potential Road Damage by Landslide



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Implement Code Red	All Hazards	2014	2016	County EMA	FEMA, NOAA
Procure updated generators and transfer switches for critical facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Obtain and distribute additional smoke detectors	All Hazards	2016	2017	County EMA, Red Cross	Local resources, OCRA
Enhance tree trimming and removal in emergency situations	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Conduct a study to review mitigating areas of frequent flash flooding	Severe Storms, Floods	2016	2018	County EMA	FEMA, OCRA
Implement programs to educate the community on the hazards affecting the township	All Hazards	2016	Ongoing	Community Planners for Green Township, County EMA	Local resources
Develop a continuity of operations plan	All Hazards	2016	2018	County EMA	Local resources, FEMA, OCRA
Conduct a study to evaluate the shelter facilities and capacity in Green Township	All Hazards	2016	2018	County EMA	FEMA
Develop a database of special needs populations	Tornado, Flood, Winter Storm, Drought, Hazmat	2018	2020	County EMA, Community Leaders of Green Township	Local resources

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Install lightning detection at community ball parks	Severe Storms	2018	2020	County EMA	FEMA
Conduct a study to determine the need for additional inertial valves	Severe Storms, Tornado, Earthquake	2018	2019	County EMA	FEMA

HARRISON

The planning team for the City of Harrison is headed by Rob Hursong, Harrison Fire Chief. This mitigation meeting included representatives from the City of Harrison along with representatives from Harrison Township. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the City of Harrison.

Name	Agency/Title
Rob Hursong	City of Harrison Fire Chief
Bill Noes	Harrison Township
Mark Louis	City of Harrison
Tom Losekamp	Harrison Township
Hank Menninger	City of Harrison
Chief Lindsey	Harrison Police
Captain Ward	City of Harrison Fire Department
Deputy Chief Chetwood	City of Harrison Fire Department
Bary Lusby	Hamilton County EMA

Community Overview

The City of Harrison is located in Harrison Township and presents a unique case of being an unincorporated area within an urban center. The two communities share many projects facilities including the community center, senior citizens center, fire and emergency services. Harrison has survived several natural disasters including a tornado in 1854, the explosion of Harrison Town Hall in 1877, flooding in 1913, and an F4 tornado in 1990.

Topography

The City of Harrison is comprised of 4.96 square miles, with 4.92 square miles of land and 0.4 square miles of water area. Harrison sits at an elevation of 610 feet and is located in the northwestern corner of Hamilton County.

Demographics

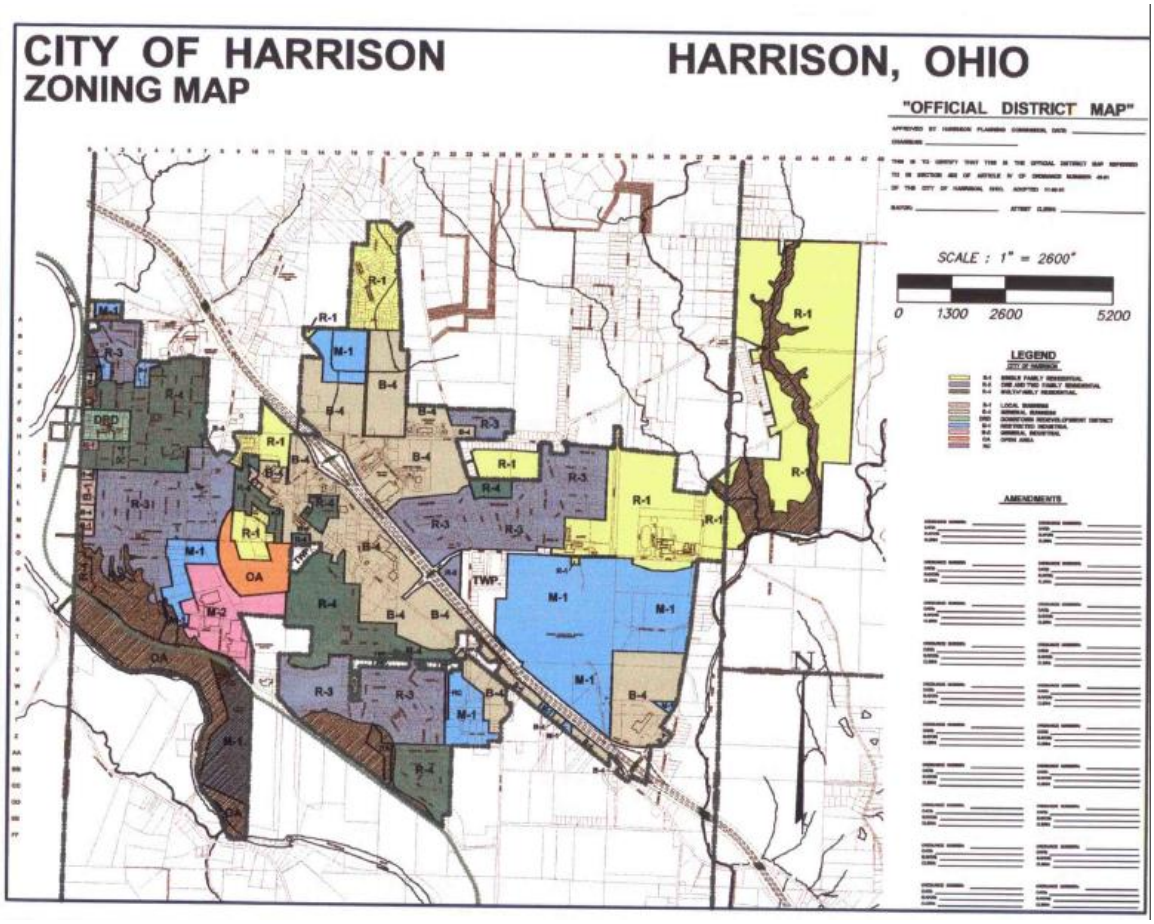
The 2010 Census reports the City of Harrison population at 9,897, with 3,765 households, and 2,659 families residing in the city. These figures represent a 32% population growth since the 2000 Census. The current population density is 2,012 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 3,353 households in Harrison. Of these, 3,221 (96.1%) are primarily English-speaking. In the remaining 132 households—47

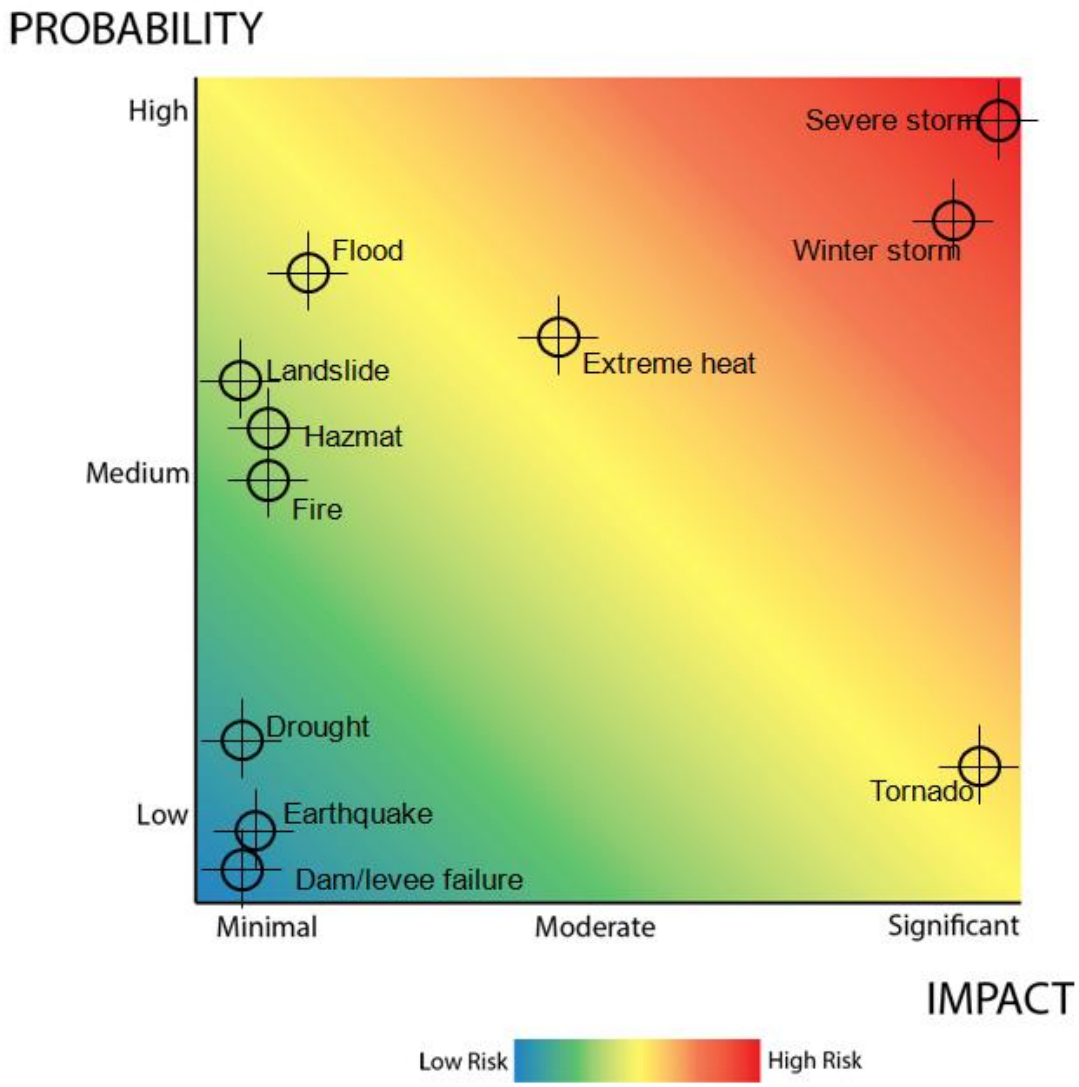
Spanish, 49 Other Indo-European, and 36 Asian and Pacific Island—there is at least one person 14 years of age or older who speaks English fluently.

Land Use and Zoning



Risk Matrix

The City of Harrison planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Enhance tree trimming and removal in emergency situations	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Procure enhanced communication system	All Hazards	2016	2018	County EMA	Local resources

HARRISON TOWNSHIP

The planning team for Harrison Township is headed by Rob Hursong, Harrison Fire Chief. This mitigation meeting included representatives from the City of Harrison along with various township representatives. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the Harrison Township.

Name	Agency/Title
Rob Hursong	City of Harrison Fire Chief
Bill Noes	Harrison Township
Mark Louis	City of Harrison
Tom Losekamp	Harrison Township
Hank Menninger	City of Harrison
Chief Lindsey	Harrison Police
Captain Ward	City of Harrison Fire Department
Deputy Chief Chetwood	City of Harrison Fire Department
Bary Lusby	Hamilton County EMA

Community Overview

Harrison Township is one of the twelve townships of Hamilton County, Ohio. Harrison Township presents a unique case of being an unincorporated area within an urban center, the City of Harrison. The two communities share many projects facilities including the community Center, senior citizens center, fire and emergency services.

Topography

Hamilton Township is comprised of 17.8 square miles, with 17.5 square miles of land and 0.3 square miles of water area. Harrison Township abuts the State of Indiana to the west and sets at an elevation of 610 feet.

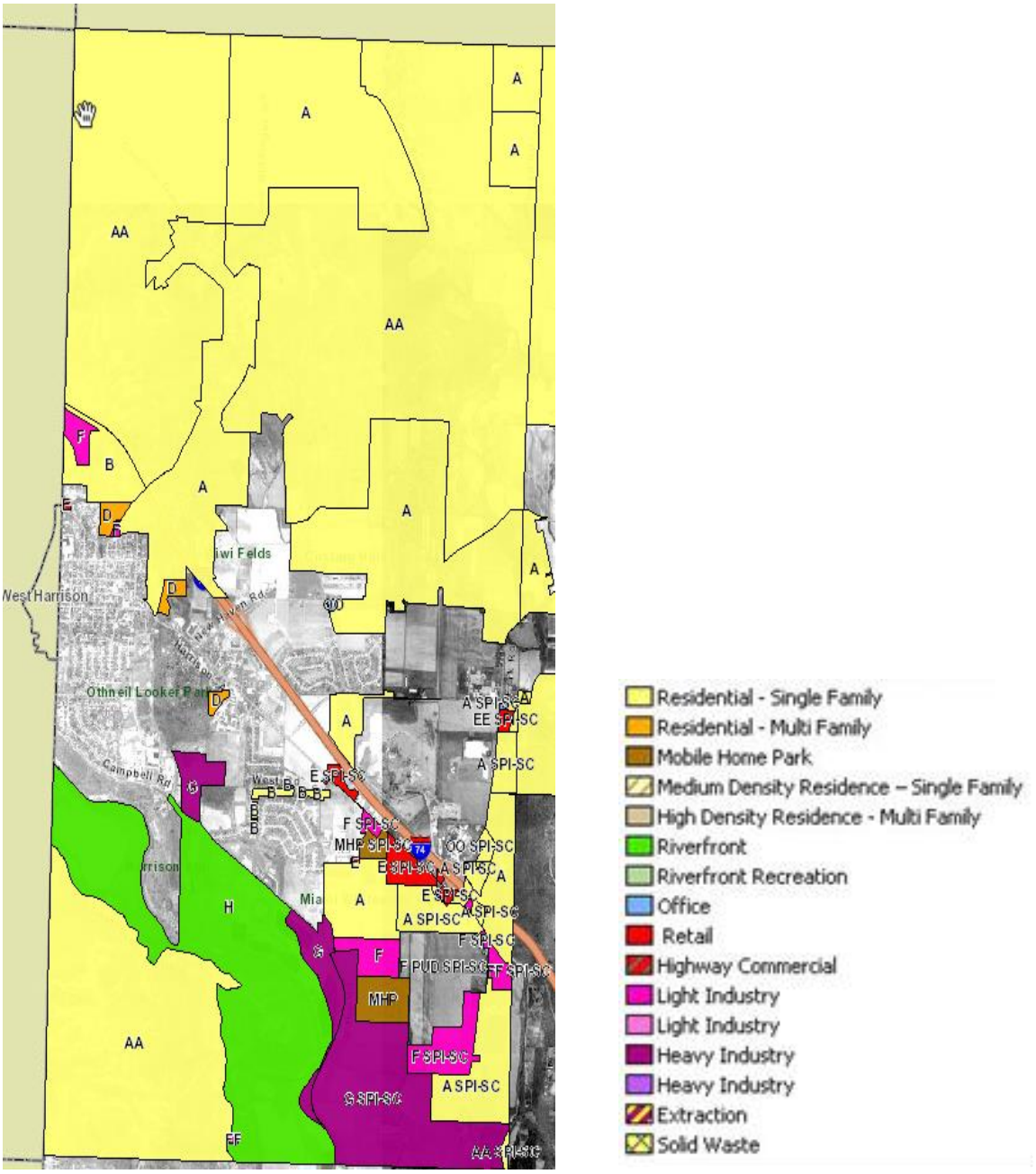
Demographics

The 2010 Census reports the Harrison Township population at 13,934, with 5,360 households, and 3,883 families residing in the township. The reported population density is 780 inhabitants per square mile.

Language

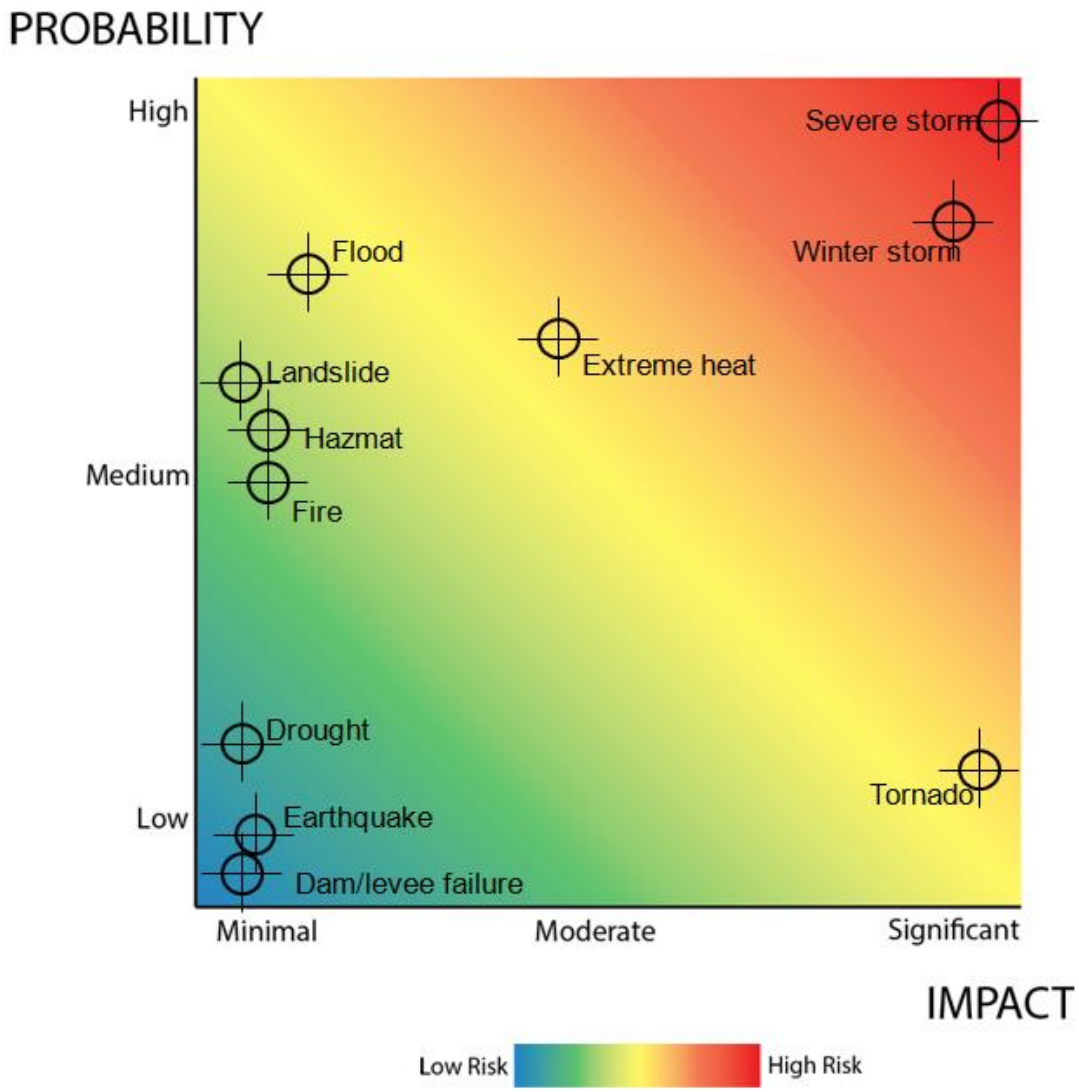
According to the 2011 American Community Survey, there are approximately 4,996 households in Harrison Township. Of these, 4,794 (96.0%) are primarily English-speaking. In the remaining 172 households, there is at least one person 14 years of age or older who speaks English fluently.

Land Use and Zoning



Risk Matrix

The Harrison Township planning team determined the risks to their community are consistent with those reported for Hamilton County.



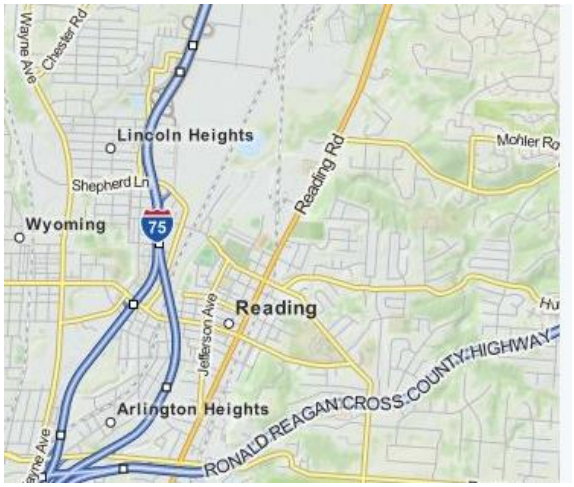
Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Earthquake, Thunderstorm, Winter Storm	2014	2016	County EMA	Local and corporate resources
Procure generators for shelter facility	All Hazards	2014	2015	County EMA	Local resources, FEMA
Institute a buy-out plan for repetitive loss properties	Floods	2014	2018	County EMA	FEMA, local resources
Enhance tree trimming and removal in emergency situations	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Establish new shelters for mobile home park residents	Severe Storms, Tornado	2016	2018	County EMA	FEMA
Procure enhanced communication system	All Hazards	2016	2018	County EMA	Local resources

LINCOLN HEIGHTS

The planning team for the Village of Lincoln Heights is headed by Stephanie Summerow Dumas, Village Manager. This mitigation meeting also included representatives from the fire department. The following table lists representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to Lincoln Heights.

Name	Agency/Title
Stephanie Summerow Dumas	Lincoln Heights Village Manager
Amber Gabriel	Lincoln Heights Fire Department
Michael Scott	Lincoln Heights Fire Department
Dana Schratt	Hamilton County EMA



Community Overview

Named after Abraham Lincoln, Lincoln Heights is located in Hamilton County Ohio, just north of Cincinnati. The development of Lincoln Heights began in 1923 and was the first African American self-governing community north of the Mason-Dixon Line.

Topography

According to the U.S. Census, the Village of Lincoln Heights has a total area of .76 square miles, of which all is land with no significant bodies of water. The city is situated at an elevation of 594 feet above sea level.

Demographics

The U.S. Census reports the population of Lincoln Heights was 3,286 in 2010 with 1,287 households, and 803 families residing in the village. The reported population density for Lincoln Heights is 4,323 residents per square mile.

Language

According to the 2011 American Community Survey, there are approximately 1,396 households in Lincoln Heights. Of these, 1,353 (96.9%) are primarily English-speaking. In the remaining 43 households, there is at least one person 14 years of age or older who speaks English fluently.

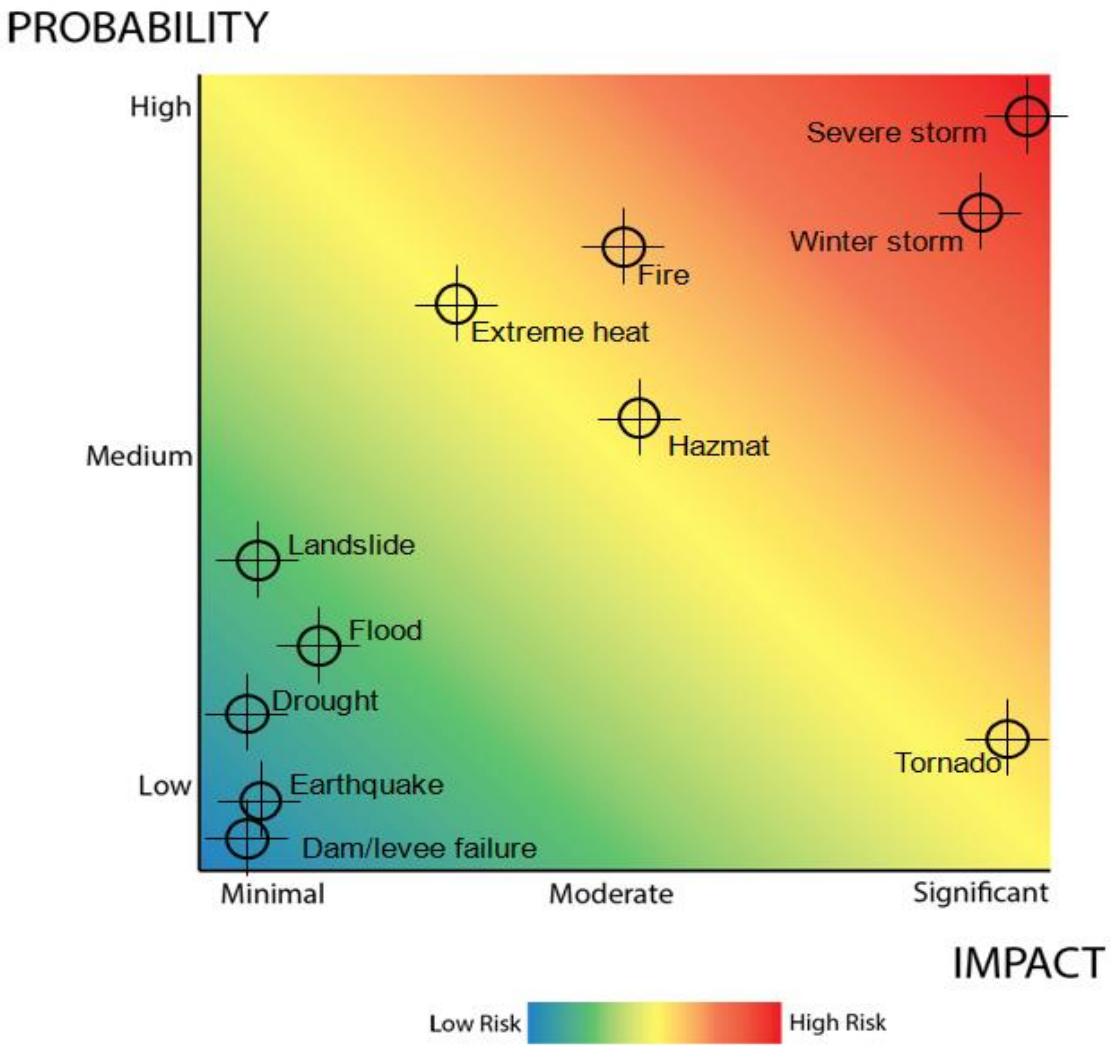
Economy & Industry

Although most jobs in Lincoln Heights revolve around education and social services, the trucking industry seems to thrive here, so there is a high demand for truckers. Also, the commercial banking industry is significant to the economy of Lincoln Heights.

Risk Matrix

The Lincoln Heights planning team agreed severe storms and winter weather pose the greatest threat to their community. Along with natural disasters, community leaders are aware that Lincoln Heights is also exposed to technological hazards, in particular hazardous materials spills.

The community is also concerned with the potential of fires in the numerous abandoned buildings in Lincoln heights.


PROBABILITY
High
Medium
Low
Severe storm
Winter storm
Fire
Extreme heat
Hazmat
Landslide
Flood
Drought
Earthquake
Dam/levee failure
Tornado
Minimal
Moderate
Significant
IMPACT
Low Risk
High Risk

Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Earthquake, Thunderstorm, Winter Storm	2014	2016	County EMA	Local and corporate resources
Supply municipal facilities with backup generators and transfer switches	All Hazards	2014	2015	County EMA	Local resources, FEMA
Enhance the current emergency communication program	All Hazards	2016	2018	County EMA	Local resources
Mitigate storm water drainage issues	Severe Storms, Flood, Flash Flood	2016	2018	County EMA	FEMA
Acquire cooling/heating shelters	Drought, Extreme Heat	2016	2018	County EMA	FEMA
Acquire training and resources to handle small hazardous materials spills	HazMat	2016	2018	County EMA	Local resources
Enhance tree trimming to minimize the amount of power outages	Tornado, Severe Winds, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Develop a public education/community outreach program to inform residents of potential hazards and emergency plans	All Hazards	2016	Ongoing	Community Planners for Lincoln Heights, County EMA	Local resources
Procure and distribute additional weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Enhance snow removal equipment and supplies	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA
Acquire storage and organizational equipment for municipal facilities	All Hazards	2018	2019	County EMA	Local resources
Remove fuel tanks at municipal site	HazMat	2016	2018	County EMA	Local resources
Improve traffic signage	Winter Weather	2018	2020	County EMA	FEMA, ODOT, FHWA

LOCKLAND

The planning team for the Village of Lockland is headed by James Benjamin, Fire Chief for the Village of Lockland. The following table lists representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the Lockland.

Name	Agency/Title
David Krings	Lockland Village Administrator
James Benjamin	Lockland Fire and Rescue Department
Bary Lusby	Hamilton County EMA

Community Overview

The Village of Lockland is located in central Hamilton County Ohio, due north of Cincinnati. Lockland was originally settled in 1828, and named, because of its four lock gates on the Miami-Erie Canal. The canal was a major transportation route from New York City through New Orleans, and the abundance of water attracted industry to the area. The canal has since been replaced by I-75, another significant transportation route.

Topography

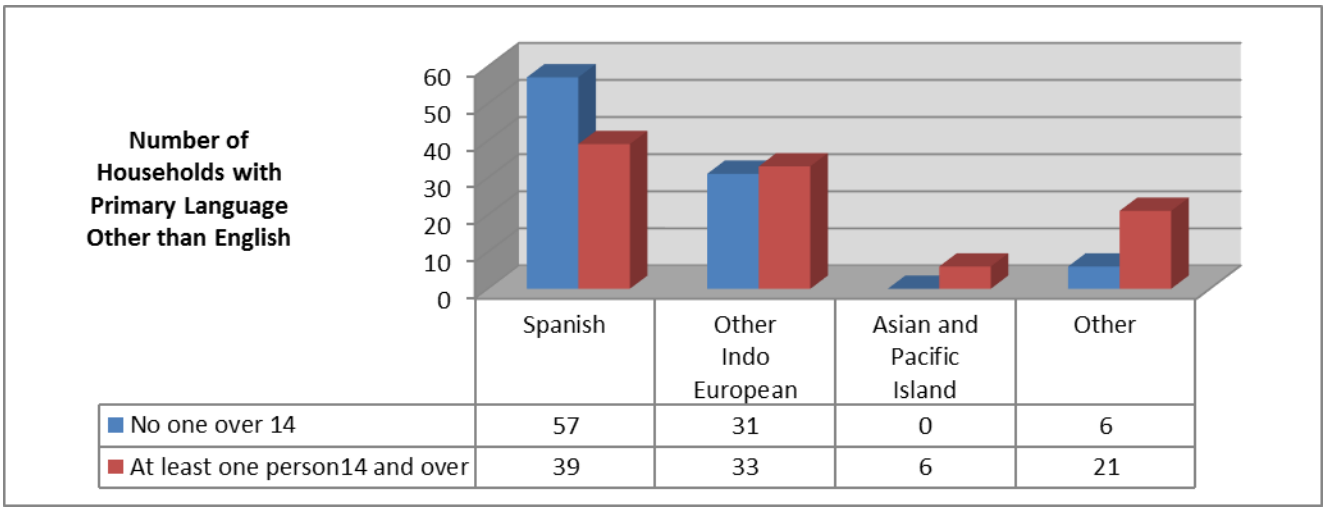
According to the U.S. Census, the Village of Lockland has a total area of 1.23 square miles, of which all is land with no significant bodies of water. The village is situated at an elevation of 581 feet above sea level.

Demographics

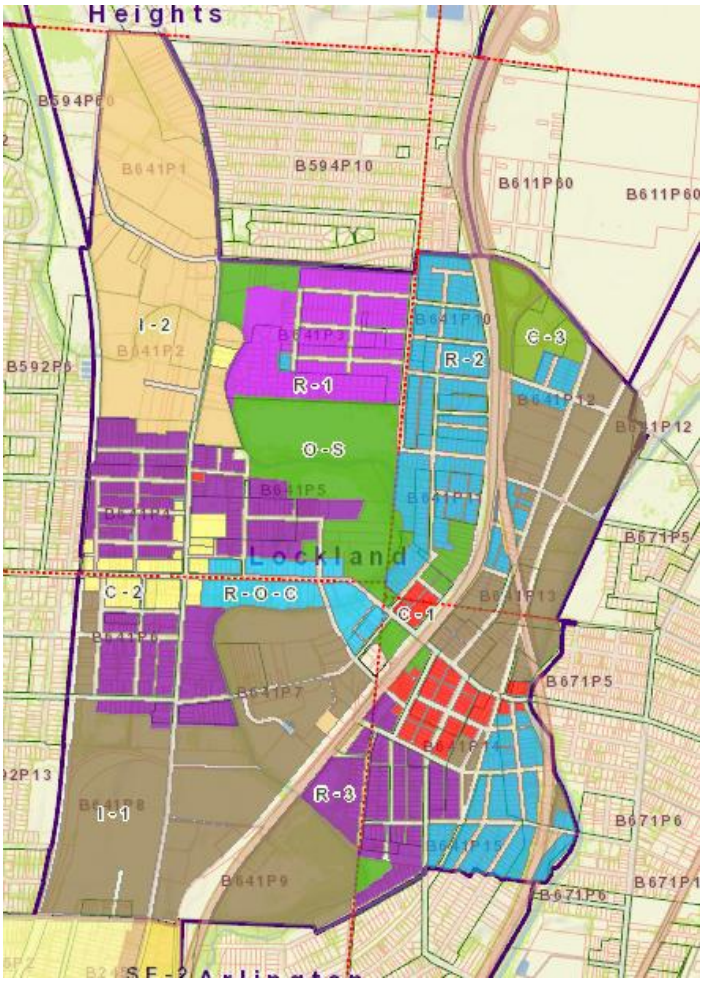
The U.S. Census reports the Lockland population was 3,449 in 2010 with 1,462 households, and 797 families residing in the village. The reported population density for Lockland is 2,804 residents per square mile. For the past several years Lockland has been experiencing a declining population.

Language

According to the 2011 American Community Survey, there are approximately 1,307 households in Lockland. Of these, 1,114 (85.2%) are primarily English-speaking. In households where English is not the primary language, 99 (7.6% of the total households) include at least one person 14 years of age or older who speaks English fluently. The table below depicts the number of households with a primary language other than English.

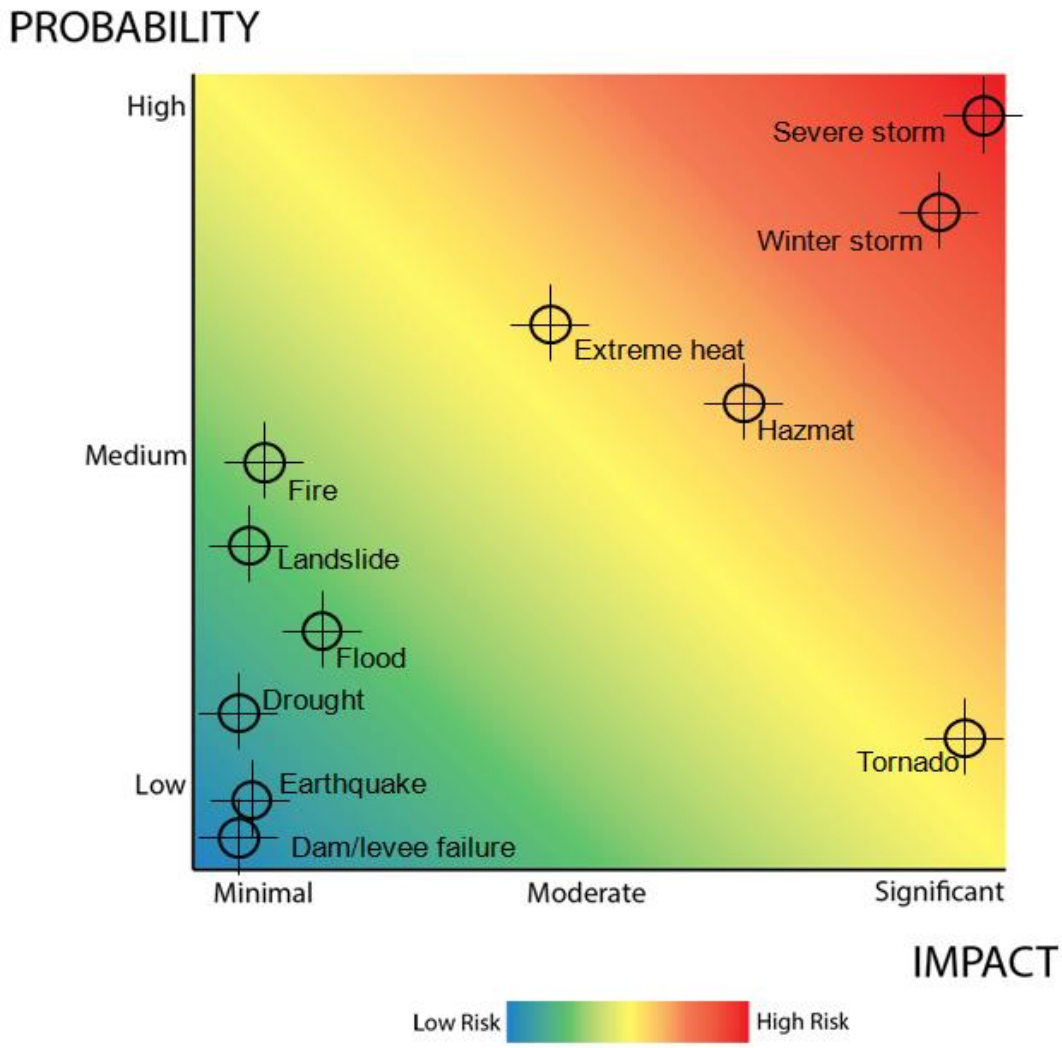


Land Use and Future Development



Risk Matrix

The Lockland planning team agreed severe storms and winter weather pose the greatest threat to their community. Along with natural disasters, community leaders are aware that Lockland is also exposed to technological hazards, in particular hazardous materials spills. Due to the lack of water, the Lockland representatives recognize that floods do not present a major threat to their community.



Mitigation Strategies

As a community with a significant amount of industry, Lockland officials are particularly interested in mitigation measures related to hazardous materials.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Implement public education programs for hazard awareness and emergency planning	All Hazards	2016	Ongoing	Community Planners for Lockland, County EMA	Local resources
Implement a commodity flow study	HazMat, Winter Weather	On Going			‘
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Supply municipal facilities with backup generators and transfer switches	All Hazards	2014	2015	County EMA	Local resources, FEMA
Mitigate storm water drainage issues	Severe Storms, Flood, Flash Flood	2016	2018	County EMA	FEMA
Enhance tree trimming to minimize the amount of power outages	Tornado, Severe Winds, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Develop safe rooms for care facilities	All Hazards	2016	2018	County EMA	FEMA, OCRA
Develop industrial site buffering	HazMat	2016	2018	County EMA	EPA
Conduct an engineering study on the Lockland ‘tunnel’	HazMat	2016	2019	Community Leaders of Lockland	Public/private partnership, FHWA, ODOT, FEMA

LOVELAND

The planning team for the City of Loveland is headed by Otto Huber, Fire Chief. Other members of the planning team include representatives from public works, safety, and fire departments. The following table lists Loveland representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Loveland.

Name	Agency/Title
Thomas Carroll	Loveland City Manager
Tom Benjamin	Loveland Fire Safety
Barry	Loveland Fire Department
Bary Lusby	Hamilton County EMA

Community Overview

The City of Loveland was incorporated on May 16, 1876 with 800 acres. Loveland, located northeast of Cincinnati, includes portions of three different townships in three different counties: Miami Township in Clermont County, Symmes Township in Hamilton County, and Hamilton Township in Warren County.

Topography

According to the U.S. Census the City of Loveland has a total area of 5.00 square miles, of which, 4.93 square miles is land and 0.07 square miles is water. The city is situated at an elevation of 597 feet above sea level. The Little Miami River runs through the city and separates Clermont and Hamilton Counties.

Demographics

The U.S. Census reports population in Loveland was 12,081 in 2010, with 4,701 households, and 3,270 families residing in the city. The population density of Loveland is 2,450 residents per square mile.

Language

According to the 2011 American Community Survey, there are approximately 3,479 households in Loveland. Of these, 3,137 (90.2%) are primarily English-speaking. In households where English is not the primary language, 329 (9.5% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that only 13 households do not have any members 14 years of age or older who speaks English—all of which speak Other Indo European languages.

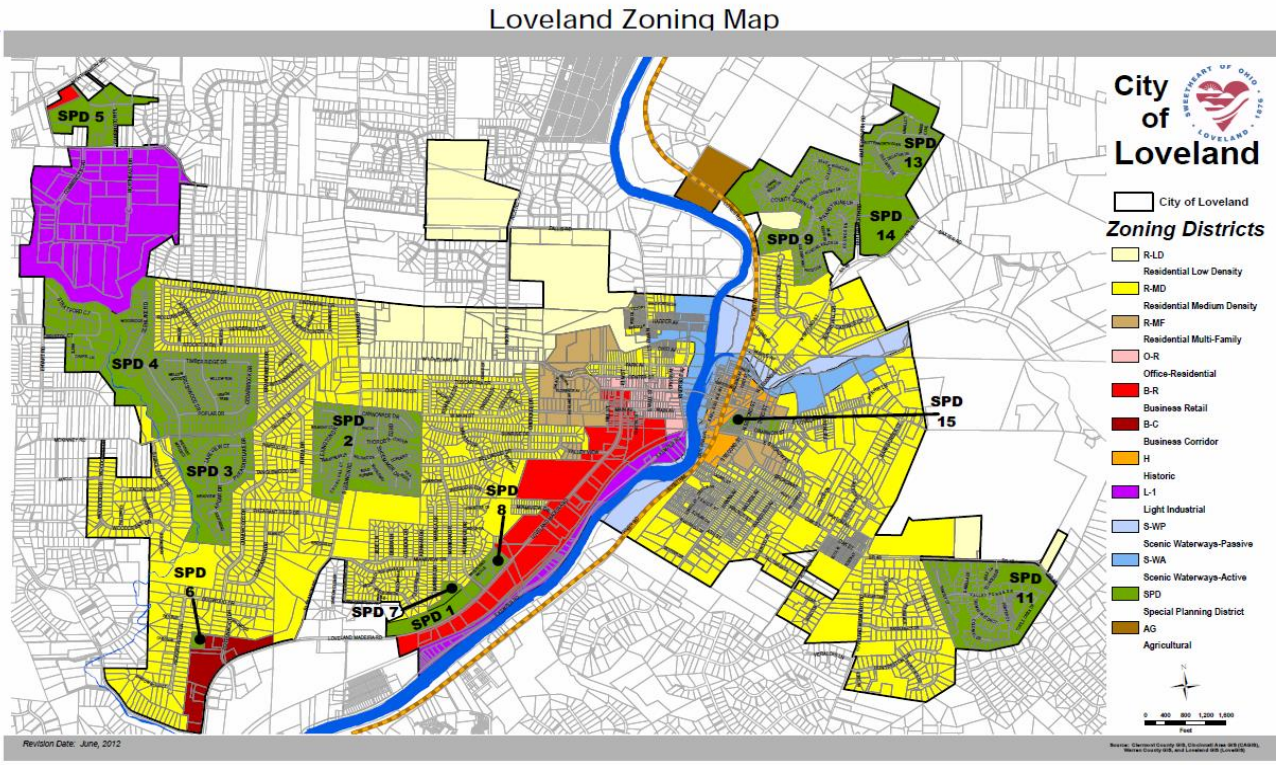
Industry

Loveland grew around the railroad and Little Miami River and light industry remains in that area. There is also a concentrated area of industry in the northwest corner of the community

Economy

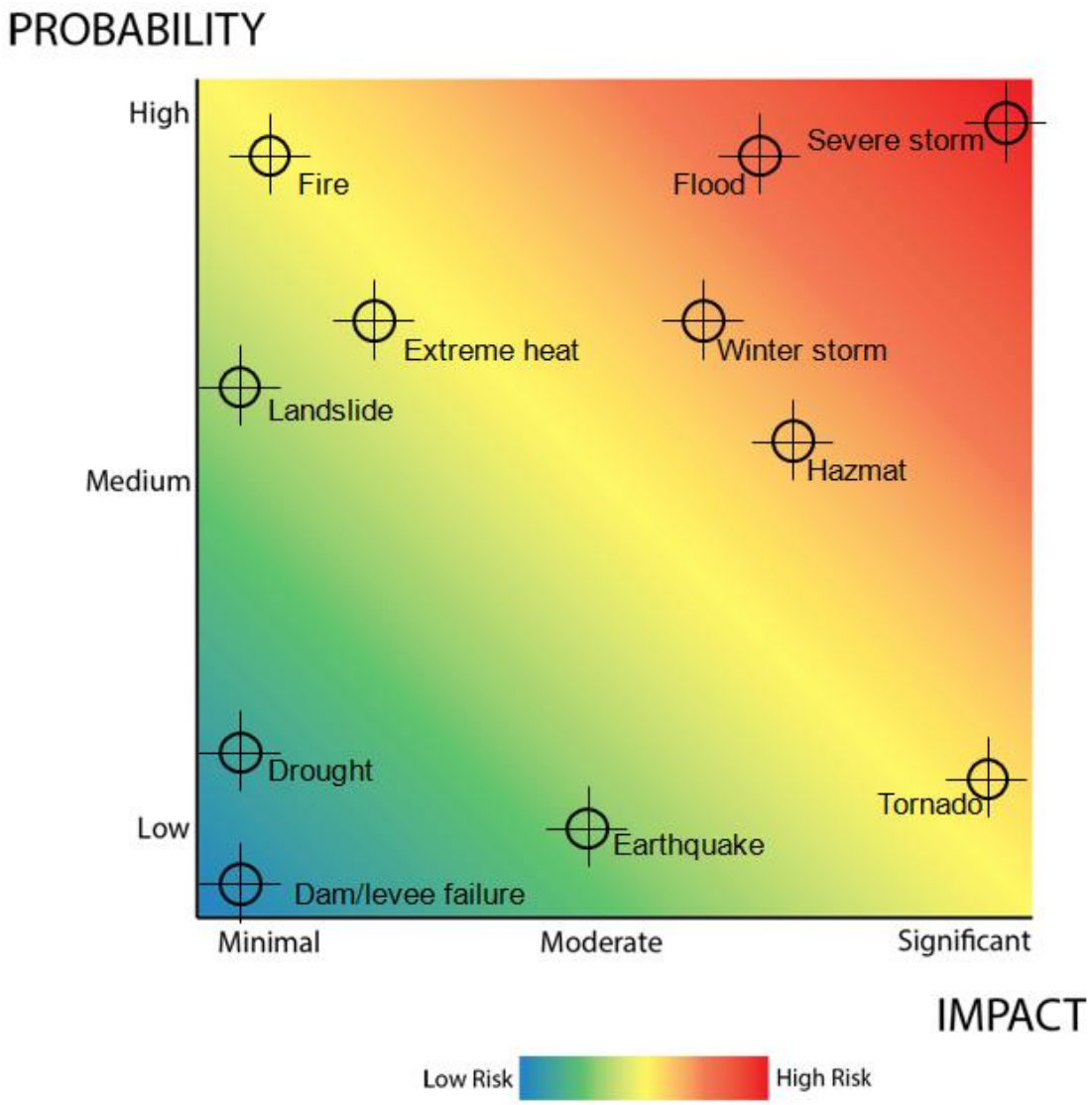
Loveland has initiated several projects to sustain and enhance the economic stability of the city. The Historic District of Loveland is in the midst of a resurgence of business growth, following redevelopment initiatives since 1995.

Land Use and Future Development



Risk Matrix

The Loveland planning team agreed severe storms pose the greatest threat to their community. Due to the industry and railroad lines running throughout this community, the planning team is aware of the potential of a hazardous materials spill. Although the potential impact is not severe, the probability of a fire is high in Loveland. Downtown Loveland's proximity to the Little Miami River has made it vulnerable to flooding. Major flooding in 1913 and 1959 led to the construction of dike along the Little Miami River. The Loveland planning team recognizes that probability and impact of flooding continues to be a significant hazard to the community.



Mitigation Strategies

As an older community with many large trees, power outages are common in high winds when tree limbs fall on power lines. The opportunity to bury power lines would minimize the impact of power outages to this community.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Clean up illegal dumping along the railroad line	HazMat	On Going			
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Institute a buy-out plan for flood prone structures	Flood	2014	2018	County EMA	FEMA, Local resources
Conduct a study to analyze the erosion issues at Riverside Drive	Landslide, Earthquake, Severe Storms, Flood, Flash Flood	2016	2018	County EMA	Community Development Grants, OCRA, FEMA
Establish and equip additional shelters	All Hazards	2016	2018	County EMA	FEMA
Improve storm water drainage to decrease localized damage caused by pooling in yards, basements, and streets	Severe Storms, Flood, Flash Flood	2016	2018	County EMA, Community Leaders of Loveland	Local resources
Trim trees to minimize the amount/duration of power outages	Tornado, Severe Winds, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Conduct a risk assessment study for landslides in West Loveland Hills	Landslide, Earthquake	2016	2018	County EMA, CAGIS	FEMA, FHWA
Install battery backup for traffic signals	HazMat	2016	2018	County EMA	Community Development Grants, Local resources
Conduct a study to redesign the West Lebanon and Loveland Road intersection	HazMat, Winter Weather, Earthquake, Landslide	2016	2018	County EMA	ODNR, EPA, FEMA

MADEIRA

The planning team for the City of Madeira is headed by Annalee Duganier, Madeira Assistant City Manager. This meeting included representatives from both Indian Hills and Madeira as these two communities are working cooperatively in this mitigation process. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the City of Madeira.

Name	Agency/Title
Annalee Duganier	Madeira Assistant City Manager
Rick Brasington	Madeira Mayor
Steve Ashbrook	Madeira and Indian Hills Joint Fire Department
Frank Maupin	Madeira Police Chief
Chuck Schlie	Indian Hills Police Chief
Dana Schratt	Hamilton County EMA

Community Overview

The City of Madeira is located in the eastern side of Hamilton County and less than 15 minutes from downtown Cincinnati.

Topography

Madeira is comprised of 3.38 square miles, with no significant bodies of water. This community sits at an elevation of 758 feet.

Demographics

After a large annexation in 1970's, the 2010 Census now reports the City of Madeira population at 8,726, with 3,297 households, and 2,420 families residing in the city. The current population density is 2,582 inhabitants per square mile.

Language

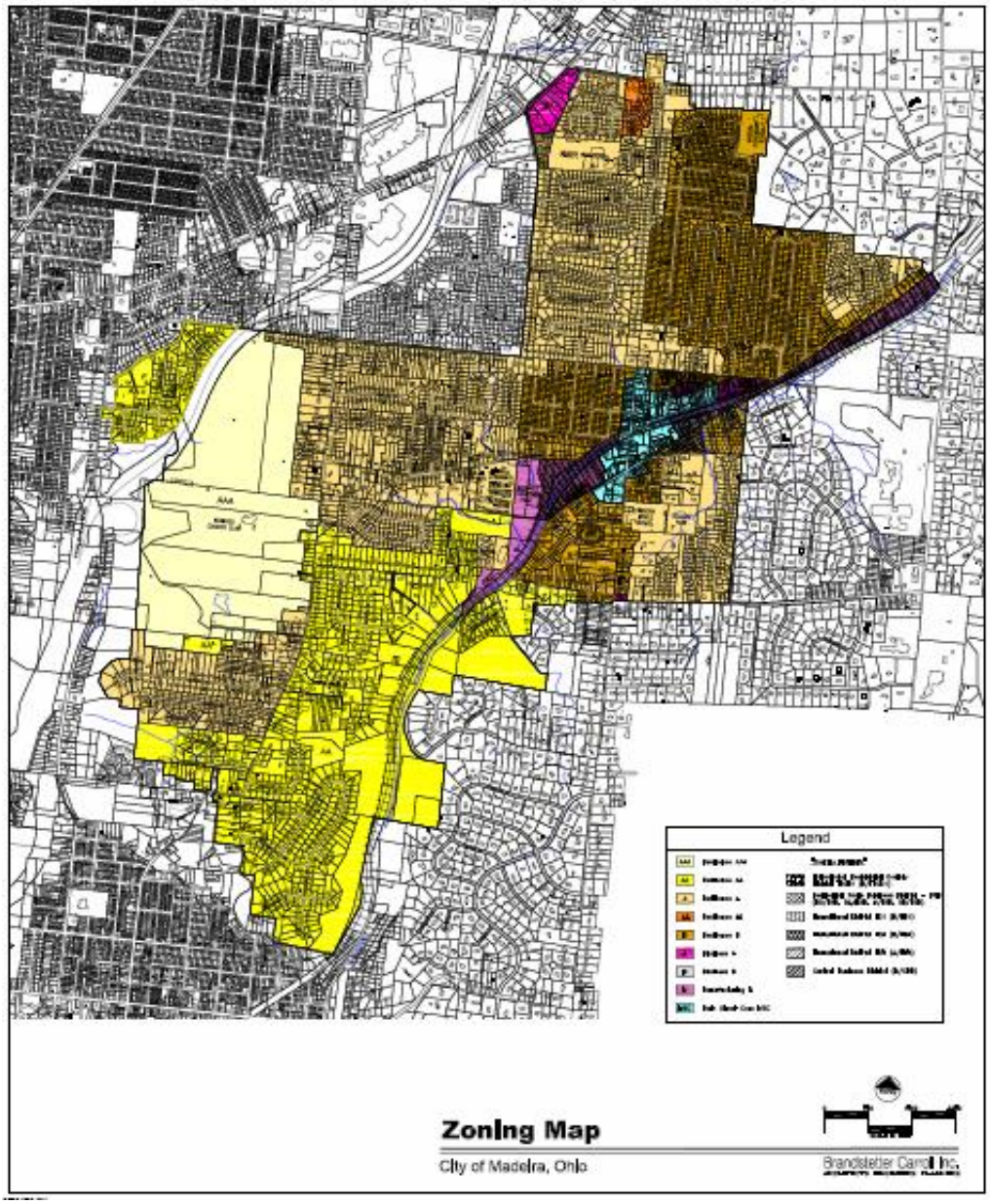
According to the 2011 American Community Survey, there are approximately 3,243 households in Madeira. Of these, 2,997 (92.4%) are primarily English-speaking. In households where English is not the primary language, 201 (6.2% of the total households) include at least one person 14 years of age or older who speaks English fluently.

Industry

Madeira is largely a residential community, with a small downtown and some light industry.

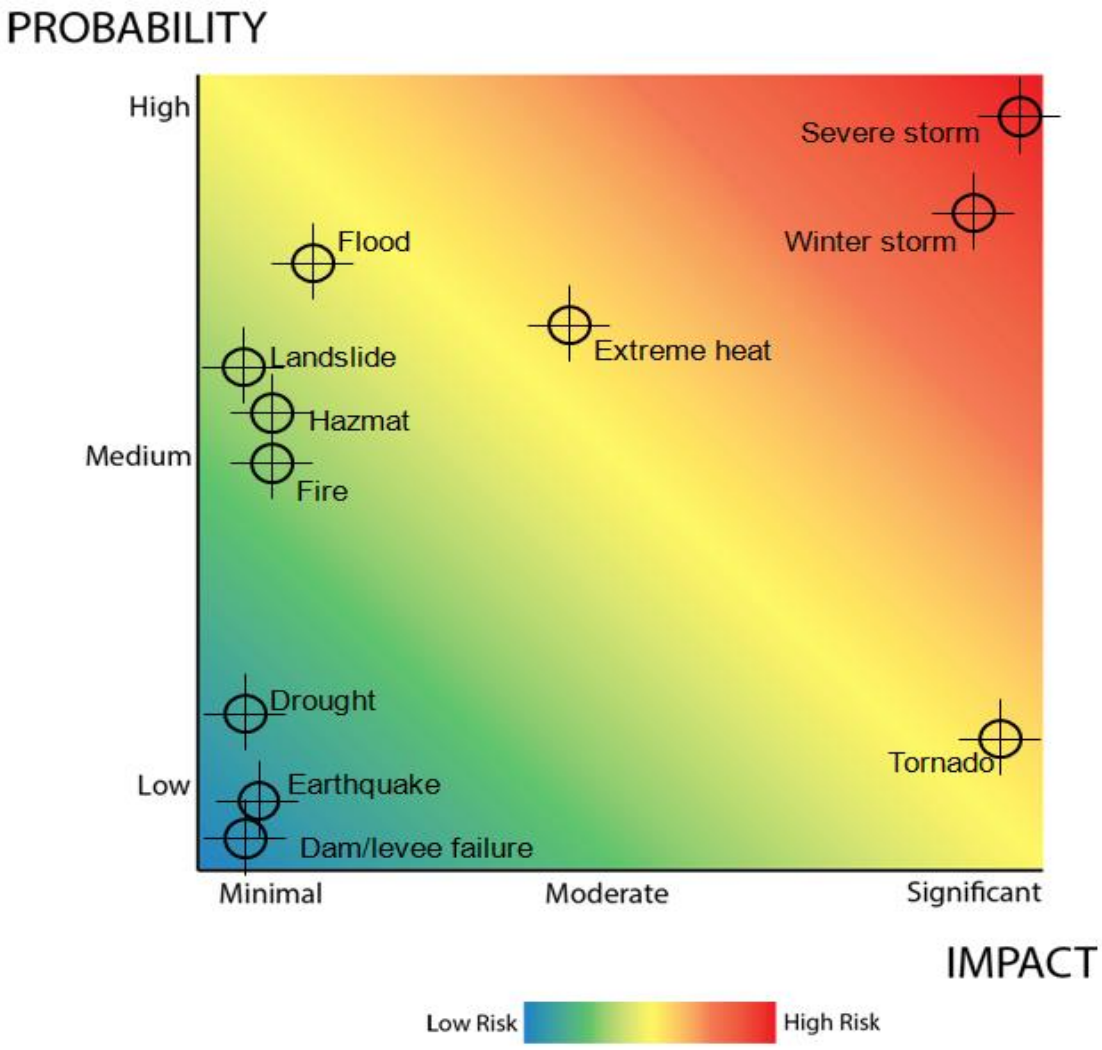
Land Use and Zoning

Since the first settlers in 1795, Indian Hills has been committed to conservation, focused on 'green space' long before green space was trendy. Almost 25% of the Indian Hills jurisdiction is permanently protected as part of the Green Areas Trust and the Greenacres Foundation.



Risk Matrix

The Madeira planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Funding for tree mitigation	Tornado, Severe Winds, Winter Weather, Extreme Heat	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Re-engineer Dawson Road	Severe Storms, Flood, Winter Weather	2014	2017	City Manager of Madeira	FEMA, ODNR
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Procure generators and transfer switches for backup power to care facilities and shelters	All Hazards	2014	2015	County EMA	Local resources, FEMA
Acquire and distribute NOAA weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Conduct a study on storm/sewer line mitigation options	Severe Storms, Flood	2016	2018	County EMA	ODOT, ODNR, FEMA, FHWA
Develop a public education program to inform residents of potential hazards and emergency plans	All Hazards	2016	Ongoing	Community Planners for Madeira, County EMA	Local resources
Incorporate landslide mapping	Severe Storms, Flood, Earthquakes	2016	2018	County EMA	Community Development Grants, OCRA, FEMA
Conduct community education for residents and businesses using natural gas	Tornado, Severe Storms, Winter Weather, Earthquakes, Fire	2016	Ongoing	County EMA	ODNR, FEMA

MARIEMONT

The planning team for the Village of Mariemont is headed by Tim Feichtner, Assistant Fire Chief for the Village of Lockland. The following table lists representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the Lockland.

Name	Agency/Title
Tim Feichtner	Mariemont Assistant Fire Chief
Jim Henderson	Village of Mariemont
Dan Policatstro	Mariemont Mayor
Rick Hines	Mariemont Chief of Police
Dana Schratt	Hamilton County EMA

Community Overview

The Village of Mariemont is located in eastern Hamilton County Ohio, just a few miles east of downtown Cincinnati. Mariemont was founded in the 1920's as a planned community, focused on English architecture with red brick Tudor-style buildings. In 2007 the village was designated a National Historic Landmark.

Topography

According to the U.S. Census, the Village of Mariemont has a total area of .89 square miles, of which .86 is land and .03 is water. The village is situated at an elevation of 587 feet above sea level.

Demographics

The U.S. Census reports that the population for Mariemont is 3,403 in 2010 with 1,443 households, and 877 families residing in the village. The reported population density for Mariemont is 3,957 residents per square mile.

Language

According to the 2011 American Community Survey, there are approximately 1,266 households in Mariemont. Of these, 1,228 (97.0%) are primarily English-speaking. In the remaining 38 households, there is at least one member 14 years of age or older who speaks English fluently.

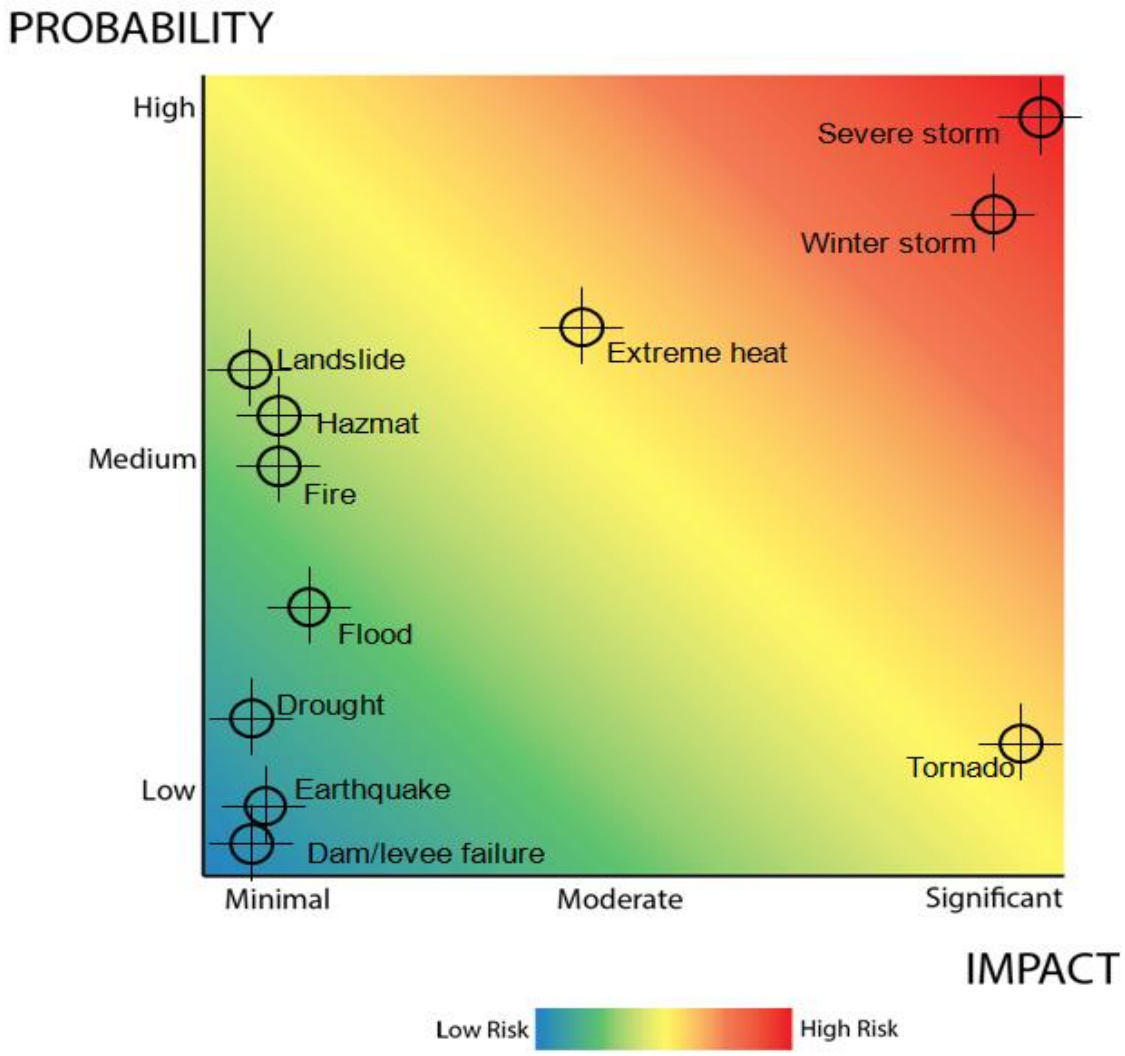
Economy

In 2007, the Village of Mariemont was designated a National Historic Landmark and can be found on the National Register of Historic Places. This community includes two overlapping historic districts, Village of Mariemont and Mariemont Historic District.

Source: http://mariemontohio.wordpress.com

Risk Matrix

The Mariemont planning team agreed with the Hamilton County planning team in determining severe storms and winter weather pose the greatest threat to their community. However, due to the location, Mariemont is not concerned about the probability of flooding.



Mitigation Strategies

Mariemont officials are particularly interested in mitigation measures related to the transportation of hazardous materials.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Earthquake, Thunderstorm, Winter Storm	2014	2016	County EMA	Local and corporate resources
Supply municipal facilities with backup generators and transfer switches	All Hazards	2014	2015	County EMA	Local resources, FEMA
Enhance the current emergency communication program	All Hazards	2016	2018	County EMA	Local resources
Acquire and distribute weather alert radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Enhance tree trimming to minimize the amount of power outages	Tornado, Severe Winds, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Draft building ordinances to ensure safe building standards.	Tornado, Severe Winds, Winter Weather, Fire, Earthquake	2016	2017	Community Leaders of Mariemont, County EMA	Local resources
Enhance spill removal and disposal procedures	HazMat	2016	2018	County EMA	Local resources
Equip buildings as safe rooms/shelters	All Hazards	2016	2018	County EMA	FEMA, OCRA
Implement public education programs for hazard awareness and emergency planning	All Hazards	2016	Ongoing	Community Planners for Mariemont, County EMA	Local resources
Develop mutual aid agreements with neighboring communities	All Hazards	2016	2017	County EMA, Community Leaders of Mariemont	Local resources

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Acquire additional snow removal equipment	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA
Develop safety standards and emergency plans	HazMat	2016	2018	County EMA	Local resources

MIAMI TOWNSHIP

The planning team for Miami Township is headed by Stephen Ober, Miami Township Fire Chief. This meeting included representatives from municipalities of Cleves and Addyston which are located within Miami Township. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the township and municipalities.

Name	Agency/Title
Steohen Ober	Miami Township Fire Chief
Danny Stacy	Village of Cleves Mayor
Jack Rininger	Miami Township Trustee
Tim Benter	INEOS ABS, Health, Environment & Safety
Daniel Pillow	Village of Addyston Mayor
Bary Lusby	Hamilton County EMA

Community Overview

Miami Township is one of the twelve townships of Hamilton County, Ohio. Within the township there are three municipalities: the Village of Addyston, the Village of North Bend, and the Village of Cleves.

Topography

Per the 2010 US Census, Miami Township comprises 23.8 square miles with 22.7 square miles of land and 1.1 square miles of water area is located in the southwestern corner of the county. At an elevation of 778 feet and a combination of hills and valleys, Miami Township is bordered by the Ohio and Great Miami Rivers.

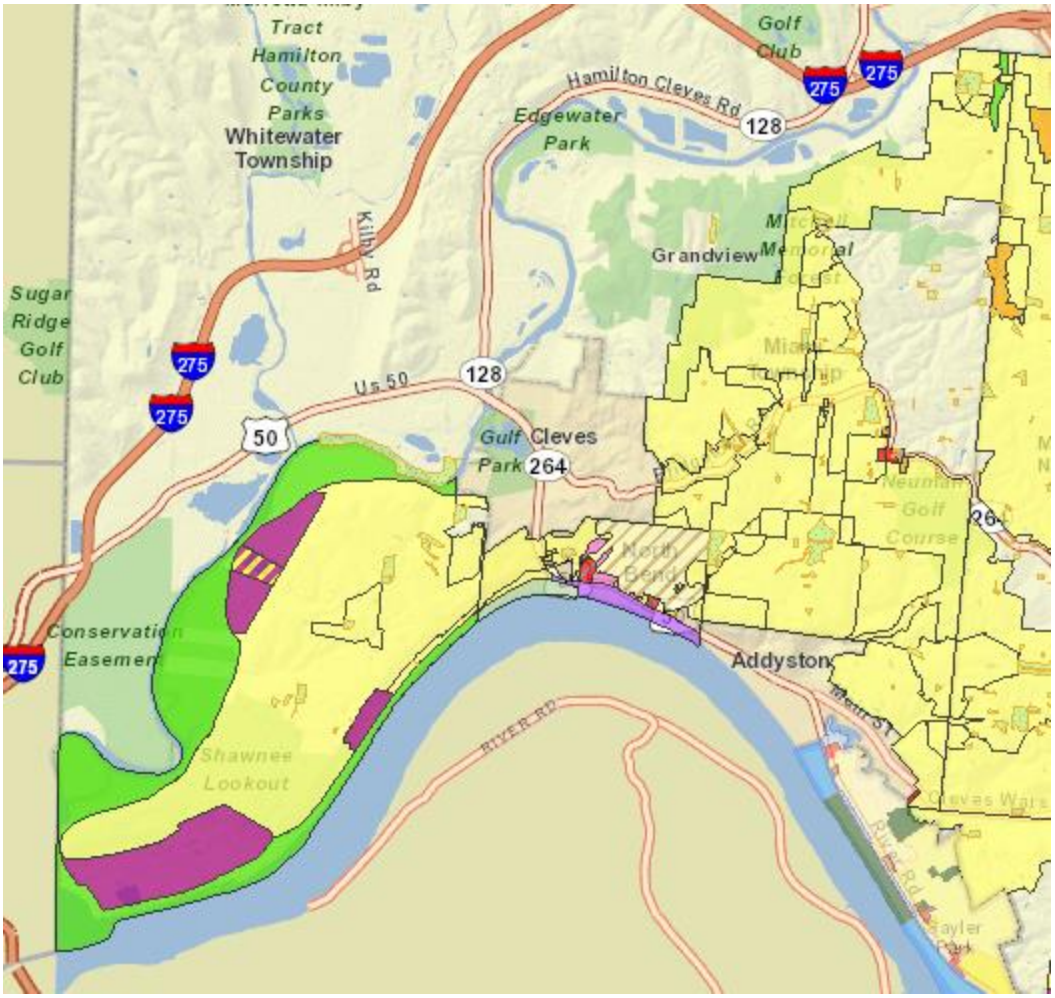
Demographics

The 2010 Census reports the Miami Township population at 15,757 (5,029 living in the incorporated areas), with 5,583 households, and 4,348 families residing in the jurisdiction. The reported population density is 594 inhabitants per square mile.

Language

According the American Community Survey, there are approximately 5, 326 households in Miami Township. Of these, 4,953 (93.0%) are primarily English-speaking. In households where English is not the primary language, 365 (6.9% of the total households) include at least one person 14 years of age or older who speaks English fluently. It is estimated that only eight households do not have members 14 years of age or older who speak English—all of which speak Spanish-speaking.

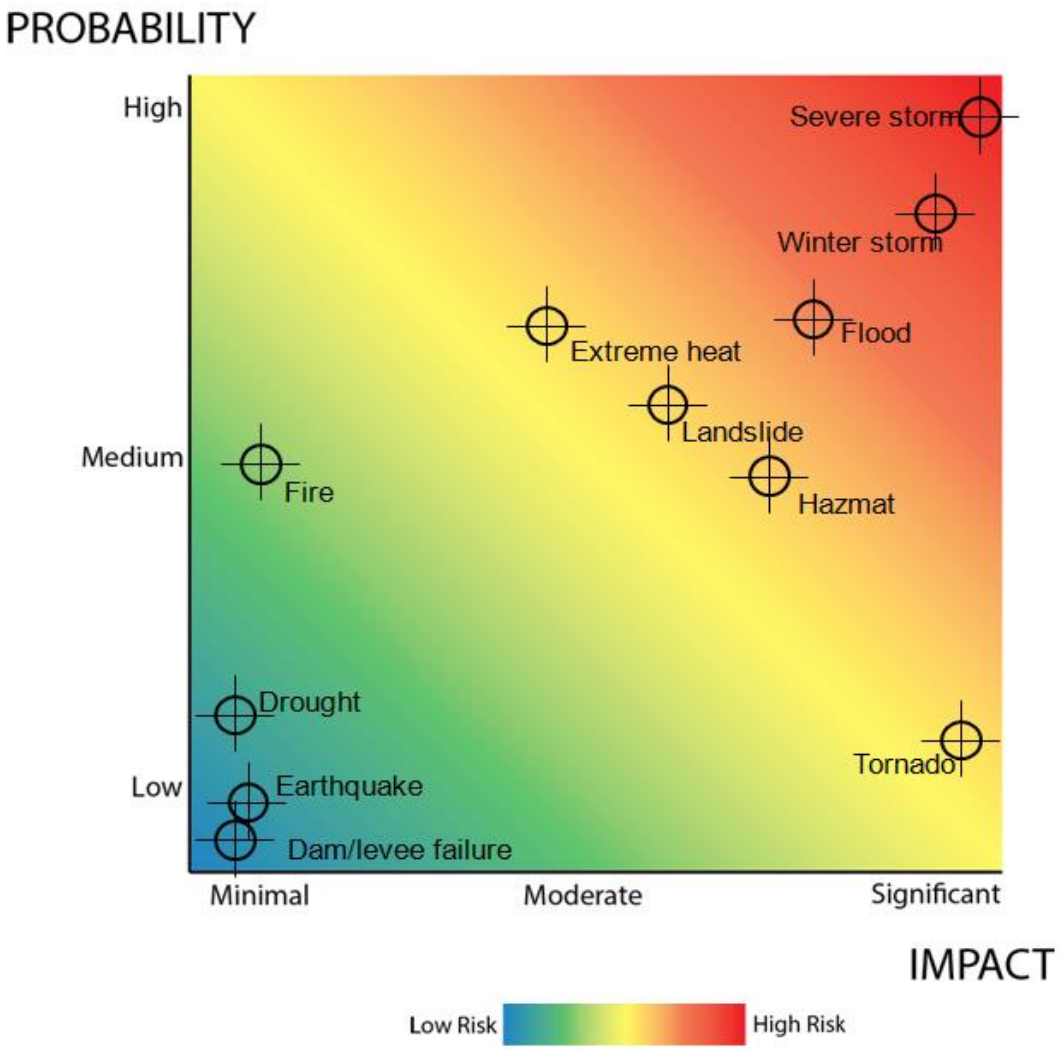
Land Use and Zoning



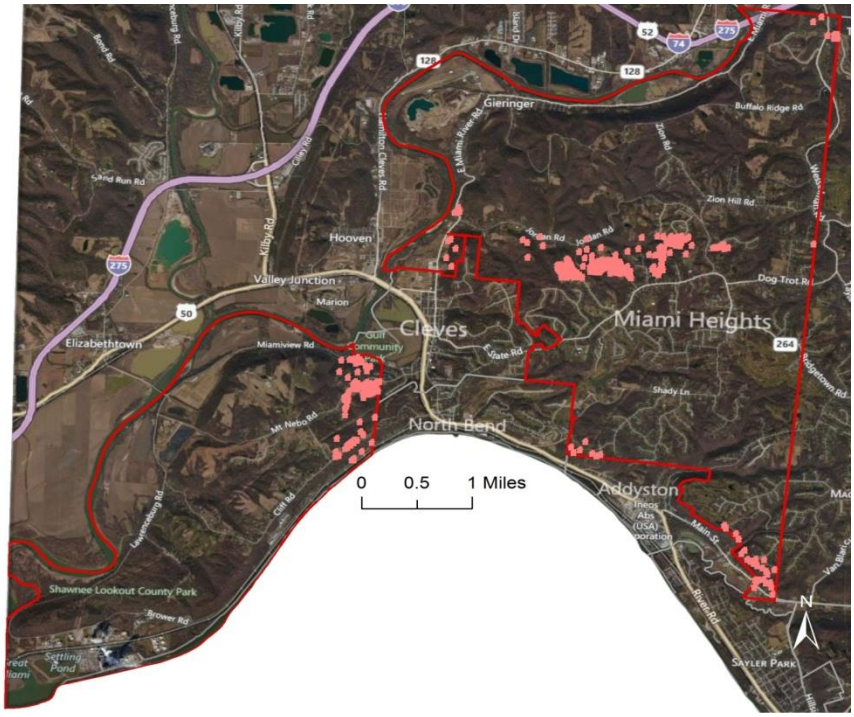

Residential - Single Family
Residential - Multi Family
Mobile Home Park
Medium Density Residence – Single Family
High Density Residence - Multi Family
Riverfront
Riverfront Recreation
Office
Retail
Highway Commercial
Light Industry
Light Industry
Heavy Industry
Heavy Industry
Extraction
Solid Waste

Risk Matrix

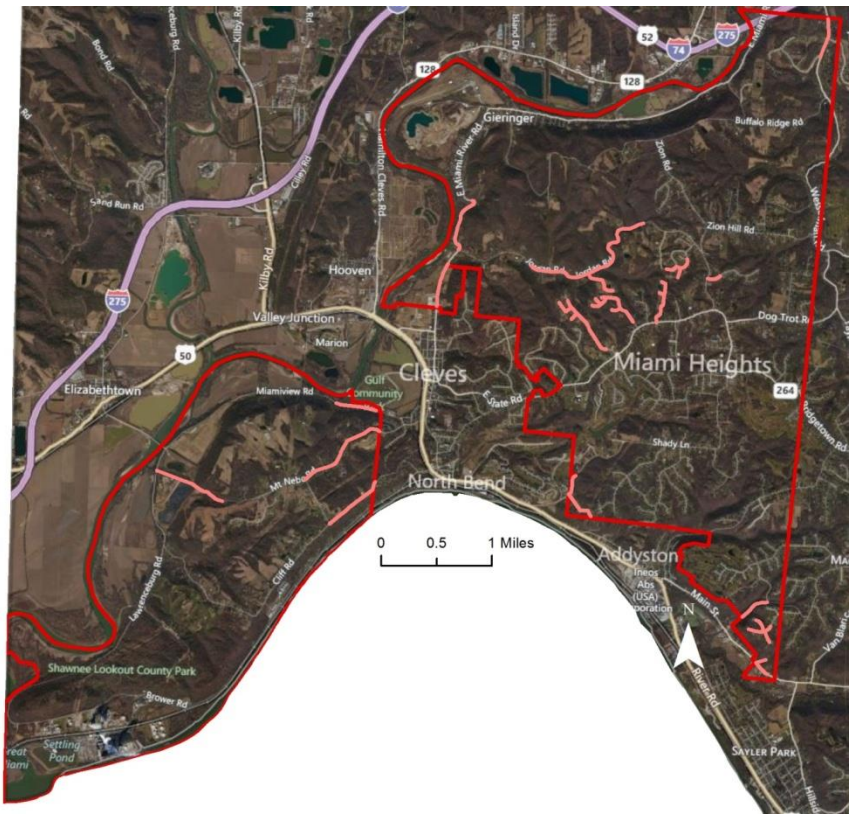
The Miami Township planning team determined the risks to their community are severe storms and winter storms. Most team members agreed that flooding, landslides and hazardous materials spills create a greater impact to their community than reported by Hamilton County.



Potential Building Damage by Landslide



Potential Road Damage by Landslide



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Earthquake, Thunderstorm, Winter Storm	2014	2016	County EMA	Local and corporate resources
Institute a buyout plan for repetitive loss properties	Flood	2014	2018	County EMA	FEMA, local resources
Elevate East Miami Road	Flood	2014	2017	Community Planners for Miami Township	FEMA, ODNR
Procure generators and transfer switches	All Hazards	2014	2015	County EMA	Local resources, FEMA
Obtain additional NOAA weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Establish shelters for trailer park residents	Severe Storms, Winter Storms, Tornado	2016	2018	County EMA	FEMA
Implement programs to educate the community on hazards affecting the county	All Hazards	2016	Ongoing	Community Planners for Miami Township, County EMA	Local resources
Expand the mutual aid agreements to include the surrounding communities within IN and KY	All Hazards	2016	2017	County EMA, Community Leaders of Miami Township	Local resources
Implement a local communication system	All Hazards	2016	2018	County EMA	Local resources
Enhance tree trimming and removal in emergency situations	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA Public Assistance Grants

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Establish a first response hazmat team and procure equipment removal and disposal	HazMat	2016	2018	County EMA	Local resources
Incorporate landslide mapping with planning	Landslide, Floods, Earthquake	2016	2018	County EMA	Community Development Grants, OCRA, FEMA

MILFORD

The planning team for the City of Milford is headed by the Chief of Police, Jamey Mills. Other members of the planning team include representatives from local departments, including police, fire, and EMA. Members of this planning committee were actively involved in reviewing strategies. The following table lists Milford representatives involved in the planning process, which included reviewing strategies to mitigate potential hazards to the community of Milford.

Name	Agency/Title
Jamey Mills	Milford Chief of Police
CJ Kim	University of Cincinnati
John E Cooper, Sr	Milford Fire Chief
Jeff Wright	Milford City Manager
Melinda Payne	Emergency Management, Volunteer
Ed Frambes	Hamilton County EMA

Community Overview

The City of Milford is located 16 miles east of Cincinnati and lies on the border of Hamilton County and Clermont County. Only 10% of Milford is located in Hamilton County. The Little Miami River runs through the center of the community. In 1913 a devastating flood hit downtown Milford destroying several businesses and washing out a pier and bridge.

Topography

Milford has a total area of 3.85 square miles, of which, 3.73 square miles is land and 0.12 square miles is water. The only significant waterway within the community is the Little Miami River.

Demographics

According to the U.S. Census, the 2010 population of Milford was 6,709, representing a 7% population increase since the 2000 census. The community comprises 3,019 households in the city, however only 13 homes are actually located in the Hamilton County portion of the city.

Language

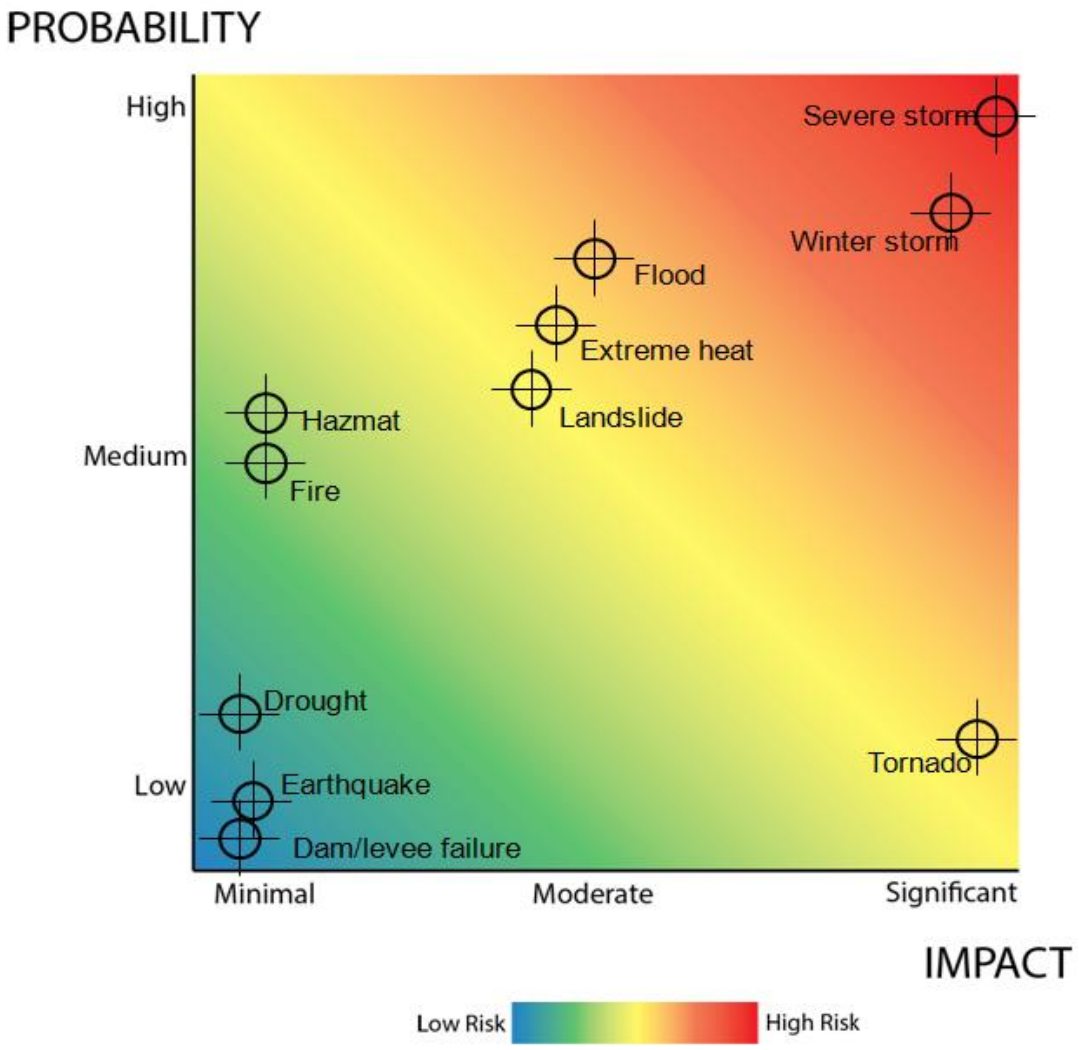
According to the 2011 American Community Survey, there are approximately 25 households in the portion of Milford located in Hamilton County. Of these, 17 (68%) are primarily English-speaking. In the remaining eight households, there is at least one member 14 years of age or older who speaks English fluently.

Economy

Although most of the Milford residents live within Clermont County, several businesses are located in Hamilton County. The railroad line runs from the Ohio River north through the center of Milford, providing a boost to the economy of Milford.

Risk Matrix

Since the community is bisected by the Little Miami River, making flooding a significant concern to the residents of Milford. The planning team also considers landslide a moderate risk to their community primarily due to storm sewer runoff.



Mitigation Strategies

The Milford planning team's primary concern is the lack of sufficient shelters within the community. Red Cross shelters are available, but not located in the city limits. The facilities that are currently designated as emergency shelters are not equipped with generators and/or transfer switches.

Although the Milford city ordinances require that new development implement underground utility lines, the community leaders would like to bury overhead power lines to insure the safety of the residents

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Install warning sirens	All Hazards	Completed			
Implement city	All Hazards	On Going			

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
band emergency radio					
Establish emergency shelters within the community	Tornado, Earthquake, Flood, Severe Storms, Winter Storms	2016	2018	County EMA	FEMA
Bury power lines	Severe Storms, Winter Storms	2014	2016	County EMA	Local and corporate resources
Procure back-up generators and transfer switches for all critical facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Harden the Milford Fire Station	Tornado, Earthquake, Severe Storms, Winter Storms	2014	2018	County EMA, Milton Fire Department	HMGP or Community Development Grants
Conduct a study to evaluate the storm water erosion	Flood, Severe Storms	2016	2018	County EMA	Community Development Grants, OCRA, FEMA
Develop a local shelter plan	All Hazards	2016	2018	County EMA	FEMA, OCRA
Conduct stream maintenance in the Little Miami	Flood, Severe Storms	2016	2018	County EMA	ODNR, FEMA
Procure supplies for local Haz-Mat spills	Haz-Mat	2016	2018	County EMA	Local resources
Develop community education for members of the community using natural gas	Tornado, Earthquake	2016	Ongoing	County EMA	ODNR, FEMA
Perform a storm water drainage analysis	Severe Storms	2016	2019	County EMA	FEMA, OCRA
Implement Nixle via public	All Hazards	2018	2019	County EMA	Local resources

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
education					
Conduct a study to evaluate inertial valves	Flood	2018	2019	County EMA	FEMA

The community of Milford is committed to keeping its' citizens safe from hazards. The Milford Disaster Plan is reviewed and updated each year. A Continuity of Operations Plan is also in progress.

MONTGOMERY

The planning team for the City of Montgomery is headed by the Fire Chief, Paul Wright. Members of this planning committee were actively involved in reviewing strategies appropriate to the community. The following table lists Montgomery representatives involved in the planning process, which included reviewing strategies to mitigate potential hazards to the community of Montgomery.

Name	Agency/Title
Paul Wright	Montgomery Fire Chief
Brian Riblet	Montgomery Public Works Director
Ed Frambes	Hamilton County EMA

Community Overview

The City of Montgomery was settled in 1796 as a small village on the route to Cincinnati. By 1960 Montgomery had become an affluent residential suburb of Cincinnati, and by 1971 the village became a city with a population of 5,000.

Topography

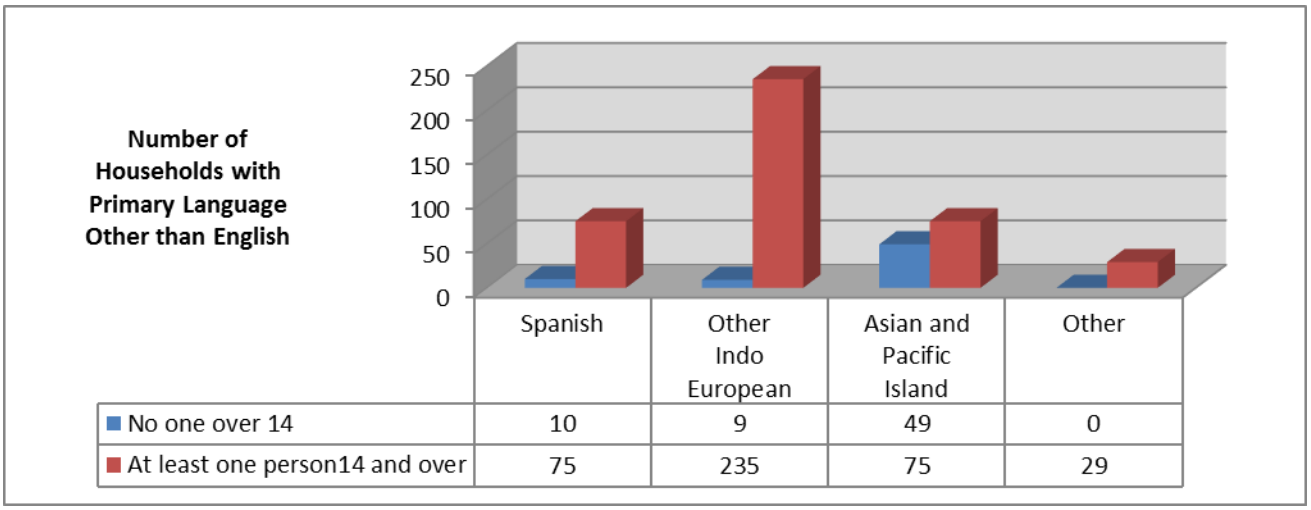
Montgomery has a total area of 5.3 square miles, of which, 5.29 square miles is land and .01 square mile is water. This community sits at an elevation of 801 feet.

Demographics

According to the U.S. Census, the 2010 population of Montgomery was 10,251, with 3,849 households and 2,940 families. The reported population density is 1,938 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 3,737 households in Montgomery. Of these, 3,255 (87.1%) are primarily English-speaking. In households where English is not the primary language, 414 (11.1% of the total households) include at least one member 14 years of age or older who speaks English fluently. .he below table depicts the number of households with a primary language other than English.

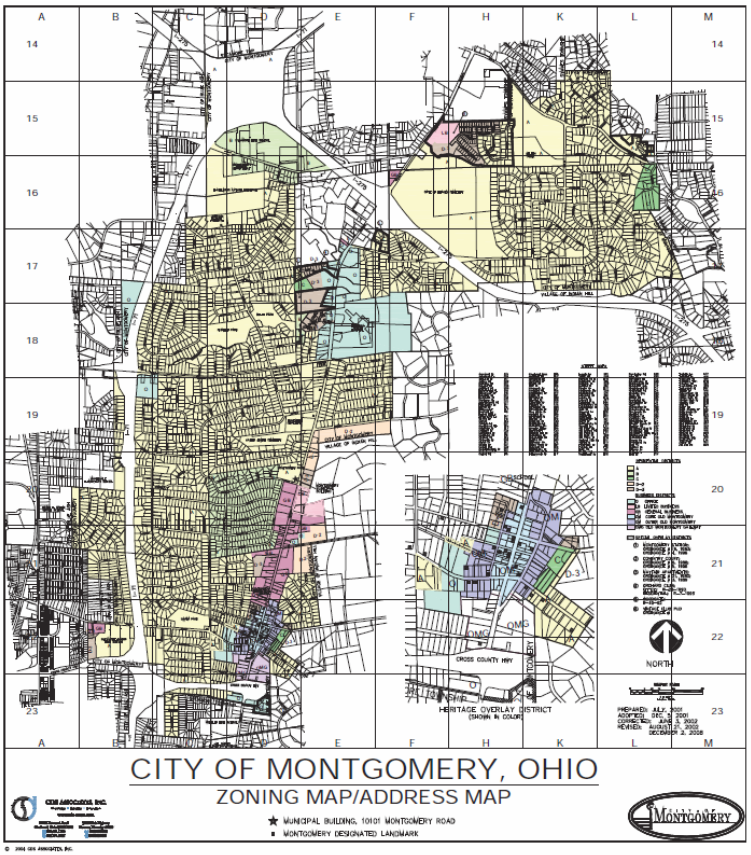


	Spanish	Other Indo European	Asian and Pacific Island	Other
No one over 14	10	9	49	0
At least one person14 and over	75	235	75	29

Economy

The citizens of Montgomery are proud of their history and the historic buildings in the community. There are 32 buildings in Montgomery that have been designated as Montgomery Landmarks; eight of these are listed on the National Register of Historic Places.

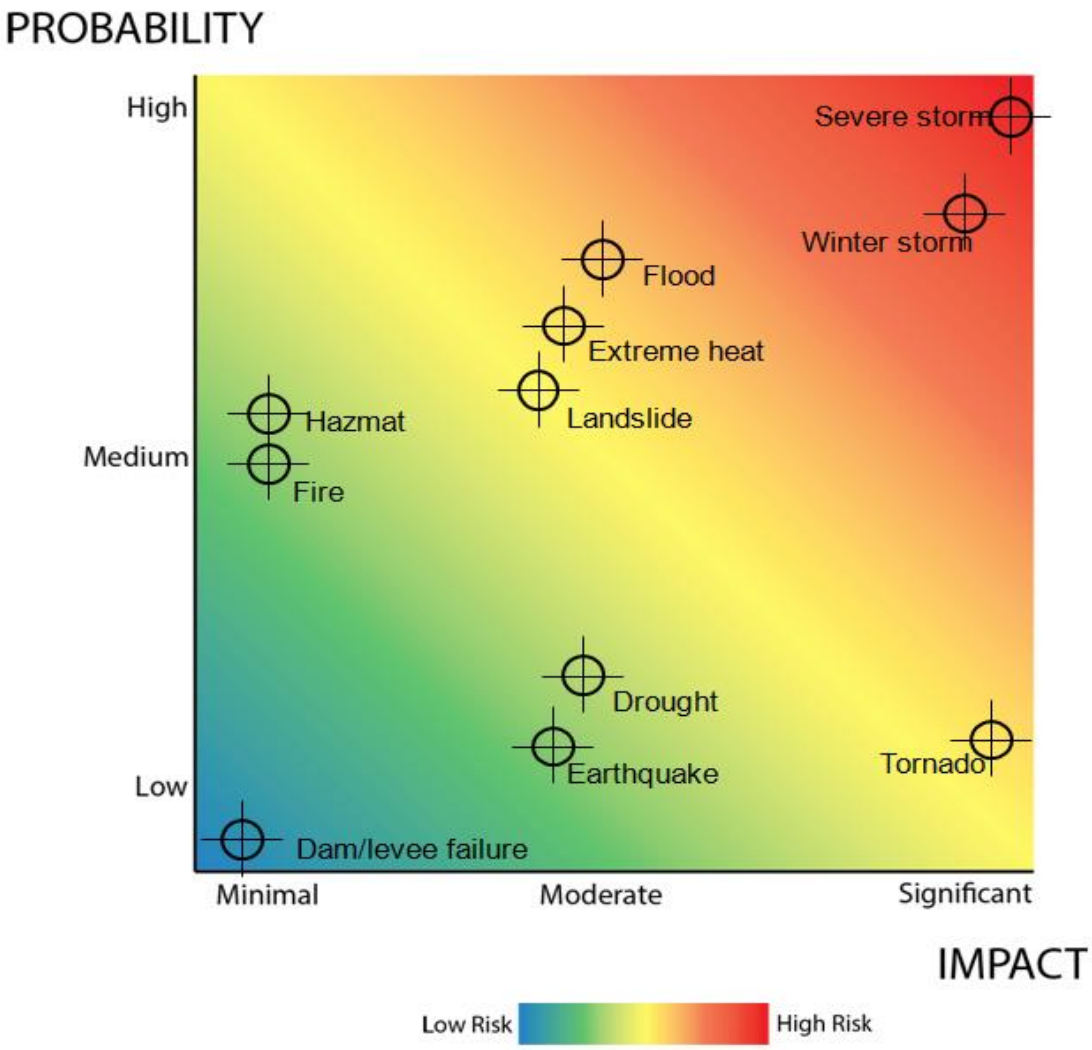
Land Use and Future Development



Source: http://www.montgomeryohio.org/about/maps/

Risk Matrix

The Montgomery planning team agreed with Hamilton County planning team that severe storms and winter storms are the greatest threat to their community. They are concerned that droughts and earthquakes could have a more significant impact to Montgomery



Mitigation Strategies

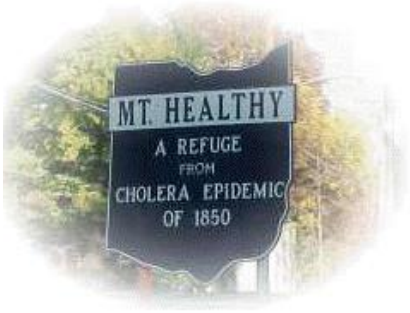
Montgomery has been designated a Tree City USA by the ODNR for the past 17 years. The community is concerned with the financial impact of a drought should trees have to be replanted. Montgomery is in

the process of implementing the use of gator bags to keep trees watered in extreme heat. Also, the community leaders would like to bury overhead power lines to insure the safety of the residents.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Procure back-up generators and transfer switches for all critical facilities	All Hazards	Completed			
Acquire gator bags	Drought	On Going			
Bury power lines	Tornado, Earthquake, Thunderstorm, Winter Storm	2014	2016	County EMA	Local and corporate resources
Harden bridges	Flood, Severe Storms, Winter Storms, Tornado, Earthquake	2016	2019	County EMA	FEMA
Implement city band emergency radio	All Hazards	2016	2018	County EMA	Local resources
Enhance the current emergency communication system	Severe Storms, Winter Storms, Tornado	2016	2018	County EMA	Local resources
Conduct a study to evaluate the structural integrity of Bethesda Hospital	Severe Storms, Tornado, Earthquake	2018	2020	Bethesda Hospital, Montgomery City Council	FEMA
Obtain an ARC GIS license to better map the community	All Hazards	2018	2018	County EMA	Local resources

The community of Montgomery has always been committed to keeping its' citizens safe from hazards. A Continuity of Operations Plan is also in place for Montgomery.

MT. HEALTHY



The planning team for the City of Mt. Healthy is headed by Steve Lawson, North College Hills Fire Chief. This mitigation meeting also included representatives from the City of North College Hill as these two communities are working cooperatively in this process. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the City of Mount Healthy.

Name	Agency/Title
Mark Fitzgerald	North College Hill City Manager
Stephen Lawson	Mt Healthy Fire Chief
Bary Lusby	Hamilton County EMA

Community Overview

The City of Mount Healthy is located about 15 miles north of downtown Cincinnati. Originally called Mount Pleasant, but when an abnormal amount of the citizens survived the cholera epidemic if the 1850's, the community was renamed Mount Healthy.

Topography

The City of Mount Healthy is comprised of 1.41 square miles of land with no significant water bodies. Mount Healthy is located in the northern side of Hamilton County at an elevation of 837 feet.

Demographics

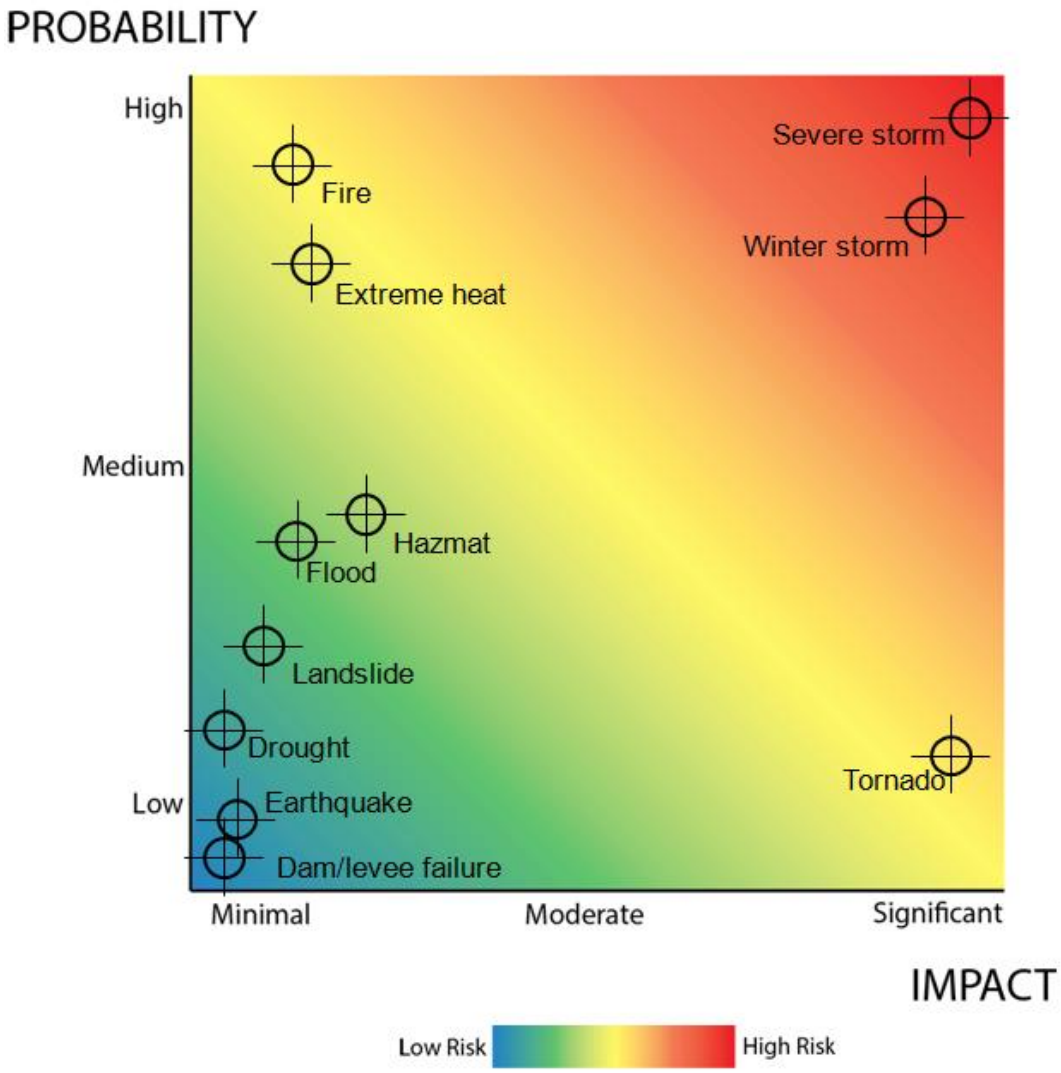
The 2010 Census reports the City of Mount Healthy population at 6,098, with 2,716 households, and 1,454 families residing in the city. The current population density is 4,325 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 2,680 households in Mount Healthy. Of these, 2,545 (95.0%) are primarily English-speaking. In the remaining 135 households, there is at least one member 14 years of age or older who speaks English fluently.

Risk Matrix

The City of Mount Healthy planning team determined the greatest risks to their community are severe storms and winter storms. Due to lack of water bodies and high elevation the probability of a flood is less likely than those reported for Hamilton County.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Require manufactured homes to be anchored	All Hazards	2016	2017	County EMA	Local resources
Acquire and distribute weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Build shelters for residents of manufactured home parks	Tornado, Severe Storms, Fire	2016	2018	County EMA	FEMA
Increase and improve snow removal equipment	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA
Increase and improve HazMat training	HazMat	2016	2018	County EMA	Local resources

The Public Works Department also functions as “First Responders” working hand in hand with Fire and Police personnel during emergency operations. The Department is tasked with critical assignments to restore community services in a timely manner.

NEWTOWN

The planning team for the Village of Newtown is headed by Lieutenant Shawn McBreen of the Newtown Police Department. For Meeting #3 in the planning process, members of the Newtown planning committee partnered with Terrace Park to review mitigation strategies appropriate to both communities. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the Village of Newtown.

Although Newtown and Terrace Park jointly brainstormed mitigation strategies, the two communities will pursue any potential grant activities independently.

Name	Agency/Title
Gerald Hayhow	Terrace Park Police Chief
Stefan Olson	Terrace Park Council (Safety)
John Hester	Terrace Park Building Department
L.B. Frey	Terrace Park Fire Chief
Shawn McBreen	Newtown Police Department
Dana Schratt	Hamilton County EMA
Thomas Synan Jr.	Newtown Police Chief

Community Overview

The Village of Newtown is located in the eastern side of Hamilton County. Newtown was settled in 1792 as Mercersburg, but the name was changed before the village was incorporated in 1901.

Topography

The Village of Newtown is comprised of 3 square miles, with 2.8 square miles of land and 0.2 square miles of water. This community is located at an elevation of 499 feet.

Demographics

The 2010 Census reports the Village of Newtown population at 2,672, with 1123 households, and 724 families residing in the community. The current population density is 1,231 inhabitants per square mile.

Language

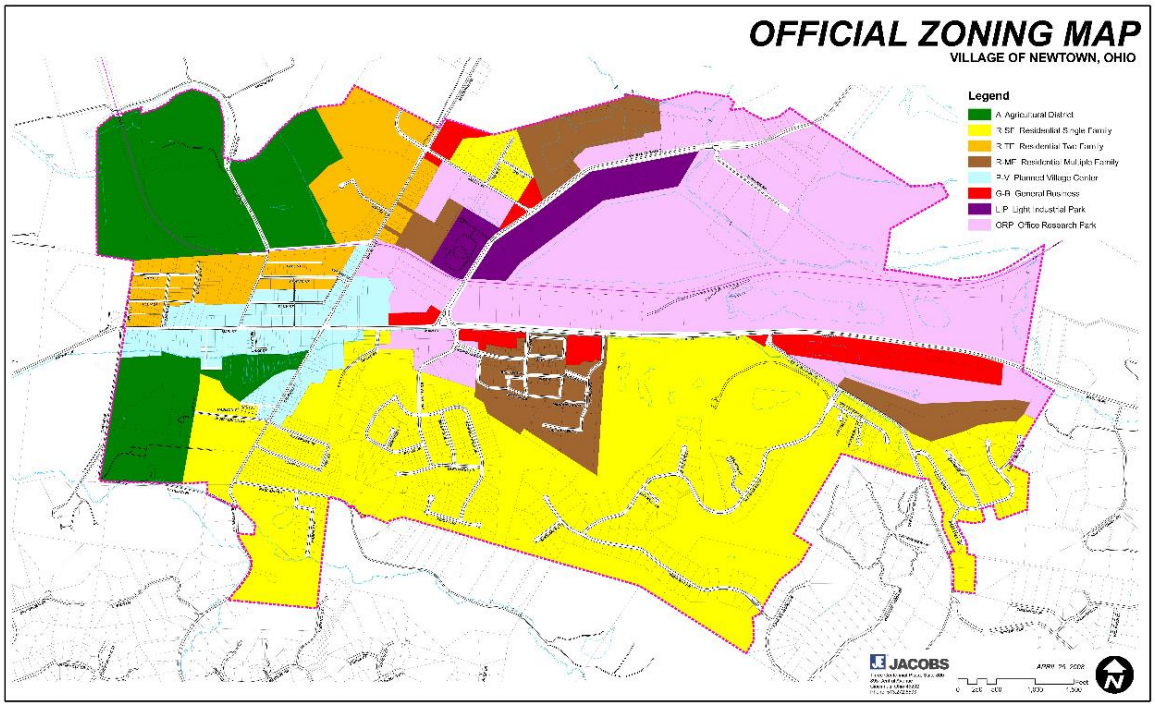
According to the 2011 American Community Survey, there are approximately 1,064 households in Newtown. Of these, 969 (91.1%) are primarily English-speaking. In households where English is not the primary language, 90 (8.5% of the total households) include at least one member 14 years of age or

older who speaks English fluently. It is estimated that only five households do not have member 14 years of age or older who speak English—all of which Other Indo European languages.

Land Use and Future Development

Terrace Park has developed a cultural of urban forestry dating back to the 1890's. The community leaders of Terrace Park recognize the value of trees to a community and are proud of their status as a Tree City USA.

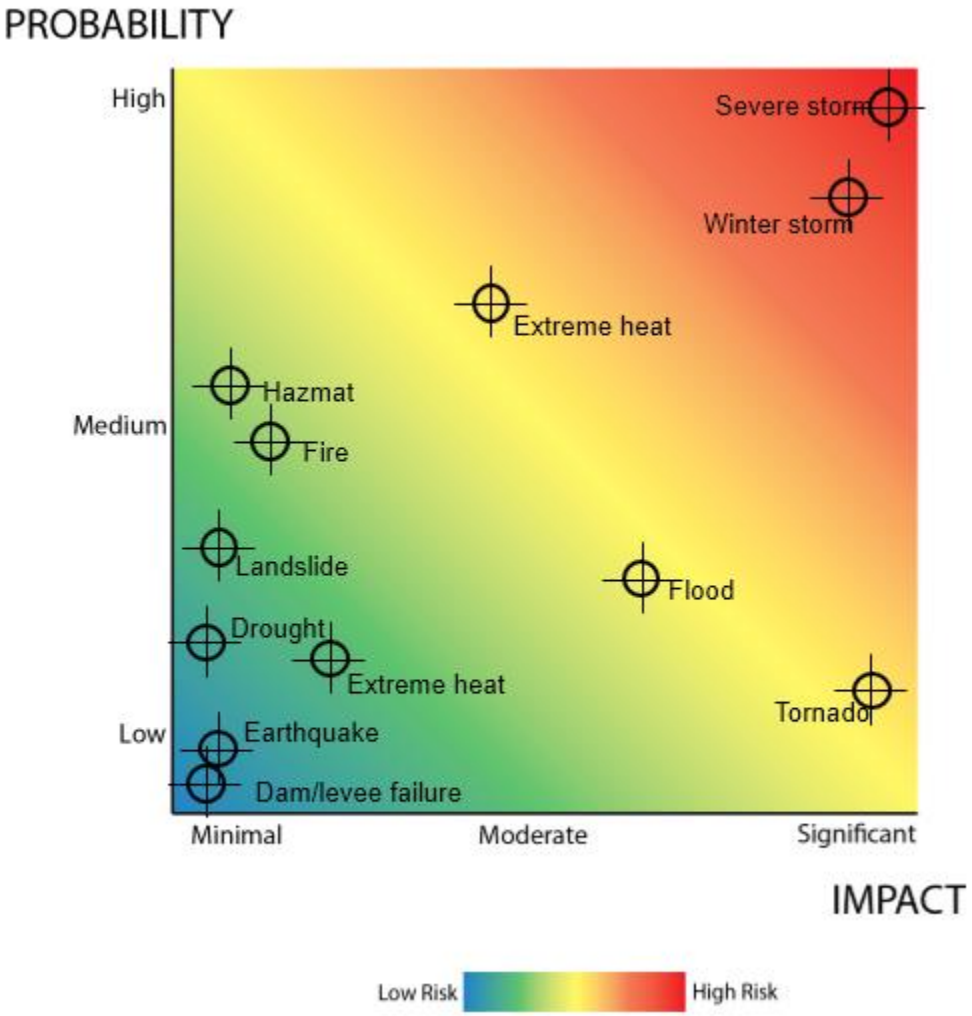
The following image depicts Newtown's official zoning map, designed for the purpose of promoting the public health, safety, convenience, and general welfare of its citizens. Newtown's zoning codes are available at http://www.newtownohio.gov and were updated in 2012.



Source: http://www.newtownohio.gov/webdocs/zoning_map.jpg

Risk Matrix

The Village of Newtown has determined that severe storms and winter storms to pose the greatest risk to their community. Due to the location of this community, the probability of flooding and landslides is less significant to Newtown than to most other jurisdictions of Hamilton County.



NOTE: The above matrix lists the hazards that the team (Newtown and Terrace Park) jointly reviewed in Meeting #3. It should be noted that Newtown has a higher probability, based on recent history, of flooding and landslides.

Approximately one-third of Newtown is in the floodplain of the east fork of the Little Miami River, which deposits into the Ohio River about three miles from the village. The east fork and Little Miami tributaries

cause flooding and back flooding into the village. While flooding does not occur frequently (i.e. low to moderate flooding), when it does occur the impact is significant. In 1997, for example, the March flooding devastated much of the area.

Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Procure back-up generators and transfer switches for all critical facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Acquire and distribute NOAA weather radios for all critical facilities	Tornado, Severe Winds, Winter Weather, Flood, Flash Flood, Earthquake	2018	2019	County EMA	FEMA, NOAA
Bury power lines	Tornado, Earthquake, Thunderstorm, Winter Storm	2014	2016	County EMA	Local and corporate resources
Enhance the communication system	All Hazards	2016	2018	County EMA	Local resources

NORTH BEND

The planning team for the Village of North Bend is headed by Doug Sammons, Mayor of the Village of North Bend. Although representatives of this community were not able to attend the mitigation meetings held in Hamilton County in January of 2013, North Bend documented their community needs and mitigation strategies using the MHMP Mitigation Strategies Survey for Hamilton County. North Bend will continue working cooperatively with Miami Township in this planning process.

Community Overview

The Village of North Bend is located directly on the Ohio River, about 15 miles west of downtown Cincinnati and six miles east of the Ohio/Indiana state line.

Topography

The Village of North Bend is comprised of 1.15 square miles of land and 0.08 square miles of water. North Bend is located in the southwest corner of Hamilton County at an elevation of 574 feet.

Demographics

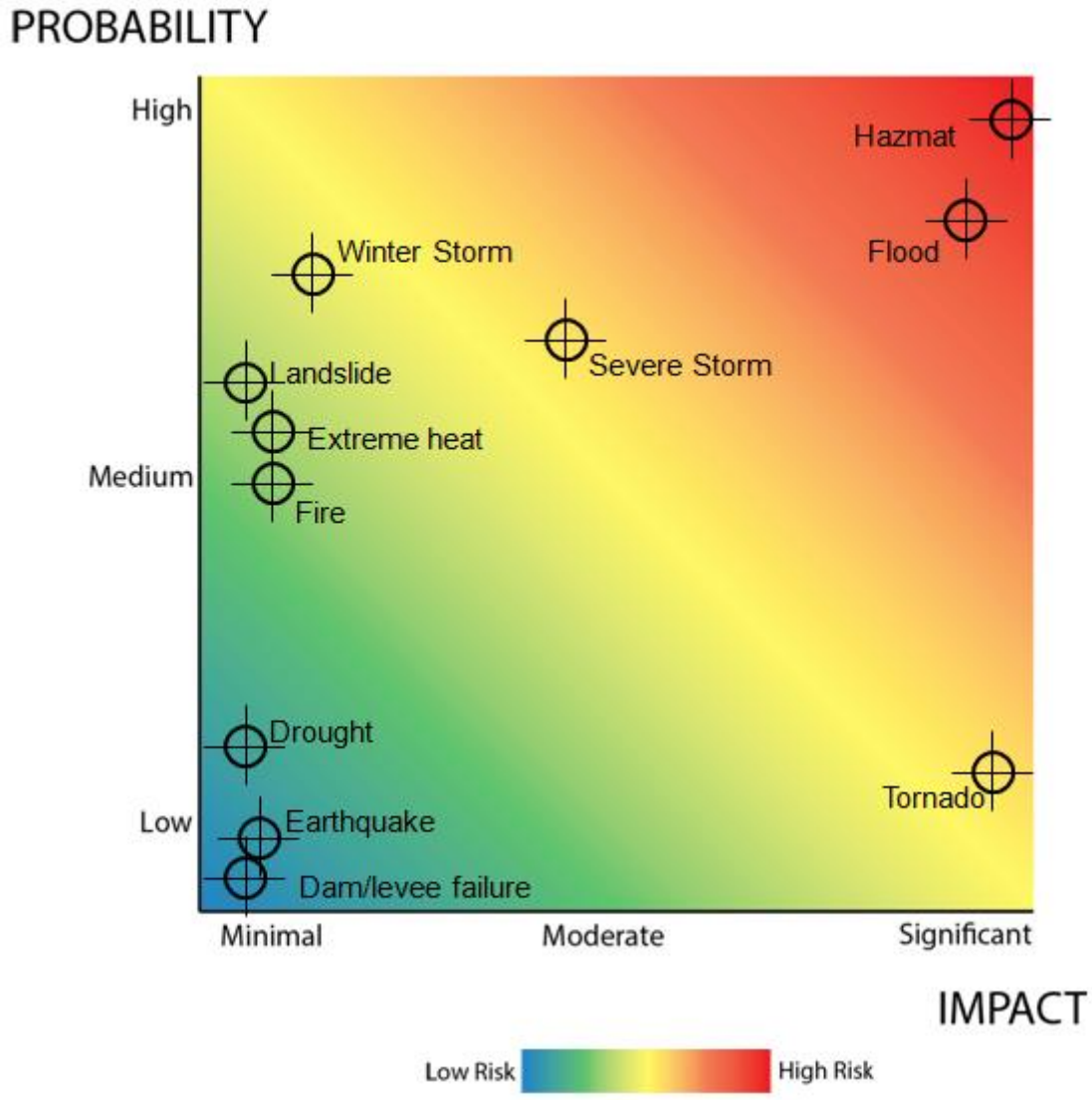
The 2010 Census reports the Village of North Bend population at 857, with 370 households, and 278 families residing in the village. The current population density is 800.9 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 396 households in North Bend. Of these, 380 (96.1%) are primarily English-speaking.

Risk Matrix

The Village of North Bend representatives determined the greatest risk to their community is hazardous materials spills. This community is located on the Three Rivers Parkway (Route 50) which is a truck route for the transportation of hazardous materials.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Procure back-up generators and transfer switches for all critical facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Develop floodplain and storm water ordinances and mapping	Tornado, Severe Winds, Winter Weather, Flood, Flash Flood	2018	2019	County EMA	Local resources
Institute land acquisition/ relocation/structure elevation processes for flood prone properties	Flood	2014	2018	County EMA	FEMA, Local resources
Enhance public education and awareness	All Hazards	2016	Ongoing	Community Planners for North Bend, County EMA	Local resources
Develop a plan for industrial site buffering	Hazmat	2016	2018	County EMA	EPA
Identify evacuation routes	All Hazards	2016	2018	County EMA	Local resources,

NORTH COLLEGE HILL

The planning team for the City of North College Hill is headed by Brian Fels, North College Hills Fire Chief. This mitigation meeting also included representatives from the City of Mt Healthy as these two communities are working cooperatively in this process. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the City of North College Hill.

Name	Agency/Title
Mark Fitzgerald	North College Hill City Manager
Stephen Lawson	Mt Healthy Fire Chief
Bary Lusby	Hamilton County EMA

Community Overview

The City of North College Hill is located about 10 miles north of downtown Cincinnati. With an ideal location in Hamilton County, Ohio, North College Hill is known as 'The Center of it All'.

Topography

The City of North College Hill is comprised of 1.83 square miles of land with no significant water bodies. North College Hill is located in the northern side of Hamilton County at an elevation of 823 feet.

Demographics

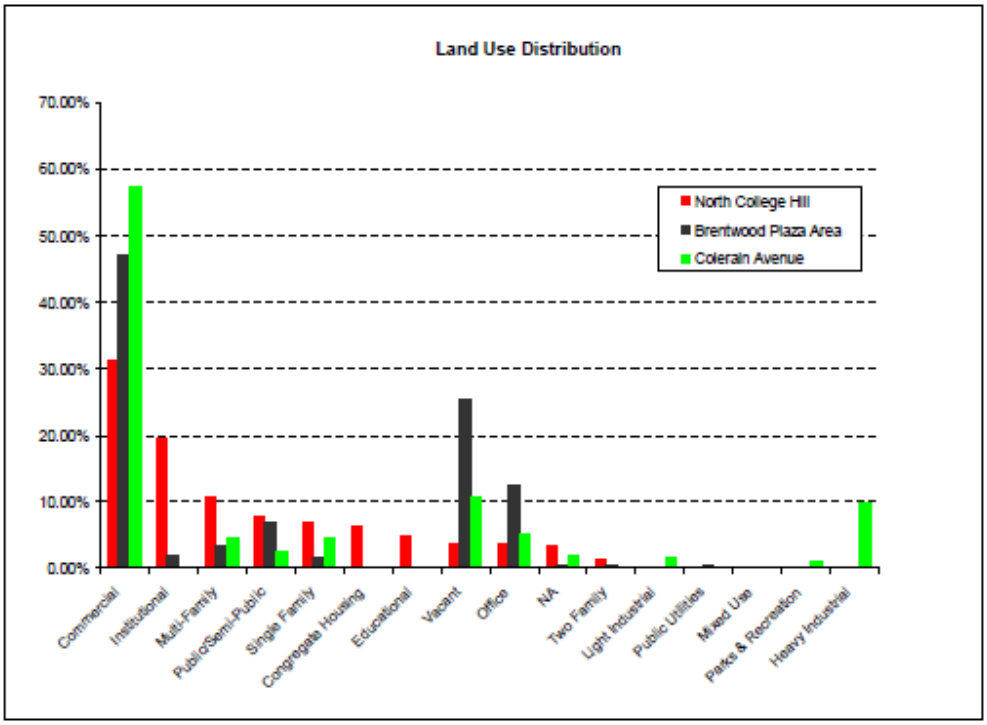
The 2010 Census reports the City of North College Hill population at 9,397, with 3,848 households, and 2,325 families residing in the city. The current population density is 5,135 inhabitants per square mile.

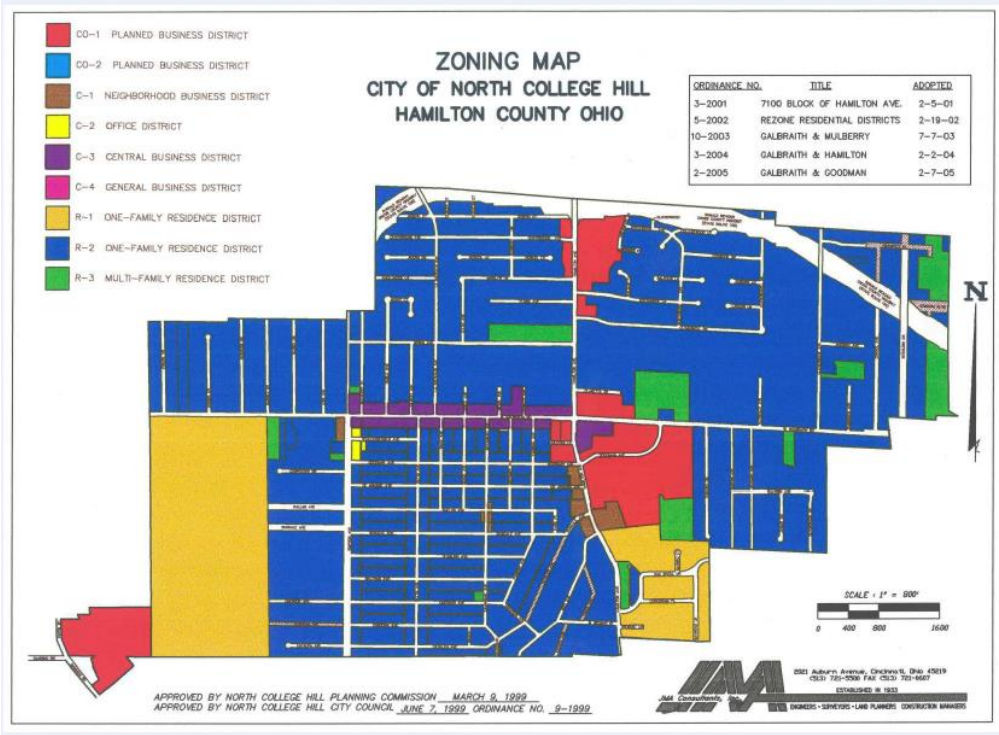
Language

According to the 2011 American Community Survey, there are approximately 4,037 households in North College Hill. Of these, 3,894 (96.5%) are primarily English-speaking. In households where English is not the primary language, 107 (2.7% of the total households) include at least one member 14 years of age or older who speaks English fluently.

Land Use and Zoning

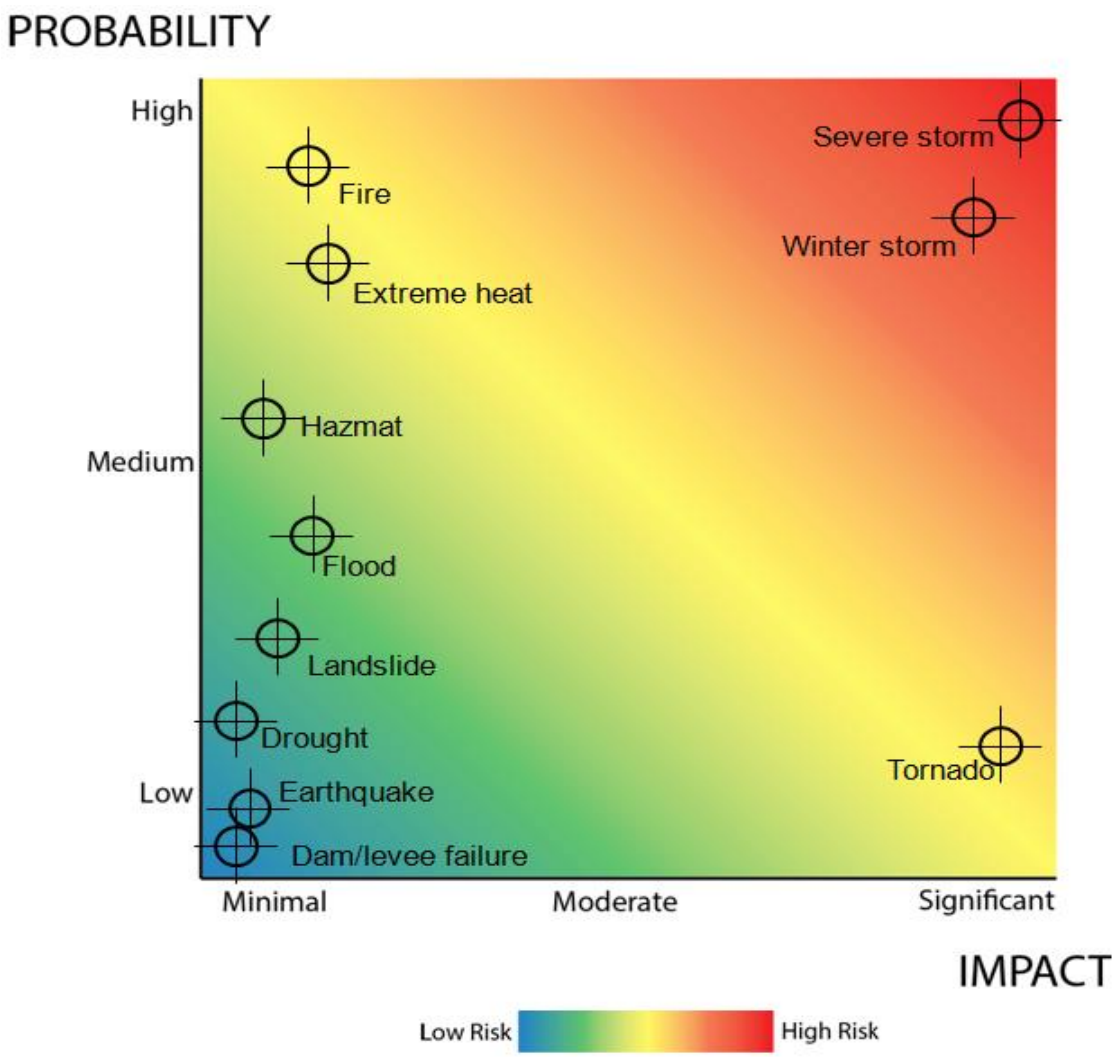
Land use classification in North College Hill is separated into three primary business corridors.





Risk Matrix

The City of North College Hill planning team determined the greatest risks to their community are severe storms and winter storms. Due to lack of water bodies and high elevation the probability of a flood is less likely than those reported for Hamilton County.


PROBABILITY
High
Medium
Low
Minimal
Moderate
Significant
IMPACT
Severe storm
Winter storm
Fire
Extreme heat
Hazmat
Flood
Landslide
Drought
Earthquake
Dam/levee failure
Tornado
Low Risk
High Risk

Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Procure backup generators and transfer switches for fire station, police station and administrative buildings	All Hazards	2014	2015	County EMA	Local resources, FEMA
Acquire and distribute weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Increase and improve snow removal equipment	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA
Increase and improve HazMat training	HazMat	2016	2018	County EMA	Local resources

The Public Works Department also functions as “First Responders” working hand in hand with Fire and Police personnel during emergency operations. The Department is tasked with critical assignments to restore community services in a timely manner.

NORWOOD

The planning team for the City of Norwood is headed by Steven J. Rump, Assistant Fire Chief. Other members of the planning team include representatives from local departments, including public safety, fire, and health. The following table lists Norwood representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Norwood.

Name	Agency/Title
Steven Rump	Norwood Assistant Fire Chief
Joseph Geers	Director of Public Safety, Norwood
Curtis Goodman	Norwood Fire Chief
Ron Wallace	Norwood Fire Department, Captain
Brad King	Norwood Health Commissioner
George Schneider	Norwood Fire Department, Captain
Joshua Berkowski	Law Director, Norwood City Hall
Bary Lusby	Hamilton County EMA

Community Overview

The City of Norwood prides itself on a strategic central location with a diverse economic base. The city is an enclave of Cincinnati and characterized by older homes and tree-lined streets. In 2011 the City of Norwood achieved national recognition for the second year in a row as one of **America's Promise Alliance's** 100 Best Communities for Young People because of their commitment to provide every young person with a healthy start.

Topography

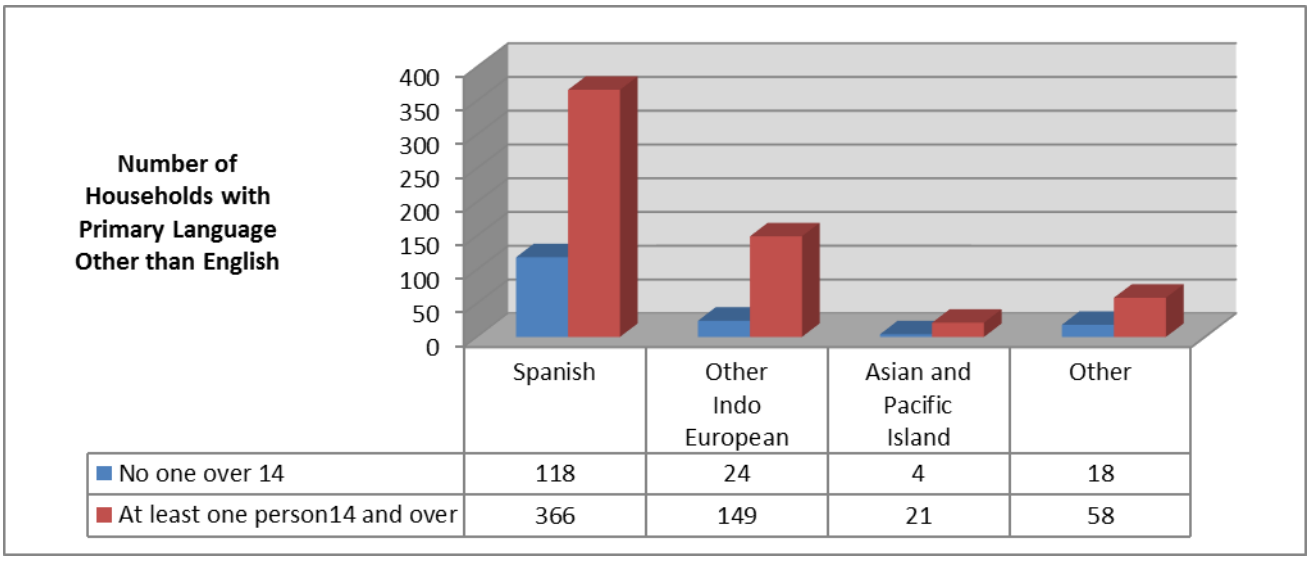
Per the 2010 US Census, Norwood comprises 3.15 sq miles with no significant water bodies. Norwood is located northeast of Cincinnati and situated at an elevation of 656 feet.

Demographics

The U.S. Census reports Norwood as the second most populous city in Hamilton County. The population was 19,207 at the 2010 Census with 8,320 households, and 4,190 families residing in the city. The reported population density is 6,097 inhabitants per square mile.

Language

According to the 2011 American Community Center, there are approximately 8,070 households in Norwood. Of these, 7,312 (90.1%) are primarily English-speaking. In households where English is not the primary language, 594 (7.4% of the total households) include at least one member 14 years of age or older who speaks English fluently. Table X depicts the number of households with a primary language other than English.



	Spanish	Other Indo European	Asian and Pacific Island	Other
No one over 14	118	24	4	18
At least one person14 and over	366	149	21	58

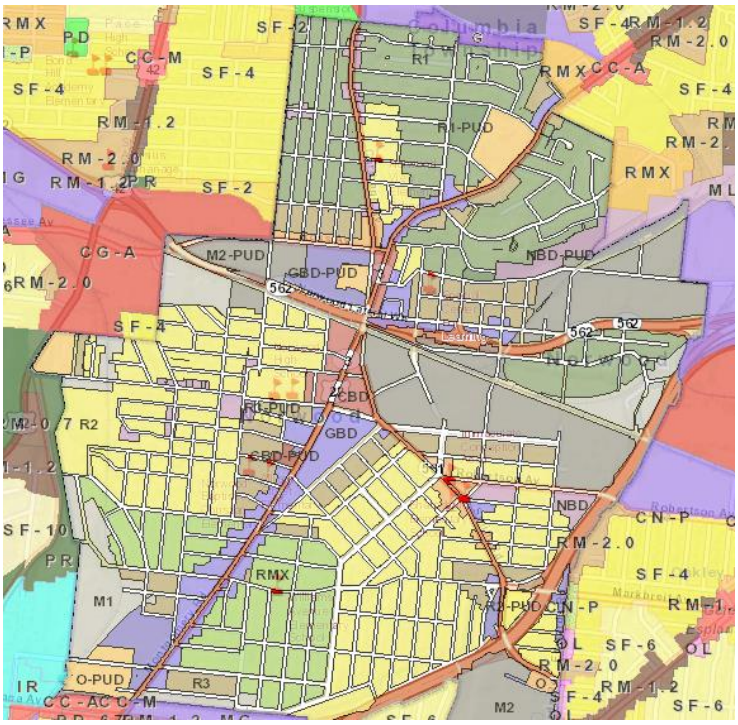
Industry

Since its residential founding in 1888, Norwood has grown into a center for commerce and industry and home for over 800 office, manufacturing, service and retail businesses. The City of Norwood has its own police, fire, and public works departments

Economy

In 1986 General Motors announced the closing of their Norwood, Ohio assembly plant. At the time of its closing the plant employed approximately 4200 workers. That date came to be known in Norwood as "Black Wednesday". The closing of the automotive plant dealt a severe blow to Norwood's economy. Eventually the community was able to recover and the former GM site became the first of several large development projects in the community

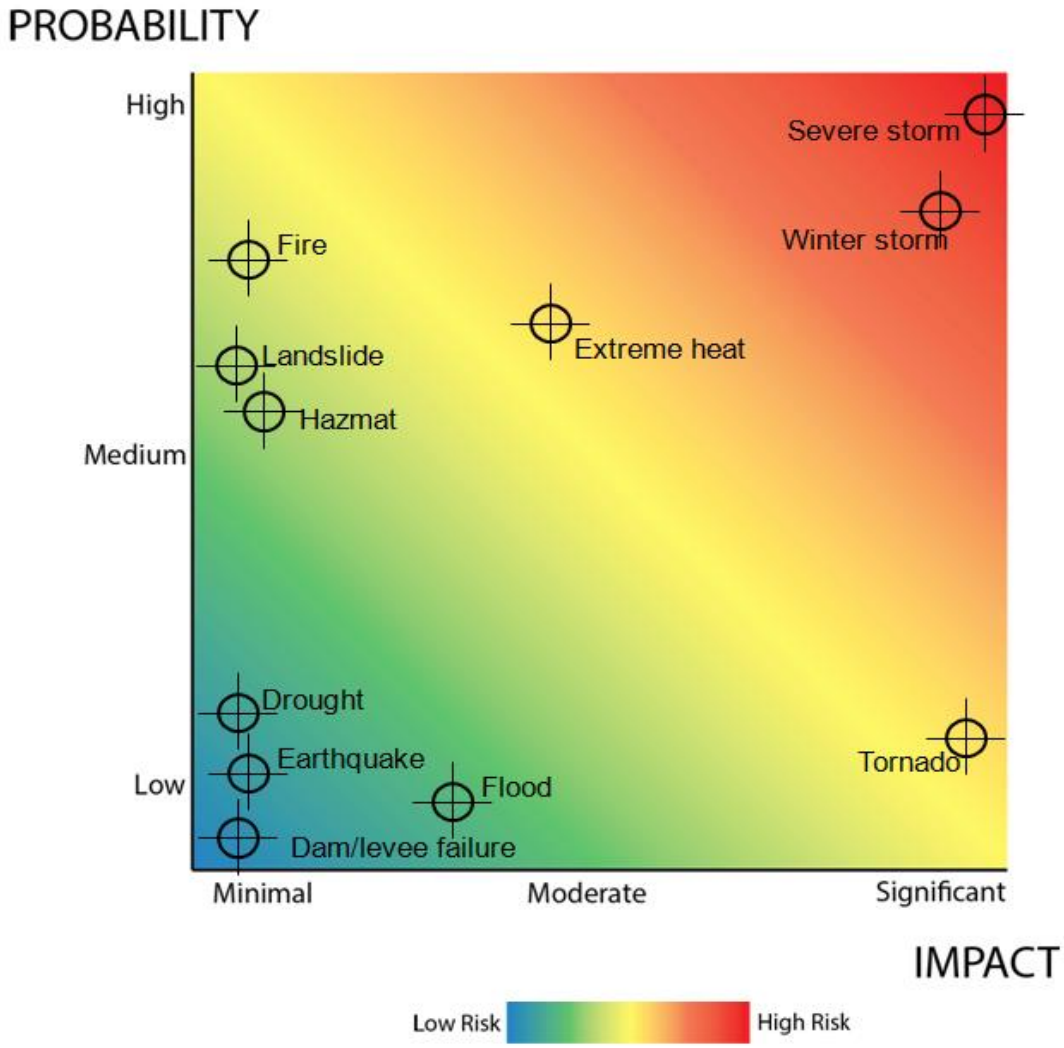
Land Use and Future Development



- Residential - Single Family
- Residential - Multi Family
- Mobile Home Park
- Medium Density Residence – Single Family
- High Density Residence - Multi Family
- Riverfront
- Riverfront Recreation
- Office
- Retail
- Highway Commercial
- Light Industry
- Light Industry
- Heavy Industry
- Heavy Industry
- Extraction
- Solid Waste

Risk Matrix

The Norwood planning team agreed severe storms and strong winds are probable and impactful. Due to the amount of heavy industry and chemical companies located along the highways running throughout this community, the planning team is aware of the potential of a hazardous materials spill. Although the potential impact is not severe, the probability of a fire is high. The planning team readily agreed that flooding was not as significant to their community as to the rest of Hamilton County.

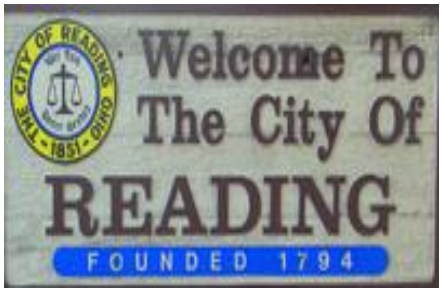


Mitigation Strategies

As an older community with many large trees, power outages are common in high winds when tree limbs fall on power lines. The opportunity to bury power lines would minimize the impact of power outages to this community.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Establish public education programs	All Hazards	2016	Ongoing	Community Planners for Norwood, County EMA	Local resources
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Expand inventory of snow removal equipment	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA
Procure funding for a HazMat truck	HazMat	2016	2018	County EMA	Local resources
Conduct a study to inventory risks and recommend strategies for tree trimming	Tornado, Severe Winds, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Obtain additional smoke detectors for community distribution	Fire	2016	2017	County EMA, Red Cross	Local resources, OCRA
Procure funding to develop/ implement an enhanced communication system.	All Hazards	2016	2018	County EMA	Local resources
Conduct a study to re-engineer rail road crossing at 562 S	HazMat, Winter Weather	2016	2018	County EMA	ODNR, EPA, FEMA
Expand backup generators to include the Norwood Community Center and Senior Center	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2015	County EMA	Local resources, FEMA
Secure funding to reinstate former staffing levels for inspections and public education	Fire, HazMat	2018	2020	Community Planners for Norwood	Local resources
Update /redesign the fire station on Highland Avenue	All Hazards	2014	2018	County EMA	Community Development Grants, HMGP

READING



The planning team for the City of Reading is headed by Kevin Kaiser, Fire Chief for the Reading Fire Department. This mitigation meeting also included representatives from the Village of Arlington Heights as these two communities are working cooperatively in this process. Other members of the planning team include representatives from public works, safety, and fire departments. The following table lists representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Reading.

Name	Agency/Title
Patrick Ross	Reading Safety Service Director
Ken Harper	Arlington Heights Police Chief
Jeff McLemore	Arlington Heights Service Director
Scott Snow	Reading Police Chief
Todd Owens	Reading Fire Department
Terry Zimmerman	Reading Police Department
Ken Wietmarscher	Reading Public Works
Darrell A. Courtney	City of Reading
Kevin Knizner	City of Reading
Robert “Bo” Bemmes	Mayor of Reading
Kevin Kaiser	Reading Fire Chief
Dana Schratt	Hamilton County EMA

Community Overview

Settled in1883, Reading was incorporated as a village on March 24, 1851 and became a city in 1886. Reading is located about 12 miles north of Cincinnati with Mill Creek running along the western border of this community.

Topography

According to the U.S. Census, the City of Reading has a total area of 2.89 square miles, of which all is land with no significant bodies of water. The city is situated at an elevation of 561 feet above sea level.

Demographics

The U.S. Census reports the population of Reading was 10,385 in 2010 with 4,554 households, and 2,624 families residing in the city. The reported population density for Reading is 3,593 residents per square mile.

Language

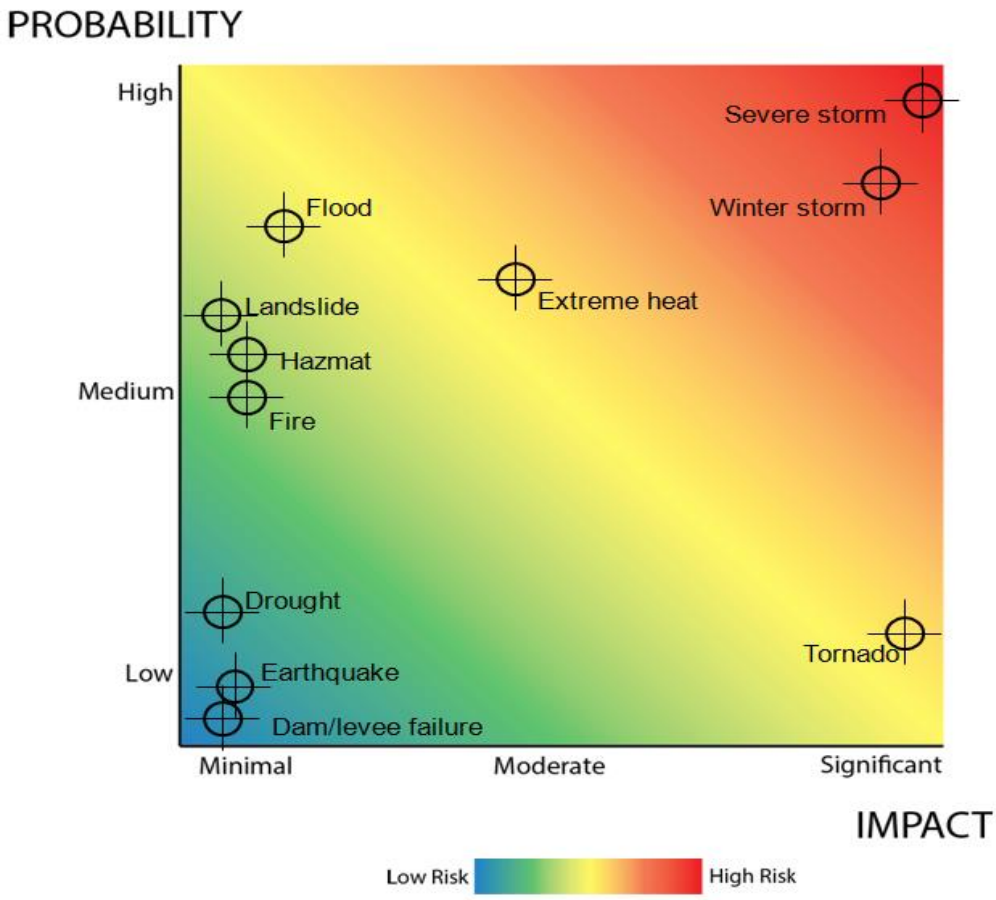
According to the 2011 American Community Survey, there are approximately 4,678 households in Reading. Of these, 4,463 (95.4%) are primarily English-speaking. In households where English is not the primary language, 170 (3.6% of the total households) include at least one member 14 years of age or older who speaks English fluently. It is estimated that 45 households—10 Spanish and 35 Other Indo European—do not have a member 14 years of age or older who speaks English.

Industry

The City of Reading has a mixture of light, medium and heavy industry. Several chemical and pharmaceutical corporations, including Dow, can be found in Reading.

Risk Matrix

The Reading planning team agreed severe storms pose the greatest threat to their community. Along with natural disasters, community leaders are aware that Reading is also exposed to technological hazards, in particular hazardous materials spills. Tornado activity for Reading is higher than the Ohio state average as well as the US average. Although the potential impact is not severe, the probability of a fire is high in Reading. Local leaders are particularly cautious as Reading has a history of damaging fires.



Mitigation Strategies

As an older community with many large trees, power outages are common in high winds when tree limbs fall on power lines. The opportunity to bury power lines would minimize the impact of power outages to this community. The area around the East Fork of Millcreek is considered flood plain and residents are aware they could be at risk.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Update tree trimming ordinances	Tornado, Severe Winds, Winter Weather		On Going		
Identify and equip local shelters with generators and transfer switches	All Hazards	2014	2015	County EMA	Local resources, FEMA
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Institute a buy-out plan for flood prone structures	Flood	2014	2018	County EMA	FEMA, local resources
Procure generators and transfer switches for schools, municipal facilities, and the senior center	All Hazards	2014	2015	County EMA	Local resources, FEMA
Mitigate the erosion issues at Clark Road	Landslide, Earthquake, Severe Storms, Flood, Flash Flood	2016	2018	County EMA	Community Development Grants, OCRA, FEMA
Improve storm water drainage	Severe Storms, Flood, Flash Flood	2016	2018	County EMA	FEMA
Develop and implement a water conservation plan	Drought, Extreme Heat	2016	2018	County EMA	ODOT, ODNR, FEMA, FHWA, USDA
Trim trees to minimize the amount/duration of power outages	Tornado, Severe Winds, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Enhance snow removal equipment and supplies	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Mitigate the erosion issues at Hunt Road and the fire station	Landslide, Earthquake, Severe Storms, Flood, Flash Flood	2016	2018	County EMA	Community Development Grants, OCRA, FEMA
Conduct a study to address the capacity of Mill Creek	Severe Storms, Flood, Flash Flood	2018	2021	County EMA	FEMA, OCRA
Develop and implement safety education for residents and businesses using natural gas	Earthquake, Flood, Tornado	2016	Ongoing	County EMA	ODNR, FEMA

SHARONVILLE

The planning team for the City of Sharonville is headed by Ralph Hammonds, Sharonville Fire Chief. Other members of the planning team include representatives from local law enforcement and fire departments. The following table lists the Sharonville representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Sharonville.

Name	Agency/Title
Michael Schappa	Sharonville Chief of Police (retired)
Ralph Hammonds	Sharonville Fire Department
Ted J Mack	City of Sharonville
Mark W Precuss	Sharonville Police
John A Cook	Sharonville Police
Dana Schratt	Hamilton County EMA

Community Overview

Sharonville was became an incorporated village in 1911, and obtained city status in 1962 being located in both Hamilton and Butler counties. Today Sharonville is known as the "City of Progress".

Topography

Sharonville is located in northeastern Hamilton County and has a total area of 9.89 square miles, of which 9.83 square miles is land and .06 square mile is water. This community sits at an elevation of 584 feet.

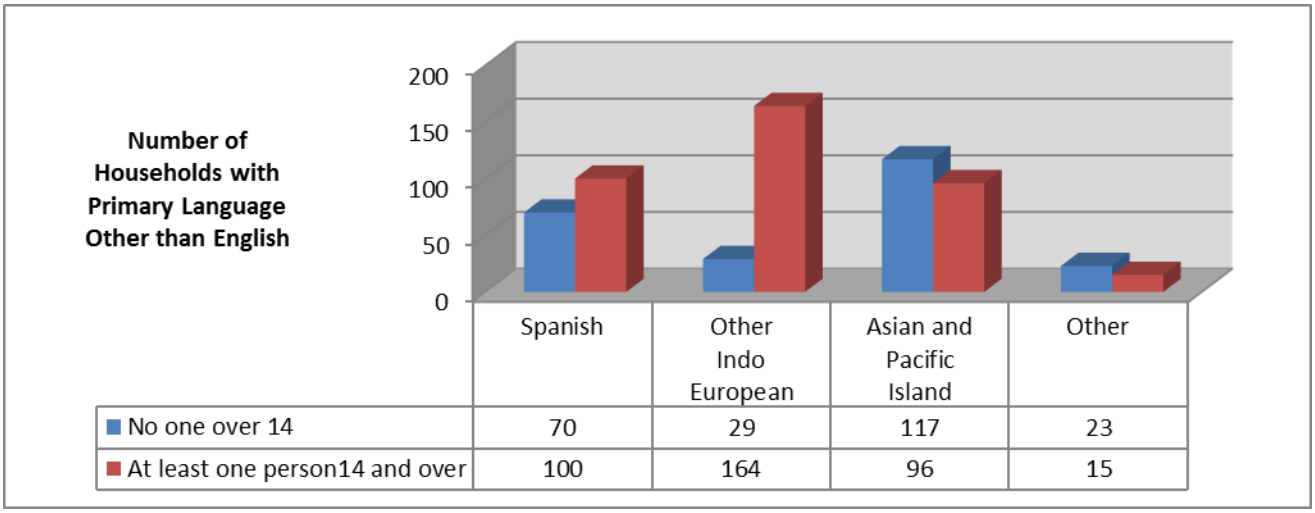
Demographics

The 2010 Census reports the Sharonville population at 13,560, 6,187 households, and 3,429 families residing in the city. The reported population density was 1,379.5 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 5,233 households in Sharonville. Of these, 4,619 (88.3%) are primarily English-speaking. In households where English is not the primary language, 375 (7.2% of the total households) include at least one member 14 years of age or

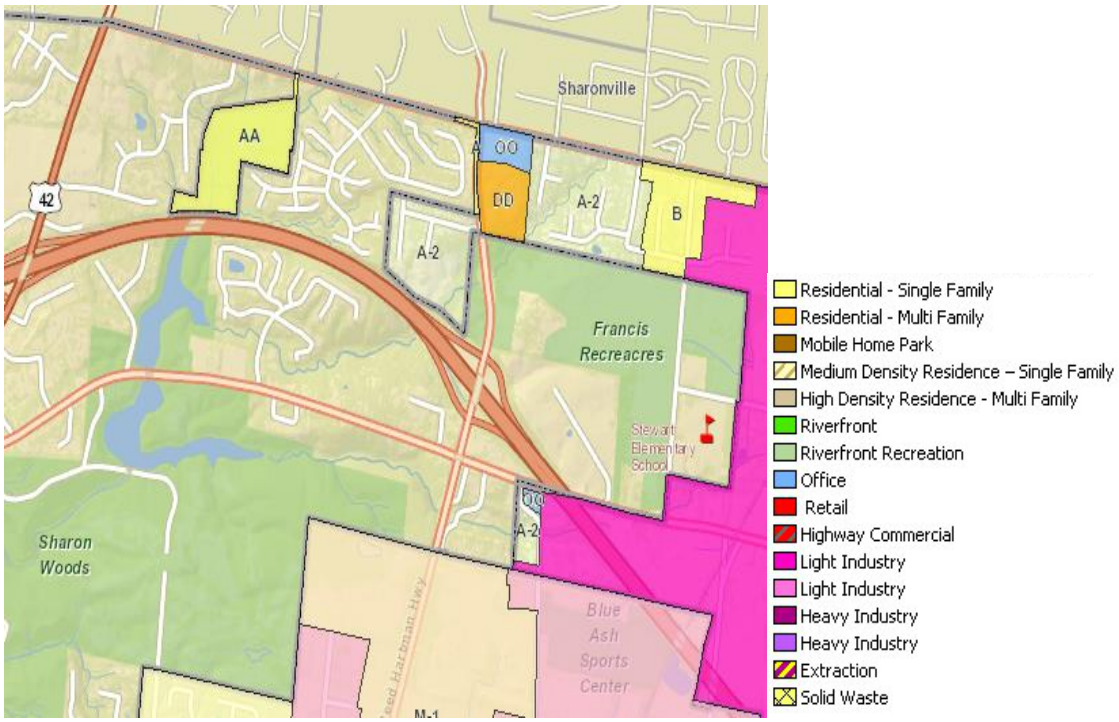
older who speaks English fluently. The following figure depicts the number of households with a primary language other than English.



Economy and Industry

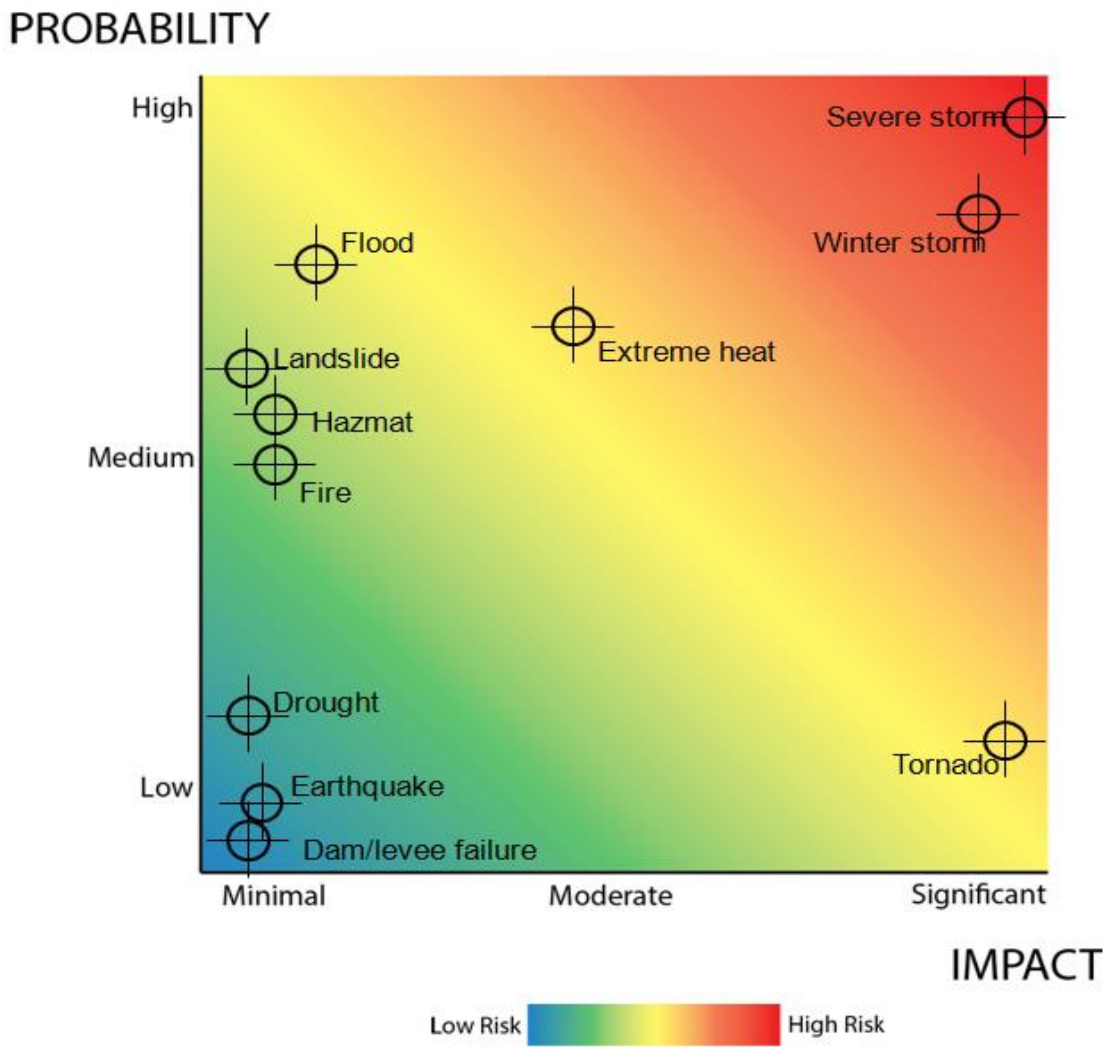
Since 1872 when the first railroad came to town, Sharonville has used its' strategic location to become a vibrant industrial environment. The 1,200 businesses in this community include numerous trucking companies, twenty office buildings, the Sharonville Convention Center, and Sharonville Transmissions. While Sharonville's residential population is almost 14,000, there are 37,000 workers that commute here for employment.

Land Use and Zoning



Risk Matrix

The Sharonville planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Institute emergency notification system Code Red	All Hazards			Completed	
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Procure backup generators/transfer switches for municipal buildings	All Hazards	2014	2015	County EMA	Local resources, FEMA
Enhance the public works communication system	Severe Storms, Winter Storms, Tornado	2016	2018	County EMA	Local resources
Conduct a study to address 'large scale gridlock/chaos' resulting from power outages	Severe Storms, Winter Storms, Tornado	2018	2020	Community Leaders of Sharonville	FEMA
Improve inventory of winter weather equipment	Winter Storms	2016	2018	County EMA	FEMA, ODOT, USDOT, FHWA
Elevate the railroad tracks through the city	HazMat, Flood	2016	2018	County EMA	FEMA, ODOT

SILVERTON

The planning team for the City of Silverton is headed by Michael J. Berens, Safety – Service Director for the City of Deer Park. This meeting included representatives from both Silverton and Deer Park as these two communities are working cooperatively in this mitigation process. Other members of the planning team include representatives from local public service and public safety. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Silverton.

Name	Agency/Title
Michael Berens	Deer Park Safety – Service Director
Denny Meador, Jr.	Deer Park Silverton Joint Fire District
Mike Schlie	Deer Park Police
Chris Brinkman	Deer Park Service
Rick Lehmkuhl	Silverton Public Works
CJ Kim	University of Cincinnati
Dana Schratt	Hamilton County EMA

Community Overview

The City of Silverton is located in Hamilton County, Ohio about ten miles northeast of Cincinnati along Interstate 71. Silverton was formed from parts of Sycamore and Columbia townships and obtained the status of hamlet in 1884. By 1904 it became an incorporated village and Silverton became a city in 1961.

Topography

Silverton is located in northeastern Hamilton County and has a total area of 1.11 square miles, of which all is land with no significant bodies of water. This community sits at an elevation of 850 feet.

Demographics

The 2010 Census reports the Silverton population at 13,560, 2,404 households, and 1,131 families residing in the city. The reported population density was 4,314 inhabitants per square mile.

Language

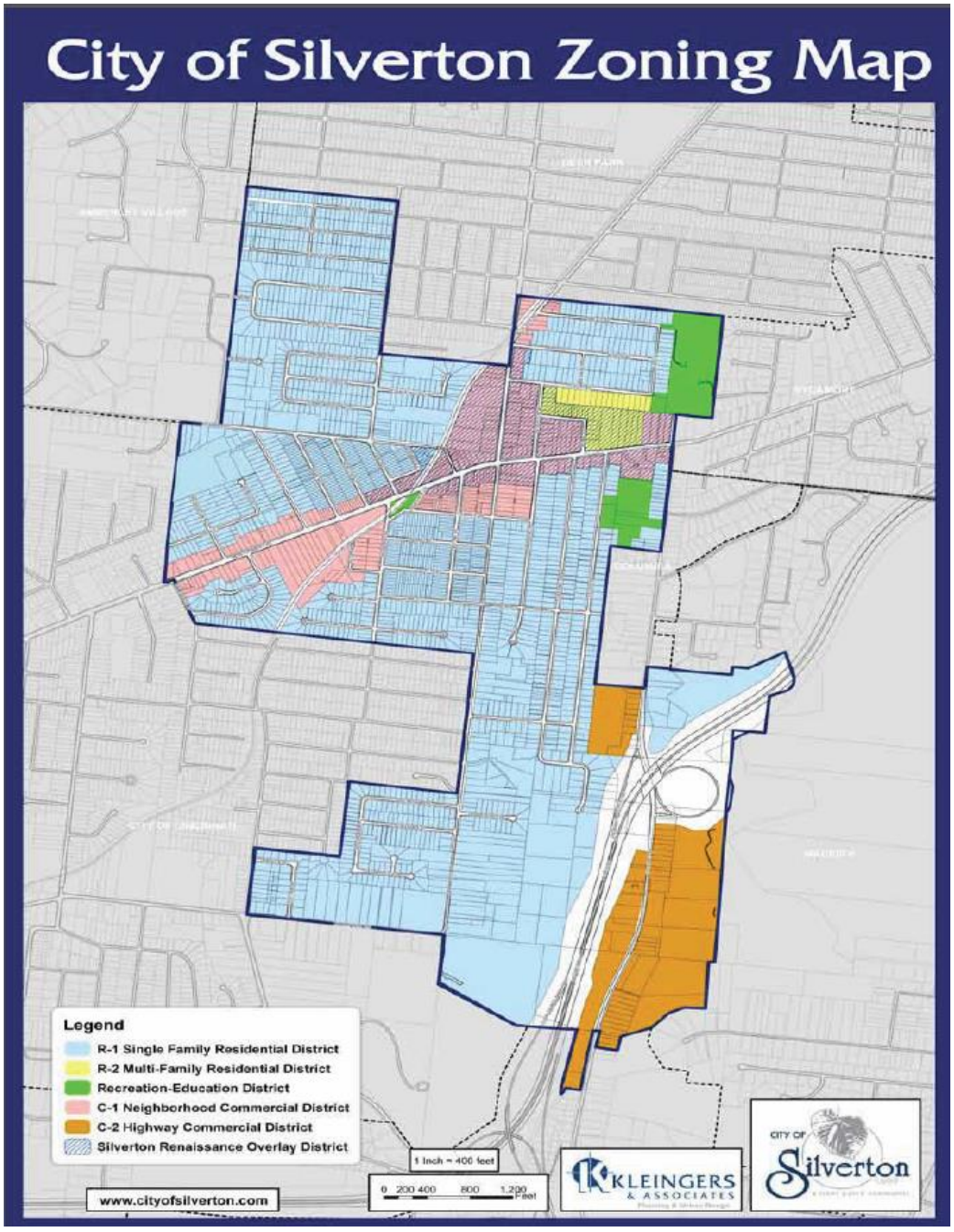
According to the 2011 American Community Survey, there are approximately 2,300 households in Silverton. Of these, 2,174 (94.5%) are primarily English-speaking. In households where English is not the primary language, 86 (3.7% of the total households) include at least one member 14 years of age or

older who speaks English fluently. It is estimated that 41 households do not have a member 14 years of age or older who speaks English—all of which are Spanish-speaking.

Economy and Industry

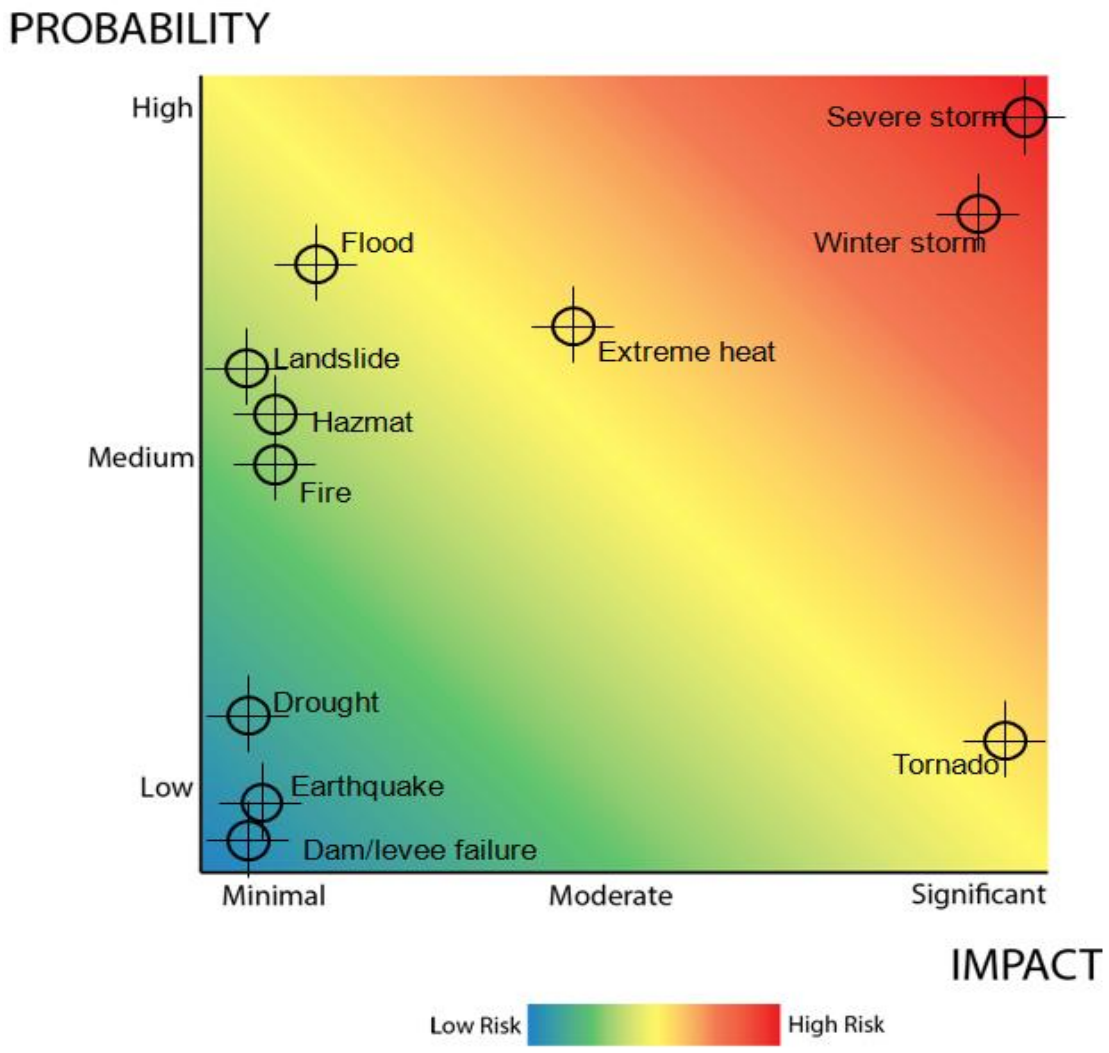
In 1883 a railroad line connected Silverton to downtown Cincinnati. This enabled residents to commute to jobs and provided an alternative to life in the city.

Land Use and Future Development



Risk Matrix

The Silverton planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

The community leaders recognize the need for improved sheltering to protect the Silverton residents. Previous shelters have been acquired by the Cincinnati Public Schools.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Restructure the intersection of Plainfield and Montgomery Roads	Severe Storms, Winter Storms	2016	2018	County EMA	Ohio Transportation Improvement Program (TIP).
Improve storm water management	Severe Storms, Flood	2016	2018	County EMA	ODOT, ODNR, FEMA, FHWA
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Procure backup generators/transfer switches for municipal facilities and community centers	All Hazards	2014	2015	County EMA	Local resources, FEMA
Construct new shelters with backup generators	All Hazards	2016	2018	County EMA	FEMA
Develop a public education program to inform residents of potential hazards and emergency plans	All Hazards	2016	Ongoing	Community Planners for Silverton, County EMA	Local resources
Acquire weather radios for municipal facilities	All Hazards	2018	2019	County EMA	FEMA, NOAA
Conduct an engineering study on flood mitigation at Stewart Road and US 71	Severe Storms, Flood	2016	2018	County EMA	ODNR, EPA, FEMA
Trim trees to minimize the amount/duration of power outages	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Elevate the railroad tracks	HazMat, Flood	2016	2018	County EMA	FEMA, ODOT

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
through the city					

SPRINGDALE

The planning team for the City of Springdale is headed by Derrick Parham, Springdale City Administrator. Other members of the planning team include representatives from city departments and public safety. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Springdale.

Name	Agency/Title
Derrick Parham	Springdale City Administrator
Michael Hoffman	Springdale Assistant Fire Chief
Michael Mathis	Springdale Police Chief
Greg Karle	Springdale Parks & Recreation Director
Jeffrey Agricola	Springdale Public Works Department
William McErlane	Springdale Building Official
Bary Lusby	Hamilton County EMA

Community Overview

The City of Springdale is located in northern Hamilton County, Ohio. The city is split in half by I-275. The southern half of the community is primarily residential, while the land north of I-275 is commercial.

Topography

Springdale is located in northeastern Hamilton County and has a total area of 4.97 square miles, of which 4.96 square miles is land and just .01 square miles of water. The community sits at an elevation of 738 feet.

Demographics

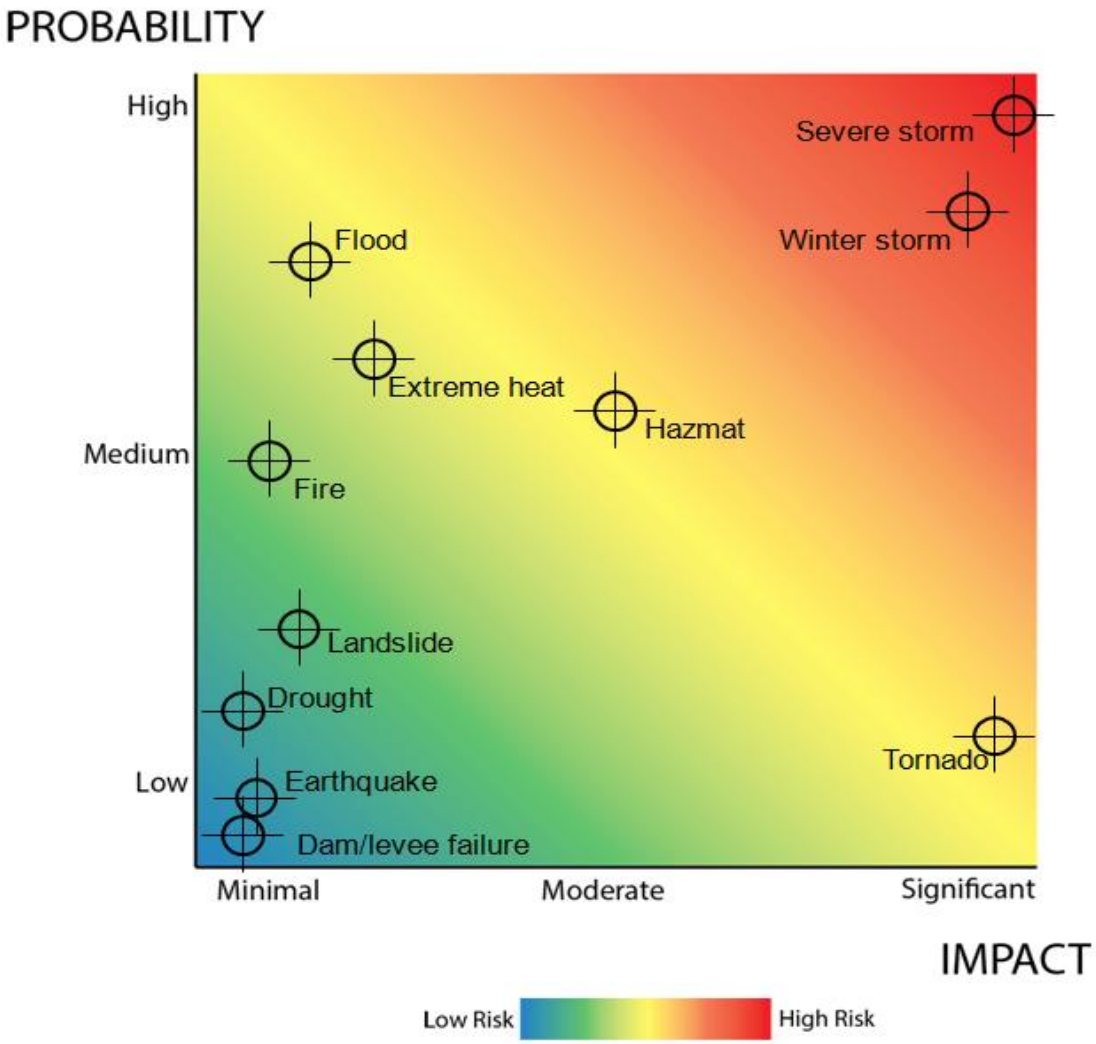
The 2010 Census reports the Springdale population at 11,223 residents, 4,631 households, and 2,771 families residing in the city. The reported population density is 2,263 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 3,882 households in Springdale. Of these, 3,210 (82.7%) are primarily English-speaking. In households where English is not the primary language, 324 (8.3% of the total households) include at least one member 14 years of age or older who speaks English fluently. The remaining 346 households—324 Spanish and 22 Asian and Pacific Island—do not have a member 14 years of age or older who speaks English.

Risk Matrix

The Springdale planning team determined the greatest risks to their community are severe storms and winter weather. Hazardous materials spills are a significant concern due to the numerous well traveled railroad lines and proximity of three major highways.



Mitigation Strategies

The community leaders recognize the need for improved sheltering to protect the Springdale residents in emergency situations.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Mitigation of railroad overpass at SR 747	HazMat , Severe Storms, Winter Storms			Completed	
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Construct new shelters with backup generators	All Hazards	2016	2018	County EMA	FEMA
Conduct an engineering study of the CSX railroad crossing at Crescentville	HazMat	2016	2018	County EMA	ODNR, EPA, FEMA
Develop a public education program to inform residents of potential hazards and emergency plans	All Hazards	2016	Ongoing	Community Planners of Springdale, County EMA	Local resources
Acquire communication radios for Public Works Department	All Hazards	2018	2019	County EMA	FEMA, NOAA
Conduct a study to determine which public buildings gave back-up power	All Hazards	2016	2017	County EMA	Local resources
Conduct community education for those with natural gas	Severe Storms, Winter Storms, Tornado, Earthquake, Fire	2016	Ongoing	County EMA	ODNR, FEMA

SPRINGFIELD TOWNSHIP

The planning team for Springfield Township is headed by Robert Leininger, Springfield Township Fire Chief. Other members of the planning team include representatives from local administrative departments. The following table lists the Springfield Township representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to this township.

Name	Agency/Title
Robert Leininger	Springfield Township Fire Chief
Chris Gilbert	Springfield Township Assistant Administrator
John Musselman	Springfield Township Service Director
Michael Hinnenkamp	Springfield Township Administrator
Ed Frambes	Hamilton County EMA

Community Overview

Springfield Township is one of the twelve townships of Hamilton County, Ohio. It is located in the northern portion of the county. The municipalities of Arlington Heights, Cincinnati, Fairfield, Forest Park, Green Hills, Glendale, Lincoln Heights, Lockland, Mt Healthy, North College Hill, Woodlawn, and Wyoming were all once a part of Springfield Township.

Topography

Springfield Township has a total area of 16.6 square miles, of which 16.4 square miles are land and 0.3 square miles are water. This community sits at an elevation of 715 feet.

Demographics

The 2010 Census reports the Springfield Township population at 36,319, with 14,047 households and 9961 families. The reported population density is 2,200 inhabitants per square mile.

Language

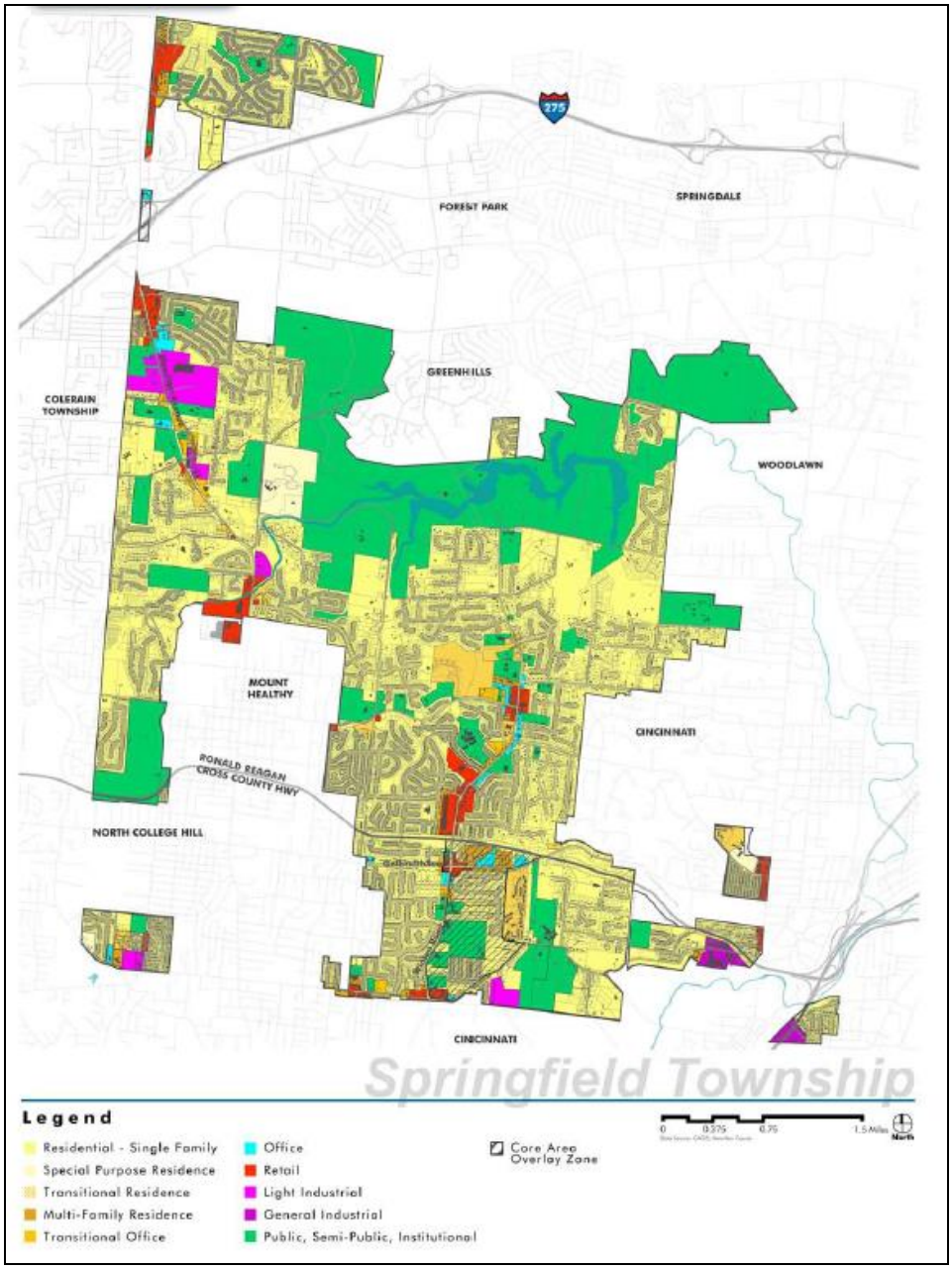
According to the 2011 American Community Survey, there are approximately 13,634 households in Springfield Township. Of these, 13,027 (95.5%) are primarily English-speaking. In households where English is not the primary language, 595 (4.4% of the total households) include at least one member 14 years of age or older who speaks English fluently. It is estimated that only 12 households do not have a member 14 years of age or older who speaks English—all of which speak Other Indo European languages.

Economy

The majority of the land in Springfield Township is residential. Significant employers include Standard Publishing and the Hillman Group.

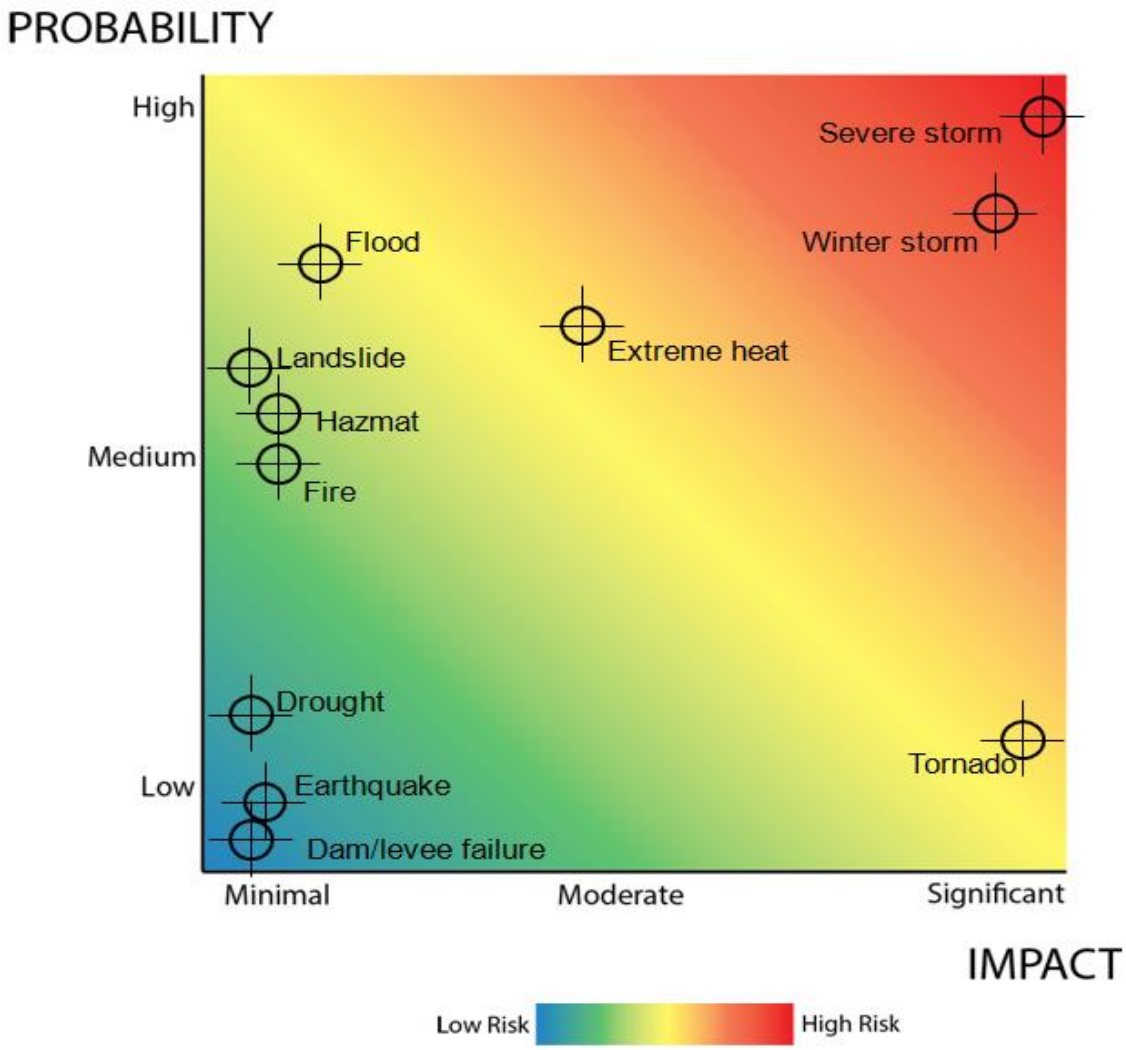
Land Use and Zoning

A predominately residential community, the township encourages preservation of open space. Community leaders have encouraged the development of recreational facilities. Springfield Township is proud of the 18 community parks in the jurisdiction.



Risk Matrix

Consistent with Hamilton County, the planning team recognized severe storms and winter storms as the risks to the community of Springfield Township.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Upgrade existing and install new sirens	All Hazards			Completed	This project was completed countywide in 2012
Obtain back-up generators for nursing homes	All Hazards	2014	2015	County EMA	Local resources, FEMA
Bury power lines	Severe Storms, Winter Storms, Tornado	2014	2016	County EMA	Local and corporate resources
Conduct stream and ditch maintenance	Flood, Landslide, Severe Storms,	2016	2018	County EMA	ODNR, FEMA
Procure additional tree trimming equipment	Severe Storms, Winter Storms, Tornado	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Conduct an engineering study to evaluate stream erosion	Flood, Landslide, Severe Storms,	2016	2018	County EMA	Community Development Grants, OCRA, FEMA
Evaluate the need for home buyouts with subsidence issues.	Flood, Landslide, Severe Storms,	2014	2018	County EMA	FEMA, Local resources
Coordinate volunteer management	All Hazards	2018	2019	Community Leaders of Springfield Township	Local resources

ST. BERNARD

The planning team for the St. Bernard City of St. Bernard is headed by Valerie Van Valkenburg, St. Bernard Safety Director. Other members of the planning team include representatives from local departments, and the Hamilton County Emergency Management. The following table lists St. Bernard representatives involved in the planning process. This process included reviewing strategies to mitigate potential hazards unique to the community of St. Bernard.

Name	Agency/Title
Valerie Van Valkenburg	St. Bernard Safety Director
Don Moeller	St. Bernard Fire Department
Phil Stegman	St. Bernard Service Director
Ed Frambes	Hamilton County EMA

Community Overview

The City of St. Bernard is located in the center of Hamilton County, Ohio. It is considered an enclave and surrounded by the City of Cincinnati.

Topography

According to the U.S. Census, St. Bernard has a total area of 1.56 square miles of which, 1.55 square miles is land and 0.01 square miles is water.

Demographics

The 2010 Census reports the population of St. Bernard is 4,368, with 1,869 households.

Language

According to the 2011 American Community Survey, there are approximately 1,783 households in St. Bernard. Of these, 1,759 (98.7%) are primarily English-speaking. In households where English is not the primary language, 16 (0.01% of the total households) include at least one member 14 years of age or older who speaks English fluently. It is estimated that only 8 households do not have a member 14 years of age or older who speaks English—all of which speak Other Indo European languages.

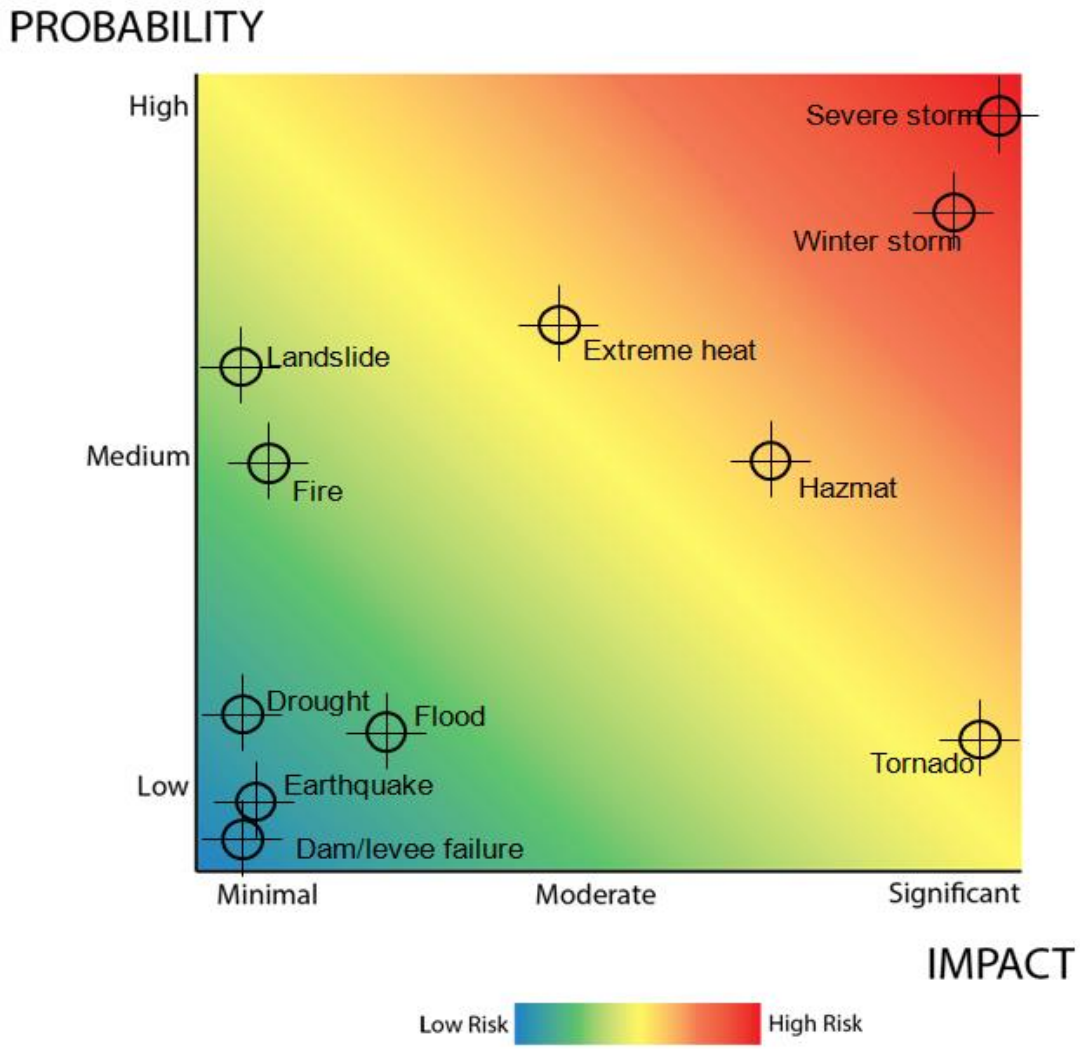
Economy

The community of St. Bernard is comprised of 60% residency, and 40% industry.

Risk Matrix

The planning team recognized hazardous materials spills as the primary hazard for St. Bernard due to the numerous trains running through the community. Although the railroad crossings are gated, there are several areas considered to be 'high crash zones'.

The St. Bernard planning team considers severe storms and strong winds as their secondary concern. Power outages are common in high winds when tree limbs fall on power lines.



Mitigation Strategies

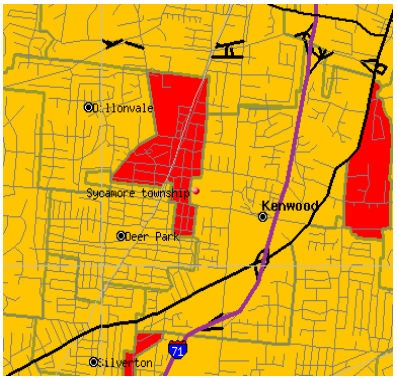
Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Storm sewer upgrade	Flood, Flash Flooding, Landslide			Completed	
Expand inventory of HazMat equipment including SCBAs	HazMat	2016	2018	County EMA	Local resources
Install portable computers in emergency vehicles	All Hazards	2014	2016	St. Bernard Fire or Police Department	Public/private partnership, local resources
Secure additional funding for the construction of a new fire station	All Hazards	2014	2018	County EMA	HMGP or Community Development Grants
Conduct a study to inventory critical facilities with/without generators and transfer switches	All Hazards	2016	2018	County EMA	FEMA, OCRA
Procure transfer switches for critical facilities	All Hazards	2014	2015	County EMA	FEMA, Local resources
Acquire and distribute weather radios	Tornado, Severe Storms, Winter Storm, Flood, Earthquake	2018	2019	County EMA	FEMA, NOAA

The St. Bernard Chief of Police, Steve Moeller, maintains a Continuity of Operation Plan for the community.

SYCAMORE TOWNSHIP

The planning team for Sycamore Township is headed by Rob Penny, Sycamore Township Assistant Fire Chief. Other members of the planning team include representatives from local departments. The following table lists representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Sycamore Township.

Name	Agency/Title
Rob Penny	Sycamore Township Assistant Fire Chief
Bruce Raabe	Sycamore Township Administrator
Perry Gerome	Sycamore Township Fire Department
Dana Schratt	Hamilton County EMA



Community Overview

Sycamore Township is one of the twelve townships of Hamilton County, Ohio. Historically an agricultural area, Sycamore Township developed as a few small communities. As the population grew many of these communities (including Sharonville, Reading, Deer Park, Amberly Village, Blue Ash, Glendale, Montgomery and Evendale) became incorporated cities and withdrew from the township. This has resulted in Sycamore Township being cut into three "islands" by annexations.

Topography

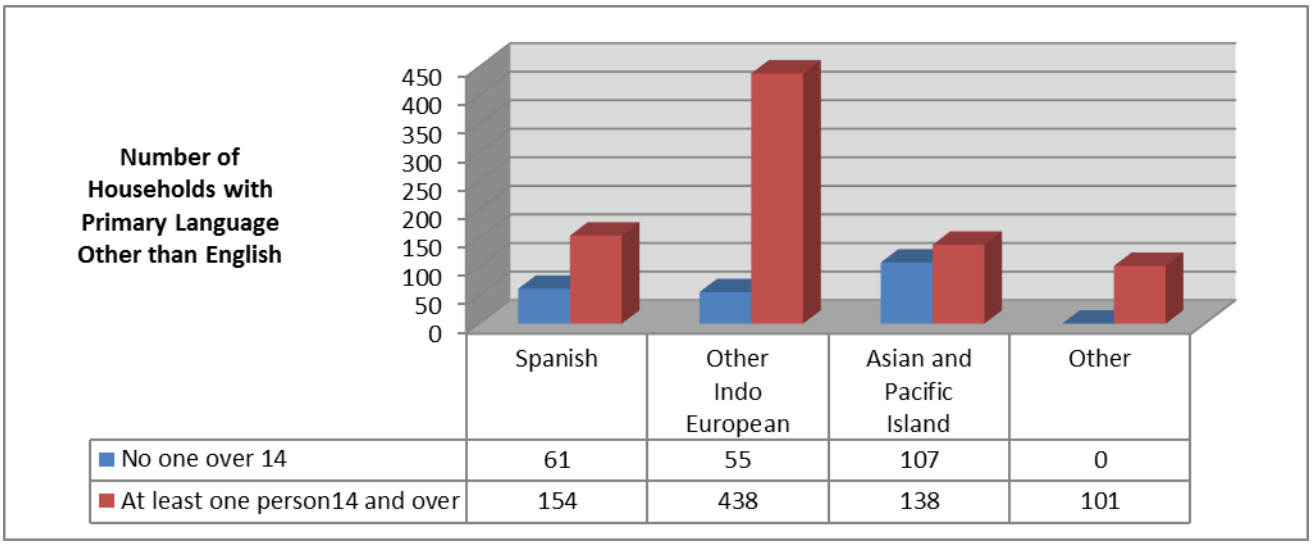
The township is comprised of 6.7 square miles, of which, all is land with no significant water. Sycamore Township is situated at an elevation of 820 feet above sea level.

Demographics

The 2010 Census reports the Sycamore Township population at 19,200, with roughly 8,282 households, and 12,672 families residing in the township. The reported population density was 2,900 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 7,858 households in Sycamore Township. Of these, 6,804 (86.6%) are primarily English-speaking. In households where English is not the primary language, 831 (10.6% of the total households) include at least one member 14 years of age or older who speaks English fluently. The table below depicts the number of households with a primary language other than English.

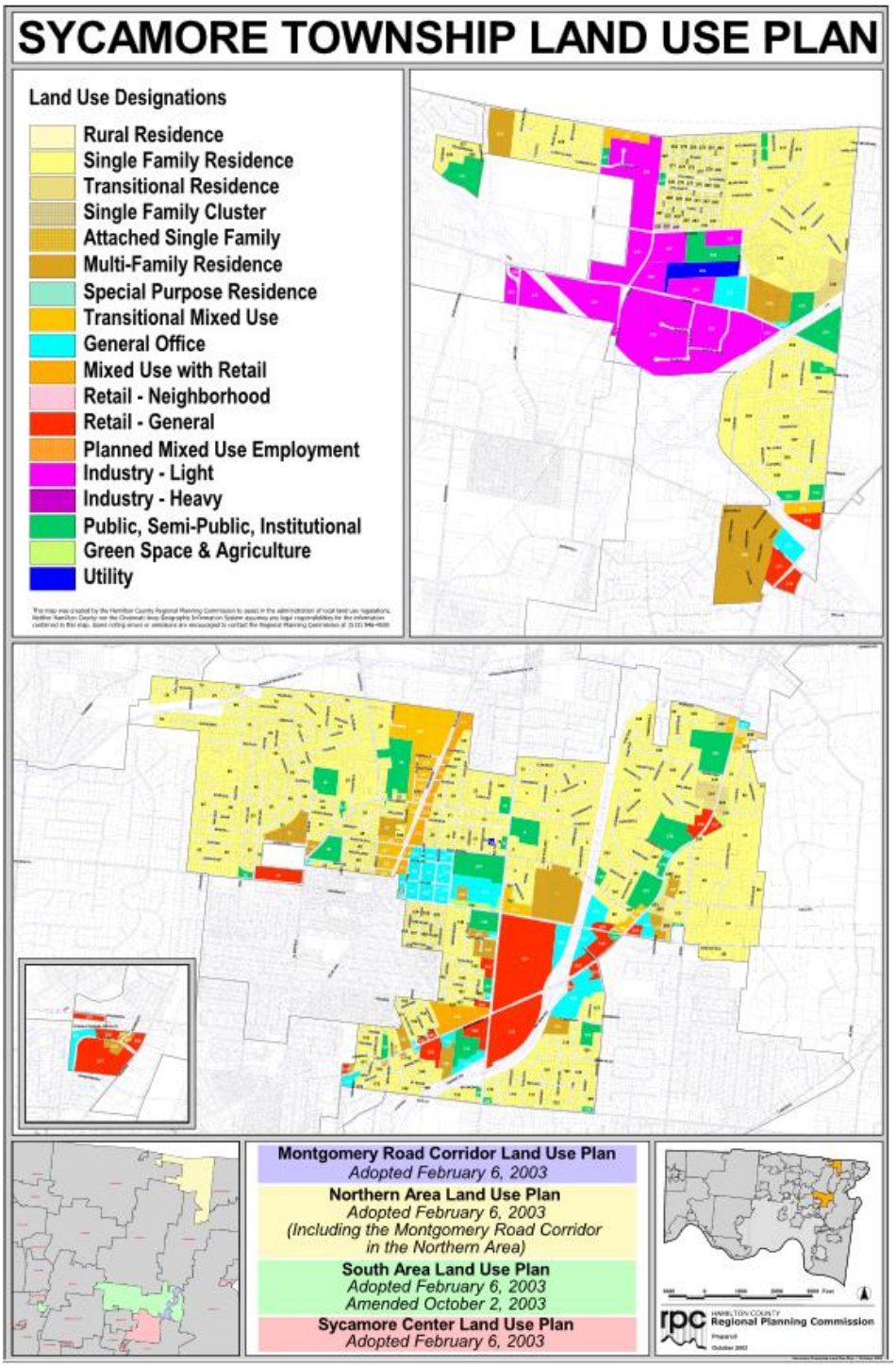


	Spanish	Other Indo European	Asian and Pacific Island	Other
No one over 14	61	55	107	0
At least one person14 and over	154	438	138	101

Economy

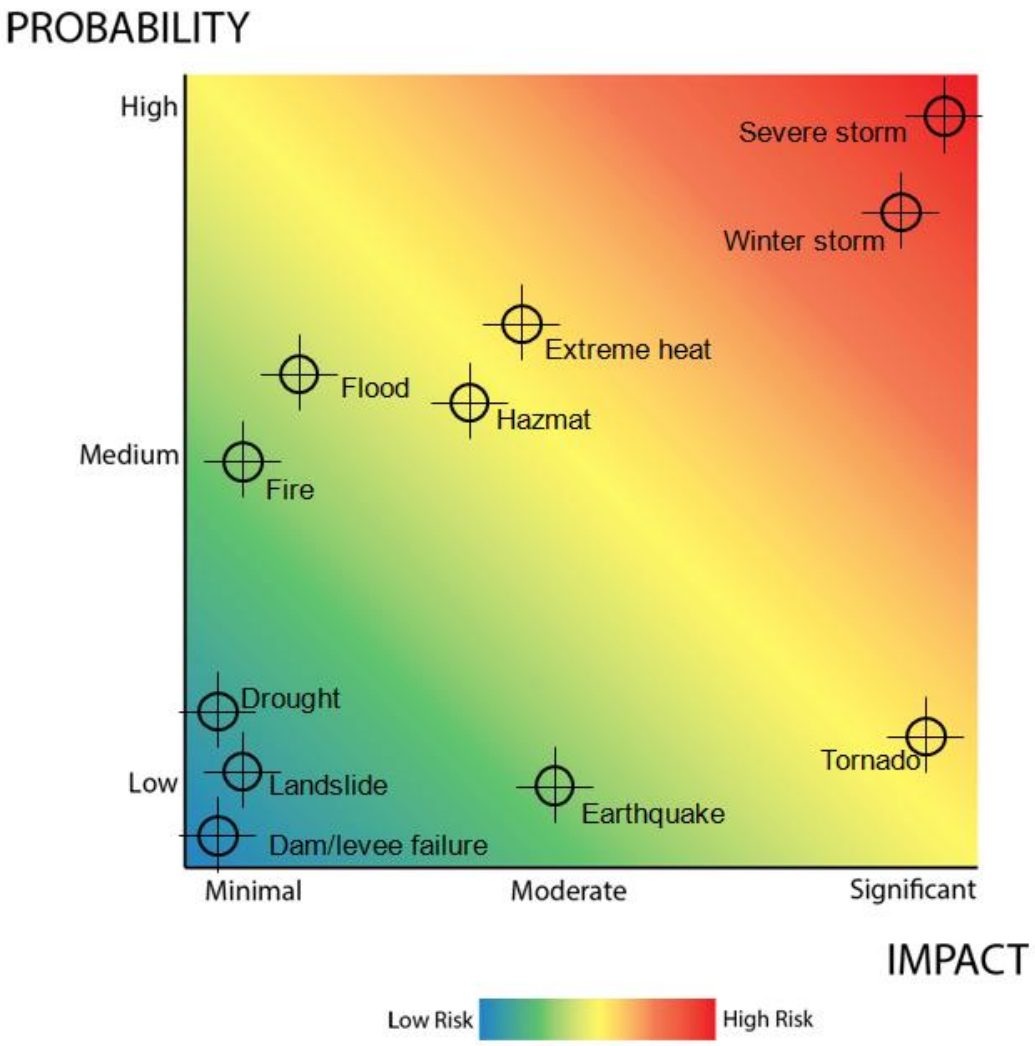
Sycamore Township has recently attracted many national and international company headquarters, with approximately 1,376 businesses located here. Of these, 1,200 are considered large business and corporations with 200 or more employees. The Kenwood area is the primary commercial district of Sycamore Township.

Land Use and Zoning



Risk Matrix

The Sycamore Township planning team determined the greatest risks to their community are storms. Hazardous materials spills are a greater concern to these residents, while landslides, fire and floods appear to be more probable in other communities of Hamilton County.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Bury power lines	Severe Storms, Winter Storms, Tornado	2014	2016	County EMA	Local and corporate resources
Procure backup generators and transfer switches for shelter facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Conduct an engineering study to evaluate the intersection of Cross Country and US 71	Severe Storms, Winter Storms, Flood, HazMat	2018	2020	County EMA	FEMA, ODOT, FHWA
Enhance the current emergency communication system	Severe Storms, Winter Storms, Tornado	2016	2018	County EMA	Local resources
House a county-wide HazMat response unit	HazMat	2018	2020	County EMA	Local resources

SYMMES TOWNSHIP

The planning team for Symmes Township is headed by Brian Elliff, Symmes Township Administrator. Other members of the planning team include representatives from local administrative departments. The following table lists Symmes Township representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to this township.

Name	Agency/Title
Brian Elliff	Symmes Township Administrator
William Turner	Symmes Township Assistant Chief
Andrew Knapp	Northeast Collaberative
Tom Benjamin	Northeast Collaberative
CJ King	University of Cincinnati
Bill Pitman	Symmes Township Director of Public Works
Brad Justice	Symmes Township Deputy Sheriff
Bary Lusby	Hamilton County EMA

Community Overview

Symmes Township is one of the twelve townships of Hamilton County, Ohio. It is located in the northeast corner of the county. Due to the annexation of Loveland, Montgomery, and Indian Hill, Symmes Township is split into two islands.

Topography

Symmes Township has a total area of 8.6 square miles, of which 8.4 square miles are land and 0.2 square miles are water. This community sits at an elevation of 735 feet.

Demographics

The 2010 Census reports the Symmes Township population at 14,683. The reported population density is 1,726 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 5,158 households in Symmes Township. Of these, 4,180 (81.0%) are primarily English-speaking. In households where English

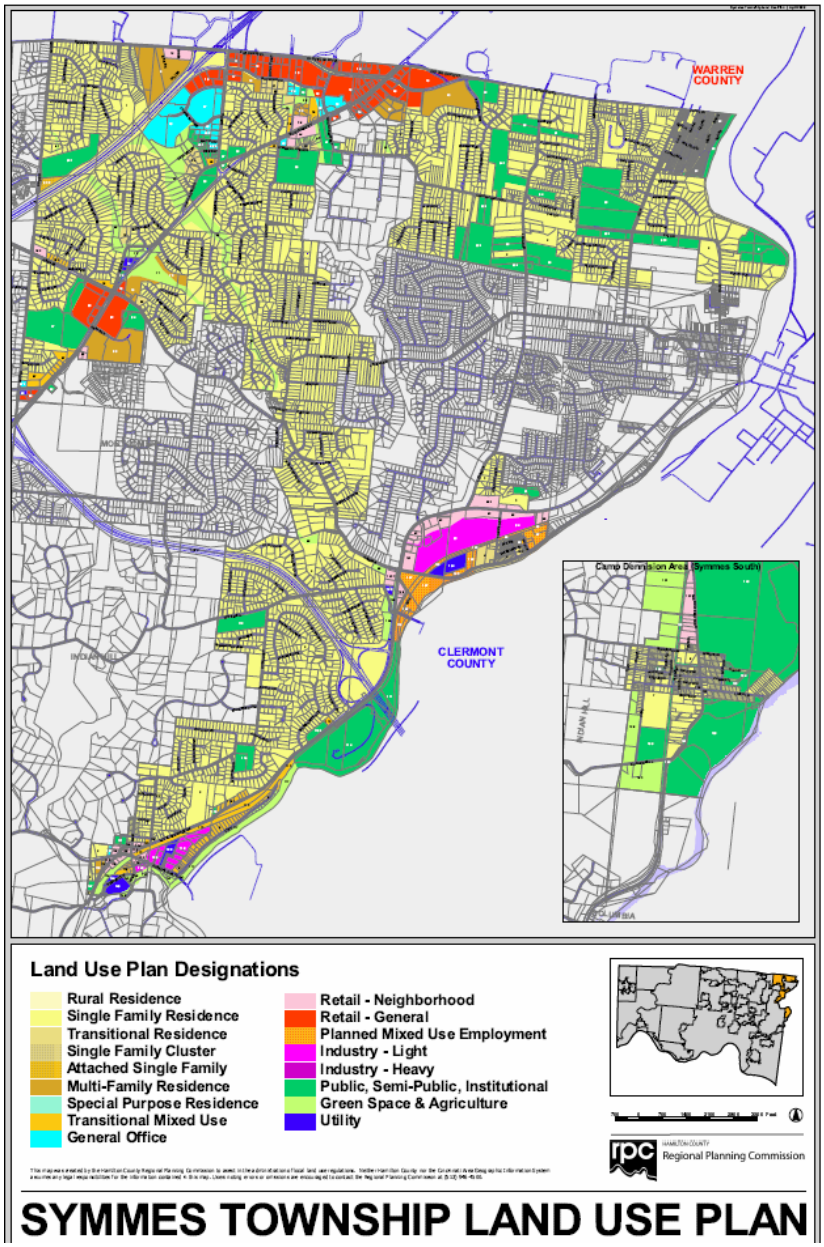
is not the primary language, 765 (14.8% of the total households) include at least one member 14 years of age or older who speaks English fluently.

Economy

The majority of the land in Symmes Township is residential. Significant employers include Standard Publishing and the Hillman Group.

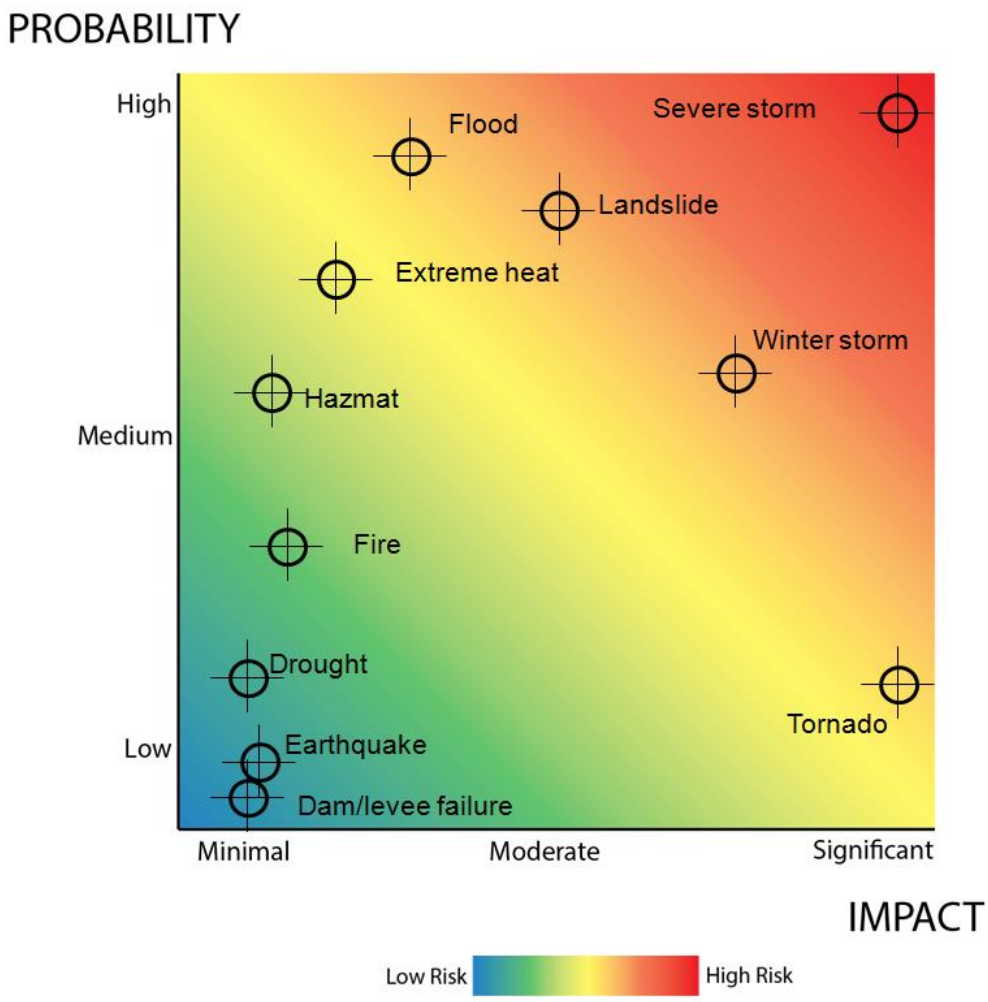
Land Use and Zoning

As the land use map below indicates, Symmes Township is primarily a residential community. A small amount of industry, primarily light industry, is found along the periphery of Symmes Township.



Risk Matrix

The Symmes Township planning team recognized severe storms as the most significant to the community. They also determined a flood or a hazardous material spill would have a greater impact to their community than Hamilton County.


PROBABILITY
High
Medium
Low
Flood
Severe storm
Landslide
Extreme heat
Winter storm
Hazmat
Fire
Drought
Tornado
Earthquake
Dam/levee failure
Minimal
Moderate
Significant
IMPACT
Low Risk
High Risk

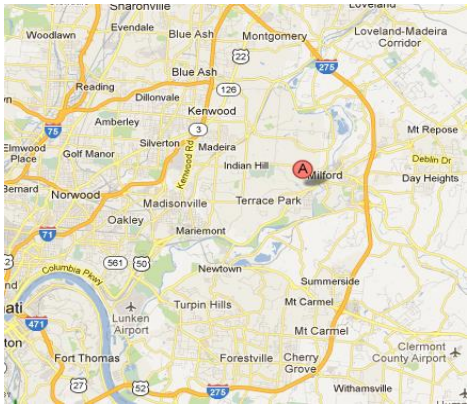
Mitigation Strategies

Although additional shelters would be beneficial to Symmes Township, the local administrators are hesitant due to liability issues.

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Develop a public education program to inform residents of potential hazards and emergency plans	All Hazards	2016	Ongoing	Community Planners for Symmes Township, County EMA	Local resources
Obtain an improved communication system	All Hazards	2016	2018	County EMA	Local resources
Re-engineer high hazard intersections	HazMat	2018	2020	County EMA	FEMA, ODOT, FHWA
Obtain back-up generators for critical facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Bury power lines	Severe Storms, Winter Storms, Tornado	2014	2016	County EMA	Local and corporate resources
Incorporate landslide mapping	Flood, Landslide, Severe Storms,	2016	2018	County EMA	Community Development Grants, OCRA, FEMA

TERRACE PARK

The planning team for the Village of Terrace Park is headed by Gerald Hayhow, Police Chief for the Village of Terrace Park. Members of this planning committee were actively involved in reviewing strategies appropriate to the community. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the Village of Terrace Park.



Name	Agency/Title
Gerald Hayhow	Terrace Park Police Chief
Stefan Olson	Terrace Park Council (Safety)
John Hester	Terrace Park Building Department
L.B. Frey	Terrace Park Fire Chief
Shawn McBreen	Newtown Police Department
Dana Schratt	Hamilton County EMA

Community Overview

The Village of Terrace Park is located in the eastern side of Hamilton County. Terrace Park was originally settles as an independent agricultural community as no roads or railroads connected it to other settlements

Topography

The Village of Terrace Park n is comprised of 1.22 square miles, with 1.7 square miles of land and .05 square miles of water. This community is located at an elevation of 561 feet.

Demographics

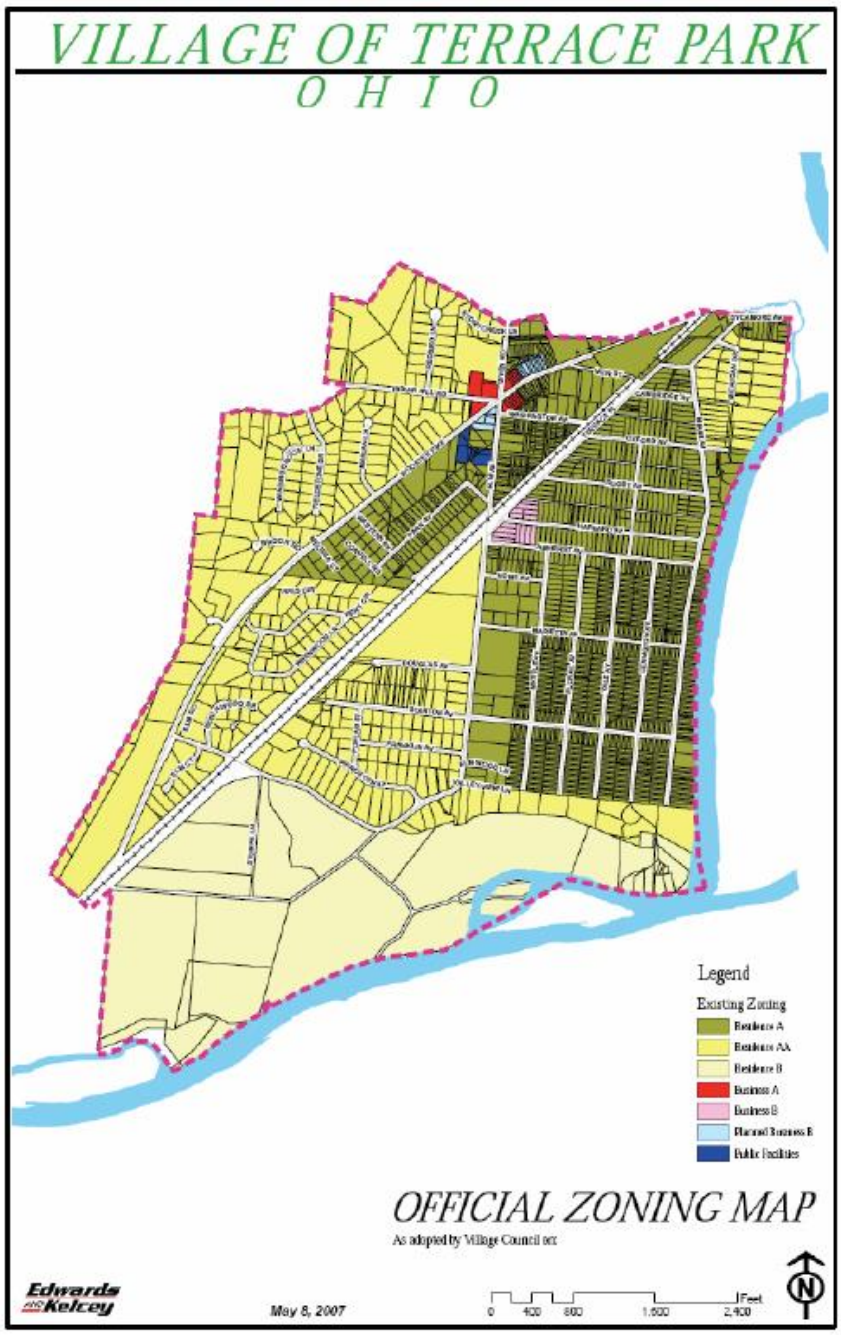
The 2010 Census reports the Village of Terrace Park population at 2,251, with 758 households, and 615 families residing in the community. The current population density is 1,923 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 780 households in Terrace Park. Of these, 728 (93.3%) are primarily English-speaking. The remaining 52 households each include at least one member 14 years of age or older who speaks English fluently.

Land Use and Future Development

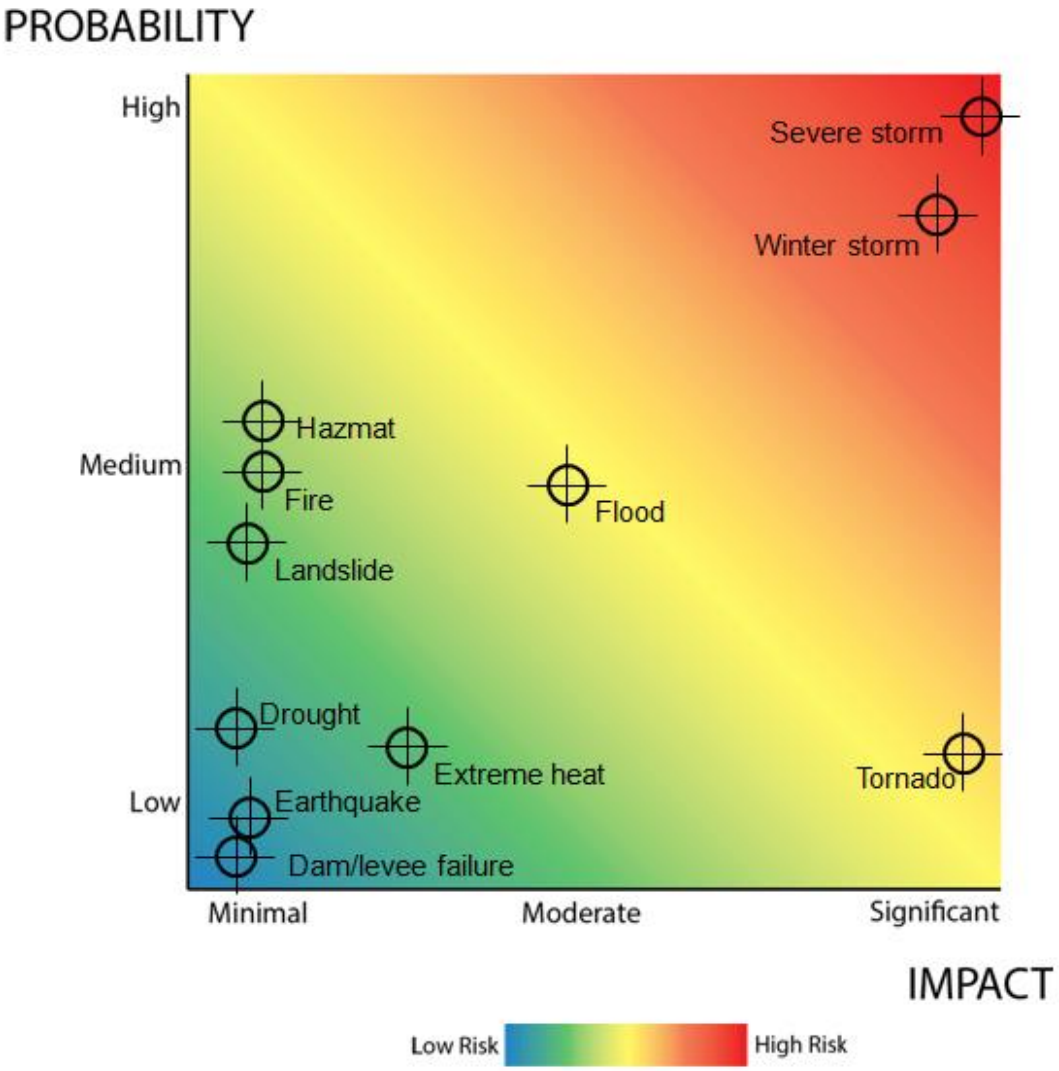
Terrace Park has developed a cultural of urban forestry dating back to the 1890's. The community leaders of Terrace Park recognize the value of trees to a community and are proud of their status as a Tree City USA.



Source: http://www.terracepark.org/village/docs/Zoning_Code_2011-Oct.pdf

Risk Matrix

The Village of Terrace Park determined that severe storms and winter storms to pose the greatest risk to their community. Due to the location of this community, the probability of flooding and landslides is less significant to Terrace Park than to most other jurisdictions of Hamilton County.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Procure back-up generators and transfer switches for all critical facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Acquire and distribute NOAA weather radios for all critical facilities	Tornado, Severe Winds, Winter Weather, Flood, Flash Flood, Earthquake	2018	2019	County EMA	FEMA, NOAA
Bury power lines	Tornado, Earthquake, Thunderstorm, Winter Storm	2014	2016	County EMA	Local and corporate resources
Enhance the communication system	All Hazards	2016	2018	County EMA	Local resources
Develop a mutual aid agreement with Miami Valley Christian Academy for emergency sheltering	All Hazards	2016	2017	County EMA, Community Leaders of Terrace Park	Local resources
Develop an agreement with other communities within Hamilton County to combine emergency training efforts	All Hazards	2016	2017	County EMA, Community Leaders of Terrace Park	Local resources

THE VILLAGE OF INDIAN HILL

The planning team for the Village of Indian Hill is headed by Chuck Schlie, The Village of Indian Hill Police Chief. This meeting included representatives from both The Village of Indian Hill and Madeira as these two communities are working cooperatively in this mitigation process. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the City of Indian Hill.

Name	Agency/Title
Dina Minneci	Madeira City Manager
Mark Tullis	The Village of Indian Hill Mayor
Steve Ashbrook	Madeira and Indian Hill Joint Fire Department
Chuck Schlie	The Village of Indian Hill Police Chief
Dana Schratt	Hamilton County EMA

Community Overview

The Village of Indian Hill is technically a city. Since being incorporated as a village in 1941, community leaders have been committed to maintaining the rural quality of Indian Hill. In 1970 the population exceeded 5,000. Under Ohio law, this designated the community as a city. The official name is “"The City of The Village of Indian Hill".

Topography

The Village of Indian Hill is comprised of 19.5 square miles, with 19.4 square miles of land and 0.10 square miles of water. Indian Hills is located in the eastern side of Hamilton County at an elevation of 561 feet and 881 feet. The area contains multiple ravines and creeks and is comprised of hilly, wooded terrain.

Demographics

The 2010 Census reports the Village of Indian Hill population at 5,785, with 2,061 households, and 1,768 families residing in the city. The current population density is 312 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 2,022 households in The Village of Indian Hill. Of these, 1,761 (87.1%) are primarily English-speaking. The remaining 261 households each include at least one member 14 years of age or older who speaks English fluently.

Industry

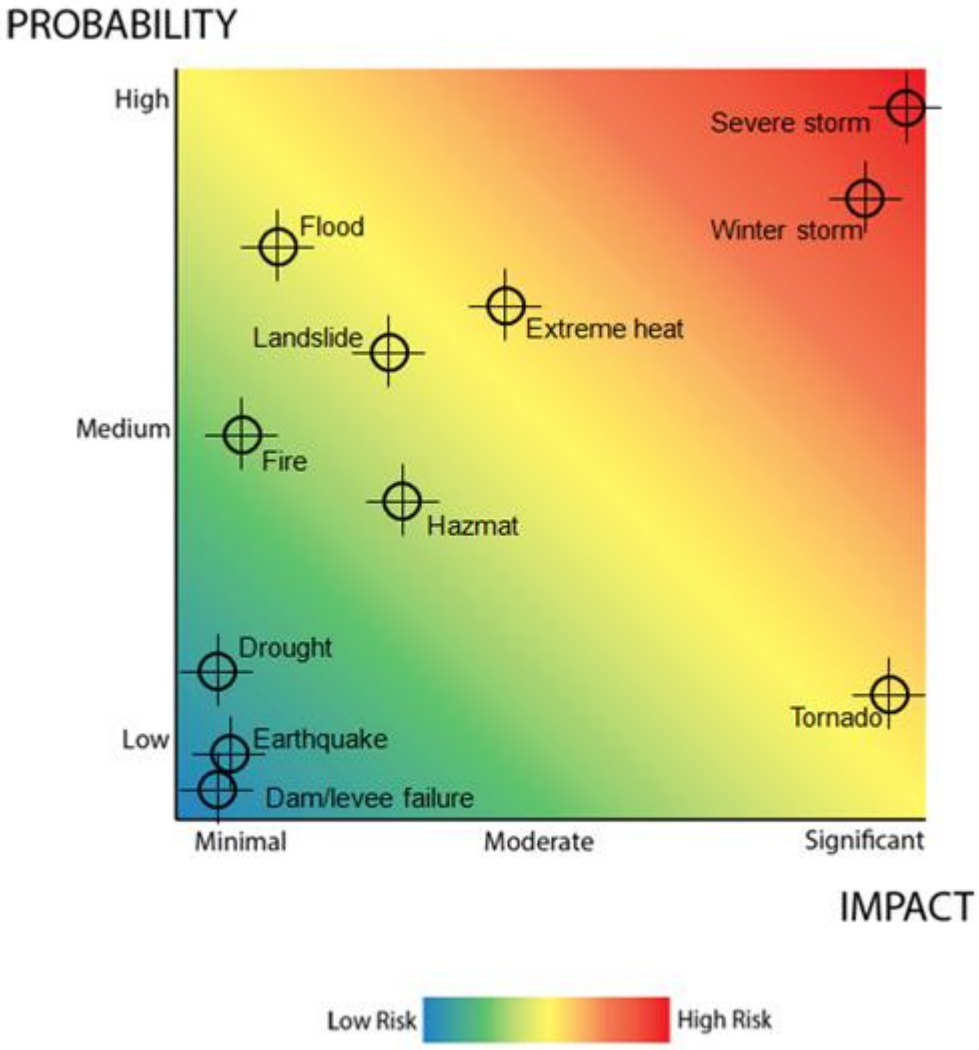
One hundred percent of Indian Hill is zoned as single-family residential or agricultural.

Land Use and Zoning

Since the first settlers in 1795, the Village of Indian Hill has been committed to conservation, focused on 'green space' long before green space was trendy. Approximately 31% of the land area is permanently protected green space, with 22.5% green area encompassed under the Green Area Trust Fund and nearly 9% green area encompassed under other privately held entities.

Risk Matrix

The Village of Indian Hill planning team determined the risks to their community are consistent with those reported for Hamilton County.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Funding for tree mitigation	Tornado, Severe Winds, Winter Weather, Extreme Heat	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Procure generators and transfer switches for backup power to shelters	All Hazards	2014	2015	County EMA	Local resources, FEMA
Acquire and distribute NOAA weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Conduct a study on storm/sewer line mitigation options	Severe Storms, Flood	2016	2018	County EMA	ODOT, ODNR, FEMA, FHWA
Develop a public education program to inform residents of potential hazards and emergency plans	All Hazards	2016	Ongoing	Community Planners for the Village of Indian Hill, County EMA	Local resources
Incorporate landslide mapping	Severe Storms, Flood, Earthquakes	2016	2018	County EMA	FEMA, OCRA, Community Development Grants
Conduct community education for residents and businesses using natural gas and tank-supplied propane.	Tornado, Severe Storms, Winter Weather, Earthquakes, Fire	2016	Ongoing	County EMA	ODNR, FEMA

WHITEWATER TOWNSHIP

The planning team for Whitewater Township is headed by Scott Schorsch, Whitewater Fire Chief. Other members of the planning team include representatives from local departments. The following table lists representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the community of Whitewater Township.

Name	Agency/Title
Scott Schorsch	Whitewater Fire Chief
Donald Anderson	Whitewater Public Works
Josh McCreary	Whitewater Public Works
Peggy Westerfeld	Whitewater Office Manager
Bary Lusby	Hamilton County EMA

Community Overview

Established in 1803, the same year that Ohio became a State, Whitewater Township is one of the twelve townships of Hamilton County, Ohio. It is located in the western part of the county bordering Indiana.

Topography

The township is comprised of 26.4 square miles, of which, 25.4 square miles is land and 1.0 square miles is water. The township is situated at an elevation of 509 feet above sea level. Whitewater Township land is diverse ranging from rolling hills to flat bottom land

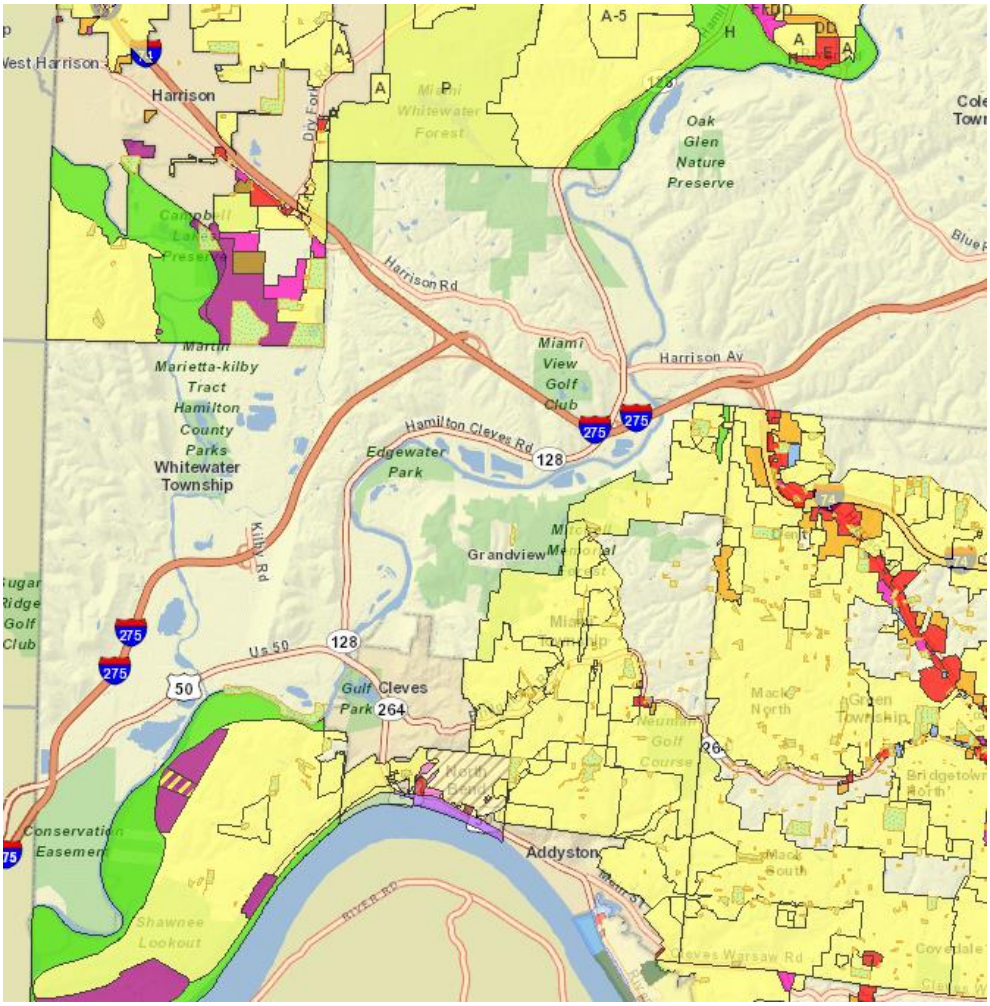
Demographics

The 2010 Census reports the Whitewater Township population at 5,519, with 2,192 households, and 1,449 families residing in the township. The reported population density is just 210 inhabitants per square mile.

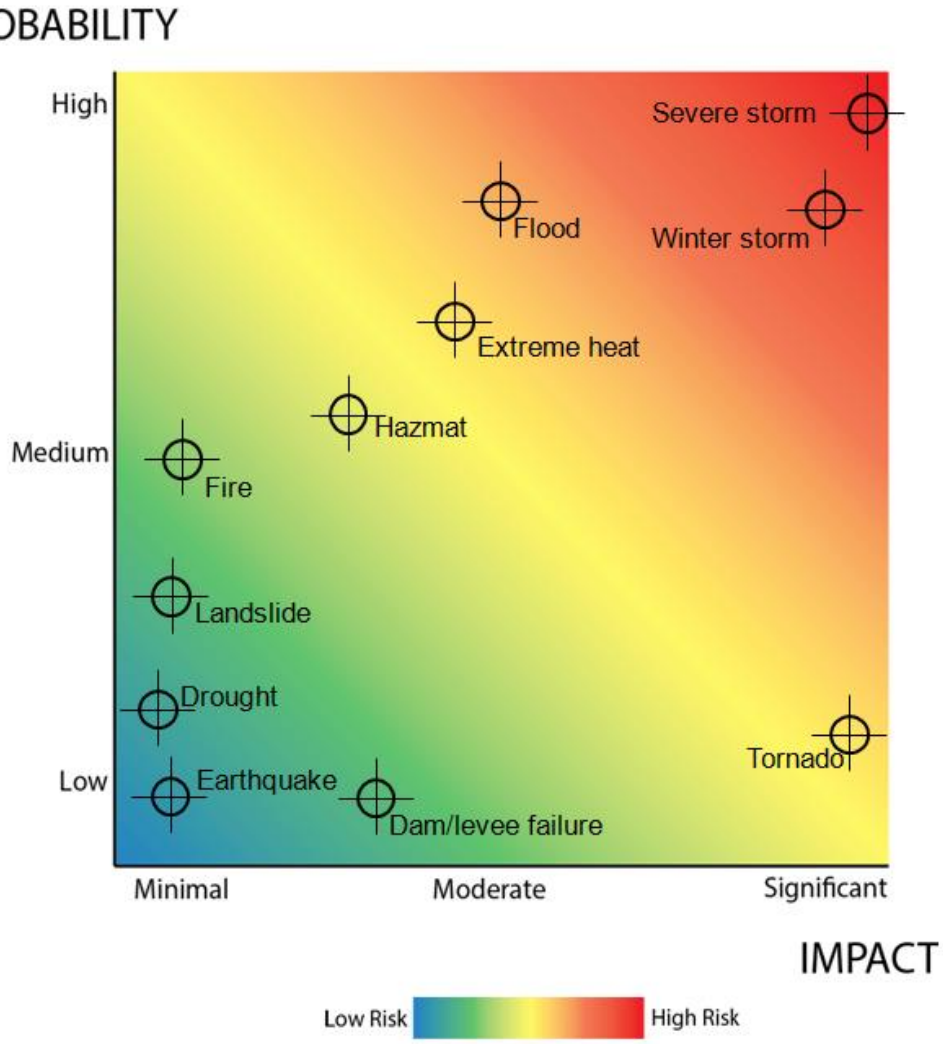
Language

According to the 2011 American Community Survey, there are approximately 2,090 households in Whitewater Township. Of these, 1,968 (94.2%) are primarily English-speaking. The remaining 122 households each include at least one member 14 years of age or older who speaks English fluently.

Land Use and Zoning



Risk Matrix



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Acquire flood prone properties thru FEMA buy back	Flood	Completed			
Procure backup generators and transfer switches	All Hazards	2014	2015	County EMA	Local resources, FEMA

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Obtain additional NOAA weather radios	All Hazards	2018	2019	County EMA	FEMA, NOAA
Conduct an engineering study to evaluate the safety of I275 northbound ramp to westbound I74	HazMat	2016	2018	County EMA	ODNR, EPA, FEMA
Conduct a study to evaluate the potential concerns of dams located in adjacent communities; develop EAPs	Flood	2016	2017	County EMA	FEMA
Conduct a study to evaluate the relocation of power lines buried in a flood plain	Severe Storms, Winter Storms, Flood	2014	2016	County EMA	Local and corporate resources
Elevate the bridge at Lawrenceburg Road.	Flood	2016	2018	County EMA	FEMA
Enhance the current emergency communication system	Severe Storms, Winter Storms, Tornado	2016	2018	County EMA	Local resources
Conduct a study to evaluate the engineering and potential use of a new fire station/community center/shelter	All Hazards	2016	2018	County EMA	Local resources
Procure additional snow equipment	Winter Storms	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA
Install a stream gauge monitor	Flood	2018	2019	County EMA	USGS, FEMA
Improve public education	All Hazards	2016	Ongoing	Community Planners for Whitewater Township , County EMA	Local resources

WYOMING

The planning team for the City of Wyoming is headed by Robert Rielage, Wyoming Fire Chief. This mitigation meeting included local leaders representing safety departments. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the City of Wyoming.

Name	Agency/Title
Robert Rielage	Wyoming Fire Chief
Rusty Herzog	Wyoming Police Department
Jim O'Riley	Wyoming City Council
Terrance Huxez	Wyoming Director of Public Works
Lynn Tetley	Wyoming City Manager
Bary Lusby	Hamilton County EMA

Community Overview

The City of Wyoming is located about 10 miles north of downtown Cincinnati. Wyoming was settled in 1861, and with 600 residents became a Village in 1874. Expansion of the rail lines encouraged industrial and population growth and by 1949 Wyoming received City status.

Topography

The City of Wyoming is comprised of 2.87 square miles of land with no significant water bodies. Wyoming is located north of Cincinnati at an elevation of 574 feet.

Demographics

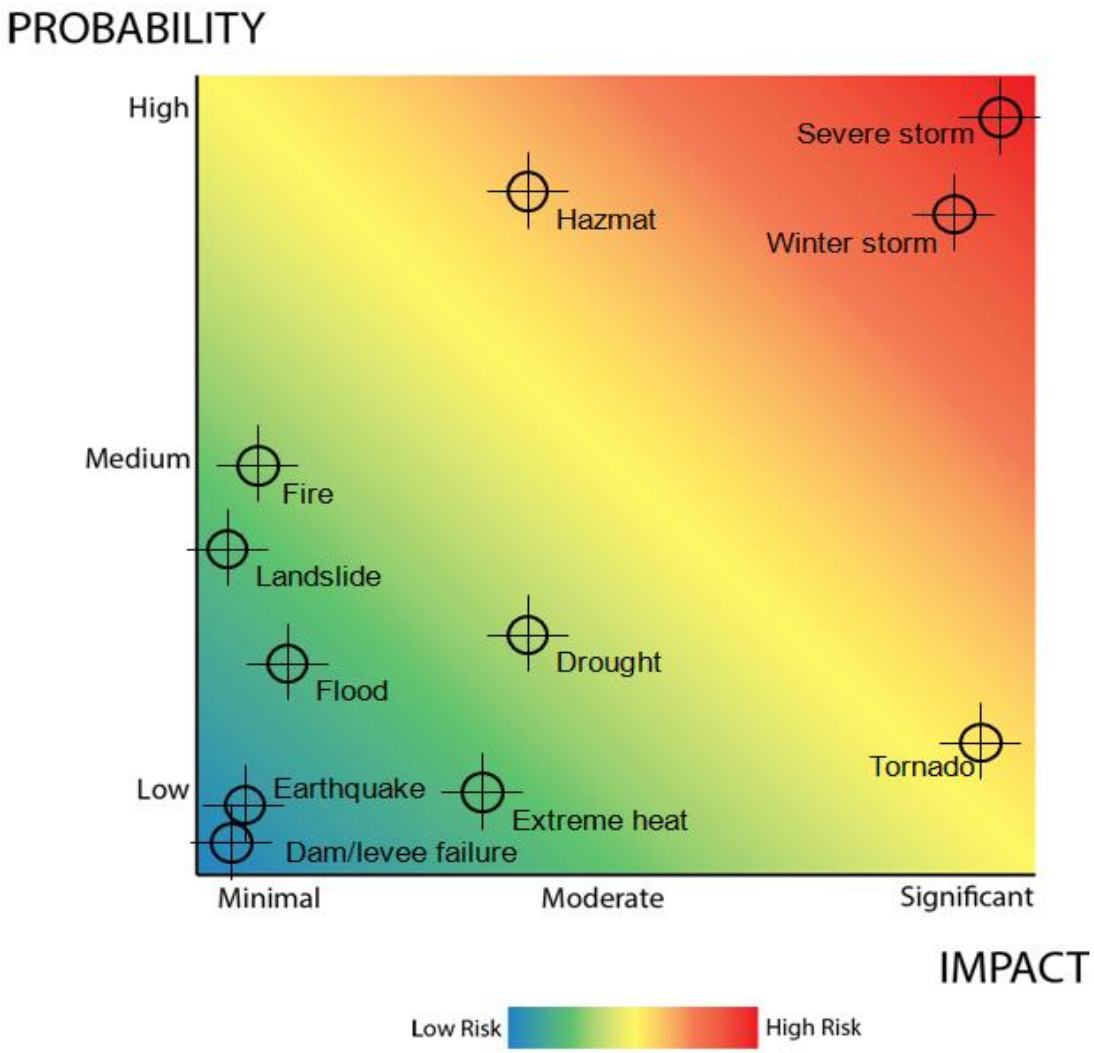
The 2010 Census reports the City of Wyoming population at 8,428, with 3,105 households, and 2,385 families residing in the city. The current population density is 2,936 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 2,984 households in Wyoming. Of these, 2,573 (86.2%) are primarily English-speaking. In households where English is not the primary language, 385 (12.9%) include at least one member 14 years of age or older who speaks English fluently. It is estimated that 26 households—18 Other Indo European and 8 Asian and Pacific Island—do not have a member 14 years of age or older who speaks English.

Risk Matrix

The City of Wyoming planning team determined the greatest risks to their community are severe storms and winter storms. Due to lack of water bodies the probability of a flood is less, but the impact of a hazardous materials spill or fire would be greater than those reported for Hamilton County.



Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Institute Code Red for emergency communications	All Hazards	Completed			
Bury power lines	Tornado, Severe Winds, Winter Weather, Drought, Extreme Heat	2014	2016	County EMA	Local and corporate resources
Procure generators and transfer switches for shelter facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Implement new plans for public education	All Hazards	2016	Ongoing	Community Planners for Wyoming, County EMA	Local resources
Conduct an study regarding industrial vulnerability	HazMat	2018	2020	County EMA	FEMA, EPA, USDA, OCRA

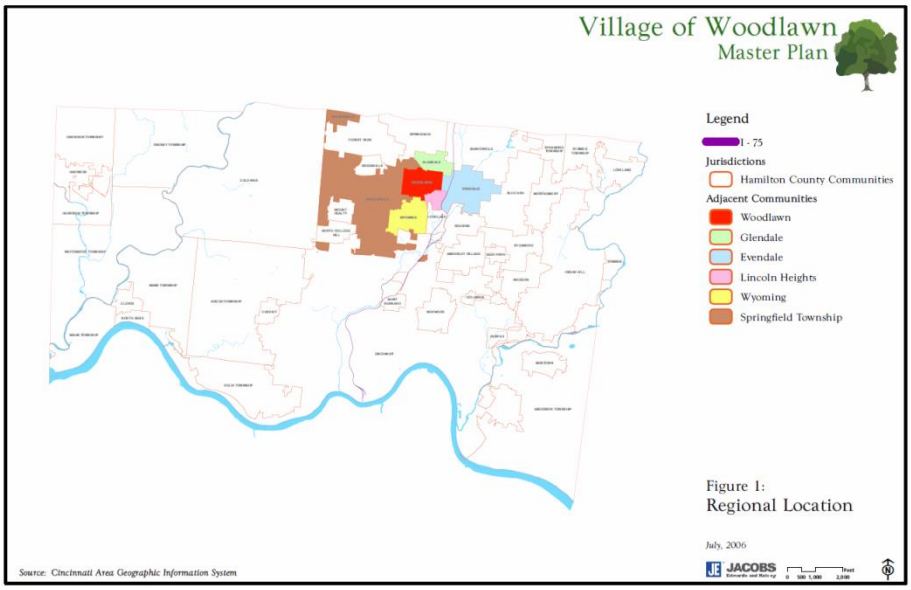
WOODLAWN

The planning team for the Village of Woodlawn is headed by Carolyn Smiley-Robertson, Municipal Manager for the Village of Woodlawn. Members of this planning committee were actively involved in reviewing strategies appropriate to the community. The following table lists the representatives involved in the planning process which included reviewing strategies to mitigate potential hazards unique to the Village of Woodlawn.

Name	Agency/Title
Carolyn Smiley-Robertson	Woodlawn Village Manager
Walter Obermeyer	Woodlawn Police Department
Rick Mynatt	Woodlawn Fire Department
Alan Geans	Woodlawn Parks and Recreation
Michael Donohue	Woodlawn Councilor
Donna Pope	Woodlawn Finance
Anthony Brown	Woodlawn Public Works
Jack Bennett	Woodlawn Police Department
Christopher Hunt	Woodlawn Fire Department
Peter Hauser	Woodlawn Fire Department
Dana Schratt	Hamilton County EMA

Community Overview

The Village of Woodlawn is located in the northern part of Hamilton County, Ohio, about ten miles from downtown Cincinnati.



Topography

The Village of Woodlawn is comprised of 2.57 square miles of land, with no significant water bodies. This community is located at an elevation of Hamilton County at 586 feet.

Demographics

The 2010 Census reports the Village of Woodlawn population at 3,294, with 1,507 households, and 766 families residing in the community. The current population density is 1,281 inhabitants per square mile.

Language

According to the 2011 American Community Survey, there are approximately 1,528 households in Woodlawn. Of these, 1,409 (92.2%) are primarily English-speaking. In households where English is not the primary language, 84 (5.4%) include at least one member 14 years of age or older who speaks English fluently. It is estimated that 35 households—11 Spanish and 24 Asian and Pacific Island—do not have a member 14 years of age or older who speaks English.

Economy & Industry

Woodlawn is a predominately residential community with a significant industrial and commercial component. Because of the influx of commuters, the weekday population is twice as large as the residential population. In 2006, the Village of Woodlawn developed a Master Plan. This plan was designed to provide direction to the residents, businesses, and administrators in the development of Woodlawn's economic needs and the best strategies for ensuring a successful future.

Land Use	Acres	% of Total
Single Family Residential	347.38	23.65%
Two-Family Residential	2.98	0.20%
Multi-Family Residential	63.56	4.33%
Commercial	59.96	4.08%
Light Industrial	254.10	17.30%
Heavy Industrial	129.73	8.83%
Institutional	42.86	2.92%
Mixed Use	0.84	0.06%
Park and Recreation	324.29	22.08%
Public Utility / Public Service	103.85	7.07%
Vacant	139.07	9.47%
TOTALS	1,468.61	100.00%

Land Use and Zoning

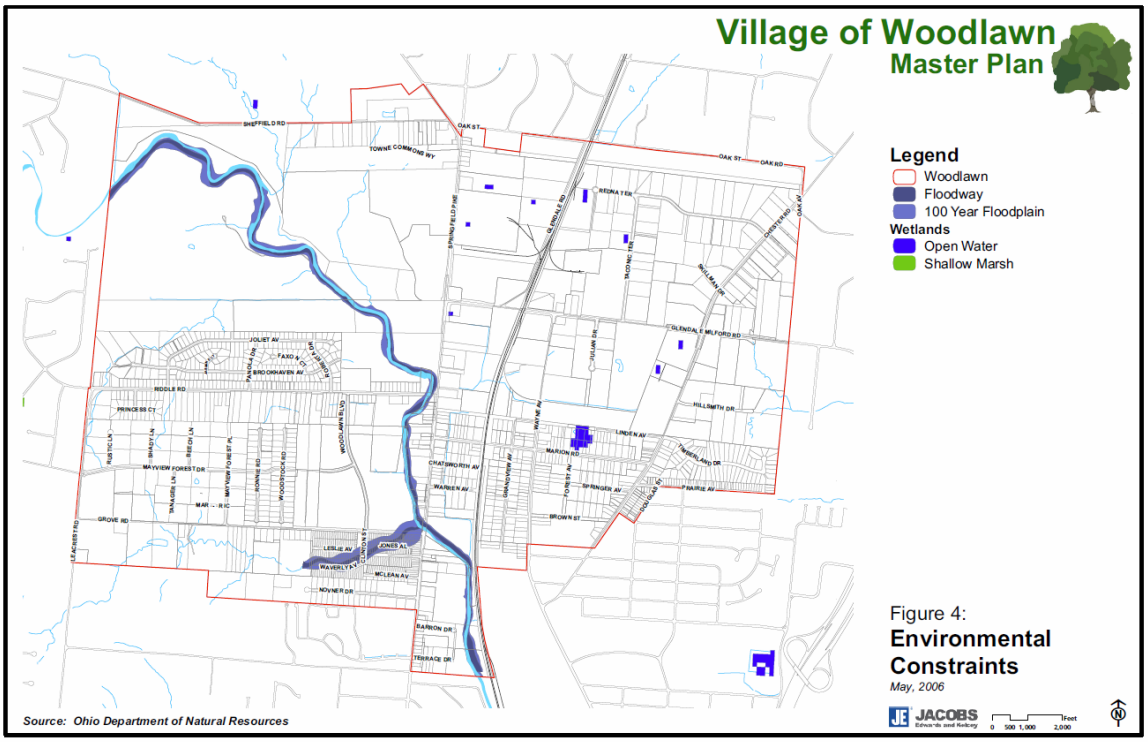
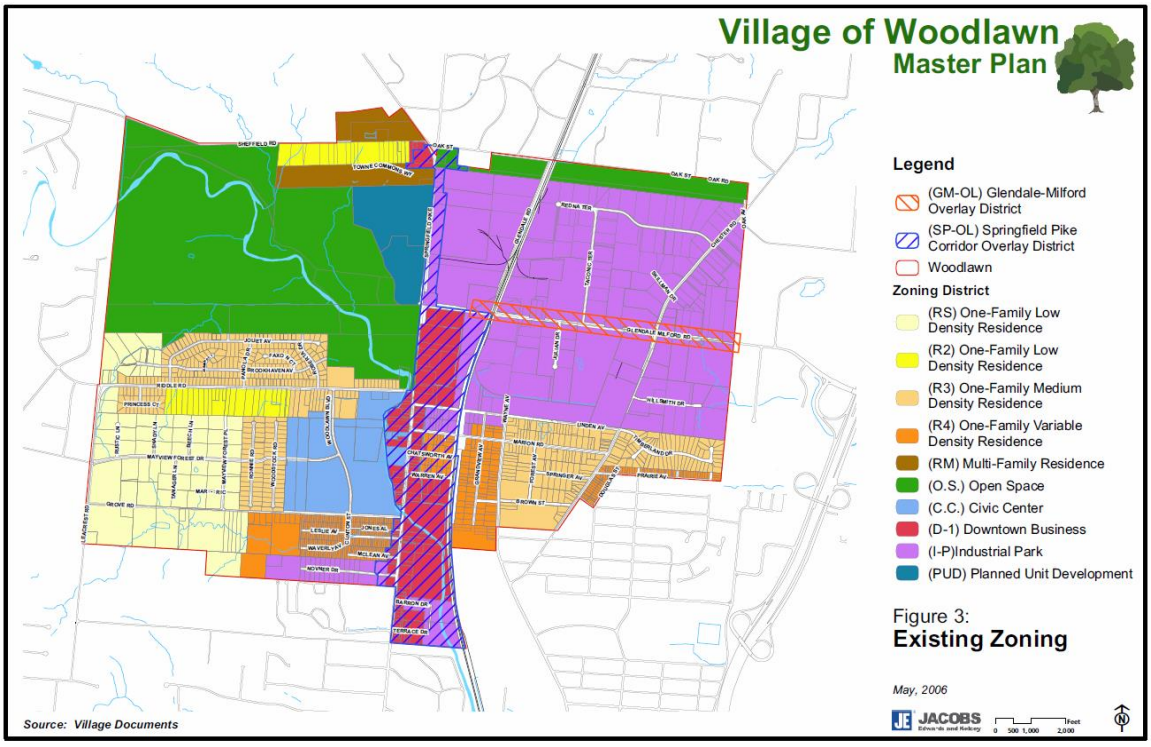
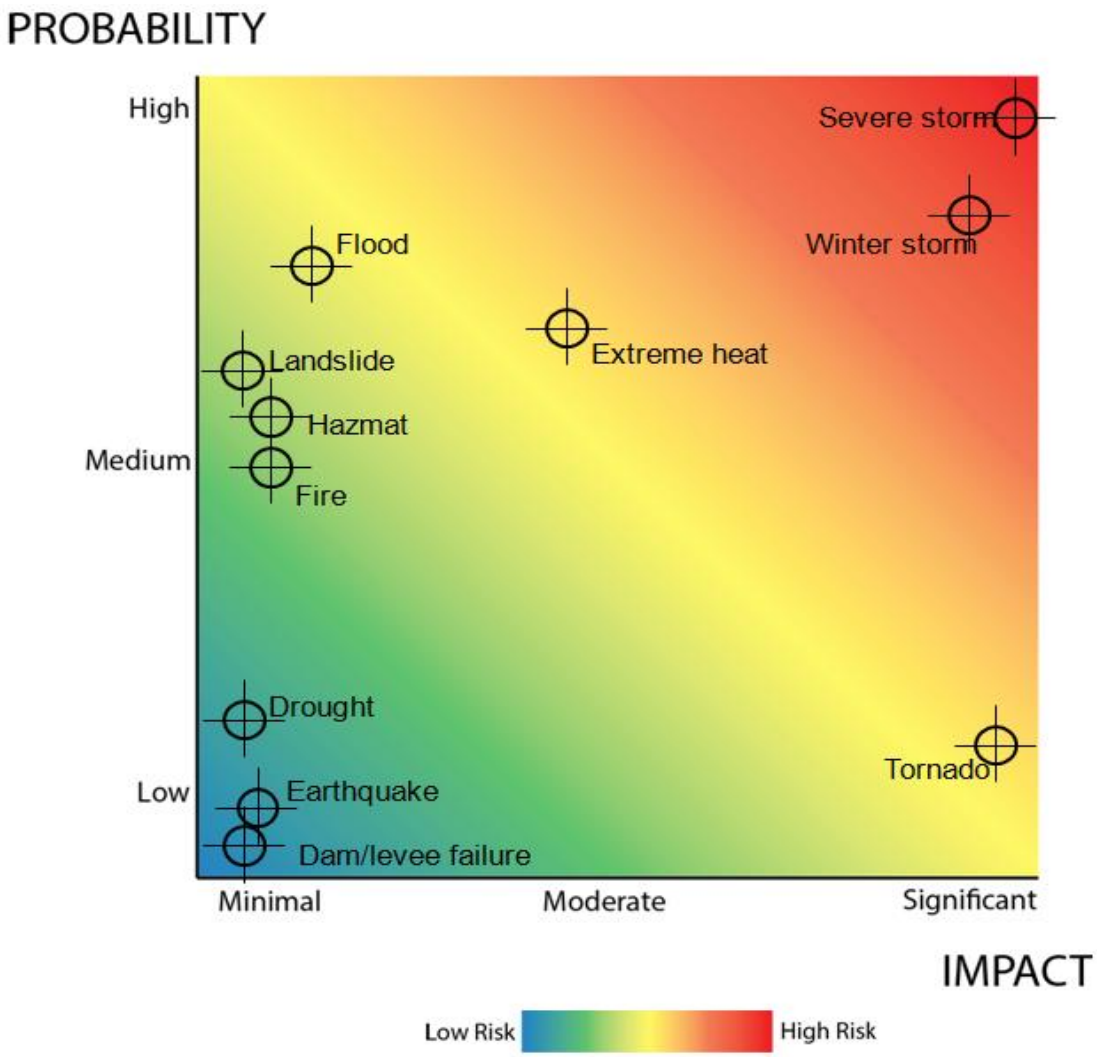


Figure 4:
Environmental Constraints
May, 2006



Risk Matrix

The Village of Woodlawn agreed with the hazard analysis of Hamilton County, and determined that severe storms and winter storms pose the greatest risk to their community.


PROBABILITY
High
Medium
Low
Severe storm
Winter storm
Flood
Extreme heat
Landslide
Hazmat
Fire
Drought
Earthquake
Dam/levee failure
Tornado
Minimal
Moderate
Significant
IMPACT
Low Risk
High Risk

Mitigation Strategies

Mitigation Item	Hazard	Expected Start	Expected Completion	Lead Agency	Potential Funding Source(s)
Develop public education to inform residents of potential hazards and emergency plans	All Hazards	2016	Ongoing	Community Planners for Woodlawn, County EMA	Local resources
Procure back-up generators and transfer switches for all critical facilities	All Hazards	2014	2015	County EMA	Local resources, FEMA
Conduct a study on storm water management	Severe Storms, Floods	2016	2018	County EMA	ODOT, ODNR, FEMA, FHWA
Enhance tree trimming	Tornado, Severe Storms, Winter Weather	2014	Ongoing	County EMA	FEMA Public Assistance Grants
Enhance the communication system	All Hazards	2016	2018	County EMA	Local resources
Develop a newsletter to advise residents of emergency communications and shelter locations	All Hazards	2016	Ongoing	Community Planners for Woodlawn,, County EMA	Local resources
Acquire and distribute NOAA weather radios for critical facilities	Tornado, Severe Winds, Winter Weather, Flood, Flash Flood, Earthquake	2018	2019	County EMA	FEMA, NOAA
Acquire additional snow management equipment	Winter Weather	2016	2018	County EMA	USDOT, FHWA, ODOT, FEMA
Conduct a study on underpass flooding issues	Flood, Flash Flood	2016	2018	County EMA	FEMA, OCRA
Conduct a study to address the carcinogenic properties of Flint Ink	HazMat	2018	2020	County EMA	EPA, OCRA

APPENDIX A –MULTI-HAZARD MITIGATION PLANNING TEAM MEETINGS

MEETING #1

Hamilton County Multi-Hazard Mitigation

5 Year Update Meeting

July 31, 2012

Bary Lusby, Operations Manager, Hamilton County EMA, thanked everyone for attending. The attendees introduced themselves to the group.

Bary stated Dr. Kim from UC, John Buechler, and Matt Riggs from the Polis Center, IUPUI, have been working on this for quite some time. Bary continued that the existing plan expired in February 2012, and this plan update is needed to receive grant funds. Bary stated that this should not affect the projects currently in progress. Bary stated that all 49 jurisdictions in Hamilton County need to approve the plan.

John provided a brief review of the plan, and explained disasters will be modeled to estimate damage. He explained there will be a series of four meetings, this being the first one; at the second one the public will review the risk; at the third meeting we will brain storm with every jurisdiction on mitigation strategies; and the fourth meeting will be final review before submitting the plan to State Homeland Security and then to FEMA. He reviewed the proposed timeframe for the subsequent meetings.

Bary stated that while there is a 25% match, participation in the meetings will count toward sweat equity, mileage, etc., so there will be no out of pocket cost. However, jurisdiction participation is required. Bary suggested keeping detailed notes on hours spent working on the plan, reviewing the drafts, mileage, car use, etc.

The roles and responsibilities of Hamilton County, Polis, and UC were reviewed.

There were several questions regarding the collection of facilities data, as to what was included, and what was not. Dr. Kim suggested each jurisdiction look at their specific data to see what is missing.

Copies were distributed, and the information will be emailed to the attendees.

A discussion ensued regarding information on various infrastructures and possible sources of information.

Examples were provided for Determining Risk = Probability x Impact for the categories including:

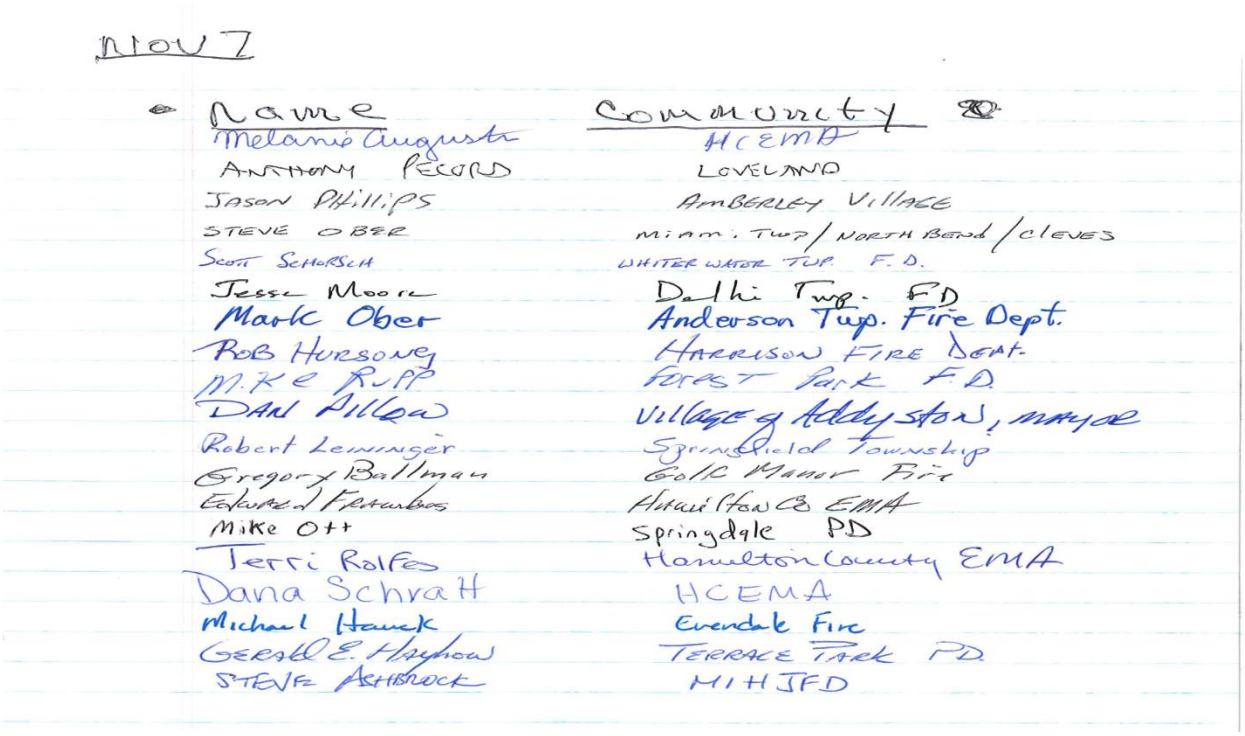
Floods, Thunderstorms, Tornadoes, Landslides, Earthquakes, Droughts, Hazmat Releases, Fires and Structure Failures. Probability will be based on FEMA Guidelines. The discussion continued if the disaster impact would be considered county wide or for the jurisdiction. County wide impact would be the consideration for today's discussion. This draft provides an idea, and the determinations are not in black and white and can be changed. Basically, this is a list of hazards with major impacts and the list can be revised.

Ed Frambes, Emergency Planning Coordinator, Hamilton County EMA / LEPC, stated all jurisdictions are not represented, the information should be sent to all jurisdictions, with a request to return the completed information in a timely manner. The information will be sent to all jurisdictions.

Scenarios for tornadoes, floods, and Hazmat releases were determined and indicated on the map for model disasters.

The meeting ended at 11:35 a.m.

MEETING #2 (first public meeting)



NOV 7

Name	Community
Melanie Augusta	HCEMA
ANTHONY PECORD	LOVELAND
JASON PHILLIPS	AMBERLEY VILLAGE
STEVE OBER	MIAMI TWP / NORTH BEND / CLEVES
SCOTT SCHORSCH	WHITEWATER TWP. F.D.
Jesse Moore	Delhi Twp. FD
Mark Ober	Anderson Twp. Fire Dept.
BOB HURSONEY	HARRISON FIRE DEPT.
MIKE RUPP	FOREST PARK F.D.
DAN PILLOW	VILLAGE of ADDYSTON, MAYOR
Robert Leininger	Springfield Township
Gregory Ballman	Golf Manor Fire
Edward Fitzenberg	Harrison Co EMA
Mike Ott	Springdale PD
Terri Rolfes	Hamilton County EMA
Dana Schrath	HCEMA
Michael Hauck	Evendale Fire
GERALD E. HAYHOW	TERRACE PARK PD
STEVE ASHBROCK	MIHJFD

November 7, 2012

At the planning team meeting, John Buechler and Dave Coats from The Polis Center presented a PowerPoint presentation that explained the risk assessment results. Each hazard was presented with a description of recent occurrences, geographic location, and when applicable, GIS and/or Hazus analysis results.

At the end of the presentation, Polis presented the risk graphics and asked if the planning team wanted to adjust any of the rankings based on the risk assessment results.

Locations and times of meetings are included in the public meeting announcement.

MEETING #2 (second public meeting)

The meeting opened with a discussion of the draft plan, the process to date and the information gathering process for the draft document. A PowerPoint presentation documented an overview of the critical information contained in the draft including a number of scenarios depicted in the plan utilizing the data collected from the planning committee in the second planning meeting.

Upon the conclusion of the presentation, The Polis Center opened the floor for further discussion and questions.

Public meeting 8 - OH10

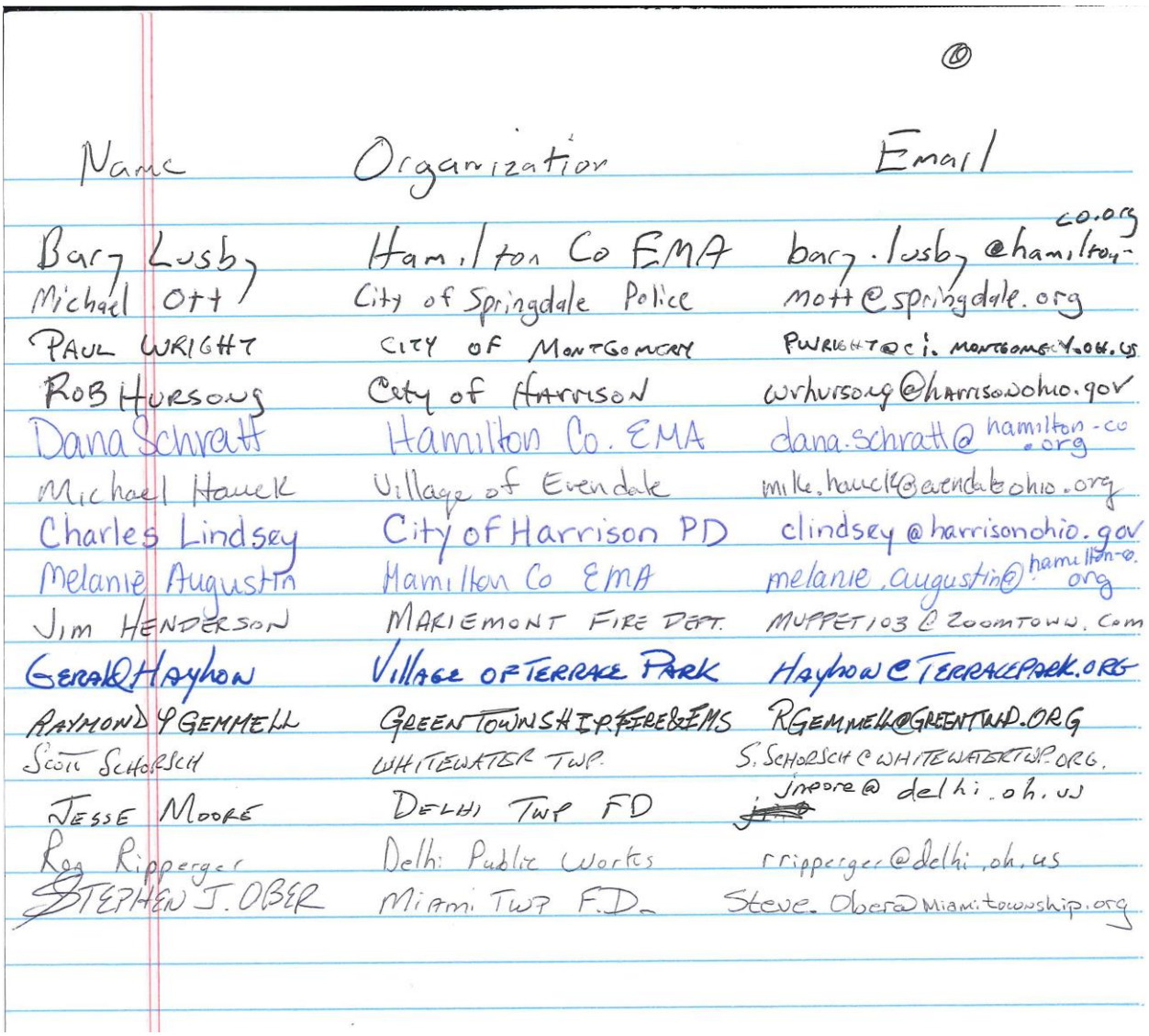
Name

JEFF RITTER Colerain Township

MEETING #3

Meeting #3 for Hamilton County consisted of locally based meetings with each participating jurisdiction. Each community had the opportunity to discuss mitigation strategies appropriate to their jurisdiction. Copies of the strategy surveys resulting from each community are available in digital format, Completed Mitigation Surveys.

MEETING #4



Name	Organization	Email
Barry Lusby	Hamilton Co EMA	barry.lusby@hamiltonco.org
Michael Ott	City of Springdale Police	mott@springdale.org
PAUL WRIGHT	CITY OF MONTGOMERY	PWRIGHT@ci.montgomery.oh.us
ROB HURSONG	City of Harrison	wrhursong@harrisonohio.gov
Dana Schratt	Hamilton Co. EMA	dana.schratt@hamilton-co.org
Michael Hauck	Village of Evendale	mike.hauck@evendaleohio.org
Charles Lindsey	City of Harrison PD	clindsey@harrisonohio.gov
Melanie Augustin	Hamilton Co EMA	melanie.augustin@hamilton-co.org
JIM HENDERSON	MARIEMONT FIRE DEPT.	MUPPET103@ZOOMTOWN.COM
GERALD HAYHOW	VILLAGE OF TERRACE PARK	HAYHOW@TERRACEPARK.ORG
RAYMOND J GEMMELL	GREEN TOWNSHIP FIRE/EMS	RGEMMELL@GREENTWP.ORG
SCOTT SCHORSCH	WHITEWATER TWP.	S.SCHORSCH@WHITEWATERTWP.ORG.
JESSE MOORE	DELHI TWP FD	jmoore@delhi.oh.us
Ron Ripperger	Delhi Public Works	rripperger@delhi.oh.us
STEPHEN J. OBER	Miami Twp F.D.	Steve.Ober@Miamitownship.org

May 2, 2013

This was the final planning team meeting. Laura Danielson from The Polis Center started by asking if everyone had had a chance to review the team. Since everyone had looked through their sections, she walked through each community in the annex.

For each community, the team reviewed the risk graphic and the mitigation strategies. Laura made any necessary revisions as they were brought up. She also walked through the courtesy review that the state completed and assigned homework to the team to complete any missing sections of the plan.

At the end of the meeting, she explained that the team would have another few weeks to complete final revisions. Once everyone is comfortable with the plan, Polis will submit it to the state for their review. When the state approves the plan, they will submit it to FEMA for final review.

Laura stressed that before she submits the plan to the state, the planning team needs to feel comfortable enough with it that they would adopt it once it gets approved.

The meeting ended at 10:30 a.m.

Ancillary Meeting

Hamilton County EMA held dam safety and awareness meetings in June 2013. The invitation letter and attendance sheets follow.

May 23, 2013

This letter serves as an invitation to attend an upcoming meeting focused on issues related to Dam Safety in Hamilton County and Ohio as well.

The Ohio Department of Natural Resources (ODNR), Division of Soil and Water Resources (DSWR) has the responsibility of implementing Ohio's Dam Safety program. The DSWR is currently increasing their educational programming and outreach efforts for Public Officials and Dam Owners on Dam Safety related topics. Development of Emergency Action Plans (EAP) for dams is a primary focus of their increased educational efforts. Public officials and Dam owners have critical roles in the successful development and implementation of EAPs for dams.

Recently, staff from the Hamilton Co. EMA and the Hamilton Soil & Water Conservation District (SWCD) met with staff from the ODNR-DSWR to plan a meeting for Hamilton County public officials and for Hamilton County Dam owners who own a "regulated" dam. **The meeting will be offered twice; 1:00 PM. – 4:00 PM. on June 13th and then again on June 19th, 6:00 PM. - 9:00 PM. Both meetings will be held in the Sharon Center located at Sharon Woods, 11450 Lebanon Road, Sharonville, Ohio 45241.** Please see the enclosed agenda for the list of topics to be covered at the meetings.

We hope you will plan to attend one of the meetings. It is important for Public officials and Dam owners to understand the Ohio Dam Safety Program and the "roles and responsibilities" they have in implementing the program at the local level. We would ask that you please contact Bary Lusby, Hamilton Co. EMA, at 513-263-8200 (bary.lusby@hamilton-co.org) or Holly Utrata-Halcomb, Hamilton SWCD at 513-772-7645 (holly.utrata-halcomb@hamilton-co.org) and affirm your attendance at the meeting.

Sincerely,

Bary Lusby
Operations Manager

Hamilton Co. EMA

Sincerely,

Holly Utrata-Halcomb
Administrator

Hamilton SWCD

Hamilton County Local Officials & Dam Owners Meeting
June 19th, 2013

	NAME	ADDRESS	DAM NAME or ORGANIZATION NAME
1	BARRY LUSBY	2000 Radcliff Drive Cincinnati, OH 45204	Ham Co HS/EMA
2	Charles Wesmer	3444 Crest Rd. Cincinnati, Oh 45251	~~[illegible]~~ Private DAM
3	Bob Sheets	HCSWCD	Soil & Water
4	CHEY ALBERTO	HCSWCD	Hamilton Co SWCD
5	Warren High	3081 Taylor Ave Cinci, O 45220	AMEC
6	Jim BOLAND	5279 LAKEFRONT DR 45247	CHATEAU LAKES (PRIVATE DAM)
7	DEBORAH BOLAND	5279 LAKEFRONT D 45247	CHATEAU LAKES (PRIVATE DAM)
8	EDWARD EWBANK	1600 East St, Cinct. 45204	Metropolitan Sewer District of GREATER CINCINNATI
9	Scott Huber		

Local Officials & Dam Owners Sign-In Sheet

	NAME	ADDRESS	DAM NAME or ORGANIZATION NAME
10	Brian Bohl	22 Triangle Park Drive Cincinnati, OH 45246	Hamilton County SWCD
11	Nick Gemmell	5465 Eula Cinti OH 45248	Hamilton County
12	Rich Cogen		Ohio River Fdn.
13	Shawn Hampson	5458 Kenridge Drive Cincinnati, OH 45242	Kenridge Lake
14	Bob		
15	Brian		
16	Holly		
17	Chey		
18			
19			
20			
21			

Hamilton County Local Officials & Dam Owners Meeting
June 13th, 2013

	NAME	ADDRESS	DAM NAME or ORGANIZATION NAME
1	BARY LUSBY	2000 Radcliff Drive Cincinnati, OH 45204	HAM CO EMA
2	Steve Rosfeld	7149 Ridge Road cincinnati ohio 45237	village of Amanbley
3	JOE KEMPE	10900 READING RD SHARONVILLE, OH 45241	CREEK RD Ret. DAM
4	Bob Mason	10245 Winton Rd Cincinnati, OH 45231	Great Parks of Hamm Co.
5	Wesley Wimmer	1600 Gest St Cinci OH 45204	MSDGC
6	Barb Wagner	" "	"
7	Doug Hoover	2000 RADCLIFF DR CINTI OH 45204	CINTI FIRE DEPT.
8	Chris Grimmelsman	2000 Radcliff Drive Cincinnati, OH 45204	Cinti Fire
9	George Kipp	6525 Drake Rd Cin. OH 45243	Village of Indian Hill

Local Officials & Dam Owners Sign-In Sheet

	NAME	ADDRESS	DAM NAME or ORGANIZATION NAME
10	Rob Hursong	200 Harrison Ave Harrison, Ohio 45030	Harrison Fire Dept.
11	Scott Schorsch	311 Ohio Ave Hooven OH 45033	Whitewater Twp. Fire/EMS
12	Timothy O Gilday	10480 Burlington Rd Cint. OH 45231	Ham Co. Engineer's office
13	Cheryl Bush	1600 West St. Cinti OH 45204	Metropolitan Sewer District of GC
14	Jeff Oxenham	225 W. Galbraith Rd Cincinnati, OH 45215	MSDGC / Stormwater Management Utility
15	Bruce Smith	3251 Springdale Rd Cinti 45251	Colerain Fire Dept
16	Kevin Forste	12100 Lake Circle Dr - Springdale 45246	Mallard Lake Town Homes
17	Steve Ashbrock	Madeira & Indian Hill JFD 6475 Drake Road Cincinnati OH 45243	Madeira & Indian Hill Joint Fire District
18	Michael Hauck	Evendale Fire Department 10500 Reading Rd. Evendale, Ohio 45241	Village of Evendale, Fire Department
19	Kevin J. Brill	10245 Winton Road Cin, OH 45231	Great Parks of Ham Co.
20	Matt Looker	10345 Winton Rd Cincinnati OH 45231	Great Parks of Hamilton County
21	Richard Goode	City of Sharonville 10900 Reading Rd. Sharonville OH 45241	City of Sharonville

Local Officials & Dam Owners Sign-In Sheet

	NAME	ADDRESS	DAM NAME or ORGANIZATION NAME
22	Brad Hill	5150 Shawview Run Cin OH 45248	Eagles Lake Condo Assc.
23	Kevin Richards	9150 Winton Rd Cinti, OH 45231 krichards@springfieldtwp.org	Springfield Township Fire Dept.
24	Dan Taphorn		Hamilton SWCD
25			
26			
27			
28			
29			
30			
31			
32			
33			

The following email was sent to additional organizations to review the plan.

From: Lusby, Bary [mailto:Bary.Lusby@hamilton-co.org]
Sent: Tuesday, May 28, 2013 1:23 PM
To: Bohl, Brian; alyon@green-acres.org; partee@littlemiami.com; dtenwolde@littlemiamiriver.org; info@miamiconservancy.org; info@millcreekwatershed.org
Cc: Danielson, Laura Ellen; Utrata-Halcomb, Holly; Taphorn, Dan
Subject: Update for the Hamilton County Multi-Hazard Mitigation Plan
Importance: High

We are sending this email in hopes of getting in touch with the following groups:

Friends of the Great Miami River

Greenacres Water Quality Project

Little Miami, Inc.

Little Miami River Partnership

Miami Conservancy District

Mill Creek Restoration Project

Mill Creek Watershed Council of Communities

We have developed, in cooperation with IUPUI and the University of Cincinnati, a revision of our Mitigation Plan that will be adopted by the jurisdictions of Hamilton County this year.

This is a multi-hazard plan that includes both flood and flash flood issues.

We would like to distribute a copy of the final draft to these watershed partners for comments and suggestions.

If you would like to receive a copy of this Mitigation Plan, please reply to me as soon as possible by email, and we will send you a link to the plan.

The plan is too large to send by email.

As always, thank you for your time and consideration.

Bary

Bary C. Lusby CEM

Operations Manager

Hamilton County Homeland Security/Emergency Management

2000 Radcliff Drive

Cincinnati, Ohio 45204

513-263-8206 Office

513-263-8222 Fax

The lesson learned from Katrina and Sandy is not that any single agency failed, the lesson is that it takes the whole community to prepare, protect, respond, recover, and mitigate.

APPENDIX B – ARTICLES PUBLISHED BY LOCAL NEWSPAPER

Earthquake shakes Cincinnati region

Business Courier

Date: Tuesday, August 23, 2011, 2:11pm EDT - Last Modified: Tuesday, August 23, 2011, 3:02pm EDT

An earthquake shook the Cincinnati area just before 2 p.m. Tuesday afternoon, with workers in some buildings in downtown evacuating.

Reuters reports a 5.8 magnitude quake struck in Virginia and shook much of Washington, D.C., and up the east coast to New York, with the Pentagon and U.S. Capitol being evacuated, according to reports on Twitter.

Locally, several organizations evacuated employees from their facilities, including the Metro transit system administrative office on Main Street and the LPK brand design firm on Garfield Place.

LPK workers felt the tremors and evacuated their offices for about 10 minutes, said Christine Bauer, an executive assistant.

“It seemed like it was louder and went on longer than the last one,” Bauer said. “You could hear it on the eighth floor. Things were shifting and moving. It’s a scary thought.”

LPK used its emergency evacuation policy for employees to leave the building.

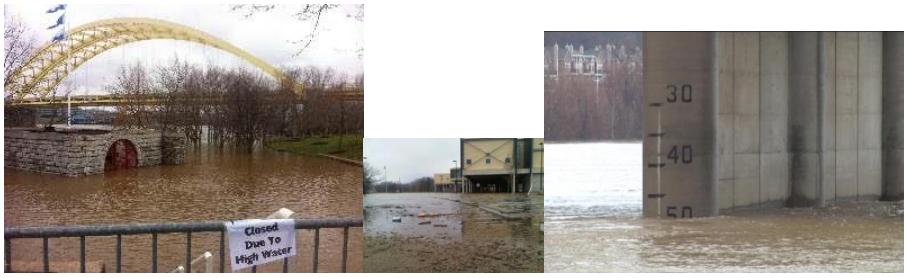
Procter & Gamble, a major downtown Cincinnati employer, did not evacuate its headquarters towers but did evacuate an office in Washington, D.C.

Spokesman Jeff LeRoy said D.C. employees temporarily left for a secure location but are now fully back at work. He said those D.C. employees did not realize at first that the shaking was related to an earthquake but departed the office as a precaution since the anniversary of the Sept. 11 terrorist attacks is near.

The Cincinnati/Northern Kentucky International Airport reports that the airport is operating as normal. But officials said travelers should call their airline because other airports might be experiencing delays.

Source: http://www.bizjournals.com/cincinnati/news/2011/08/23/earthquake-shakes-cincinnati-region.html

Ohio River expected to crest at or above flood stage



CINCINNATI, OH (FOX19) - The Ohio River will crest at or above flood stage along the entire length of the river in the FOX19 viewing area and will stay at or above flood stage for an extended period of time not dropping back to flood stage until late next week.

At 1 p.m., the river at Cincinnati was measured at 55.3 feet. It's expected to crest at 56.6 feet on Monday afternoon. Anything over 56 feet is considered moderate flooding.

In response to the flooding, the City of Cincinnati is installing floodgates across Mehring Way and Carr Street, requiring the closure of Mehring Way between Harriet Street and Freeman Avenue. Detour signs will be in place. For a full list of road closures, click here.

In other areas:

- Ohio River @ Markland now 49.8' going above flood stage 3 p.m. Friday then rising to 52.0' by 7am Sunday. (flood stage = 51')
- Ohio River @ Cincinnati now 54.9' - it surpassed flood stage @ 7:10 p.m. Wednesday and will rise to 56.5' 1pm Monday. (flood stage = 52')
- Ohio River @ Meldahl now 51.73' - it surpassed flood stage @ 12:30 p.m. Thursday and will rise to 54.3'@ 1 p.m. Monday. (flood stage = 51')
- Ohio River @ Maysville now 52.4' - it surpassed flood stage @ 4 p.m. Wednesday and will rise to 55.0' @ 1 p.m. Monday. (flood stage = 50')

A flood warning is also in effect for the Little Miami River and Ohio River around Newtown and Anderson Township.

The river is not expected to go back below flood stage until late next week, perhaps as late as Friday.

The high water is also causing a lot of problems for business owners and local residents along the river.

Bellevue's Beach Park is almost entirely under water. Hooters and The Beer Sellar have shut their doors to keep customers and employees safe. In addition, Riverview East Academy on Kellogg Avenue is closed on Thursday.

In addition, students at Riverview East Academy have been forced to relocate due to flooding at the school.

September 5, 2012
Rob Nichols, (330) 760-7582, Rob.Nichols@governor.ohio.gov

USDA DESIGNATES 85 OHIO COUNTIES AS NATURAL DISASTER AREAS

Kasich sought assistance for Ohio farmers, agriculture industry hurt by severe drought, weather disasters

COLUMBUS – Today, the U.S. Department of Agriculture granted Governor John R. Kasich's request for a Secretarial disaster designation for 85 of Ohio's 88 counties following the severe heat, rainfall shortages and other weather-related disasters that struck large areas of the state over the spring and summer. The designation gives eligible Ohio farmers access to drought-related federal assistance such as emergency low-interest loans for crop losses, relief payments for non-insurable losses, the temporary deferral of payments on federal loans and permission to cut hay for livestock from acreage otherwise set aside for conservation.

"Agriculture is an essential component of Ohio's economy and our heritage, and if our farmers and Ohio's food industry are suffering, Ohio suffers. The federal declaration will help keep farmers on their feet and mitigate some of the damage caused by the bad weather," said Kasich.

USDA Secretary Thomas Vilsack's disaster declaration letter containing the full list of designated counties can be viewed here. Ohio farmers in these counties are encouraged to contact their local Farm Service Agency (FSA) office for additional information.

In July, Kasich signed Executive Order 2012-11K which, among other things, instructed state agencies to help farmers reduce the negative impacts of the drought and to seek federal assistance. A copy of the EO can be viewed here.

Additionally, the EO instructed state agencies to work with Ohio's farmers to minimize the potential environmental and economic impact of an agricultural drought. To this end, the Ohio Department of Agriculture, Ohio State University Extension and FSA will host a series of meetings in September at which the public can speak with experts on drought mitigation practices. The public meeting schedule can be viewed here.

###

Chicago Tribun
NEWS

Girl killed in massive pileup on icy Ohio highway

January 21, 2013 | Joe Wessels | Reuters


(STAFF, REUTERS)

CINCINNATI (Reuters) - A 12-year-old girl was killed on Monday and dozens of people injured in a 76-vehicle pileup on an icy Ohio highway, one of three major crashes that clogged roadways across the state, authorities said.

Sixty cars and 16 tractor trailers slammed into one another on Interstate 275 near Cincinnati just after 11:35 a.m., Hamilton County Sheriff's spokesman Jim Knapp said.

Girl killed, dozens injured in pair of massive pile-up crashes

Whiteout snow conditions blamed for crashes on I-275, I-75

UPDATED 7:40 PM EST Jan 22, 2013

Police said Sammy Reagan was killed after the car she was riding in was involved in the weather-related accident.

The Kings School District released a statement Tuesday that said Sammy was a sixth-grader at Columbia Elementary School in Maineville.

She had a twin brother as well as a younger brother.

"Sammy just brought sunshine everywhere she went," teacher Mike Luke said.

Funeral arrangements have not been released.

The crashes were reported in the westbound and eastbound lanes of I-275 at Hamilton Avenue and on southbound I-75 between Middletown and Monroe at the 31 mile marker.

The I-275 crash involved 70 passenger vehicles and 16 commercial vehicles, sheriff's deputies said.

The girl had gotten out of a damaged vehicle and was standing near a cable median barrier when another vehicle struck the cable, which then struck her. She was pronounced dead at 12:24 p.m. at Mercy Fairfield Hospital. Earlier reports had indicated she was an adult woman.

APPENDIX C – HISTORICAL HAZARDS FROM NCDC

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
CINCINNATI	29-JAN-08	THUNDERSTORM WIND	50	0	0	3K	0	Large trees were knocked down. A line of severe thunderstorms along a strong cold front produced wind damage across southern and western Ohio.
DAYTON	05-FEB-08	FLOOD	0	0	0	5K	0	A mudslide closed a portion of Delta Avenue in Columbia-Tusculum. The mudslide encompassed a parked vehicle. A line of severe thunderstorms developed during the late evening ahead of a strong cold front.
IDLEWILD	15-MAY-08	FLOOD	0	0	0	2K	0	Several roads had high water in the city of Cincinnati. A slow moving low pressure system brought an extended period of moderate to heavy rain to southern Ohio.
CINCINNATI	03-JUN-08	THUNDERSTORM WIND	50	0	0	8K	0	Trees were knocked down across the county. Thunderstorms developed in the afternoon along a northward moving warm front. Additional thunderstorms developed during the evening as the front moved north.
IDLEWILD	04-JUN-08	HAIL	88	0	0	3K	0	Strong thunderstorms continued to develop and track along a warm front that was stalled over the region. Training storms caused excessive rainfall in some areas.
HARRISON ARPT	04-JUN-08	FLASH FLOOD	0	0	0	3K	0	Several major interchanges were flooded throughout the Cincinnati metro area. Strong thunderstorms continued to develop and track along a warm front that was stalled over the region. Training storms caused excessive rain.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
RENDCOMB JCT	04-JUN-08	THUNDERSTORM WIND	56	0	0	15K	0	Numerous large tree limbs were blown down, up to 20 to 40 feet long and a foot in diameter. Many smaller trees and power lines were downed. Damage started west of the intersection of Erie and Delta Roads in Hyde Park, moving east.
VILLAGE OF INDIAN HILL	04-JUN-08	THUNDERSTORM WIND	50	0	0	5K	0	Numerous trees and large limbs were downed. Strong thunderstorms continued to develop and track along a warm front that was stalled over the region. Training storms caused excessive rainfall in some areas.
RED BANK	04-JUN-08	TORNADO	0	0	0	40K	0	A broken damage path suggesting brief tornadic touchdowns was found just west of Newtown in eastern Hamilton County. Numerous trees were broken off on both sides of the Little Miami River to the northwest of Clear Creek Park.
NEWTOWN	28-JUN-08	THUNDERSTORM WIND	56	0	0	2K	0	A cold front crossed the region overnight on the 28th with numerous reports of damaging winds, large hail, and measured strong wind gusts.
NORTH BEND	22-JUL-08	THUNDERSTORM WIND	50	0	0	8K	0	Trees were knocked down across the western Cincinnati suburbs. A severe mesoscale convective system moved across the southern half of the forecast area during the early morning.
SPRINGDALE	08-JUL-08	HAIL	75	0	0	1K	0	Strong to severe thunderstorms developed during the afternoon and evening as a cold front moved through the region.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
MADEIRA	28-JUN-08	THUNDERSTORM WIND	56	0	0	3K	0	A 65 mph gust was estimated in Madeira. Penny size hail also fell in the storm. A cold front crossed the region overnight on the 28th with numerous reports of damaging winds, large hail, and measured strong wind gusts.
CRESCENTVILLE	08-JUL-08	THUNDERSTORM WIND	52	0	0	20K	0	A building collapsed on Mosteller Road. Numerous trees and power lines were downed in the Cottingham area. Strong to severe thunderstorms developed during the afternoon and evening as a cold front moved through the region.
WHITE WATER PARK	20-JUL-08	THUNDERSTORM WIND	50	0	0	10K	0	Several homes had shingles peeled off their roofs and antennas knocked down. Large tree limbs were also downed. A complex of severe thunderstorms moved across the region during the evening.
BRIDGETOWN	20-JUL-08	THUNDERSTORM WIND	50	0	0	5K	0	Numerous trees were knocked down across the western Cincinnati suburbs. A complex of severe thunderstorms moved across the region during the evening.
CUMMINGSVILLE	22-JUL-08	THUNDERSTORM WIND	52	0	0	15K	0	Widespread trees were downed from Avondale to Norwood. A 60 mph gust was estimated in Madeira. A home in Reading had roof shingles and shutters peeled off. A severe mesoscale convective system moved across the southern part of the state.
EVENDALE	28-JUN-08	THUNDERSTORM WIND	50	0	0	3K	0	Several trees and power lines were downed. A cold front crossed the region overnight on the 28th with numerous reports of damaging winds, large hail, and measured strong wind gusts.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
AMBERELEY	11-FEB-09	THUNDERSTORM WIND	50	0	0	1K	0	Scattered severe thunderstorms developed during the afternoon and evening.
DELHI HILLS	11-FEB-09	HAIL	75	0	0	1K	0	Scattered severe thunderstorms developed during the afternoon and evening.
MADEIRA	11-FEB-09	THUNDERSTORM WIND	52	0	0	1K	0	Scattered severe thunderstorms developed during the afternoon and evening.
MONTGOMERY	30-MAY-09	HAIL	100	0	0	5K	0	Supercells developed across southwest and south central Ohio during the evening as a warm front moved across the region, producing large hail and two tornadoes.
NEWTOWN	30-MAY-09	HAIL	88	0	0	3K	0	Supercells developed across southwest and south central Ohio during the evening as a warm front moved across the region, producing large hail and two tornadoes.
CRESCENTVILLE	30-MAY-09	HAIL	88	0	0	3K	0	Supercells developed across southwest and south central Ohio during the evening as a warm front moved across the region, producing large hail and two tornadoes. The hail fell near the Interstate 75/275 interchange.
CINCINNATI	02-JUN-09	HAIL	100	0	0	0	0	A frontal boundary stalled over the Ohio Valley and combined with an upper level short wave to produce damaging storms across the region. Several reports were received from in and around Cincinnati of three quarters to inch size.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
HYDE PARK	02-JUN-09	FLASH FLOOD	0	0	0	1K	0	A frontal boundary stalled over the Ohio Valley and combined with an upper level short wave to produce damaging storms across the region. Standing water blocked interstate 71 at the Dana Avenue exit. Creeks and streams flooded.
DELHI HILLS	02-JUN-09	HAIL	100	0	0	0	0	A frontal boundary stalled over the Ohio Valley and combined with an upper level short wave to produce damaging storms across the region.Spotters and public reported one inch hail from Price Hill to Saint Bernard.
ADDYSTON	25-JUN-09	HAIL	125	0	0	0	0	A weak boundary along the Ohio River provided a focus for thunderstorm activity ahead of a cold front. This translated to a weak trough axis that extended from northern Kentucky to central Ohio later in the day.
FORESTVILLE	26-JUN-09	HAIL	125	0	0	0K	0	A weak boundary along the Ohio River provided a focus for thunderstorm activity ahead of a cold front. This translated to a weak trough axis that extended from northern Kentucky to central Ohio later in the day.
CHEVIOT	26-JUN-09	THUNDERSTORM WIND	51	0	0	3K	0	A weak boundary along the Ohio River provided a focus for thunderstorm activity ahead of a cold front. This translated to a weak trough axis that extended from northern Kentucky to central Ohio later in the day.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
READING	26-JUN-09	THUNDERSTORM WIND	52	0	0	6K	0	A weak boundary along the Ohio River provided a focus for thunderstorm activity ahead of a cold front. This translated to a weak trough axis that extended from northern Kentucky to central Ohio later in the day.
LUNKEN FIELD	30-JUL-09	FLASH FLOOD	0	0	0	5K	0	A large area of showers and thunderstorms brought flash flooding and flooding to portions of Ohio. High water and a small rock slide occurred on the Columbia Parkway.
CINCINNATI	05-APR-10	HAIL	75	0	0	0K	0	Supercells developed along a warm front initially affecting northern Kentucky during the late afternoon hours. Activity increased and developed into multicell clusters as it lifted northeast across the area.
NORWOOD	02-JUN-10	THUNDERSTORM WIND	50	0	0	1K	0	The atmosphere eventually recovered from the passage of an outflow boundary in the morning. Storms developed along a convergent axis ahead of a surface trough. Lift was aided by an enhanced short wave moving across Indiana.
CINCINNATI	15-JUN-10	FLASH FLOOD	0	0	0	2K	0	A Mesoscale Convective System developed along a surface wave over Illinois and Indiana during mid to late afternoon. It evolved into a squall line as it moved into the area, although there were some discrete storms that developed.
PLEASANT RUN FARMS	21-JUN-10	THUNDERSTORM WIND	50	0	0	1K	0	Severe weather occurred during the morning and into the early afternoon hours of June 21st. The main threat was damaging thunderstorm winds. Eight large trees were reported down due to damaging winds.thunderstorm winds.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
ST BERNARD	21-JUN-10	THUNDERSTORM WIND	50	0	0	10K	0	Severe weather occurred during the morning and into the early afternoon hours of June 21st. The main threat was damaging thunderstorm winds. A large tree branch was blown into a roof of a home. The roof of the home was damaged.
CINCINNATI	27-JUN-10	FLASH FLOOD	0	0	0	2K	0	Severe weather developed during the day of June 27th. The main threats were damaging winds and flash flooding. Some neighborhoods had flooded streets due to heavy rainfall.
MADEIRA	28-JUN-10	FLASH FLOOD	0	0	0	5K	0	Severe weather developed during the day of June 27th. The main threats were damaging winds and flash flooding.Significant standing water was reported in some locations.
CINCINNATI	17-JUL-10	HAIL	100	0	0	0	0	Scattered thunderstorms developed during the afternoon hours of July 17th. The main threat from these storms was hail.
DELHI	17-JUL-10	HAIL	75	0	0	0	0	Scattered thunderstorms developed during the afternoon hours of July 17th. The main threat from these storms was hail.
CINCINNATI	15-AUG-10	THUNDERSTORM WIND	50	0	0	2K	0	Isolated severe weather developed during the afternoon hours of August 15th. The main threat was damaging winds. A couple of trees and some power lines were reported down across the northern part of the city.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
CINCINNATI	26-OCT-10	THUNDERSTORM WIND	60	0	0	5K	0	A historically deep low pressure system sent a very strong cold front into a marginally unstable, but very sheared environment. A line of storms formed west of the area overnight and moved into the region during the peak heating hours
CINCINNATI	28-FEB-11	THUNDERSTORM WIND	50	0	0	3K	0	A line of severe storms moved through during the morning hours of February 28th. The main threats were damaging winds and flash flooding, however one tornado also occurred with this event. Numerous trees were reported down.
VILLAGE OF INDIAN HILL	23-MAR-11	THUNDERSTORM WIND	50	0	1	10K	0	An upper level jet stream tracking through the Ohio Valley combined with low pressure at the surface to produce severe thunderstorms during the afternoon of March 23rd. Several supercells developed producing large hail.
HARRISON	23-MAR-11	HAIL	88	0	0	0	0	An upper level jet stream tracking through the Ohio Valley combined with low pressure at the surface to produce severe thunderstorms during the afternoon of March 23rd. Several supercells developed producing large hail.
HARRISON	19-APR-11	HEAVY RAIN	0	0	0	1K	0	An area of storms moved through during the morning hours of April 19th bringing hail to the region.Urban flooding occurred due to heavy rainfall.
NORWOOD	20-APR-11	THUNDERSTORM WIND	63	0	0	0	0	A line of storms moved through the area during the late night hours of April 19th and into the early morning hours of April 20th.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
NEWTOWN	20-APR-11	THUNDERSTORM WIND	50	0	0	5K	0	A line of storms moved through the area during the late night hours of April 19th and into the early morning hours of April 20th. A large one-hundred year old tree was knocked down onto a house.
VALLEY JCT	20-APR-11	FLOOD	0	0	0	10K	0	A line of storms moved through the area during the late night hours of April 19th and into the early morning hours of April 20th. Buildings at a canoe rental and a driving range were inundated with water.
LUNKEN FIELD	20-APR-11	THUNDERSTORM WIND	58	0	0	0	0	A line of storms moved through the area during the late night hours of April 19th and into the early morning hours of April 20th.
MT ST JOSEPH	20-APR-11	THUNDERSTORM WIND	50	0	0	2K	0	A line of storms moved through the area during the late night hours of April 19th and into the early morning hours of April 20th. A large sign was blown onto the highway due to damaging thunderstorm winds.
CINCINNATI	20-APR-11	THUNDERSTORM WIND	50	0	0	1K	0	A line of storms moved through the area during the late night hours of April 19th and into the early morning hours of April 20th. Large tree branches were broken due to damaging thunderstorm winds.
DENT	22-APR-11	FLOOD	0	0	0	1K	0	Showers and thunderstorms moved through the area during the afternoon hours. These storms produced heavy rainfall which caused some flooding across the area.Six inches to a foot of standing water was reported on roadways.
CINCINNATI	23-APR-11	HEAVY RAIN	0	0	0	1K	0	A complex of showers and thunderstorms moved through the area during the early morning hours. A portion of Interstate 471 had high water on it due to heavy rainfall.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
MT ST JOSEPH	23-APR-11	FLASH FLOOD	0	0	0	1K	0	A line of storms moved through during the afternoon hours of April 23rd. Damaging thunderstorm winds, tornadoes, and flash flooding occurred with this event. Foley Road had seven inches of flowing water across it.
NORTH BEND	10-JUN-11	HAIL	75	0	0	0	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.
CLEVES	10-JUN-11	HAIL	100	0	0	0	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.
DELHI	10-JUN-11	HAIL	75	0	0	0	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.
ADDYSTON	10-JUN-11	HAIL	75	0	0	0	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
DELHI	10-JUN-11	HAIL	88	0	0	0	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.
BRIDGETOWN	10-JUN-11	HEAVY RAIN	0	0	0	0	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.
LUNKEN FIELD	10-JUN-11	THUNDERSTORM WIND	50	0	0	0	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.
LUNKEN FIELD	10-JUN-11	THUNDERSTORM WIND	55	0	0	0	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.
DENT	10-JUN-11	FLASH FLOOD	0	0	0	15K	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
CLEVES	10-JUN-11	THUNDERSTORM WIND	50	0	0	2K	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.
HARRISON	10-JUN-11	HAIL	100	0	0	0	0	Non-severe early morning convection over the Ohio River produced a deep outflow boundary across northern Kentucky, southeast Indiana, and southern Ohio. This boundary triggered the development of severe thunderstorms during the late morning.
MT WASHINGTON	21-JUN-11	FLASH FLOOD	0	0	0	1K	0	An approaching shortwave trough combined with ample instability in a warm and moist air mass across Ohio and Northern Kentucky during the afternoon. This led to the development of severe thunderstorms that also produced flash flooding.
CHERRY GROVE	21-JUN-11	FLASH FLOOD	0	0	0	1K	0	An approaching shortwave trough combined with ample instability in a warm and moist air mass across Ohio and Northern Kentucky during the afternoon. This led to the development of severe thunderstorms that also produced flash flooding.
FERNBANK	03-AUG-11	THUNDERSTORM WIND	50	0	0	1K	0	A line of convection ahead of a cold front produced severe weather across parts of Ohio during the morning hours. The main threat from these storms was damaging thunderstorm winds. Large tree limbs were reported down.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
PLEASANT RUN FARMS	07-AUG-11	THUNDERSTORM WIND	50	0	0	3K	0	A cluster of storms in Indiana organized into a bow echo during the afternoon and then moved into Ohio. This produced severe weather across the central parts of Ohio. The main threat from these storms was damaging thunderstorm winds.
FORESTVILLE	08-AUG-11	HAIL	88	0	0	0	0	Thunderstorms developed along a dewpoint boundary extending from central Illinois, through southern Indiana, and into central Kentucky. Some of these storms produced severe weather. The main threats from these storms were large hail and winds.
CUMMINGSVILLE	26-SEP-11	HEAVY RAIN	0	0	0	0	0	A slow moving cold front produced heavy rainfall totals across western Ohio.Cars were stuck in high water due to heavy rain. One house had flooding in the basement.
MILFORD	05-DEC-11	FLOOD	0	0	0	1K	0	A low pressure system combined with a slow moving cold front to produce widespread rain across the Ohio Valley. The result of the heavy rain was numerous reports of flooding in the area. Some of the flooding lingered into the morning hours.
CINCINNATI	05-DEC-11	FLOOD	0	0	0	1K	0	A low pressure system combined with a slow moving cold front to produce widespread rain across the Ohio Valley. The result of the heavy rain was numerous reports of flooding in the area. Some of the flooding lingered into the morning hours.
IDLEWILD	17-JAN-12	FLOOD	0	0	0	1K	0	An area of convection ahead of a strong cold front produced heavy rain across parts of the Ohio Valley during the morning hours. As a result, some flooding occurred across southern Ohio during the late morning and early afternoon hours.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
MARIEMONT	17-JAN-12	FLOOD	0	0	0	1K	0	An area of convection ahead of a strong cold front produced heavy rain across parts of the Ohio Valley during the morning hours. As a result, some flooding occurred across southern Ohio during the late morning and early afternoon hours.
DAYTON	17-JAN-12	FLOOD	0	0	0	1K	0	An area of convection ahead of a strong cold front produced heavy rain across parts of the Ohio Valley during the morning hours. As a result, some flooding occurred across southern Ohio during the late morning and early afternoon hours.
BRIDGETOWN	17-JAN-12	FLOOD	0	0	0	1K	0	An area of convection ahead of a strong cold front produced heavy rain across parts of the Ohio Valley during the morning hours. As a result, some flooding occurred across southern Ohio during the late morning and early afternoon hours.
MONTGOMERY	17-JAN-12	FLOOD	0	0	0	1K	0	An area of convection ahead of a strong cold front produced heavy rain across parts of the Ohio Valley during the morning hours. As a result, some flooding occurred across southern Ohio during the late morning and early afternoon hours.
CINCINNATI	15-MAR-12	FLASH FLOOD	0	0	0	1K	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
MT WASHINGTON	15-MAR-12	FLASH FLOOD	0	0	0	1K	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.
CINCINNATI	15-MAR-12	FLASH FLOOD	0	0	0	1K	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.
WHITE OAK	15-MAR-12	HAIL	100	0	0	0	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.
MT WASHINGTON	15-MAR-12	FLASH FLOOD	0	0	0	1K	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.
WHITE OAK	15-MAR-12	HAIL	100	0	0	0	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
MT WASHINGTON	15-MAR-12	FLASH FLOOD	0	0	0	1K	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.
CINCINNATI	15-MAR-12	FLASH FLOOD	0	0	0	1K	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.
LOVELAND	15-MAR-12	HAIL	100	0	0	0	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.
LOVELAND	15-MAR-12	HAIL	88	0	0	0	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.
WHITE OAK	15-MAR-12	HAIL	100	0	0	0	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
LOVELAND	15-MAR-12	HAIL	88	0	0	0	0	Slow moving and redeveloping thunderstorms produced heavy rain over portions of the Ohio Valley during the morning hours. Some locations experienced flooding from the rainfall. A few of these storms also produced large hail.
SILVERTON	30-MAR-12	THUNDERSTORM WIND	50	0	0	1K	0	Thunderstorms developed ahead of a cold front, with modest shear and instability in place. The severe weather threat from these storms was large hail and damaging thunderstorm winds. A large limb fell and took utility wires down.
ST BERNARD	30-MAR-12	HAIL	75	0	0	0	0	Thunderstorms developed ahead of a cold front, with modest shear and instability in place. The severe weather threat from these storms was large hail and damaging thunderstorm winds.
ST BERNARD	30-MAR-12	HAIL	100	0	0	0	0	Thunderstorms developed ahead of a cold front, with modest shear and instability in place. The severe weather threat from these storms was large hail and damaging thunderstorm winds.
NORTH COLLEGE HILL	30-MAR-12	THUNDERSTORM WIND	50	0	0	2K	0	Thunderstorms developed ahead of a cold front, with modest shear and instability in place. The severe weather threat from these storms was large hail and damaging thunderstorm winds. Large trees were reported down.
SILVERTON	30-MAR-12	THUNDERSTORM WIND	50	0	0	1K	0	Thunderstorms developed ahead of a cold front, with modest shear and instability in place. The severe weather threat from these storms was large hail and damaging thunderstorm winds. A large limb fell and took utility wires down.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
NORTH COLLEGE HILL	30-MAR-12	THUNDERSTORM WIND	50	0	0	2K	0	Thunderstorms developed ahead of a cold front, with modest shear and instability in place. The severe weather threat from these storms was large hail and damaging thunderstorm winds. Large trees were reported down due to high winds.
NORTH COLLEGE HILL	30-MAR-12	THUNDERSTORM WIND	50	0	0	2K	0	Thunderstorms developed ahead of a cold front, with modest shear and instability in place. The severe weather threat from these storms was large hail and damaging thunderstorm winds.Large trees were reported down.
DEER PARK	01-APR-12	HAIL	100	0	0	0	0	A cold front dropping south across the Ohio Valley helped to trigger thunderstorm development in an unstable environment with deep shear. Some of these storms became severe with large hail and heavy rainfall being the main threats.
SHARONVILLE	01-APR-12	HEAVY RAIN	0	0	0	0	0	A cold front dropping south across the Ohio Valley helped to trigger thunderstorm development in an unstable environment with deep shear. Some of these storms became severe with large hail and heavy rainfall being the main threats.
SHARONVILLE	01-APR-12	HAIL	75	0	0	0	0	A cold front dropping south across the Ohio Valley helped to trigger thunderstorm development in an unstable environment with deep shear. Some of these storms became severe with large hail and heavy rainfall being the main threats.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
SHARONVILLE	01-APR-12	HAIL	100	0	0	0	0	A cold front dropping south across the Ohio Valley helped to trigger thunderstorm development in an unstable environment with deep shear. Some of these storms became severe with large hail and heavy rainfall being the main threats.
HARRISON	01-APR-12	HAIL	100	0	0	0	0	A cold front dropping south across the Ohio Valley helped to trigger thunderstorm development in an unstable environment with deep shear. Some of these storms became severe with large hail and heavy rainfall being the main threats.
CLEVES	25-APR-12	HAIL	125	0	0	0	0	Low pressure moving across the region helped trigger thunderstorms in an unstable environment. Several of these storms became severe, with the main threat being large hail.
HARRISON	25-APR-12	HAIL	75	0	0	0	0	Low pressure moving across the region helped trigger thunderstorms in an unstable environment. Several of these storms became severe, with the main threat being large hail.
WYOMING	01-MAY-12	FLASH FLOOD	0	0	0	1K	0	A warm front lifting across the Ohio Valley during the morning brought into the area a very unstable airmass. Numerous thunderstorms developed during the afternoon and evening. The environment was favorable for large hail and damaging winds.
WHITE OAK	01-MAY-12	HAIL	175	0	0	0	0	A warm front lifting across the Ohio Valley during the morning brought into the area a very unstable airmass. Numerous thunderstorms developed during the afternoon and evening. The environment was favorable for large hail and damaging winds.

Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
DENT	01-MAY-12	HAIL	100	0	0	0	0	A warm front lifting across the Ohio Valley during the morning brought into the area a very unstable airmass. Numerous thunderstorms developed during the afternoon and evening. The environment was favorable for large hail and damaging winds.
WYOMING	01-MAY-12	HAIL	100	0	0	0	0	A warm front lifting across the Ohio Valley during the morning brought into the area a very unstable airmass. Numerous thunderstorms developed during the afternoon and evening. The environment was favorable for large hail and damaging winds.
CINCINNATI	01-MAY-12	HAIL	175	0	0	0	0	A warm front lifting across the Ohio Valley during the morning brought into the area a very unstable airmass. Numerous thunderstorms developed during the afternoon and evening. The environment was favorable for large hail and damaging winds.
SHARONVILLE	01-MAY-12	FLASH FLOOD	0	0	0	1K	0	A warm front lifting across the Ohio Valley during the morning brought into the area a very unstable airmass. Numerous thunderstorms developed during the afternoon and evening. The environment was favorable for large hail and damaging winds.
DEER PARK	01-MAY-12	HAIL	175	0	0	0	0	A warm front lifting across the Ohio Valley during the morning brought into the area a very unstable airmass. Numerous thunderstorms developed during the afternoon and evening. The environment was favorable for large hail and damaging winds.

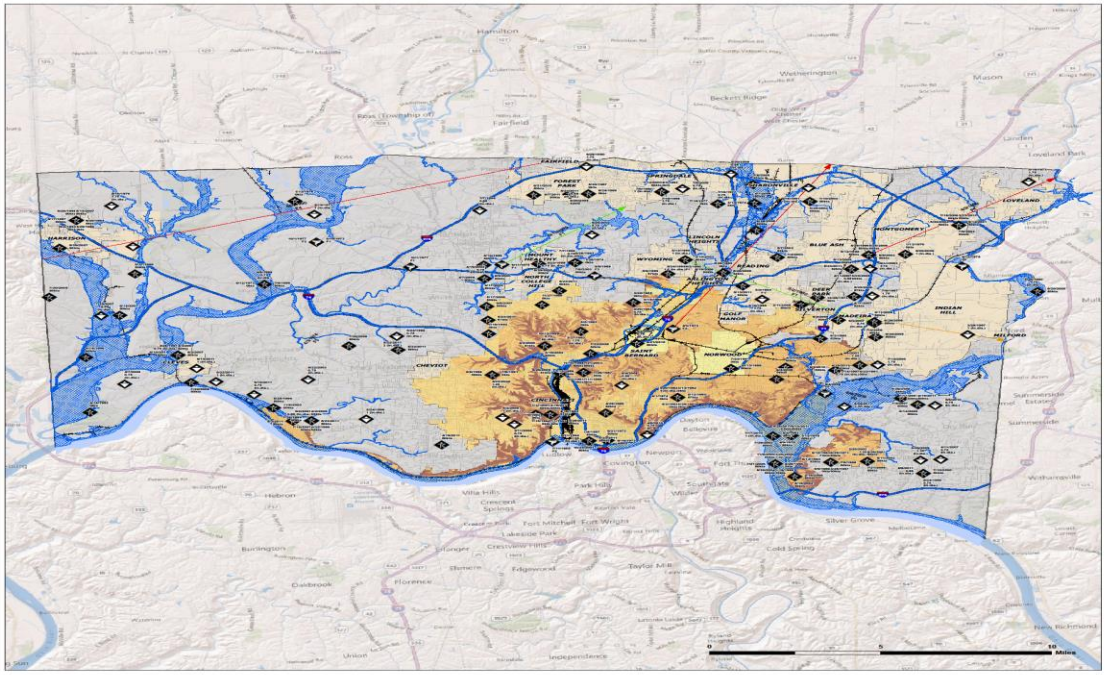
Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
WHITE WATER PARK	01-MAY-12	FLASH FLOOD	0	0	0	5K	0	A warm front lifting across the Ohio Valley during the morning brought into the area a very unstable airmass. Numerous thunderstorms developed during the afternoon and evening. The environment was favorable for large hail and damaging winds.
TWIGHTWEE	02-MAY-12	FLASH FLOOD	0	0	0	1K	0	A warm front lifting across the Ohio Valley during the morning brought into the area a very unstable airmass. Numerous thunderstorms developed during the afternoon and evening. The environment was favorable for large hail and damaging winds.
MADEIRA	29-JUN-12	THUNDERSTORM WIND	50	0	0	1K	0	A very hot and potentially unstable airmass interacted with northwesterly flow aloft to produce a derecho across northern Illinois. This derecho then moved rapidly east southeast across the Ohio Valley producing widespread straight line winds.
BLUE ASH ARPT	29-JUN-12	THUNDERSTORM WIND	50	0	0	1K	0	A very hot and potentially unstable airmass interacted with northwesterly flow aloft to produce a derecho across northern Illinois. This derecho then moved rapidly east southeast across the Ohio Valley producing widespread straight line
HARRISON	29-JUN-12	THUNDERSTORM WIND	60	0	0	0	0	A very hot and potentially unstable airmass interacted with northwesterly flow aloft to produce a derecho across northern Illinois. This derecho then moved rapidly east southeast across the Ohio Valley producing widespread straight line winds.

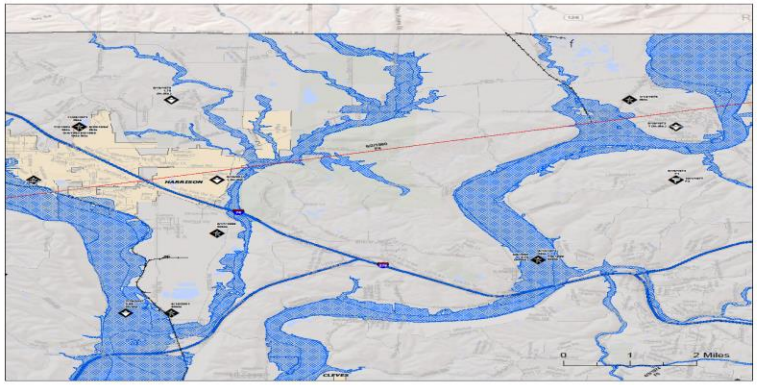
Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
CHERRY GROVE	29-JUN-12	THUNDERSTORM WIND	50	0	0	1K	0	A very hot and potentially unstable airmass interacted with northwesterly flow aloft to produce a derecho across northern Illinois. This derecho then moved rapidly east southeast across the Ohio Valley producing widespread straight line winds.
MADEIRA	29-JUN-12	THUNDERSTORM WIND	56	0	0	2K	0	A very hot and potentially unstable airmass interacted with northwesterly flow aloft to produce a derecho across northern Illinois. This derecho then moved rapidly east southeast across the Ohio Valley producing widespread straight line winds.
LUNKEN FIELD	29-JUN-12	THUNDERSTORM WIND	51	0	0	0	0	A very hot and potentially unstable airmass interacted with northwesterly flow aloft to produce a derecho across northern Illinois. This derecho then moved rapidly east southeast across the Ohio Valley producing widespread straight line winds.
MONTGOMERY	01-JUL-12	HAIL	100	0	0	0	0	An upper level disturbance combined with daytime heating to produce numerous thunderstorms during the afternoon and evening. The main threats from these storms were large hail and damaging winds.
SHARONVILLE	01-JUL-12	HAIL	88	0	0	0	0	An upper level disturbance combined with daytime heating to produce numerous thunderstorms during the afternoon and evening. The main threats from these storms were large hail and damaging winds.
LOVELAND	01-JUL-12	HAIL	88	0	0	0	0	An upper level disturbance combined with daytime heating to produce numerous thunderstorms during the afternoon and evening. The main threats from these storms were large hail and damaging winds.

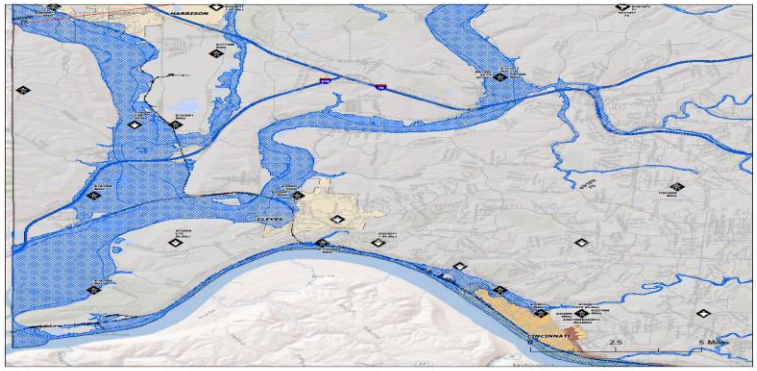
Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
FOREST PARK	05-JUL-12	HAIL	100	0	0	0	0	Thunderstorms developed in a very warm airmass during the afternoon and evening hours. The main threats from these storms were damaging thunderstorm winds and large hail.
WHITE WATER PARK	18-JUL-12	THUNDERSTORM WIND	50	0	0	20K	0	A very moist and unstable air mass combined with a cold front dropping south into the Ohio Valley to produce numerous areas of convection. The threats from these storms included large hail, damaging thunderstorm winds, and flash flooding.
DELHI	18-JUL-12	THUNDERSTORM WIND	52	0	0	2K	0	A very moist and unstable air mass combined with a cold front dropping south into the Ohio Valley to produce numerous areas of convection. The threats from these storms included large hail, damaging thunderstorm winds, and flash flooding.
DENT	18-JUL-12	THUNDERSTORM WIND	55	0	0	0	0	A very moist and unstable air mass combined with a cold front dropping south into the Ohio Valley to produce numerous areas of convection. The threats from these storms included large hail, damaging thunderstorm winds, and flash flooding.
HARRISON	18-JUL-12	HAIL	75	0	0	0	0	A very moist and unstable air mass combined with a cold front dropping south into the Ohio Valley to produce numerous areas of convection. The threats from these storms included large hail, damaging thunderstorm winds, and flash flooding.
CINCINNATI	18-JUL-12	FLASH FLOOD	0	0	0	10K	0	A very moist and unstable air mass combined with a cold front dropping south into the Ohio Valley to produce numerous areas of convection. The threats from these storms included large hail, damaging thunderstorm winds, and flash flooding.

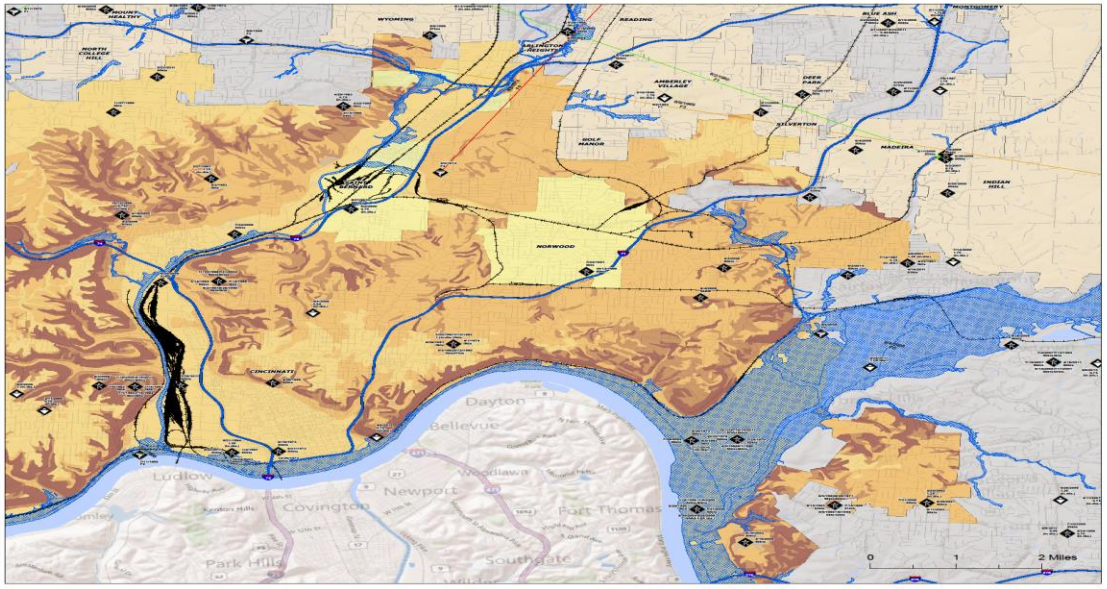
Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
MACK	18-JUL-12	THUNDERSTORM WIND	50	0	0	1K	0	A very moist and unstable air mass combined with a cold front dropping south into the Ohio Valley to produce numerous areas of convection. The threats from these storms included large hail, damaging thunderstorm winds, and flash flooding.
MADEIRA	18-JUL-12	HAIL	125	0	0	0	0	A very moist and unstable air mass combined with a cold front dropping south into the Ohio Valley to produce numerous areas of convection. The threats from these storms included large hail, damaging thunderstorm winds, and flash flooding.
BLUE ASH ARPT	24-JUL-12	THUNDERSTORM WIND	50	0	0	10K	0	An organized thunderstorm complex moved southeastward into the Ohio Valley ahead of a cold front during the morning hours and pushed through the area into the early afternoon. The main threats from the storms in this complex were damaging winds.
RENDCOMB JCT	26-JUL-12	THUNDERSTORM WIND	50	0	0	30K	0	Strong upper level winds combined with an unstable airmass to produce widespread convection during the afternoon hours. The primary threats from these storms were damaging winds and large hail. Several large trees fell.
DAYTON	26-JUL-12	THUNDERSTORM WIND	50	0	0	2K	0	Strong upper level winds combined with an unstable airmass to produce widespread convection during the afternoon hours. The primary threats from these storms were damaging winds and large hail. Trees were reported down.

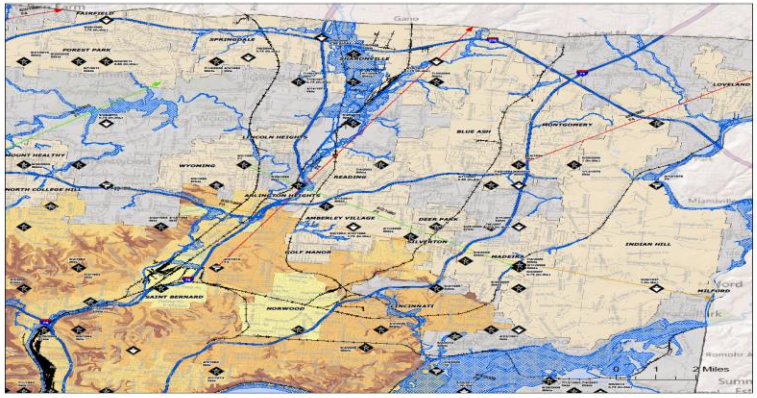
Location	Date	Type	Magnitude	Death	Injury	Property Damage	Crop Damage	Description
CINCINNATI	26-JUL-12	HAIL	100	0	0	0	0	Strong upper level winds combined with an unstable airmass to produce widespread convection during the afternoon hours. The primary threats from these storms were damaging winds and large hail.
DELHI	27-JUL-12	THUNDERSTORM WIND	55	0	0	1K	0	A surface low moving through the area helped to trigger the development of clusters of thunderstorms during the afternoon and evening. Some of these storms became organized, increasing the threat of damaging winds.
IDLEWILD	27-JUL-12	THUNDERSTORM WIND	50	0	0	1K	0	A surface low moving through the area helped to trigger the development of clusters of thunderstorms during the afternoon and evening. Some of these storms became organized, increasing the threat of damaging winds.
DELHI	27-JUL-12	THUNDERSTORM WIND	55	0	0	1K	0	A surface low moving through the area helped to trigger the development of clusters of thunderstorms during the afternoon and evening. Some of these storms became organized, increasing the threat of damaging winds.
NORTH BEND	27-JUL-12	THUNDERSTORM WIND	50	0	0	3K	0	A surface low moving through the area helped to trigger the development of clusters of thunderstorms during the afternoon and evening. Some of these storms became organized, increasing the threat of damaging winds.











Hamilton County, OH
Pre-Disaster Mitigation Plan
Historical Natural Hazards Map

Legend

- Severe Thunderstorm (Hail Event)
- Severe Thunderstorm (Wind Event)
- Tornado Touchdown

Tornado Track
FScale
- 1
- 2
- 3
- 4

Landslide
POTENTIAL
- Low Susceptibility
- High Susceptibility

- Interstate
- Local Road
- Railroad
- River
- Lake
- 100 Year Flood Area
- City

N
W E
S

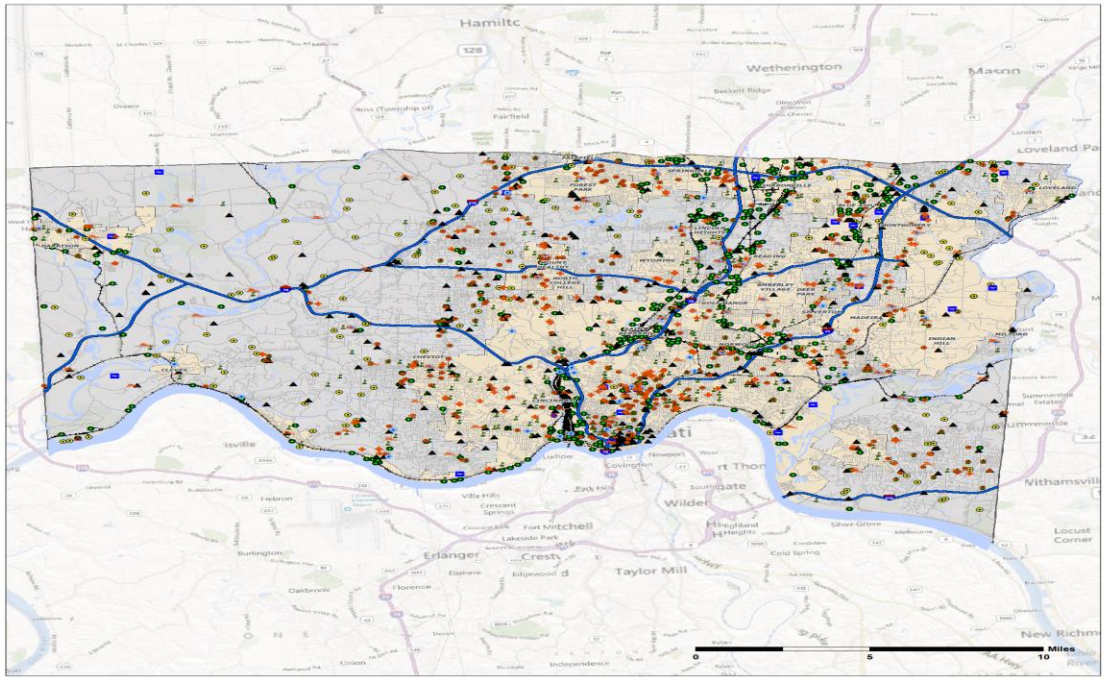
Data Sources: NOAA; CAGIS; University of Cincinnati

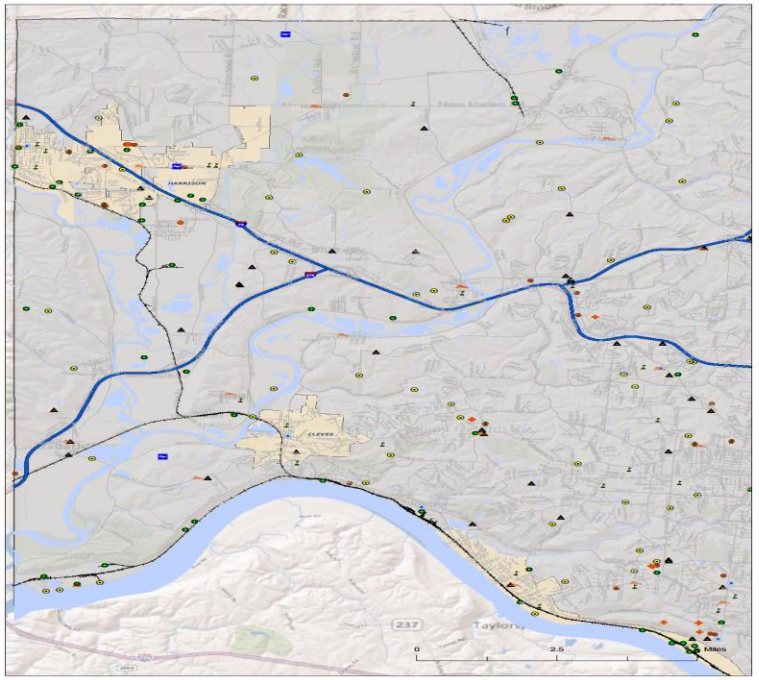
University of Cincinnati

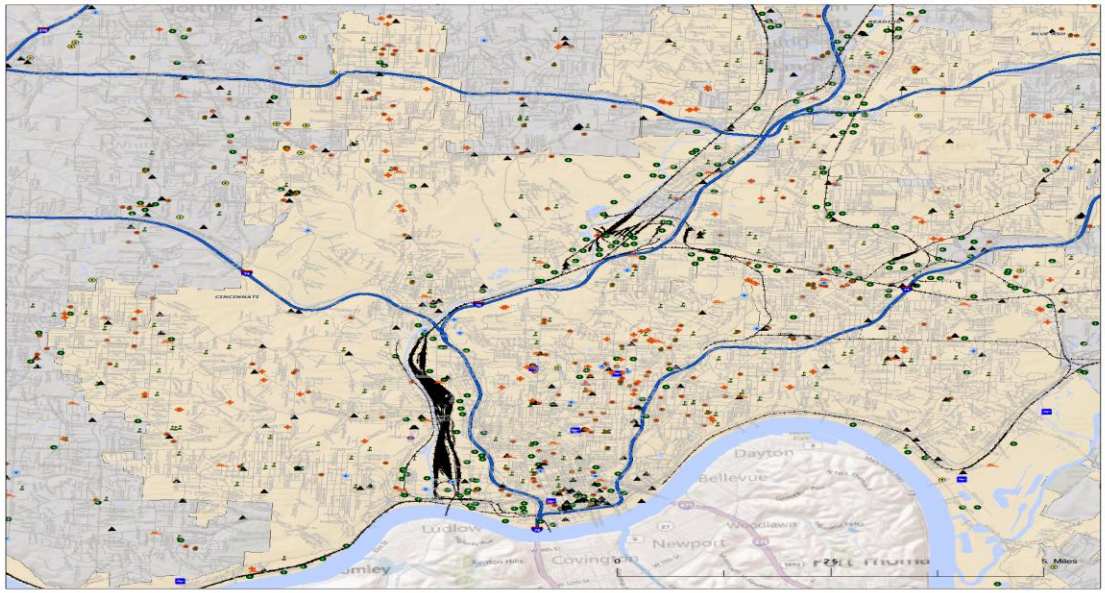
The Polis Center

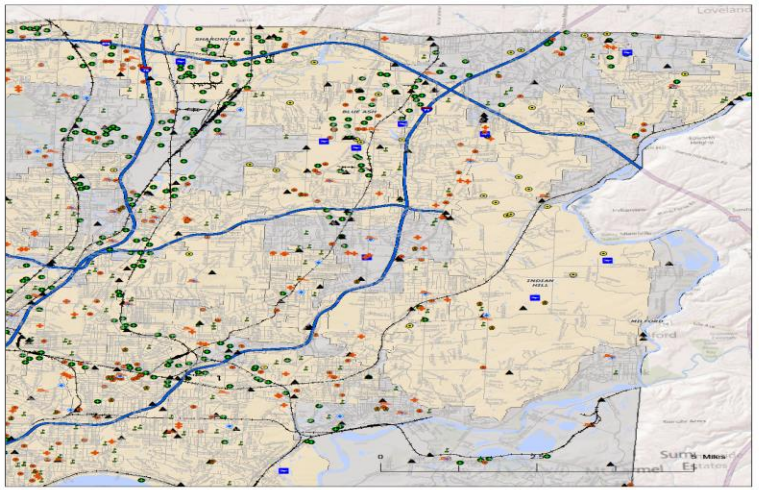
APPENDIX E – ADOPTING RESOLUTIONS

Adopted Resolutions on file at the Hamilton County EMA Office









Hamilton County, OH
Pre-Disaster Mitigation Plan
Critical Facilities Map

Legend

- Care Facility
- Emergency Operation Center
- Fire Station
- Police Station
- School
- Emergency Planning Facility
- Airport
- Bus Facility
- Communication Facility
- Dams
- Electric Power Facility
- Hazardous Material
- Oil Facilities
- Potable Water Facility
- Wastewater Facility
- Interstate
- Local Road
- Railroad
- River
- Lake
- City

N
W
E
S

Data Sources: NOAA;CAGIS;University of Cincinnati

UNIVERSITY OF Cincinnati

The Polis Center
INDIANA UNIVERSITY-PURDUE UNIVERSITY INDIANAPOLIS

APPENDIX G – LIST OF CRITICAL AND ESSENTIAL FACILITIES

Class	Name	Address	City
Airport	Belcan	10200 Anderson Way	Blue Ash
Airport	Galenstein Park	5677 Creek Rd	Blue Ash
Airport	9 Newsport	500 Central Ave	Cincinnati
Airport	Brown	171 Pedretti Ave	Cincinnati
Airport	Christ Hospital	2139 Auburn Ave	Cincinnati
Airport	Cincinnati Municipal Airport Lunken Fiel	262 Wilmer Ave	Cincinnati
Airport	Cincinnati-Blue Ash	City Hall	Cincinnati
Airport	Good Samaritan Hospital	375 Dixmyth Ave	Cincinnati
Airport	Horizons	5055 Wooster Rd	Cincinnati
Airport	The Jewish Hospital	4777 E Galbraith Rd	Cincinnati
Airport	University Hospital/sicu	234 Goodman St. Ml #0736	Cincinnati
Airport	Hamilton County Sheriff's Patrol	11021 Hamilton Ave	Forest Park
Airport	Cincinnati West	3520 Central Pkwy	Harrison
Airport	Raylene	Po Box 439	Harrison
Airport	C C A	9400 Cunningham Rd	Indian Hill
Airport	Gallenstein	7187 Given Rd	Indian Hill
Airport	Bethesda North Hospital	10500 Montgomery Rd	Montgomery
Airport	Lost Bridge	10042 Mt. Nebo Rd	North Bend
Airport	Valley Asphalt	11641 Mosteller Rd	Sharonville
Airport	C.C.A.	9501 Union-cemetary Rd	Loveland
Care	Alaska Acres Care Center	3584 Alaska Avenue	Cincinnati
Care	Alois Alzheimers Center	70 Damon Road	Cincinnati
Care	Anderson Nursing and Rehab Center	8139 Beechmont Avenue	Cincinnati
Care	Archbishop Liebold Home	476 Riddle Road	Cincinnati
Care	Bayley Place	990 Bayley Place Drive	Cincinnati
Care	Beechwood Home	2140 Pogue Avenue	Cincinnati
Care	Blue Ash Nursing and Rehabilitation Cent	4900 Cooper Road	Blue Ash
Care	Brookwood Retirement Community	12100 Reed Hartman Highway	Cincinnati
Care	Burlington House Nursing Home	2222 Springdale Road	Cincinnati
Care	Camargo Manor	7625 Camargo Road	Cincinnati
Care	Clovernook Healthcare Pavillion - Nursin	7025 Clovernook Avenue	Cincinnati

Care	Communicare of Clifton	625 Probasco Street	Cincinnati
Care	Cottingham Retirement Community	3995 Cottingham Drive	Cincinnati
Care	Courtyard At Seasons, Nursing Home	7100 Deerwester Drive	Kenwood
Care	Deupree Community	4001 Rosslyn Drive	Cincinnati
Care	Deupree House	3939 Erie Avenue	Cincinnati
Care	Drake Center/ SNF	151 West Galbraith Road	Cincinnati
Care	Dual Manor Health Care Center	515 Martin Luther King Drive East	Cincinnati
Care	East Galbraith Health Care Center	3889 East Galbraith Road	Cincinnati
Care	East Galbraith Nursing Home	3875 East Galbraith Road	Cincinnati
Care	Garden Park Health Care Center	3536 Washington Avenue	Cincinnati
Care	Glencare Center	3627 Harvey Avenue	Cincinnati
Care	Glendale Place Care Center	779 Glendale Milford Road	Cincinnati
Care	Golden Age Care Center	3635 Reading Road	Cincinnati
Care	Harmony Court	6969 Glenmeadow Lane	Cincinnati
Care	Harrison Pavilion	2171 Harrison Avenue	Cincinnati
Care	Heartland of Maderia	5970 Kenwood Road	Madeira
Care	Heartland of Mt. Airy	2250 Banning Road	Cincinnati
Care	Heartland of Woodside	5970 Kenwood Road	Madeira
Care	Hillebrand Nursing and Rehabilitation Ce	4320 Bridgetown Road	Cincinnati
Care	Home at Hearthstone, The	8028 Hamilton Avenue	Cincinnati
Care	Home at Taylor's Pointe, The - Nursing H	3464 Springdale Road	Springdale
Care	Hyde Park Health Care Center - Nursing H	4001 Rosslyn Drive	Cincinnati
Care	Indian Spring of Oakely	4900 Babson Place	Cincinnati
Care	Ivy Woods Care Center	2025 Wyoming Avenue	Cincinnati
Care	Judson Care Center	2373 Harrison Avenue	Cincinnati
Care	Kenwood Terrace Care Center	7450 Keller Road	Madeira
Care	Lakeridge Villa Healthcare Center	7220 Pippin Road	Cincinnati
Care	Liberty Nursing Center of Riverside	315 Lilenthal Street	Cincinnati
Care	Liberty Nursing Center of Riverview	5999 Bender Road	Cincinnati
Care	Lighthouse Pointe Health Care Center	21 West Columbia Avenue	Reading
Care	Lincoln Crawford Nursing and Rehabilitat	1346 Lincoln Avnue	Cincinnati
Care	Llanfair Retirement Community - Nursing	1701 Llanfair Avenue	Cincinnati
Care	Lodge Care Center, The	9370 Union Cemetary Road	Loveland

Care	Madeira Health Care Center	6940 Stiegler Lane	Madeira
Care	Mapleknoll Village	11100 Springfield Pike	Cincinnati
Care	Marjorie P. Lee Retirement Community	3550 Shaw Avenue	Cincinnati
Care	Matrix Healthcare of Three Rivers	7800 Jandacres Drive	Cincinnati
Care	Meadowbrook Care Center	8211 Weller Road	Montgomery
Care	Meadows Health Care Center, The	11760 Pellston Court	Cincinnati
Care	Mercy Franciscan Terrace	100 Compton Road	Cincinnati
Care	Mercy Franciscan West Park	2950 West Park Drive	Cincinnati
Care	Mercy St. Theresa Center	7010 Rowan Hills Drive	Mariemont
Care	Montgomery Care Center	7777 Cooper Road	Montgomery
Care	Mother Margaret Hall	5900 Delhi Road	Delhi
Care	Mountain Crest Nursing and Rehab	2586 Lafeuille Avenue	Cincinnati
Care	Mt. Notre Dame Health Center	699 E. Columbia Avenue	Cincinnati
Care	Mt. Washington Care Center	6900 Beechmont Avenue	Cincinnati
Care	Oak Hills Pavillion	4307 Bridgetown Road	Cincinnati
Care	Oak Pavillion Nursing Center	510 Oak Street	Cincinnati
Care	Pleasant Ridge Care Center - (Formerly M	5501 Verulam Avenue	Cincinnati
Care	Residence at Garden Gate	6922 Ohio Avenue	Cincinnati
Care	Residence at Greystone	2420 Harrison Avenue	Cincinnati
Care	Residence at Park View	6300 Daly Road	Cincinnati
Care	Residence at Salem Woods	6164 Salem Road	Cincinnati
Care	Scarlet Oaks Retirement Community	440 Layfayette Avenue	Cincinnati
Care	Shawnee Springs Retirement Home - Nursin	10111 Simonson Road	Harrison
Care	St. Margaret Hall - Nursing Home	1960 Madison Road	Cincinnati
Care	Terrace View Gardens	3904 Northbend Road	Cincinnati
Care	Three Rivers Nursing and Rehabilitation	7800 Jandacres Drive	Cincinnati
Care	Triplecreek Retirement Community	11230 Pippin Road	Cincinnati
Care	Twin Lakes	9840 Montgomery Road	Cincinnati
Care	Twin Towers	5343 Hamilton Avenue	Cincinnati
Care	Veranda Gardens	11784 Hamilton Avenue	Cincinnati
Care	Victoria Retirement Community	1500 Sherman Avenue	Cincinnati
Care	Victory Park Nursing Home	1578 Sherman Avenue	Norwood
Care	Wellspring at Evergreen Health Center	8000 Evergreen Drive	Cincinnati

Care	Western Hills Retirement Villa	6210 Cleves Warsaw Pike	Cincinnati
Care	Woods Edge Pointe	1171 Towne Street	Cincinnati
Care	Bethesda North Hospital	10500 Montgomery Rd	Cincinnati
Care	Christ Hospital	2139 Auburn Ave	Cincinnati
Care	Cincinnati Children's Hospital	3333 Burnet Ave	Cincinnati
Care	Drake Center	151 W. Galbraith St	Cincinnati
Care	Good Samaritan Hospital (Cincinnati)	375 Dixmyth Ave	Cincinnati
Care	Jewish Hospital	4777 E. Galbraith St	Cincinnati
Care	Mercy Hospital Anderson	7500 State Rd	Cincinnati
Care	Mercy Hospital Mt. Airy	2446 Kipling Ave	Cincinnati
Care	Mercy Hospital Western Hills	3131 Queen City Ave	Cincinnati
Care	Shriners Hospital for Children	3229 Burnet Ave	Cincinnati
Care	US Veterans Medical Center	3200 Vine St	Cincinnati
Care	University Hospital	234 Goodman St	Cincinnati
Care	Mercy Harrison	10500 New Haven Rd.	Harrison
Care	Regency Hospital	3111 Straight St.	Cincinnati
Care	Select Medical	375 Dixmyth Ave 15th fl	Cincinnati
Care	Summit Behavioral Healthcare	1101 Summit Road	Cincinnati
Care	Bridgewell Hospital	5500 Verulam Street	Cincinnati
Care	Good Samaritan Western Ridge	6949 Good Samaritan Drive	Cincinnati
Care	Able Manor Home	2927 Douglas Terrace	Cincinnati
Care	Alterra Clare Bridge Cottage	4850 E Galbraith Rd	Cincinnati
Care	Alterra Clare Bridge Of Anderson	6870 Clough Pike	Cincinnati
Care	Arden Courts Of Anderson Township	6870 Clough Pike	Cincinnati
Care	Arden Courts Of Kenwood	4580 E Galbraith Rd	Cincinnati
Care	Aspen Amber Park Retirement Community	3801 E Galbraith Rd	Cincinnati
Care	Atria Northgate Park	9191 Roundtop Rd	Cincinnati
Care	Bridgeway Pointe	165 W Galbraith Rd	Cincinnati
Care	Cambridge Health Care Center	3615 Washington Ave	Cincinnati
Care	Carriage Court Of Kenwood	4650 E Galbraith Rd	Cincinnati
Care	Center For Respite Care	3550 Washington Ave	Cincinnati
Care	Empress Home I	2321 Upland Pl	Cincinnati
Care	Empress Home II	2327 Upland Pl	Cincinnati

Care	Julmar Share-a-home Association	5427 Julmar Dr	Cincinnati
Care	The Lodge Retirement Community	12050 Montgomery Rd	Cincinnati
Care	Mallard Cove	1410 Mallard Cove Dr	Cincinnati
Care	Masonic Eastern Star Community	1630 West North Bend Rd	Cincinnati
Care	Open Arms Living Center	3545 Eden Ave	Cincinnati
Care	The Parkdale	610 Forest Ave	Cincinnati
Care	Pavilion At Camargo Manor	7625 Camargo Rd	Cincinnati
Care	Regency Village, Ltd	6550 Hamilton Ave	Cincinnati
Care	Sterling House Of Springdale	11320 Springfield Pike	Cincinnati
Care	Sunrise Assisted Living Of Kenwood	9090 Montgomery Rd	Cincinnati
Care	Brookdale Senior Living	9101 Winton Rd	Springfield
Care	The Terrace At Westside	1859 Grand Ave	Cincinnati
Care	Wellspring Health Center	8000 Evergreen Ridge Dr	Cincinnati
Care	Alois Alzheimer Center	70 Damon Rd	Cincinnati
Care	Archbishop Liebold Home	476 Riddle Rd	Cincinnati
Care	Bayley Place	990 Bayley Place	Cincinnati
Care	Beechwood Home	2140 Poge Ave	Cincinnati
Care	Brookwood Retirement Community	12100 Reed Hartman Highway	Cincinnati
Care	Cottingham Retirement Community	3995 Cottingham Dr	Cincinnati
Care	Courtyard At Seasons	7100 Dearwester Dr	Cincinnati
Care	Drake Center, Inc.	151 West Galbraith Rd	Cincinnati
Care	Evergreen & Wellspring Retirement Commun	230 West Galbraith Rd	Cincinnati
Care	Hyde Park Health Center	4001 Rosslyn Dr	Cincinnati
Care	Llanfair Retirement Community	1701 Llanfair Ave	Cincinnati
Care	Maple Knoll Village - Beecher Place	11100 Springfield Pike	Cincinnati
Care	Marjorie P. Lee Retirement Community	3550 Shaw Ave	Cincinnati
Care	Mercy Franciscan At West Park	2950 West Park Dr	Cincinnati
Care	Mercy Franciscan Terrace	100 Compton Rd	Springfield
Care	Mount Healthy Christian Home	8097 Hamilton Ave	Springfield
Care	Saint Margaret Hall Inc.	1960 Madison Rd	Cincinnati
Care	Scarlet Oak Retirement Community	440 Lafayette Ave	Cincinnati
Care	Terrace View Gardens	3904 Northbend Rd	Cheviot
Care	The Stratford At Kenwood	5559 Kenwood Rd	Cincinnati

Care	Triple Creek Retirement Community	11230 Pippin Rd	Cincinnati
Care	Twin Lakes	9840 Montgomery Rd	Cincinnati
Care	Twin Towers	5343 Hamilton Ave	Cincinnati
Care	Veranda Gardens	11784 Hamilton Ave	Cincinnati
Care	Victoria Retirement Community	1500 Sherman Ave	Cincinnati
Care	Three Rivers Nursing And Rehabilitation	7800 Jandaracres Dr	Cincinnati
Care	Oak Hills Pavilion	4307 Bridgetown Rd	Cheviot
Care	Western Hills Retirement Village	6210 Cleves Warsaw Rd	Cincinnati
Care	Graceworks Enhanced Living	450 West Wyoming Ave	Lockland
Care	Grace Works	11370 Springfield Pike	Springdale
Dam	Alvarez Pond Dam		Green Township
Dam	Anderson Lake Dam		Anderson Township
Dam	Apple Hill Farm Lake Dam		Cincinnati
Dam	Archiebald Lake Dam		Springfield Township
Dam	Arlington Memorial Gardens Lake Dam		Springfield Township
Dam	Aston Oaks Lake Dam (aka Aston Lakes Dam		Miami Township
Dam	Auberger Pond Dam		Colerain Towship
Dam	Basin 'A		Miami Township
Dam	Basin 'B		Miami Township
Dam	Bond Road Landfill Pond Dam IV		Symmes Township
Dam	Borntrager Pond Dam		Whitewater Township
Dam	Burger Lake Dam		Symmes Township
Dam	Burnet Woods Lake Dam		Cincinnati
Dam	Byrneside Lake Dam		Anderson Township
Dam	Carpenter's Creek Subdivision Pond No. 1		Evendale
Dam	Carpenter's Creek Subdivision Pond No. 2		Evendale
Dam	Chateau Lakes No. 1 Dam		Green Township
Dam	Chateau Lakes No. 2 Dam		Cincinnati
Dam	Cincinnati Central Turners Lake Dam		Colerain Township
Dam	Coldstream Country Club Dam No. 1		Cincinnati
Dam	Coldstream Country Club Dam No. 2		Anderson Township
Dam	Cornelius Lake Dam		Harrison Township
Dam	Cornell Park Dam		Symmes Township

Dam	Country Hills Lake Dam	Green Township
Dam	Crest Hills Lake Dam (aka Ridgewood Golf	Sycamore Township
Dam	Christas Development Company Lake Dam	Symmes Township
Dam	Crossings of Springdale Lake No. 1 Dam	Springfield Township
Dam	Crossings of Springdale Lake No. 1 Dam	Springdale
Dam	Dam South of New Baltimore	Unknown
Dam	Delhurst Lake Dam	Delhi Township
Dam	Dream Valley Lake Dam	Green Township
Dam	Eagle's Lake Dam	Green Township
Dam	Eagles Cliff Lake Dam	Miami Township
Dam	Eagles Lake Dam	Green Township
Dam	Eastwood Industrial Development Dam	Columbia Township
Dam	Faris Pond Dam	Colerain
Dam	Four Mile Lake Dam	Anderson Township
Dam	Gate of Heaven Cemetary Lake Dam	Symmes Township
Dam	Gier Pond Dam	Madeira
Dam	Goettle Lake Dam	Colerain Township
Dam	Green Lake Dam	Addyston
Dam	Greenhills Country Club Lake Dam	Springfield
Dam	Heimann Pond Dam	Symmes Township
Dam	Heitzler Pond Dam	Colerain Township
Dam	Henn Lake Dam	Delhi Township
Dam	Heritage Lake Dam	Anderson
Dam	Hermitage Club Lake Dam	Cincinnati
Dam	Hester Pond Dam	Colerain Township
Dam	Hollkamp Lake Dam	Anderson Township
Dam	Joseph Green Pond Dam	Unknown
Dam	Kemper Meadow Dam	Springfield Township
Dam	Kenridge Lake Dam	Cincinnati
Dam	Knapp Pond Dam	Springfield Township
Dam	Kreis Dam - Sharon Lake	Sycamore Township
Dam	Lake Cindy Dam	Green Township
Dam	Lake Gloria Dam	Colerain Township

Dam	Lake Louise Dam	Anderson Township
Dam	Lake Ridge Dam	Springfield Township
Dam	Lawrence Pond Dam	Madeira
Dam	Leming Lake Dam	Symmes Township
Dam	Lincoln Heights Upground Reservoir	Sycamore Township
Dam	Little Miami Wastewater Treatment Levee	City of Cincinnati
Dam	Mallard Cove Lake Dam	Cincinnati
Dam	Miami Fort FGD Retrofit	Harrison Township
Dam	Miami View Golf Club Pond No. 1 Dam	Miamitown
Dam	Miami View Golf Club Pond No. 2 Dam	Miamitown
Dam	Miami-Whitewater Forest Lake Dam	Cincinnati
Dam	Moore Lake Dam	Symmes Township
Dam	Motz Farms Lake Dam	Anderson Township
Dam	Muddy Creek Wastewater Treatment Lagoon	City of Cincinnati
Dam	Neumann Pond Dam	Miami Township
Dam	New Waterstone Lake Dam	Symmes
Dam	Niehaus Pond Dam	Anderson Township
Dam	Nina Lake Dam	Colerain Township
Dam	Nippert Lake Dam No. 1	Symmes Township
Dam	Nippert Lake Dam No. 2	Symmes Township
Dam	Nippert Lake Dam No. 3	Symmes Township
Dam	Omniplex Dam	Springfield Township
Dam	Paulmeadows Lake Dam (aka: "Knechtly Pon	Symmes Township
Dam	Peter Lake Dam	Cincinnati
Dam	Peterloon Lake Dam	Symmes Township
Dam	Peters Pond Dam	Colerain Township
Dam	Providence Hospital Lake Dam	Cincinnati
Dam	Prudential East Runoff Control Basin	Sycamore Township
Dam	Prudential West Runoff Control Basin	Sycamore Township
Dam	Queen City Gravel Lake Dam	Miami Township
Dam	Raible Pond Dam	Colerain Township
Dam	Roell Lake Dam	Delhi Township
Dam	Rumpke Dam	Colerain Township

Dam	Rumpke Sanitary Landfill Sedimentation	Colerain Township
Dam	Sacred Heart Seminary Lake Dam	Anderson Township
Dam	Scherzinger Pond Dam	Whitewater Township
Dam	Schlanser Pond Dam	Colerain Township
Dam	Schultz Lake Dam	Whitewater Township
Dam	Sharonville Retention Pond/Dam	Sharonville
Dam	Shawnee Pines Lake Dam	Columbia Township
Dam	Sodgpa Lake Dam	Colerain Township
Dam	Sprague Lake Dam	Colerain Township
Dam	Stenger Lake Dam	Green Township
Dam	Stevens Pond Dam	Green Township
Dam	Strimple Creek Dam	Cincinnati
Dam	Sycamore Creek Waste Water Treatment Pla	Symmes Township
Dam	Tanager Woods Lake Dam	Montgomery
Dam	Thompson Lake Dam	Sycamore Township
Dam	Tomes Lake Dam	Anderson Township
Dam	Tumlin Lake Dam	Whitewater Township
Dam	Un-Named Dam No. 2	Colerain Township
Dam	Un-Named Dam No. 4	Crosby Township
Dam	Un-Named Dam No. 6	Green Township
Dam	Un-Named Dam No. 7	Green Township
Dam	Un-Named Dam No. 10	Miami Township
Dam	Un-Named Dam No. 12	Whitewater Township
Dam	Un-Named Dam No. 8	Green Township
Dam	Un-named Dam No. 9	Harrison Township
Dam	Wasmer Lake Dam	Cincinnati
Dam	Weheler Lake Dam	Colerain Township
Dam	West Fork of Mill Creek Lake Dam	Springfield
Dam	Whirlpool Hazard at US 50 Bridge	Miami Township (West)
Dam	Winton Woods Golf Course Lake "D" Dam	Springfield Township
Dam	Winton Woods Golf Course Lake "E" Dam	Cincinnati
Dam	Winton Woods Sediment Retention Pond	Springfield Township
Dam	Wright Farm West Detention Basin Dam	Springfield Township

Dam	Zillig Pond Dam		Colerain Township
Dam	Unknown		Colerain
ElecPower	Miami Fort	11021 Brower Rd	North Bend
ElecPower	Procter and Gamble Cincinnati Plant	5201 Spring Grove Ave	St Bernard
ElecPower	U.C. Power Plant	3019 Vine St	Cincinnati
EmergencyCtr	Hamilton Co Emergency Mgmt Agency	2000 Radcliff Drive	Cincinnati
Fire	Admin Office	7850 Five Mile Road	Cincinnati
Fire	Station 10	6211 Salem Road	Cincinnati
Fire	Station 100	6330 Broadwell Road	Cincinnati
Fire	Station 101	6880 Hunley Road	Cincinnati
Fire	Station 102	11474 Colerain Avenue	Cincinnati
Fire	Station 103	6000 Thompson Road	Cincinnati
Fire	Station 104	3586 Wayne Street	Cincinnati
Fire	Station 105	7998 Main Street	Miamitown
Fire	Station 105	6736 ST RT. 128	Cincinnati
Fire	Station 107	2280 Sylved Avenue	Green Township
Fire	Station 109	2850 W. Kemper Road	Cincinnati
Fire	Station 11	601 Elliott Avenue	Cincinnati
Fire	Station 12	3001 Spring Grove	Cincinnati
Fire	Station 13	10647 Kenwood Road	Cincinnati
Fire	Station 14	430 Central Avenue	Cincinnati
Fire	Station 15	4343 Cooper Road	Cincinnati
Fire	Station 16	3814 Harrison Ave	Cheviot
Fire	Station 17	2101 W. Eight Street	Cincinnati
Fire	Station 18	478 Wilmer	Cincinnati
Fire	Station 19	2814 Vine Street	Cincinnati
Fire	Station 2	18 E. Seymour Avenue	Cincinnati
Fire	Station 20	1668 Blue Rock	Cincinnati
Fire	Station 21	2131 State	Cincinnati
Fire	Station 23	1623 Madison	Cincinnati
Fire	Station 24	4526 Glenway Avenue	Cincinnati
Fire	Station 25	3251 Springdale Road	Cincinnati
Fire	Station 26	3360 W. Galbraith Road	Cincinnati

Fire	Station 27	6985 River Road	Cincinnati
Fire	Station 28	9139 Baughman Road	Cincinnati
Fire	Station 28	9139 Baughman Road	Harrison
Fire	Station 29	564 W. Liberty	Cincinnati
Fire	Station 3	329 E. Ninth Street	Cincinnati
Fire	Station 30	6321 Rapid Run Road	Cincinnati
Fire	Station 31	4401 Marburg	Cincinnati
Fire	Station 32	650 Forest Avenue	Cincinnati
Fire	Station 33	697 Need Road	Cincinnati
Fire	Station 34	301 Ludlow Avenue	Cincinnati
Fire	Station 35	3002 Junietta	Cincinnati
Fire	Station 36	388 Greenwell Avenue	Cincinnati
Fire	Station 37	310 Lilenthal	Cincinnati
Fire	Station 38	725 Circle	Cincinnati
Fire	Station 39	301 Maple Street	Cincinnati
Fire	Station 4	7149 Ridge Road	Cincinnati
Fire	Station 40	10500 Reading Road	Evendale
Fire	Station 42	1201 W. Kemper road	Forest Park
Fire	Station 43	11240 Southland Road	Forest Park
Fire	Station 45	80 E. Sharon Road	Glendale
Fire	Station 46	2731 Erie Avenue	Cincinnati
Fire	Station 47	6450 Wiehe Road	Cincinnati
Fire	Station 48	11000 Winton road	Cincinnati
Fire	Station 49	5917 Prentice	Cincinnati
Fire	Station 5	8 E. McMicken	Cincinnati
Fire	Station 50	6558 Parkland	Cincinnati
Fire	Station 51	5801 Hamilton Avenue	Cincinnati
Fire	Station 53	6303 Harrison Avenue	Cincinnati
Fire	Station 54	5911 Bridgetown Road	Green Township
Fire	Station 55	5410 Audro Road	Green Township
Fire	Station 56	200 Harrison Avenue	Harrison
Fire	Station 57	10250 West Road	Harrison
Fire	Station 58	1201 Steffens Avenue	Cincinnati

Fire	Station 59	101 N. Cooper Avenue	Lockland
Fire	Station 6	7954 Beechmont Avenue	Cincinnati
Fire	Station 60	9425 Loveland-Madeira Road	Loveland
Fire	Station 61	8871 Weekly Lane	Loveland
Fire	Station 62	126 S. Lebanon Road	Loveland
Fire	Station 64	6475 Drake Road	Cincinnati
Fire	Station 65	7205 Miami Avenue	Cincinnati
Fire	Station 66	6904 Murray Avenue	Cincinnati
Fire	Station 67	6907 Wooster Pike	Mariemont
Fire	Station 68	10000 Mt. Nebo Road	Cincinnati
Fire	Station 69	4938 E. Miami River Road	Cleves
Fire	Station 7	2058 Sutton	Cincinnati
Fire	Station 70	3780 Shady Lane	Cleves
Fire	Station 73	10150 Mongomery Road	Montgomery
Fire	Station 74	7700 Perry Street	Mt. Healthy
Fire	Station 75	10335 Burlington Road	Springfield Township
Fire	Station 76	3537 Church Street	Newtown
Fire	Station 78	1646 W. Galbraith Road	North College Hill
Fire	Station 79	9150 Winton Road	Springfield Township
Fire	Station 8	5901 Montgomery Road	Cincinnati
Fire	Station 82	4725 Montgomery Road	Norwood
Fire	Station 83	1000 Market Street	Reading
Fire	Station 84	601 Columbia Avenue	Reading
Fire	Station 86	11637 Chester Road	Sharonville
Fire	Station 87	11210 Reading Road	Sharonville
Fire	Station 89	7050 Blue Ash Road	Silverton
Fire	Station 9	4017 Reading Road	Cincinnati
Fire	Station 90	12147 Lawnview Avenue	Springdale
Fire	Station 91	5116 Vine Street	St. Bernard
Fire	Station 92	8540 Kenwood Road	Cincinnati
Fire	Station 93	11580 Deerfield Road	Cincinnati
Fire	Station 94	428 Elm Avenue	Terrace Park
Fire	Station 94	428 Elm Avenue	Terrace Park

Fire	Station 95	311 Ohio Avenue	Cincinnati
Fire	Station 96	10121 Springfield Pike	Cincinnati
Fire	Station 97	600 Grove Avenue	Wyoming
Hazmat	CSXT Cincinnati, OH (Queensgate)	3601 Geringer Avenue	
Hazmat	D-G Custom Chrome, LLC	5200 Lester Road	
Hazmat	DA-LITE SCREEN CO	11500 Williamson Road	
Hazmat	Dayton Freight Lines	2831 Cresentiville Road	
Hazmat	Deaconess Hospital	311 Straight Street	
Hazmat	Decorative Technologies Group - Cincinna	1270 Hillsmith Drive	
Hazmat	DEGS of Cincinnati, LLC	105 East Fourth Street, Suite B-100	
Hazmat	Degussa (Evonik) Corp	620 Shepherd Dr	Lockland
Hazmat	Derrick Co., Inc	4560 Kellogg Avenue	
Hazmat	Diversapack LLC	470 W Northland Blvd	
Hazmat	Duke Energy	11029 State Route #128	
Hazmat	Duke Energy	11777 Solzman Rd	
Hazmat	Duke Energy	2801 Eastern Avenue	
Hazmat	Duke Energy	11021 Brower Road	
Hazmat	Duke Energy Ohio	5445 Audro Drive	
Hazmat	Duke Energy Ohio	424 Gest Street	
Hazmat	DuPont Fort Hill Plant	11215 Brower Road	
Hazmat	E J Thomas Co	6161 Wiehe Rd	
Hazmat	Eastern Sheet Metal, Inc.	8959 Blue Ash Road	
Hazmat	EI Ceramics LLC	2600 Commerce Blvd	
Hazmat	EMD Chemicals	2909 Highland Avenue	
Hazmat	Emerald Hilton Davis	2235 Langdon Farm Rd.	
Hazmat	EnerSys	540 Northland Blvd.	
Hazmat	Environmental Enterprises, Inc.	4650 Spring Grove	
Hazmat	Environmental Protection Lockheed Martin	11029 Kenwood Road	
Hazmat	Epcor Foundries	425 West North Bend Road	
Hazmat	Equistar Chemicals LP	11530 Northlake Dr.	
Hazmat	Eternal Food Service	605 North Wayne	Lockland
Hazmat	Ethicon Endo Surgery (Warehouse)	10683 Mckinley Road	
Hazmat	Ethicon Endo- Surgery, INC	4545 Creek Road	

Hazmat	F L Emmert Company	2007 Dunlap Street	
Hazmat	F&M Mafco, Inc.	9149 Dry Fork Road	
Hazmat	Faxon Machining	11101 Adwood Drive	
Hazmat	FBF Limited DBA Queen City Steel Treatin	2980 Spring Grove Ave.	
Hazmat	FedEx Express Corporation OXDA	124 Commerce Road	
Hazmat	FedEx Express-CVGRC	4675 Cornell Road	
Hazmat	Feintool Cincinnati Inc	11280 Cornell Park Drive	
Hazmat	Fibre Glass-Evercoat	6600 Cornell Road	
Hazmat	First Student, Inc. #11458	100 Hamilton Boulevard	
Hazmat	FLINT GROUP PIGMENTS, CINCINNATI OH	410 Glendale-milford Road	
Hazmat	Floturn, Inc	120 Progress Place	
Hazmat	Ford Motor Co	3000 Sharon Rd	
Hazmat	Forest Pharmaceuticals	5000 Brotherton Road	
Hazmat	Formica Corporation	10155 Reading Road	Evendale 45241
Hazmat	FRANKLYNN INDUSTRIES, INC.	167 Commerce Boulevard	
Hazmat	Frisch's Restaurants Inc.	3011 Stanton Ave	
Hazmat	Fujifilm Graphic Systems U.S.A., Inc. -	1650 Magnolia Drive	
Hazmat	Fusite Division	6000 Fernview Avenue	
Hazmat	G.A. Avril Co	4445 Kings Run Drive	
Hazmat	G.A. Avril Co	2108 Eagle Court	
Hazmat	GE Aircraft Engines Evendale (Confidenti	1 Neumann Way	Evendale 45241
Hazmat	GE Global Computer Operations	8700 Governor's Hill Drive	
Hazmat	General Mills Operations, Inc.	11301 Mosteller Road	
Hazmat	General Tool Co	101 Landy Lane	
Hazmat	General Tool Co (Woodlawn)	900 Glendale Milford Road	
Hazmat	Girindus America Inc.	8560 Reading Road	
Hazmat	Givaudan Flavors Corp.	1199 Edison Dr.	
Hazmat	Givaudan Flavors Corporation	1199 Edison Drive	
Hazmat	GKN Aerospace	11230 Deerfield Road	
Hazmat	GKN Aerospace	11495 Deerfield Road	
Hazmat	Good Samaritan Hospital	375 Dixmyth Avenue	
Hazmat	123rd ACS, Blue Ash ANG Station	10649 Mckinley Avenue	
Hazmat	A-G Tool & Die Co.	5927 Hamilton-cleves Pike	

Hazmat	A.B. STEEL MILL, INC.	204 West North Bend Road	
Hazmat	Agrium North Bend Nitrogen Operations	10743 Brower Road	
Hazmat	Air Products and Chemicals, Inc.	356 Three Rivers Pkwy (inside Ineos	
Hazmat	Airgas Great Lakes Inc.	1200 Gest Street, Suite B	
Hazmat	ALUMINUM EXTRUDED SHAPES, INC.	10549 Reading Road	Evendale 45241
Hazmat	American Compressed Steel Corp	200 W North Bend Road	
Hazmat	American Foods Group-Sharonville	3480 East Kemper Road	
Hazmat	American Red Cross	720 Sycamore St.	
Hazmat	Aramark Uniform Services and Career Appa	4936 Montgomery Road	
Hazmat	Archway Sales, Inc	6615 Corporate Drive	
Hazmat	Ashland Inc.	2788 Glendale-milford Rd	Evendale 45241
Hazmat	AT&T	358 Gest Street	
Hazmat	AT&T	525 Vine Street	
Hazmat	AT&T	209 Seventh Street	
Hazmat	Auxier Gas Inc	319 Riverside Drive	
Hazmat	Aviation Component Service Center	199 Container Place	
Hazmat	Avon Products, Inc. (Confidential)	175 Progress Place	
Hazmat	Avon Products, Inc. (Public Version)	175 Progress Place	
Hazmat	AZZ Galvanizing - Cincinnati	4454 Steel Place	
Hazmat	Baerlocher Production USA LLC	5890 Highland Ridge Drive	
Hazmat	Barrett Paving Materials Inc.	9550 Valley Junction Rd	
Hazmat	Barrett Paving Materials, Inc.	387 Smalley Road	Lockland
Hazmat	Barrett Paving Materials, Inc.	7374 Main Street	
Hazmat	Barrett Paving Materials, Inc.	24 Byrnes Lake Court	
Hazmat	BAXTER-WILBERT BURIAL VAULT SERVICE	909 East Ross Avenue	St Bernard
Hazmat	Bethesda North Hospital	10500 Montgomery Road	
Hazmat	Bethesda Oak Campus	619 Oak Street	
Hazmat	Bodycote Thermal Processing	710 Burns Street	
Hazmat	Bonsal American	5155 Fischer Avenue	St Bernard
Hazmat	BP (Triumph Energy)	4525 Kellogg Ave	
Hazmat	BP Products North America, INC	930 Tennessee Avenue	
Hazmat	Brewer Company	7300 Main Street	
Hazmat	Brooks Equipment	106 Northeast Drive	

Hazmat	Buckeye Terminals, LLC - Cincinnati Term	5150 River Rd
Hazmat	BUCKLEY MANUFACTURING COMPANY	10333 Wayne Avenue
Hazmat	Budget Rent a Car Systems Inc	465 E Galbraith Road
Hazmat	Bunzl Distribution Midcentral, Inc.	4699 Malsbary Road
Hazmat	Buzzi Unicem USA, Cincinnati Distributio	6381 River Road
Hazmat	C.J. Krehbiel Company	3962 Virginia Avenue
Hazmat	C.W. Zumbiel Company (a.k.a. Zumbiel Pac	2339 Harris Ave.
Hazmat	Caraustar Mill Group, Inc - Cincinnati P	5500 Wooster Road
Hazmat	Cargill AGHorizons	5495 River Road
Hazmat	Cargill Flavor Systems (formerly Degussa	10261 Chester Road
Hazmat	Cast-Fab Technologies, Inc.	3040 Forrer Street
Hazmat	Caterpillar Logistics	3440 East Kemper Road
Hazmat	CEMEX	200 Barkley Ave
Hazmat	CF Industries	5125 River Road
Hazmat	Charter Bus Services	1053 Ebenezer Road
Hazmat	Chevron Products Company	5000 St. Rt. 128
Hazmat	Christ Hospital	2139 Auburn Avenue
Hazmat	Cincinnati AT&T	1036 West Liberty Street
Hazmat	Cincinnati Bell Technology Solutions - G	11500 Goldcoast Avenue
Hazmat	Cincinnati Bell Technology Solutions, In	229 Seventh Street
Hazmat	Cincinnati Bell Telephone - 7th and Elm	209 W. 7th Street
Hazmat	Cincinnati Bell Telephone - 7th and Plum	229 W. 7th Street
Hazmat	Cincinnati Bell Telephone - Avondale Cen	3405 Harvey Avenue
Hazmat	Cincinnati Bell Telephone - BLASOHALL01	10151 Alliance Road
Hazmat	Cincinnati Bell Telephone - Cherry Grove	2055 Eight Mile Road
Hazmat	Cincinnati Bell Telephone - Cheviot Cent	4242 Bridgetown Road
Hazmat	Cincinnati Bell Telephone - CNCNOHDO	Rear Of 7011 Vine Street
Hazmat	Cincinnati Bell Telephone - CNCNOHFZ	6527 Miami Avenue
Hazmat	Cincinnati Bell Telephone - CNCNOHU2008	5454 North Bend Road
Hazmat	Cincinnati Bell Telephone - CNCNOHUA	341 Pedretti Road
Hazmat	Cincinnati Bell Telephone - CNCNOHUD	5075 Crookshank Road
Hazmat	Cincinnati Bell Telephone - CNCNOHUE	2564 North Bend Road
Hazmat	Cincinnati Bell Telephone - CNCNOHUF	8130 Burkhart Street

Hazmat	Cincinnati Bell Telephone - Covedale Cen	5524 Cleves-warsaw	
Hazmat	Cincinnati Bell Telephone - CTWHOHUA	3631 Short Ridge Circle	
Hazmat	Cincinnati Bell Telephone - CTWHOHUB	2875 Loretta Avenue	
Hazmat	Cincinnati Bell Telephone - DHTPOHUA	469 Neeb Road	
Hazmat	Cincinnati Bell Telephone - Evandale Cen	1000 Reading Road	Evendale 45241
Hazmat	Cincinnati Bell Telephone - Glendale Cen	980 Laurel Avenue	
Hazmat	Cincinnati Bell Telephone - Groesbeck Ce	3370 Compton Road	
Hazmat	Cincinnati Bell Telephone - Harrison Cen	115 S. Walnut Street	
Hazmat	Cincinnati Bell Telephone - Hartwell Par	140 E. Galbraith Road	
Hazmat	Cincinnati Bell Telephone - Hyde Park Ce	1310 Delta Avenue	
Hazmat	Cincinnati Bell Telephone - LVLDOHAE	751 Lebanon Road	
Hazmat	Cincinnati Bell Telephone - LVLDOHEV	11887 Mason Road	
Hazmat	Cincinnati Bell Telephone - LVLDOHUB	12061 Montgomery Road	
Hazmat	Cincinnati Bell Telephone - Madisonville	4927 Plainville Road	
Hazmat	Cincinnati Bell Telephone - MMTPOHU2016	7750 Foxtrot Drive	
Hazmat	Cincinnati Bell Telephone - Montgomery C	8315 Cornell Road	
Hazmat	Cincinnati Bell Telephone - Mt. Healthy	7335 Hamilton Avenue	
Hazmat	Cincinnati Bell Telephone - Mt. Washingt	6176 Benneville Avenue	
Hazmat	Cincinnati Bell Telephone - North Greenh	10823 Mill Road	
Hazmat	Cincinnati Bell Telephone - Northside Ce	4331 Hamilton Avenue	
Hazmat	Cincinnati Bell Telephone - Norwood Cent	2216 Norwood Avenue	
Hazmat	Cincinnati Bell Telephone - Price Hill C	3710 Warsaw Avenue	
Hazmat	Cincinnati Bell Telephone - Rossmoyne Ce	4515 Sycamore Road	
Hazmat	Cincinnati Bell Telephone - Saylor Park	6710 Hillside Drive	
Hazmat	Cincinnati Bell Telephone - SLTNOHUA	6823 Kenton Avenue	
Hazmat	Cincinnati Bell Telephone - SPDAOHUA	11965 Kenn Road	
Hazmat	Cincinnati Bell Telephone - St. Bernard	200 E. Ross Road	
Hazmat	Cincinnati Bell Telephone - Tri County C	328 E. Kemper Road	
Hazmat	Cincinnati Bell Telephone - WDLWOHAE	10300 Taconic Terrace	
Hazmat	Cincinnati Bell Telephone - Westwood Cen	2949 Urwiler Road	
Hazmat	Cincinnati Bell Wireless - UC	240 Calhoun Street	
Hazmat	Cincinnati Bulk terminals, LLC	895 W. Mehring Way	
Hazmat	Cincinnati Children's Hospital Medical C	3333 Burnet Avenue	

Hazmat	Cincinnati Children's Hospital Medical C	5642 Hamilton Avenue	
Hazmat	Cincinnati Drum Service[CRO]	400 Cavett Ave	
Hazmat	CINCINNATI ENQUIRER	1531 Western Avenue	
Hazmat	Cincinnati Freezer Corp.	2881 E. Sharon Road	Evendale 45241
Hazmat	Cincinnati Incorporated	7420 Kilby Road	
Hazmat	Cincinnati Plating & Repair Co, Inc	331 E. 13th Street	
Hazmat	Cincinnati POP Facility	312 Plum Street, Suite 775	
Hazmat	Cincinnati Steel Products	4540 Steel Place	
Hazmat	Cincinnati Steel Treating Company	5701 Mariemont Avenue	
Hazmat	CINCINNATI THERMAL SPRAY	5901 Creek Road	
Hazmat	Cincinnati, OH POP	1120 W 6th Street	
Hazmat	Cindus Corporation	515 Station Avenue	
Hazmat	Cintas Corporation	5570 Ridge Road	
Hazmat	Cintech Industrial Coatings, Inc	2217 Langdon Farm Road	
Hazmat	CNW LIMITED LLC	4710 Madison Road	
Hazmat	Coca-Cola Bottling Co.	5100 Duck Creek Rd	
Hazmat	Cognis Corporation Cincinnati	4900 Este Avenue, Bldg. 53	
Hazmat	Cognis Oleochemicals LLC Cincinnati	4900 Este Avenue	
Hazmat	Color Intermediates(Sun Chemical)	5366 Este Avenue	
Hazmat	Consolidated Grain and Barge	300 Three Rivers Parkway	
Hazmat	Consolidated Metal Products, Inc.	1028 Depot Street	
Hazmat	Convergys Customer Management Group Inc.	201 E. Fourth Street	
Hazmat	Convergys Information Management Group I	229 W. Seventh Street	
Hazmat	Corrugated Chemicals, Inc	3865 Virginia Avenue	
Hazmat	Costco Wholesale #379	1100 East Kemper Rd	
Hazmat	Covidien	2111 East Galbraith Road	
Hazmat	CSX Intermodal Cincinnati	2149 Western Avenue	
Hazmat	Graphic Packaging	4500 Beech Street	
Hazmat	Graphic Packaging International	10600 Evendale Drive	Evendale 45241
Hazmat	Greater Cincinnati Asphalt Terminal 2	10100 Bower Rd	
Hazmat	Green Bay Packaging, Inc. Cincinnati Div	7660 School Road	
Hazmat	Greyhound Lines, Inc	1005 Gilbert Ave	
Hazmat	Griffin Industries, INC.	1120 Mehring Way	

Hazmat	Grippo Potato Chip Co	6750 Colerain Ave
Hazmat	GSF Energy, LLC	10795 Hughes Road
Hazmat	H. B. Fuller Company	4440/4450 Malsbury Road
Hazmat	H. Hafner & Sons, Inc	5445 Wooster Pike
Hazmat	H. Meyer Dairy Company	415 John Street
Hazmat	H. Nagel & Son Co	2641 Spring Grove Avenue
Hazmat	Hadronics, Inc.	4570 Steel Place
Hazmat	Harrison Concrete	10422 Campbell Road
Hazmat	Harrison Concrete	150 Pilot Road
Hazmat	Harrison Concrete	607 Shepherd Avenue
Hazmat	Hater Industries[CRO]	240 Stille Drive
Hazmat	HCC Sealtron	9705 Reading Road
Hazmat	Heroux-Devtek, Inc	189 Container Place
Hazmat	Hewlett Packard Co - Blue Ash	11515 Grooms Rd.
Hazmat	Hewlett-Packard Blue Ash Data Center	11515 Grooms Road
Hazmat	Hexion Specialty Chemical	630 Glendale-milford Road
Hazmat	Heyob Energy (formerly heyob oil)	111 May Drive
Hazmat	Hill & Griffith Company- Cincinnati Plan	1085 Summer Street
Hazmat	Hilltop Basic Resources - East Cincinnat	6777 Kellogg Ave
Hazmat	Hilltop Basic Resources - Fleet / Plant	1223 West 8th Street
Hazmat	Hilltop Basic Resources - River Terminal	511 Water Street
Hazmat	Holcim (US) Inc	3270 Southside Avenue
Hazmat	Home City Ice Co.	11920 Kemper Springs Dr.
Hazmat	Home Depot #3814	3461 Joseph Road
Hazmat	Home Depot #3821	1266 Omniplex Drive
Hazmat	Home Depot #3822	6300 Glenway Avenue
Hazmat	Home Depot #3832	3400 Highland Avenue
Hazmat	Home Depot #3863	400 Comfort Drive
Hazmat	Huck Group	110 Industrial Drive
Hazmat	Hunting Specialized Products	1210 Glendale-milford Road
Hazmat	ILSCO	4370 Madison Road
Hazmat	INDIANA & OHIO RAILWAY- MCCULLOUGH YARD	2650 Highland Ave.
Hazmat	INEOS ABS (USA) CORPORATION ADDYSTON, OH	356 Three Rivers Parkway

Hazmat	Intercontinental Chemical Corporation	4660 Spring Grove Ave	
Hazmat	Interstate Brands Corp	747 W. 5th Street	
Hazmat	J.M. Smucker Company	5204 Spring Grove Avenue	
Hazmat	Jacobson Distribution Co	3131 Spring Grove Avenue	
Hazmat	Jim Beam Brands Co., Inc.	Jim Beam Brands Co. Inc.	
Hazmat	JOHN MORRELL & co	801 East Kemper Rd.	
Hazmat	JohnsonDiversey - Sharonville	3630 E Kemper Rd	
Hazmat	JPS Technologies, Inc.	11110 Deerfield Road	
Hazmat	JTM Freezer	275 Industrial Drive	
Hazmat	Kao Brands	2535 Spring Grove Ave	
Hazmat	Keebler Company	One Trade Street	
Hazmat	Kellogg Snacks	11490 Mosteller Rd	
Hazmat	Kinder Morgan	5297 River Road	
Hazmat	KNEISEL CONTRACTING CORP.	3461 Mustafa Drive	
Hazmat	KOI Warehouse, Inc. - Arlington	1330 Arlington	
Hazmat	KOI Warehouse, Inc.-Burbank	630 Burbank Street	
Hazmat	Kopp Turkeys Inc	10964 Campbell Road	
Hazmat	Kost USA, Inc.	3500 Southside Avenue	
Hazmat	KUTOL PRODUCTS COMPANY	7650 Camargo Road	
Hazmat	Lehigh Cement Co	2792 Glendale Milford Road	Evendale 45241
Hazmat	Level 3 - Cincinnati	105 E. Fourth Street	
Hazmat	Level 3 - Cincinnati	400 Pike Street	
Hazmat	Level 3 - CNCNOH1W - Cincinnati POP	1428 W. 8th Street	
Hazmat	Level 3 - CNCNOHA2	1248 Budd Street	
Hazmat	Liquid Transfer Terminal Ohio,Inc.	64 Congress Avenue	
Hazmat	LOWE'S OF NORWOOD, OH (#1585)	5385 Ridge Avenue	
Hazmat	LOWE'S OF NW CINCINNATI, OH. (#534)	10235 Colerain Ave.	
Hazmat	LOWE'S OF SPRINGDALE #760	505 East Kemper Road	
Hazmat	LOWE'S OF WESTERN HILLS, OH (#2338)	6150 Harrison Road	
Hazmat	LSI (Lighting Systems, INC)	10000 Alliance Road	
Hazmat	Marathon	11001 Brower Road	
Hazmat	Marathon- River Road	4015 River Road	
Hazmat	MCI - CCIAOH	312 Plum Street, 8th Floor	

Hazmat	MCI - CIIIOH	1380 West 6th Street	
Hazmat	MCI - CINNOH, CIAEOH	150 East 4th Street, 2nd Floor	
Hazmat	MCI - CKDKOH (CFTEOH)	1200 W 8th Street, 1st Floor	
Hazmat	MCI-CIADOH	511 Walnut Street	
Hazmat	Mechanical Finishing, INC	6350 Este Avenue	
Hazmat	Medpace Bioanalytical Laboratories	4750 Wesley Ave Suite Q	
Hazmat	Mercy Franciscan Hospital Mt. Airy	2446 Kipling Avenue	
Hazmat	Mercy Health Partners	4600 Mcauley Place	
Hazmat	Mercy Hospital Anderson	7500 State Road	
Hazmat	Meridian Diagnostics Inc	3471 River Hills Drive	
Hazmat	Miami Valley International- Cinti	11775 Highway Dr	
Hazmat	Michelman, Inc. Kemper Facility	3023 E. Kemper Road, Buildings 2 & 3	
Hazmat	Michelman, Inc. Shell Facility	9080 Shell Road	
Hazmat	Micro Metal Finishing, LLC	3448 Spring Grove Avenue	
Hazmat	Milacron Inc, Consumable Products Divisi	3000 Disney Street	
Hazmat	Moellering Industries Inc	6325 Este Ave	
Hazmat	Molecular Research Center, Inc.	5645 Montgomery Road	
Hazmat	Montgomery Inn Commissary	109 Illinois	
Hazmat	Moore Wallace North America, RR Donnelle	7800 Redsky Drive	
Hazmat	MV Transportation, Inc	1801 Trans Park Drive	
Hazmat	MVM, Inc	11997 Runyan Drive	
Hazmat	Nash Finch Company Cincinnati Distributi	6300 Creek Road	
Hazmat	NEASE CORPORATION	10740 Paddys Run Road	
Hazmat	Neutral Tandem, Inc	344 Gest Street Suite C	
Hazmat	NEYRA INDUSTRIES, INC.	10700 Evendale Drive	Evendale 45241
Hazmat	Nieman Plumbing	2030 Stapleton Court	
Hazmat	Norfolk Southern Railway	3150 East Sharon Road	
Hazmat	Norfolk Southern Railway	1410 Gest Street	Evendale 45241
Hazmat	Occidental Chemical Corporation's Cincin	4701 Paddock Road	
Hazmat	Ohio Cat	11330 Mosteller Road	
Hazmat	OIL DISTRIBUTING COMPANY	5228 River Road	
Hazmat	OKI Systems	10685 Medallion Drive	Evendale 45241
Hazmat	Pain Enterprises	4460 Mellwood Avenue	

Hazmat	Patheon Pharmaceuticals	2110 East Galbraith Road	
Hazmat	PCS Purified Phosphates(formerly Albrigh	10818 Paddy's Run Rd	
Hazmat	Penske Truck Leasing Co., L.P.	2528 Commodity Circle	
Hazmat	Pepsi Americas Cincinnati	2121 Sunnybrook Dr.	
Hazmat	Peter Cremer North America LP	100 June Street	
Hazmat	Peter Cremer North America LP	3117 Southside Avenue	
Hazmat	Petermann	1630 Westwood Avenue	
Hazmat	Petermann	2151 State Avenue	
Hazmat	Petermann	1861 Section Road	
Hazmat	Pilot Chemical Company of Ohio, Lockland	606 Shepherd Dr	Lockland
Hazmat	Pitt Ohio Express, LLC	11501 Mosteller Road	
Hazmat	Planet Products Corporation	4200 Malsbary Rd	
Hazmat	PMC Specialties Group, Inc.	501 Murray Road	
Hazmat	Porter Guertin Co.	2150 Colerain Avenue P.o. Box 14177	
Hazmat	Portman Equipment Co.	4331 Rossplain Rd	
Hazmat	Praxair Distribution, Inc(confidential)	8376 Reading Road	
Hazmat	Premier Ink Systems, Inc.	10420 North State Street	
Hazmat	Pride Cast Metals, Inc	2737 Colerain Avenue	
Hazmat	Pristine, Inc. SIte	410 Cavett Avenue	
Hazmat	Procter & Gamble	5348 Vine Street	
Hazmat	Procter & Gamble	5280 Vine Street	
Hazmat	Procter & Gamble	400 North Murray Road	
Hazmat	Procter & Gamble (CONFIDENTIAL)	6083 Center Hill Ave.	
Hazmat	Procter & Gamble (confidential)	2150 Sunnybrook Drive	
Hazmat	Procter & Gamble Co	5201 Spring Grove Avenue	
Hazmat	Procter & Gamble Co	5299 Spring Grove Avenue	
Hazmat	Procter & Gamble Co	5289 Vine Street	
Hazmat	Procter & Gamble Co	500 North Murray Road	
Hazmat	Procter & Gamble Co (CONFIDENTIAL)	11510 Reed Hartman Highway	
Hazmat	Procter & Gamble Co. (CONFIDENTIAL)	6083 Center Hill Ave.	
Hazmat	Procter & Gamble Co. (CONFIDENTIAL)	11810 East Miami River Road	
Hazmat	Procter & Gamble Co. (CONFIDENTIAL)	1 P & G Plaza	
Hazmat	Procter & Gamble(confidential)	700 Wilmer Avenue	

Hazmat	Procter &Gamble (CONFIDENIAL)	8500 Governers Hill Dr	
Hazmat	PSC - Philip Industrial Services (Allwas	10671 Evendale Drive	Evendale 45241
Hazmat	Queen City Terminals	3806 Kellogg Avenue	
Hazmat	QUICK PAK LLC (MMC)	12110 Champion Way	
Hazmat	Qwest Communications - Cincinnati POP	205 West Fourth St., Suite 920	
Hazmat	Qwest Communications - Cincinnati Regen	607 Evans Street	
Hazmat	R.A. Heller Company	10530 Chester Road	
Hazmat	Reinhart FoodService LLC	535 Shepherd Avenue	Lockland
Hazmat	Republic Waste Services	11563 Mosteller Road	
Hazmat	Republic Waste/CSI	5723 Este Ave	
Hazmat	Rhodia Inc. (Cincinnati plant)	4775 Paddock Road	
Hazmat	Rhodia Inc. (Cincinnati Warehouse)	11420 Mosteller Road	
Hazmat	Rhodia Inc(CRO 07/31/2008)	11420 Mosteller Road	
Hazmat	Richard Goettle, Inc	12071 Hamilton Avenue	
Hazmat	Richard Miller Treatment Plant	5651 Kellogg Avenue	
Hazmat	Richards Industries	3170 Wasson Road	
Hazmat	Rock-Tenn Company	3347 Madison Road	
Hazmat	Rohm and Haas (confidential)	2000 West Street	
Hazmat	Rotex Inc	1230 Knowlton Street	
Hazmat	Rumpke	3700 Struble Road	
Hazmat	Rumpke Bond Hill	11452 Bond Road	
Hazmat	Rumpke Norwood Overhaul	4932 Beech Street	
Hazmat	Rumpke Sanitary Landfill, Inc	10795 Hughes Road	
Hazmat	Ryder Transportation Services #0322A	1190 Gest St	
Hazmat	Ryder Transportation Services #0372A	2575 Commodity Circle	
Hazmat	Ryerson Inc.- Cincinnati Plant	3475 Spring Grove Avenue	
Hazmat	S&B Industrial Minerals N.A	1262 State Avenue	
Hazmat	Safety-Kleen Systems, Inc.	11923 Tramway Dr.	
Hazmat	Sam's Club # 6450	5375 North Bend Road	
Hazmat	SAM'S CLUB # 6544	9550 Fields Ertel Road	
Hazmat	Sam's Club # 8131	4825 C Marburg Avenue	
Hazmat	Sam's Club # 8132	800 Kemper Common Circle	
Hazmat	Samuel Adams Brewery Co, LTD	1625 Central Parkway	

Hazmat	Sawbrook Steel Castings LLC	425 Shepherd Ave.
Hazmat	Sealed Air	2550 Commerce Blvd
Hazmat	Sharonville, OH PCS SWITCH	11370 Enterprise Dr.
Hazmat	Sharonville, OH POP SCO	3235 Sharon Road. (3235 East Sharon Rd.)
Hazmat	Shepherd Chemical Company	2803 Highland Avenue
Hazmat	Sherwin - Williams Company	145 Caldwell Drive
Hazmat	Sherwin-Williams #1246	3143 E. Kemper Road
Hazmat	Sherwin-Williams #4311	10488 Chester Rd
Hazmat	Sherwin-Williams #4399	1150 W. 8th St. Ste 112
Hazmat	Siemens Energey	4620 Forest Avenue
Hazmat	Skurow Brothers (Bishop) Oil Company	9361 Reading Rd
Hazmat	Smith Electrochemical Co.	5936 Carthage Court
Hazmat	Smurfit-Stone Container Enterprises, Inc	9960 Alliance Road
Hazmat	Southside River-Rail Terminal, Inc.	3500 Southside Avenue
Hazmat	SPECTRUM MARKETING SUPPORT/TWO J SUPPLY	14 Sunnybrook
Hazmat	Speedway 1026	3 E North Bend Rd
Hazmat	Speedway 1086	5387 W North Bend Rd
Hazmat	Speedway 1547	5571 Colerain Ave
Hazmat	Speedway 3081	11790 Lebanon Rd
Hazmat	Speedway 5071	8210 Pippin Rd
Hazmat	Speedway 5110	12184 Mason Rd
Hazmat	Speedway 5211	625 Northland Rd
Hazmat	Speedway 5218	2691 Springdale Rd
Hazmat	Speedway 5268	595 Anderson Ferry Rd
Hazmat	Speedway 5415	5234 Ridge Ave
Hazmat	Speedway 7560	10915 New Haven Rd
Hazmat	Speedway 9573	9251 Colerain Ave
Hazmat	Speedway 9574	2857 River Rd
Hazmat	Speedway 9585	7300 Hamilton Road
Hazmat	Speedway 9637	10565 Loveland Madeira
Hazmat	Speedway 9693	11620 Hamilton Ave
Hazmat	Spring Grove Resource Recovery	4879 Spring Grove Ave
Hazmat	Springdale Ice Cream & Beverage	11801 Chesterdale Road

Hazmat	ST. BERNARD SOAP CO	5177 Spring Grove Ave	
Hazmat	State Avenue Manufacturing	1240 State Avenue	
Hazmat	Steelcraft Manufacturing Co., Division o	9017 Blue Ash Road	
Hazmat	STOCK MANUFACTURING AND DESIGN	10040 Cilley Road	
Hazmat	Suburban Propane(confidential)	10112 Harrison Ave	
Hazmat	Sun Chemical	12049 Centron Place	
Hazmat	Sun Chemical Corporation	4526 Chickering Ave	
Hazmat	Sunoco (Salem Sutton)	6090 Salem Rd.	
Hazmat	Sunoco (Sunset)	100 Sunset Avenue	
Hazmat	Sunoco (Westbourne)	3217 Westbourne Dr.	
Hazmat	Superior Honda	4777 Spring Grove Ave	
Hazmat	Superior Pool Products, LLC.	12075 Northwest Blvd., Bldg. A, Suite 50	
Hazmat	Swifty Station #152	1545 Glendale Milford Rd	Evendale 45241
Hazmat	Swifty Station #235	9786 Reading Road	Evendale 45241
Hazmat	Swifty Station #275	2265 Norwood Ave	
Hazmat	SYSCO Food Services	10510 Evendale Drive	Evendale 45241
Hazmat	T-Mobile USA, Inc. Cincinnati	312 Elm Street	
Hazmat	TEAM INDUSTRIAL SERVICES, INC.	10540 Chester Road	
Hazmat	Tenacity Mfg Co	801 South Cooper Avenue	
Hazmat	The Wornick Company - Creek Road Facilit	4700 Creek Road	
Hazmat	The Wornick Company - Kenwood Road Facil	10825 Kenwood Road	
Hazmat	Thorntons Inc. #58	6405 Glenway Avenue	
Hazmat	Thorntons Inc. #63	2568 W. North Bend Road	
Hazmat	Thorntons Inc. #65	4530 Reading Road	
Hazmat	Time Warner Cable OH2	11252 Cornell Park Dr.	
Hazmat	Toyota Motor Sales, USA	4550 Creek Road	
Hazmat	Trans-Acc, Inc.	11167 Deerfield Road	
Hazmat	Trans-Ash, Inc	11021 Brower Road	
Hazmat	Trans-Ash, Inc	617 Shepherd Drive	
Hazmat	Tri-Star Industrial Cleaning & Recycling	635 Shepherd Drive	
Hazmat	Truckway Leasing	1745 Dreman Ave	
Hazmat	TSS Aviation	11550 Mosteller Road	
Hazmat	TSS Technologies	1201 Hillsmith Drive	

Hazmat	TSS Technologies	10570 Chester Road	
Hazmat	Twin Rivers Technologies Natural Ingredi	4700 Este Avenue	
Hazmat	U-Pull-and-Pay, LLC - Cin	426 West Seymour Avenue	
Hazmat	UNI-REF, INC.	11301 Jefferson Avenue	
Hazmat	United Dairy Farmers	3955 Montgomery Road	
Hazmat	United Parcel Service	11141 Canal Rd	
Hazmat	United Parcel Service	500 Gest Street	
Hazmat	United Parcel Service Freight	3250 East Kemper Road	
Hazmat	United Refrigeration	3929 Apple Street	
Hazmat	United States Playing Card Company	4590 Beech Street	
Hazmat	United States Postal Service	3055 Crescentville Rd	
Hazmat	United States Postal Service	1591 Dalton Ave	
Hazmat	United Waste Water Services	11807 Reading Road	
Hazmat	US EPA	26 West Martin Luther King Drive	
Hazmat	US EPA Test and Evaluation Facility	1600 Gest Street	
Hazmat	US Ink A Division of Sun Chemical Corpor	600 Redna Terrace	
Hazmat	US Ink A Division of Sun Chemical Corpor	10590 Chester Road	
Hazmat	VA Medical Center	3200 Vine Street	
Hazmat	Valley Asphalt Corporation Plant #14	7940 Main Street	
Hazmat	Valley Asphalt Corporation Plant #17	5073 Kilby Road	
Hazmat	Valley Asphalt Corporation Plant #19	612 Mehning Way	
Hazmat	Valley Asphalt Corporation Plant #9/#23	11641 Mosteller Road	
Hazmat	VALLEY NATIONAL GASES, INC	1152 Findley Street	
Hazmat	Valvoline Cincinnati Packaging Plant	3901 River Road	
Hazmat	Varland Metal Service Inc.	3231 Fredonia Avenue	
Hazmat	Vectron VI CINOX	4914 Gray Road	
Hazmat	Verizon (CINCINNATI MTSO)	1522 Central Parkway	
Hazmat	Verizon Wireless	4445 Lake Forest Drive, Suite 425	
Hazmat	VI-CAS MANUFACTURING COMPANY, INC.	8407 Monroe Avenue	
Hazmat	Westway Feed Products Company	3335 Southside Avenue	
Hazmat	White Castle System, Inc.	3400 Central Parkway	
Hazmat	White Castle System, Inc.	3126 Exon Avenue	Evendale 45241
Hazmat	WILLIAM POWELL COMPANY	2503 Spring Grove Avenue	

Hazmat	Wingate Packaging	4347 Indeco Court	
Hazmat	Woodlawn Rubber Co	11268 Williamson Rd	
Hazmat	Wright Brothers, Inc	1930 Losantiville Rd	
Hazmat	XTEK, Inc	11454 Reading Road	
Hazmat	Zenith Logistics (Formerly Kroger Co.)	98 Glendale-milford Road	
Hazmat	Cincinnati Vulcan Company	5353 Spring Grove Ave	
Hazmat	Frisch's Restaurants Inc.	3011 Stanton Ave	
Hazmat	Sherwin Williams	11429 Princeton Pike	Springdale
Police	Deer Park Police Department	7777 Blue Ash Rd	Deer Park
Police	Anderson Township Sheriffs Office Dist 5	7954 Beechmont Ave.	Anderson Township
Police	University of Cincinnati Police	3223 Eden Ave	Cincinnati
Police	Hamilton County Sheriff - Patrol	11021 Hamilton Ave	Mt Healthy Heights
Police	Cincinnati - Traffic Unit	800 Evans St	Cincinnati
Police	Cincinnati - Park Unit	5083 Colerain Ave	Cincinnati
Police	Xavier University Police Department	1648 Herald Ave- Flynn Hall	Cincinnati
Police	Wyoming Police Department	600 Grove Avenue	Wyoming
Police	Woodlawn Police Department	10143 Woodlawn Blvd	Cincinnati
Police	University of Cincinnati Campus	51 West Corry Blvd.	Cincinnati
Police	Terrace Park Police Department	428 Elm Street	Terrace Park
Police	Sycamore Township	8540 Kenwood Road	Cincinnati
Police	Summit Behavioral Health Center Police D	1101 Summit Road	Cincinnati
Police	Springfield Twp. Police Department	1130 Compton Road	Cincinnati
Police	Springdale Police Department	12105 Lawnview Avenue	Cincinnati
Police	Silverton Police Department	6860 Plainfield Road	Silverton
Police	Sharonville Police Department	10900 Reading Road	Cincinnati
Police	Saint Bernard Police Department	4700 Vine Street	St Bernard
Police	Reading Police Department	1000 Market Street	Reading
Police	Norwood Police Department	4645 Montgomery Rd	Cincinnati
Police	North College Hill Police Department	1646 West Galbraith Road	Cincinnati
Police	Norfolk Southern Railway Police Departme	1400 Gest Street	Cincinnati
Police	Newtown Police Department	3536 Church Street	Cincinnati
Police	Mount Healthy Police Department	7700 Perry Street	Cincinnati
Police	Montgomery Police Department	10150 Montgomery Road	Cincinnati

Police	Mariemont Police Department	6907 Wooster Pike	Mariemont
Police	Madeira Police Department	7141 Miami Ave	Madeira
Police	Loveland Police Department	126 S Lebanon Road	Loveland
Police	Lockland Police Department	101 North Cooper Avenue	Cincinnati
Police	Lincoln Heights Police Department	1201 Steffens Avenue	Cincinnati
Police	Indian Hill Police Department	6525 Drake Road	Indian Hill
Police	Health Alliance Department of Public Saf	3200 Burnet Avenue	Cincinnati
Police	Harrison Police Department	311 Harrison Ave	Harrison
Police	Hamilton County Sheriff's Office	1000 Sycamore Street	Cincinnati
Police	Hamilton County Park Rangers	10245 Winton Road	Cincinnati
Police	Greenhills Police Department	11000 Winton Road	Cincinnati
Police	Green Twp. Police Department	6303 Harrison Avenue	Cincinnati
Police	Golf Manor Police Department	6450 Wiehe Road	Cincinnati
Police	Glendale Police Department	301 East Sharon Avenue	Glendale
Police	Forest Park Police Department	1203 West Kemper Road	Forest Park
Police	Fairfax Police Department	5903 Hawthorne Avenue	Cincinnati
Police	Evendale Police Department	10500 Reading Road	Evendale
Police	Elmwood Place Police Department	300 Maple Street	Cincinnati
Police	Delhi Twp. Police Department	934 Neeb Road	Cincinnati
Police	Deer Park Police Department	4250 Matson Pl	Deer Park
Police	CSX Railroad Police Department	3601 Geringer St	Cincinnati
Police	College of Mount St. Joseph Police Depar	5701 Delhi Road	Cincinnati
Police	Colerain Twp. Police Department	4200 Springdale Road	Cincinnati
Police	Cleves Police Department	101 North Miami Avenue	Cleves
Police	Cincinnati State College Campus Police	3520 Central Parkway	Cincinnati
Police	Cincinnati Police Department	1012 Ludlow Avenue	Cincinnati
Police	Cincinnati Police Department	4150 Reading Road	Cincinnati
Police	Cincinnati Police Department	3201 Warsaw Avenue	Cincinnati
Police	Cincinnati Police Department	3295 Erie Avenue	Cincinnati
Police	Cincinnati Police Department	310 Ezzard Charles Drive	Cincinnati
Police	Cheviot Police Department	3814 Harrison Ave	Cincinnati
Police	Blue Ash Police Department	4343 Cooper Road	Blue Ash
Police	Arlington Heights Police Department	601 Elliott Avenue	Cincinnati

Police	Amberley Village Police Department	7149 Ridge Road	Cincinnati
Police	Addyston Police Department	235 Main St	Addyston
PotWater	Lockland Water Treatment Plant	590 North Wayne	Lockland
PotWater	Indian Hill Water Works		Columbia Twp
Rail	Norfolk Southern	Mariemont	Mariemont
School	Charles T Young Elementary	401 N Miami Ave	Cleves
School	Three Rivers Middle	8575 Bridgetown Rd	Harrison
School	St. John The Baptist Elementary	508 Park Ave	Harrison
School	Christ Centered School	220 Sunset Ave	Harrison
School	Harrison Christian Elementary	949 Harrison Ave	Harrison
School	Crosby Elementary	8382 New Haven Rd	Harrison
School	Harrison Elementary	600 E Broadway St	Harrison
School	Whitewater Valley Elementary	10800 Campbell Rd	Harrison
School	Harrison Junior High	9830 West Rd	Harrison
School	Harrison High	9860 West Rd	Hooven
School	Hooven Elementary	4317 Chidlaw Ave	Miamitown
School	Miamitown Elementary	6578 St Rt 128	North Bend
School	Taylor High	36 E Harrison Ave	Loveland
School	Loveland Primary	550 Loveland Madeira Rd	Loveland
School	Loveland Elementary	600 Loveland Madeira Rd	Loveland
School	Loveland Intermediate	757 S Lebanon Rd	Loveland
School	Symmes Elementary	11820 Enyart Rd	Loveland
School	Loveland Middle	801 S Lebanon Rd	Loveland
School	Loveland High	1 Tiger Trl	Terrace Park
School	Terrace Park Elementary	723 Elm Ave	Cincinnati
School	St. Francis Seraph School	14 E Liberty St	Cincinnati
School	Alder'sgate Christian High	1810 Young St	Cincinnati
School	V L T Academy	1100 Sycamore St	Cincinnati
School	Cincinnati Hills Christian Academy Otto	140 W 9th St	Cincinnati
School	School For Creative & Performing Arts	108 West Central Pkwy	Cincinnati
School	Rothenberg Prep Elementary	2120 Vine St	Cincinnati
School	St. Joseph School	745 Ezzard Charles Dr	Cincinnati
School	St. Vincent De Paul Elementary	4036 River Rd	Cincinnati

School	Riverside Academy Elementary	3280 River Rd	Cincinnati
School	Oyler Elementary	2121 Hatmaker St	Cincinnati
School	Rees E. Price Elementary	1228 Considine Ave	Cincinnati
School	Holy Family School	3001 Price Ave	Cincinnati
School	Resurrection Elementary	1740 Iliff Ave	Cincinnati
School	St. Lawrence Elementary	1020 Carson Ave	Cincinnati
School	St. William School	4125 Saint William Ave	Cincinnati
School	Elder High	3900 Vincent Ave	Cincinnati
School	Seton High	3901 Glenway Ave	Cincinnati
School	Quebec Heights Elementary	1655 Ross Ave	Cincinnati
School	Carson Elementary	4323 Glenway Ave	Cincinnati
School	St. Francis DeSales School - Cincinnati	1602 Madison Rd	Cincinnati
School	Mercy Montessori Center	2335 Grandview Ave	Cincinnati
School	Purcell-Marian High	2935 Hackberry St	Cincinnati
School	St. Ursula Academy	1339 E Mcmillan St	Cincinnati
School	Christ Emmanuel Christian Academy	1225 E McMillan St	Cincinnati
School	Dohn Community High	608 E Mcmillan St	Cincinnati
School	Life Skills Center Of Cincinnati	2612 Gilbert Ave	Cincinnati
School	Frederick Douglass Elementary	2627 Park Ave	Cincinnati
School	Alliance Academy of Cincinnati	1712 Duck Creek Rd	Cincinnati
School	Xavier University Montessori Lab School	3800 Victory Pkwy	Cincinnati
School	Hoffman-Parham Elementary	3060 Durrell Ave	Cincinnati
School	Parham Elementary	1835 Fairfax Ave	Cincinnati
School	Walnut Hills High	3250 Victory Pkwy	Cincinnati
School	St. Mary School	2845 Erie Ave	Cincinnati
School	Summit Country Day High	2161 Grandin Rd	Cincinnati
School	Springer School & Center	2121 Madison Rd	Cincinnati
School	Kilgour Elementary	1339 Herschel Ave	Cincinnati
School	Clark Montessori High (Future)	3030 Erie Ave	Cincinnati
School	Withrow International High	2488 Madison Rd	Cincinnati
School	Withrow University High	2520 Madison Rd	Cincinnati
School	St. Cecilia School	4115 Taylor Ave	Cincinnati
School	Ohio Connections Academy Elementary	2727 Madison Rd	Cincinnati

School	East End Community Heritage	2569 Saint Leo Pl	Cincinnati
School	Grace Christian Elementary	3628 Boudinot Ave	Cincinnati
School	St. Aloysius Gonzaga School	4390 Bridgetown Rd	Cincinnati
School	St. Catharine Of Siena School	3324 Wunder Ave	Cincinnati
School	St. Martin Of Tours	3729 Harding Ave	Cincinnati
School	Mother Of Mercy High	3036 Werk Rd	Cincinnati
School	Cheviot Elementary	4040 Harrison Ave	Cincinnati
School	Midway Elementary	3156 Glenmore Ave	Cincinnati
School	Westwood Elementary (Future)	2981 Montana Ave	Cincinnati
School	Bridgetown Middle	3900 Race Rd	Cincinnati
School	Holy Trinity School	5411 Moeller Ave	Norwood
School	Norwood View Elementary	5328 Carthage Ave	Norwood
School	Sharpsburg Elementary	4400 Smith Rd	Norwood
School	Williams Avenue Elementary	2132 Williams Ave	Norwood
School	Norwood Middle	2060 Sherman Ave	Norwood
School	Norwood High	2020 Sherman Ave	Cincinnati
School	Nativity School	5936 Ridge Ave	Cincinnati
School	T.C.P. World Academy Elementary	6000 Ridge Ave	Cincinnati
School	Woodford Paideia Elementary	3500 Lumford Pl	Cincinnati
School	Veritas/Cesar Chavez Academy High	1769 Carll St	Cincinnati
School	W.E.B. Dubois High	1812 Central Pkwy	Cincinnati
School	Orion Academy Elementary	1798 Queen City Ave	Cincinnati
School	King Academy Community	933 Bank St	Cincinnati
School	Cincinnati College Prep Academy	1425 Linn St	Cincinnati
School	Quebec Heights Elementary (Temp)	2475 White St	Cincinnati
School	Roberts Paideia EAcademy	1702 Grand Ave	Cincinnati
School	Hays-Porter Elementary	1030 Cutter St	Cincinnati
School	Robert A.Taft Information Tech High	420 Ezzard Charles Dr	Cincinnati
School	Terry's Montessori Elementary	419 Poplar Ave	Cincinnati
School	St. Rita School for the Deaf High	1720 Glendale Milford Rd	Reading
School	Our Lady Of Sacred Heart School	170 Siebenthaler Ave	Cincinnati
School	St. James of the Valley School	411 Springfield Pike	Cincinnati
School	St. Peter And Paul Elementary	416 W Vine St	Reading

School	Mount Notre Dame High	711 E Columbia Ave	Springfield
School	Hillcrest Training School	246 Bonham Rd	Cincinnati
School	Arlington Heights Academy	607 Carthage Ave	Lockland
School	Lockland Elementary	200 N Cooper Ave	Cincinnati
School	Lincoln Heights Elementary	1113 Adams St	Cincinnati
School	Woodlawn Elementary	31 Riddle Rd	Reading
School	Central Community Elementary	1301 Bonnell St	Reading
School	Hilltop Community Elementary	2236 Bolser Dr	Wyoming
School	Elm Avenue Elementary	134 Elm Ave	Wyoming
School	Hilltop Elementary	425 Oliver Rd	Wyoming
School	Vermont Avenue Elementary	33 Vermont Ave	Wyoming
School	Wyoming Middle	17 Wyoming Ave	Lockland
School	Lockland High	249 W Forrer St	Reading
School	Reading Community High	810 E Columbia Ave	Wyoming
School	Wyoming High	106 Pendery Ave	Cincinnati
School	Carthage Paideia Academy Elementary	125 W North Bend Rd	Cincinnati
School	Hartwell Elementary	8320 Vine St	Cincinnati
School	Elmwood Place Elementary	400 Maple St	Saint Bernard
School	St. Clement School	4534 Vine St	Saint Bernard
School	Roger Bacon High	4320 Vine St	Saint Bernard
School	St Bernard Elementary	4515 Tower Ave	Saint Bernard
School	St Bernard-Elmwood Place High	4615 Tower Ave	Cincinnati
School	Winton Woods Primary North Elementary	73 Junefield Ave	Cincinnati
School	Winton Woods Middle	147 Farragut Rd	Cincinnati
School	Corryville Catholic School	108 Calhoun St	Cincinnati
School	Mt Auburn International Academy	244 Southern Ave	Cincinnati
School	Hillcrest South Jr High	3009 Burnet Ave	Cincinnati
School	Fairview-Clifton German Language School	3689 Clifton Ave	Cincinnati
School	Schiel Prim Schl Arts Enrchmnt	2821 Vine St	Cincinnati
School	William H Taft Elementary	270 Southern Ave	Cincinnati
School	Hughes Center High	2515 Clifton Ave	Cincinnati
School	Annunciation Elementary	3545 Clifton Ave	Cincinnati
School	Cincinnati Junior Academy	3798 Clifton Ave	Cincinnati

School	Regional Institute for Torah & Secular	2211 Losantiville Ave	Cincinnati
School	St. Boniface School	4305 Pitts Ave	Cincinnati
School	Chase Elementary	1710 Bruce Ave	Cincinnati
School	St. Vivian Elementary	885 Denier Pl	Cincinnati
School	McAuley High	6000 Oakwood Ave	Springfield
School	St. Xavier High	600 North Bend Rd	Springfield
School	Central Baptist Academy	7645 Winton Rd	Cincinnati
School	Eden Grove Academy	6277 Collegevue Pl	Cincinnati
School	Central Baptist Academy	7645 Winton Rd	Cincinnati
School	College Hill Fundamental Academy	1625 Cedar Ave	Cincinnati
School	Mt. Airy Elementary	5730 Colerain Ave	Cincinnati
School	Pleasant Hill Elementary	1350 W North Bend Rd	Springfield
School	Whitaker Elementary	7400 Winton Rd	Cincinnati
School	Aiken College and Career High	5641 Belmont Ave	Cincinnati
School	Ethel M.Taylor Elementary	1930 Fricke Road	Cincinnati
School	Robert A. Taft Information Tech High	2240 Baltimore Ave	Cincinnati
School	Roll Hill Elementary	2411 Baltimore Ave	Cincinnati
School	Cardinal Pacelli Elementary	927 Ellison Ave	Cincinnati
School	St. Ursula Villa School	3660 Vineyard Pl	Cincinnati
School	Riverview East Elementary	3555 Kellogg Ave	Cincinnati
School	Prince Of Peace Elementary	6000 Murray Rd	Cincinnati
School	The Good Shepherd Catholic Montessori	4460 Berwick St	Cincinnati
School	Seven Hills School	5400 Red Bank Rd	Cincinnati
School	Lighthouse Community School Inc	6100 Desmond St	Cincinnati
School	John P Parker Elementary	5051 Anderson Pl	Cincinnati
School	Fairfax Elementary	3847 Southern Ave	**Mariemont**
School	Mariemont Elementary	6750 Wooster Pike	**Mariemont**
School	Mariemont Jr High	6743 Chestnut St	Cincinnati
School	Shroder High	5030 Duck Creek Rd	**Mariemont**
School	Mariemont High	3812 Pocahontas Ave	Cincinnati
School	New School Montessori	3 Burton Woods Ln	Cincinnati
School	Burton Elementary	876 Glenwood Ave	Cincinnati
School	North Avondale Montessori Elementary	615 Clinton Springs Ave	Cincinnati

School	Rockdale Academy Elementary	335 Rockdale Ave	Cincinnati
School	South Avondale Elementary	636 Prospect Pl	Cincinnati
School	Guardian Angels School	6539 Beechmont Ave	Cincinnati
School	Archbishop McNicholas High	6536 Beechmont Ave	Cincinnati
School	Altercrest Day Treatment High	274 Sutton Rd	Cincinnati
School	Mt. Washington Elementary (Temp)	3401 Edwards Rd	Cincinnati
School	Sands Montessori Elementary	6421 Corbly Rd	Cincinnati
School	Maddux Elementary	943 Rosetree Ln	Cincinnati
School	Sherwood Elementary	7080 Grantham Way	Cincinnati
School	Rex Ralph Center	1310 Adams Rd	Springfield
School	John Paul II Catholic School	9375 Winton Rd	Cincinnati
School	Mt Healthy Prep and Fitness	7601 Harrison Ave	Cincinnati
School	Beautiful Savior Lutheran School	11981 Pippin Rd	Springfield
School	Central Montessori Academy Elementary	1904 Springdale Rd	Springfield
School	Winton Woods Primary South Elementary	825 Lakeridge Dr	Springfield
School	Brent Elementary	8791 Brent Dr	Cincinnati
School	Pleasant Run Elementary	11765 Hamilton Ave	Springfield
School	North Elementary	2170 Struble Rd	Cincinnati
School	Pleasant Run Middle	11770 Pippin Rd	Cincinnati
School	Mt Healthy High	2046 Adams Rd	Springfield
School	Finneytown Secondary Campus	8916 Fontainebleau Ter	Cincinnati
School	Northwest High	10761 Pippin Rd	Cincinnati
School	Summit Academy Cincinnati	745 Derby Ave	Cincinnati
School	Winton Hills Academy Elementary	5300 Winneste Ave	Cincinnati
School	Winton Montessori Elementary	4750 Winton Rd	Cincinnati
School	Our Lady Of Victory School	808 Neeb Rd	Cincinnati
School	St. Aloysius On-The-Ohio School	6207 Portage St	Cincinnati
School	Sayler Park Elementary (Temp Locatiion)	6607 Hillside Ave	Cincinnati
School	C O Harrison Elementary	585 Neeb Rd	Cincinnati
School	Rapid Run Middle	6345 Rapid Run Rd	Deer Park
School	Howard Elementary	4131 Matson Ave	Cincinnati
School	All Saints Elementary	8939 Montgomery Rd	Deer Park
School	Leaves of Learning	7131 Plainfield Rd	Cincinnati

School	St. Vincent Ferrer Elementary	7754 Montgomery Rd	Cincinnati
School	The Rockwern Academy	8401 Montgomery Rd	Cincinnati
School	Linden Grove School	4122 Myrtle Ave	Cincinnati
School	Silverton Paideia Elementary	6829 Stewart Rd	Cincinnati
School	Holmes Elementary	8688 Donna Ln	Cincinnati
School	Blue Ash Elementary	9541 Plainfield Rd	Deer Park
School	Amity Elementary	4320 E Galbraith Rd	Deer Park
School	Deer Park Junior / Senior High	8351 Plainfield Rd	Cincinnati
School	P.A.C.E. High	1601 California Ave	Cincinnati
School	Horizon Science Academy Cincinnati	1055 Laidlaw Ave	Cincinnati
School	St. Aloysius Educational Center	4721 Reading Rd	Cincinnati
School	Cincinnati Hebrew Day School	2222 Losantiville Ave	Cincinnati
School	Marva Collins Preparatory	7855 Dawn Rd	Cincinnati
School	A.B. Miree Fundamental Academy	1660 Sternblock Ln	Cincinnati
School	Phoenix Community Learning Center	3595 Washington Ave	Cincinnati
School	Harmony Community Middle	1580 Summit Rd	Cincinnati
School	Life Skills Center Of Hamilton County	7710 Reading Rd	Cincinnati
School	Bond Hill Academy Elementary	1510 California	Cincinnati
School	Roselawn Condon Elementary	7735 Greenland Pl	Cincinnati
School	Academy Multilingual Immersion	1908 Seymour Ave	Cincinnati
School	Woodward Career Technical High	7005 Reading Rd	Cincinnati
School	Our Lady Of Lourdes Elementary	5835 Glenway Ave	Cincinnati
School	St. Antoninus Elementary	5425 Julmar Dr	Cincinnati
School	St. Dominic School	371 Pedretti Ave	Cincinnati
School	St. Teresa Of Avila School	1194 Rulison Ave	Cincinnati
School	Dater Montessori Elementary	2840 Boudinot Ave	Cincinnati
School	Covedale Elementary	5130 Sidney Rd	Cincinnati
School	Delhi Middle	5280 Foley Rd	Cincinnati
School	Delshire Elementary	4402 Glenhaven Rd	Cincinnati
School	Gilbert A. Dater High	2146 Ferguson Rd	Cincinnati
School	Western Hills University High	2144 Ferguson Rd	Cincinnati
School	Western Hills Engineering High	2144 Ferguson Rd	Cincinnati
School	The Cincinnati Waldorf	5555 Little Flower Ave	Cincinnati

School	Our Lady of Grace Catholic School	2940 W Galbraith Rd	Cincinnati
School	LaSalle High	3091 N Bend Rd	Cincinnati
School	St. Joseph Villa Academy SN Elementary	5400 Edalbert Dr	Cincinnati
School	Struble Elementary	2760 Jonrose Ave	Cincinnati
School	Weigel Elementary	3242 Banning Rd	Cincinnati
School	White Oak Middle	3130 Jessup Rd	Cincinnati
School	North College Hill Jr/Sr High	1620 W Galbraith Rd	Cincinnati
School	Winton Woods Intermediate	825 Waycross Rd	Cincinnati
School	Winton Woods Elementary	1501 Kingsbury Dr	Springfield
School	Welch Primary	12084 Deerhorn Dr	Cincinnati
School	Winton Woods High	1231 W Kemper Rd	Cincinnati
School	Scarlet Oaks Vocational CDC	3254 E Kemper Rd	Sharonville
School	St. Michael Catholic School	11136 Oak St	Cincinnati
School	Evendale Elementary	3940 Glendale Milford Rd	Cincinnati
School	Glendale Elementary	930 Congress Ave	Cincinnati
School	Princeton Virtual Academy	3900 Cottingham Dr	Cincinnati
School	Sharonville Elementary	11150 Maple St	Cincinnati
School	Blue Ash Educational Bldg Elementary	10149 Kenwood Rd	Cincinnati
School	Archbishop Moeller High	9001 Montgomery Rd	Cincinnati
School	Ursuline Academy	5535 Pfeiffer Rd	Cincinnati
School	Springs East Elementary	9429 Loveland Madeira Rd	Cincinnati
School	Maple Dale Elementary	6100 Hagewa Dr	Cincinnati
School	Montgomery Elementary	9609 Montgomery Rd	Cincinnati
School	Edwin H Greene Intermediate Middle	5200 Aldine Dr	Cincinnati
School	Sycamore Jr High	5757 Cooper Rd	Cincinnati
School	Sycamore High	7400 Cornell Rd	Cincinnati
School	St. Gertrude School	6543 Miami Ave	Cincinnati
School	Cincinnati Country Day High	6905 Given Rd	Madeira
School	Madeira Elementary	7840 Thomas Dr	Indian Hill
School	Indian Hill Elementary	6100 Drake Rd	Indian Hill
School	Indian Hill Primary	6207 Drake Rd	Indian Hill
School	Indian Hill Middle	6845 Drake Rd	Madeira
School	Madeira High	7465 Loannes Dr	Indian Hill

School	Indian Hill High	6865 Drake Rd	Newtown
School	Miami Valley Christian Academy	6830 School St	Cincinnati
School	Mercer Elementary	2600 Bartels Rd	Cincinnati
School	Wilson Elementary	2465 Little Dry Run Rd	Cincinnati
School	Turpin High	2650 Bartels Rd	Cincinnati
School	St. Gabriel Consolidated School	18 W Sharon Rd	Springdale
School	Herman Turner Academy	353 W Kemper Rd	Cincinnati
School	Bethany Elementary	555 Albion Ave	Cincinnati
School	Springdale Elementary	350 W Kemper Rd	Cincinnati
School	Princeton Community Middle	11157 Chester Rd	Cincinnati
School	Princeton High	11080 Chester Rd	Cincinnati
School	Diamond Oaks Vocational CDC	6375 Harrison Ave	Cincinnati
School	St. Bernard School - Taylor Creek	7115 Springdale Rd	Cincinnati
School	St. Ignatius Loyola School	5222 North Bend Rd	Cincinnati
School	St. James the Greater School	6111 Cheviot Rd	Cincinnati
School	Monfort Heights Elementary	3711 W Fork Rd	Cincinnati
School	Miami Heights Elementary	7670 Bridgetown Rd	Cincinnati
School	Our Lady Of Visitation School	3180 South Rd	Cincinnati
School	St. Jude Elementary	5940 Bridgetown Rd	Cincinnati
School	Charles W Springmyer Elementary	4179 Ebenezer Rd	Cincinnati
School	John Foster Dulles Elementary	6481 Bridgetown Rd	Cincinnati
School	Oakdale Elementary	3850 Virginia Ct	Cincinnati
School	Oak Hills High	3200 Ebenezer Rd	Cincinnati
School	The Schilling School For Gifted Children	8100 Cornell Rd	Cincinnati
School	Cincinnati Hills Christian Academy Eleme	11312 Snider Rd	Cincinnati
School	Cincinnati Hills Christian Academy Middl	11300 Snider Rd	Cincinnati
School	Cincinnati Hills Christian Academy High	11525 Snider Rd	Cincinnati
School	Stewart Elementary	11850 Conrey Rd	Cincinnati
School	St. Peter Claver Latin School for Boys	123 E 13th St	Cincinnati
School	Colerain Elementary	4850 Poole Rd	Cincinnati
School	Houston Early Learning Center	3310 Compton Rd	Cincinnati
School	Taylor Elementary	3173 Springdale Rd	Cincinnati
School	Bevis Elementary	10133 Pottinger Rd	Cincinnati

School	Colerain Middle	4700 Poole Rd	Cincinnati
School	Colerain High	8801 Cheviot Rd	Cincinnati
School	St. John The Baptist Catholic School	5375 Dry Ridge Rd	Cincinnati
School	Immaculate Heart Of Mary Catholic School	7800 Beechmont Ave	Cincinnati
School	Summit Elementary	8400 Northport Dr	Cincinnati
School	Ayer Elementary	8471 Forest Rd	Cincinnati
School	Nagel Middle	1500 Nagel Rd	Cincinnati
School	Anderson High	7560 Forest Rd	Cincinnati
School	Academy Of World Languages Elementary	2030 Fairfax Ave	Cincinnati
School	Clark Montessori High (Current)	5425 Winton Ridge Ln	Cincinnati
School	Hamilton County Math & Science Academy	2675 Civic Center Dr	Cincinnati
School	Heritage Hill Elementary	11961 Chesterdale Rd	Cincinnati
School	Cincinnati Leadership Academy	7243 Eastlawn Dr	Cincinnati
School	Cincinnati Speech & Reading Intervention	1812 Central Pkwy	Cincinnati
School	Frederick Douglass Elementary	2627 Park Ave	Madeira
School	Madeira Middle	6612 Miami Ave	Cincinnati
School	NIA University Community	3556 Reading Rd	Cincinnati
School	Virtual High	425 Ezzard Charles Dr	Cincinnati
School	Chase Elementary	4151 Turrill St	Cincinnati
School	Pleasant Ridge Montessori School	5945 Montgomery Rd	Cincinnati
School	Hughes STEM High School	2515 Clifton Ave	Cincinnati
School	Westwood Elementary (Current)	2601 Westwood Northern Blvd	Cincinnati
School	James N Gamble Montessori High School	5425 Winton Ridge Ln	Cincinnati
School	James N Gamble Montessori High School	2601 Westwood Northern Blvd	Cincinnati
School	South Elementary	7900 Werner Ave	Cincinnati
School	North College Hill Elementary	6955 Grace Ave	Cincinnati
School	North College Hill Middle	1624 W Galbraith Rd	Norwood
School	Sharpsburg Primary	4400 Smith Rd	Cincinnati
School	Reading Middle	230 Halker Ave	Cincinnati
School	Seven Hills School	2726 Johnstone Place	Golf Manor
School	Bnos Rochel Pesia Fruma High School	2209 Losantiville	Golf Manor
School	Cincinnati Hebrew Day School	2222 Losantiville	Mariemont
School	Mariemont Preschool	3908 Plainville Road	Mariemont

APPENDIX H – LANDSLIDE ANALYSIS

LANDSLIDE HAZARD

Hazard Definition

Landslides cause substantial economic, human, and environmental losses throughout the world. They are often triggered by other natural disasters, such as earthquakes and floods, and are difficult to predict. The fundamental requirement for mapping and predicting landslide hazards in location and timing is the thorough knowledge and understanding of the factors and mechanisms of the key Earth processes that can lead to mass wasting and movement. Landslide can threaten buildings, roads, and other infrastructures. In hilly area, landslide usually poses serious impact on roads as well as buildings.

A landslide is defined as the movement of a mass of rock, debris, or earth down a slope (Cruden, 1991). Landslides are a type of mass wasting which denotes any down slope movement of soil and rock under the direct influence of gravity. The term landslide encompasses events such as rock falls, topples, slides, spreads, and flows, such as debris flows commonly referred to as mudflows or mudslides (Varnes, 1996). Landslides can be initiated by rainfall, earthquakes, volcanic activity, changes in groundwater, disturbance and change of a slope by man-made construction activities, or any combination of these factors.

Landslides are treated as rare events because of their limited spatial occurrence. They are not random, but predictable phenomena. If failing to be predicted, landslide can cause public risk of injury and even loss of life. When landslide occurs around roads, it has impact on its regional economy not only because of the closure of road, but also the cost of fixing road embankment and slope failure. Most landslides can be predicted if proper investigations are performed in time. As the cost of preventing landslides is less than the cost of correcting them, and the occurrence of the initial slope movement can lead to additional unstable conditions, the landslide susceptibility assessment is necessary.

Factors that dictate landslide occurrence include slope angle, the load, material strength, frictional resistance, and water content. Most slope failures and landslides have complex causes. Slope stability (ability of slope to resist sliding) depends on the dynamic equilibrium between the driving gravity force pulling it down and the resisting force holding it up. Immediate events (dynamic variables) that could upset the balance between the driving and resisting forces acting on slope and trigger landslide hazards include heavy rains, thawing of frozen ground, earthquakes, stream erosion at base of slope, and human activities such as removing mass materials from base of slope through roads and building lots constructions, removing vegetation cover due to agricultural or forestry cultivation, etc.

Landslide Maps

A landslide inventory map shows the locations and outlines of landslides. A landslide inventory is a data set that may present a single event, a regional event, or multiple events. Small-scale maps may show only landslide locations whereas large-scale maps may distinguish landslide sources from deposits and classify different kinds of landslides and show other pertinent data.

A landslide hazard map indicates the possibility of landslides occurring throughout a given area. A hazard map may be as simple as a map that uses the locations of old landslides to indicate potential instability, or as complex as a quantitative map incorporating probabilities based on variables such as rainfall thresholds, slope angle, soil type,

and levels of earthquake shaking. An ideal landslide hazard map shows not only the chances that a landslide may form at a particular place, but also the chance that it may travel downslope a given distance.

A landslide risk map shows the expected annual cost of landslide damage throughout an area. Risk maps combine the probability information from a landslide hazard map with an analysis of all possible consequences (property damage, casualties, and loss of service).

A landslide susceptibility map ranks slope stability of an area into categories that range from stable to unstable. Susceptibility maps show where landslides may form. **Figure 1** shows the areas susceptible to landslide.

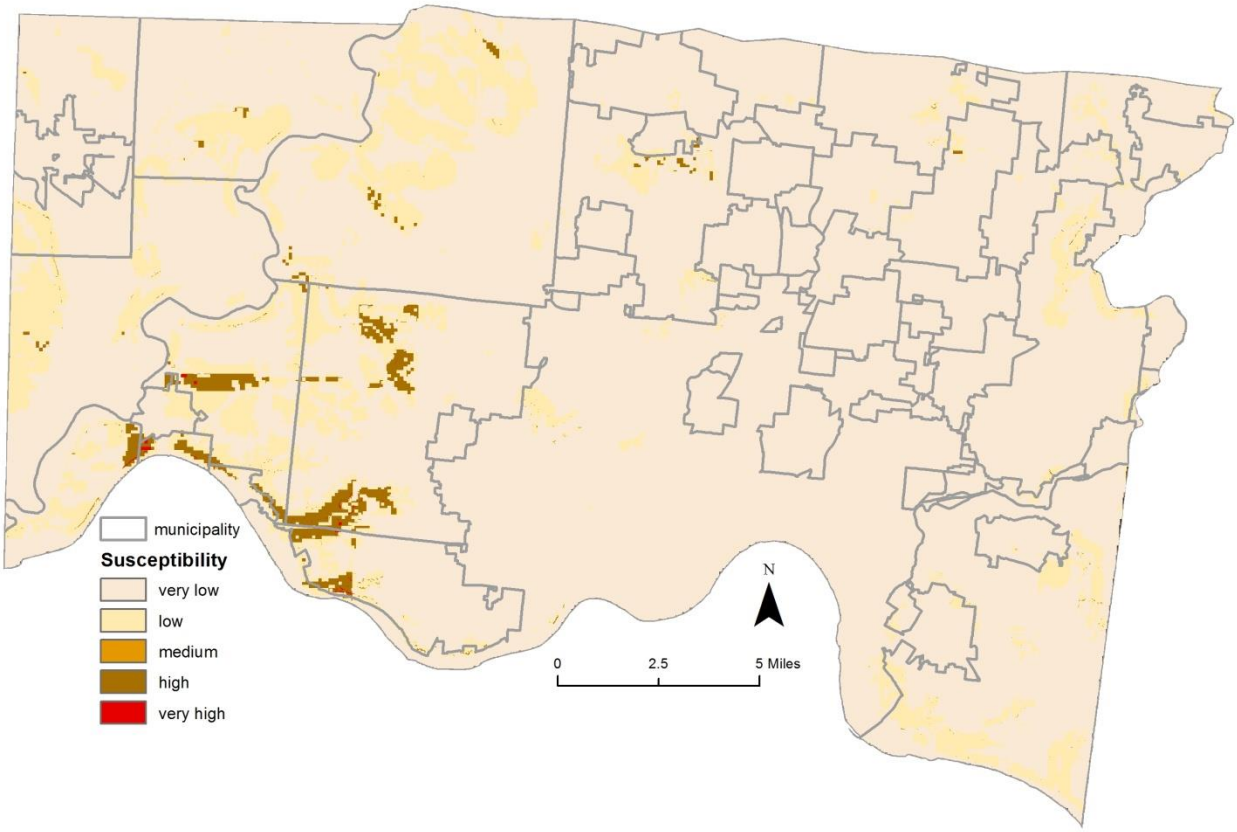


Figure 1. Landslide Susceptibility of Hamilton County, OH

Data Source

The occurrence of landslides in a given area generally depends upon the complex interaction of different dependent and independent factors like slope angle, slope aspect, soil type, erodible soil, depth to groundwater, land cover pattern, distance from the stream, etc. Factors such as slope angle, soil type, distance from the river, and the erodible soil are statistically significant in controlling the slope movement, whereas liquidity index, precipitation, land cover, and depth to water are not statistically significant.

The data used in the landslide susceptibility analysis includes:

- The Digital Elevation Model (DEM) data with a cell size of 10m from USGS
- The soil mapping units of Hamilton County from the soil survey geographic (SSURGO) database prepared by U.S. Department of Agriculture, Natural Resource Conservation Service
- The annual average precipitation data from National Weather Service (NWS) River Forecast Centers (RFCs) in National Oceanic and Atmospheric Administration (NOAA)

- Hydrography from Census 2000 TIGER/Line Data
- Roads from Census 2000 TIGER/Line Data
- USGS DS 240: Enhanced Historical Land-Use and Land-Cover Data Sets of the U.S. Geological Survey

The factors to assess the landslide susceptibility include:

- Slope angle, derided from the DEM raster
- Soil type
- Erodible soil, derided from soil type data according to Soil Survey of Hamilton County Ohio (USDA iv-v)
- Annual precipitation
- Proximity to streams
- Land use
- Primary and secondary roads

All data are georeferenced to the NAD_1983_StatePlane_Ohio_South_FIPS_3402_Feet projection system and are oriented to the North American Datum of 1983 (NAD83).

Previous Occurrences for Landslide Hazard & Geographic Location for Landslide Hazard

On January 1st 2012, a record rainfall contributed to landslides on Columbia Parkway, leading to traffic headaches and costly cleanups. The threat of another landslide closed part of Columbia Parkway as the hilly terrain continued its slow slide toward the Ohio River. Accounts of landslide concerns can date back to the 1970s. A 1980 U.S Geological survey report estimated Hamilton County likely had the highest annual per capita landslide damage costs in the country. Within Hamilton County, Cincinnati alone was spending about $500,000 annually on emergency landslide repairs. Despite the chronic problem, no long-term plan currently exists to permanently fix the problem.

Hamilton County is a region of high landslide susceptibility and hazard potential. Landslide hazard includes any direct or indirect hazard posed to humans and properties because of landslide activity. The areas susceptible to landslides are located along streams and along steep valleys that contain weak glacial-lacustrine silts and clays, and where other unconsolidated glacial sediments are concentrated. Portions of Hamilton County are prone to numerous and costly landslides in the form of rotational slumps and earth flows. The majority of bedrock slope failures are in the shale-dominated Kope Formation and to a lesser degree in the Miamitown Shale. Landslides tend to occur in the thick colluviums developed on these units when excessive hydrostatic pressure builds up in this zone. **Figure 2** shows the Hamilton County is overall considered as large numbers of landslides occurrence and high susceptibility.

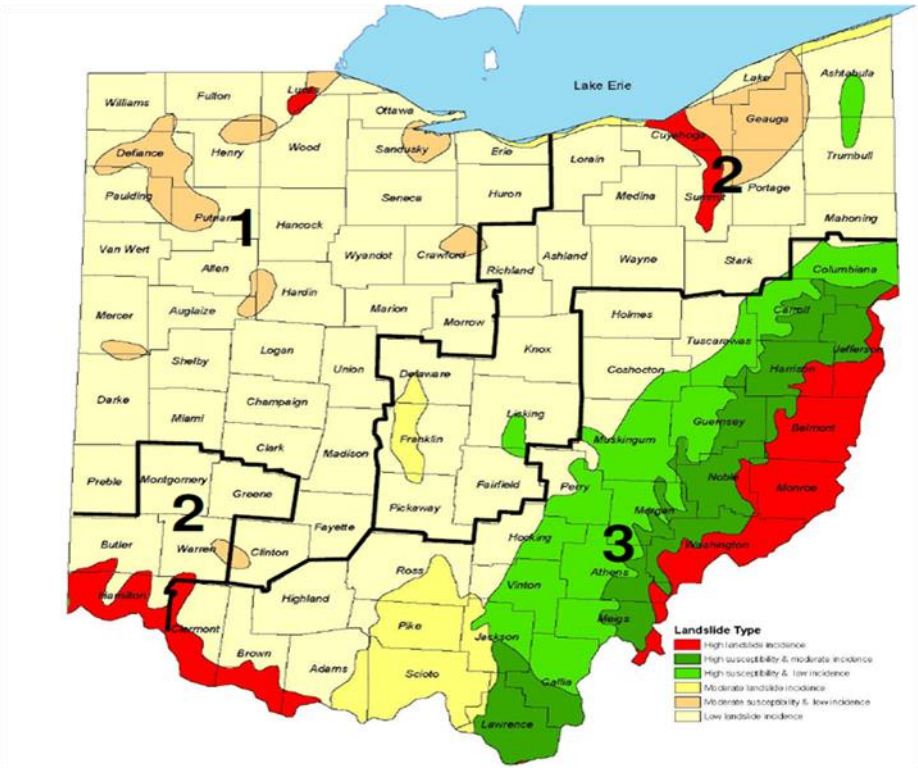


Figure 2. State of Ohio Landslide Incidence and Susceptibility (Ohio EMA, USGS)

The county has the different risk for occurrence of landslide. The area adjacent to Ohio River with steep slope under erodible soils has a higher incidence of landslides.

Huffman Court (Cincinnati, Ohio) is a classic locality for landslides related to glacial lake clays. Material was removed from the uphill side of property and placed on the downhill side to make a flat building pad. Sliding began almost immediately, and three houses at the eastern end of the property were lost. Subsequently two additional houses in the center and western end have been removed. The landslidng on this street is rotational slumping and translational block glide movement riding on soft lake clay.

Lawyers Pointe (Anderson Township, Hamilton County, Ohio) was a deep-seated slide in glacial material, and was an ancient landslide. The signs of landsliding should have been observed during initial site investigation before the development was begun. Because the main failure surface was so deep, conventional soil borings would not have revealed the problem, but inspection of aerial photographs in combination with an examination of the creek bed would have shown the problem.

Landslides in Columbia Parkway (Cincinnati, Ohio) are a regular occurrence along Columbia Parkway. Common along the Parkway are thin landslides that travel as long sheets. Engineers and geologists refer to this variety of ground movement as translational landslides. These slides are usually associated with close proximity (thin landslides) to the Kope Formation, a mudstone rich rock unit of Ordovician age. Accordingly property damage is less severe than with other types of landslides. Movement can be very quick, often overnight.

Mt. Adams (Cincinnati, Ohio) is the most prominent topographic feature in Cincinnati. It is also home to one of the most expensive landslide remediation projects in the history of the U.S. The cost of remediation was $44.5 million

in 2005 dollars. A normal retaining wall for this slide could not be used because the failure surface was too deep. The concrete piers adjacent to the I-471 cloverleaf are tied back into the bedrock with a series of cables that terminate in a bedrock tunnel that parallels the pier wall.

Hazard Extent for Landslide Hazard

The historical landslides generally happened along River moved from southwest to northeast across the county. The extent of the hazard varies both in terms of the extent of the vegetation, the soil type, and the slope.

Risk Identification for Landslide Hazard

According to FEMA's MHIRA document, Hamilton County has 15 average annual slides (ODOT). Its potential loss is ranked high. Based on historical information, the probability of a landslide is medium in terms of the resulting damage (many affecting only yard areas and not encroaching on any structures). Landslides with varying magnitudes are expected to happen. In Meeting #x, the planning team determined that the potential impact of a landslide is significant; therefore, the overall risk of a landslide hazard for Hamilton County is Elevated.

HAZUS-MH Landslide Analysis

The analysis consisted of three parts: (1) preparation of a landslide susceptibility map of Hamilton County, (2) identification of highways and roads with high landslide susceptibility within Hamilton County, and (3) assessment of building and critical infrastructure with high landslide susceptibility within Hamilton County.

Landslide Susceptibility Analysis for Landslide Hazard

The landslide susceptibility is indicated by a susceptibility priority number (SPN) in this analysis. The priority values of each factor are assigned based on the susceptibility priority model by Nandi and Shakoor (2009) where correlation of the landslide frequency with the slope angle showed that the landslide frequency increases with increasing slope angle, reaching a maximum at the 31 – 40 degree category and then decreasing beyond that range. As for soil type, silty and clayey soils were most susceptible to landslide occurrence. Similarly, the highly to very highly rated erodible soils and the proximity to the streams showed good correlation with the occurrence of landslides. A numerical ranking is implemented as in **Table 1** and the factor maps are reclassified (**Figure 3.1 to 3.6**). As a result, map layers containing a continuous measurement such as slope angle or non-scaled data such as soil type are converted into certain class thematic maps with defined priority values. The landslide susceptibility is indicated by a susceptibility priority number (SPN) as follows: SPN= $\frac{\left[\left(\frac{x_{1p}}{x_{1max}}\right)+\left(\frac{x_{2p}}{x_{2max}}\right)+\cdots\left(\frac{x_{np}}{x_{nmax}}\right)\right]}{n}$, where X_{ip} (i =1 to n) are the priority values of each class (1 to 5), X_{imax}(i=1 to n) is the maximum priority value of the respective classes (5), and n (n=6) is the number of factors used in the analysis. The SPN value ranges from 0 to 1. A value close to 0 implies a more stable region and a value close to 1 implies a more unstable zone. The SPN value is reclassified into five groups: sites with SPN$\leq$ 0.35 are categorized as very low susceptibility sites, those with SPN between 0.35 and 0.50 as low susceptibility sites, those with SPN between 0.50 and 0.65 as moderate susceptibility sites, those with SPN between 0.65 and 0.80 as high susceptibility sites, and those with scores $\geq$ 0.80 as high susceptibility sites. In order to find the buildings and roads with high landslide susceptibility, High and Very High landslide susceptibility are selected.

Table 1. Numerical ranking of the factors

Factors	Categories	Ranking	Factors	Categories	Ranking
Slope Angle (degree)	0-15	1	Soil Type	Silt	5
	15-30	2		Clay	4
	30-45	5		Sand	2
	45-60	4		Complex	3
	>60	3		Gravel Pit	1
Erodible Soil	Not eroded	1	Precipitation (inch)	41.1-42.9	1
	Eroded	5		43.0-44.7	2
Proximity to stream (meter)	0-500m	5		44.8-45.6	3
	501-1000m	4	Land use	Urban	3
	1001-1500m	3		Agriculture	4
	1501-2000m	2		Forest	5
	>2000m	1		Water body	1

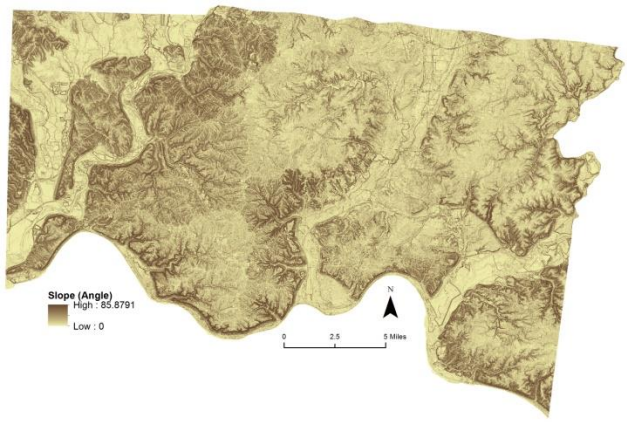


Figure 3.1. Slope angle

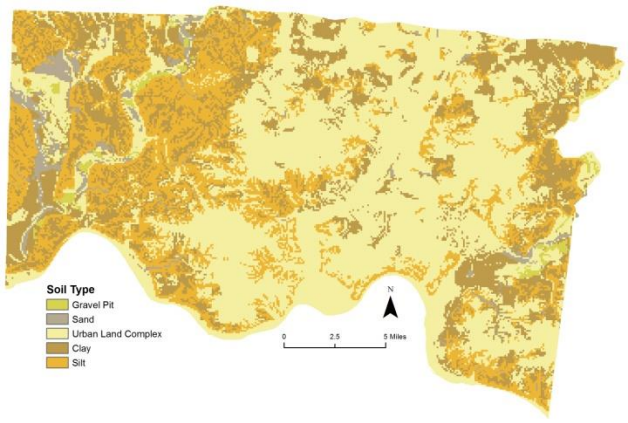


Figure 3.2. Soil type

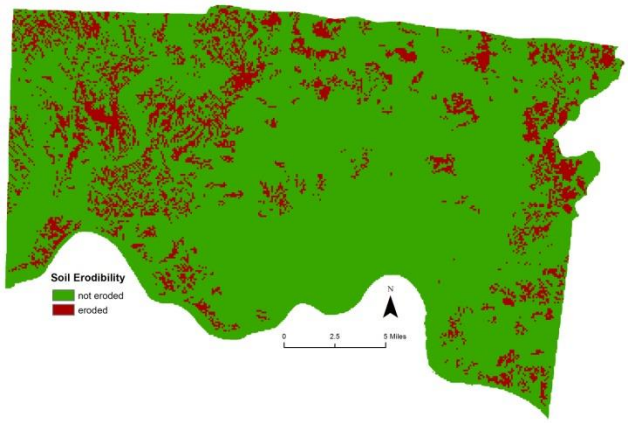


Figure 3.3. Erodible soil

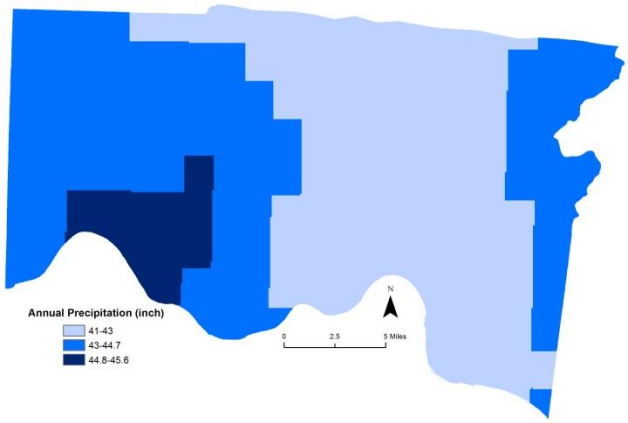


Figure 3.4. Annual precipitation

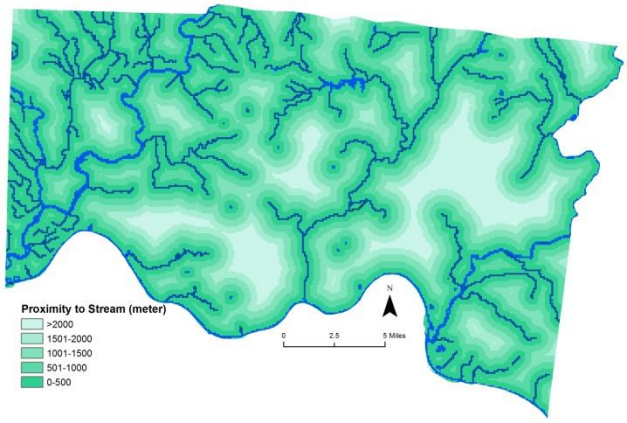


Figure 3.5. Proximity to stream

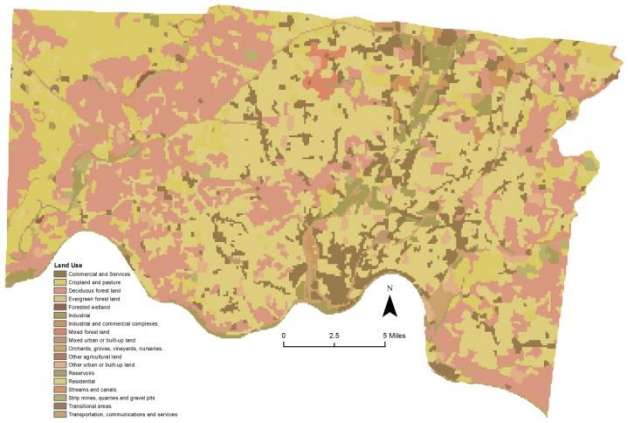


Figure 3.6. Land use

The landslide susceptibility to roads (**Figure 4**) shows the areas of high landslide susceptibility and roads passing through high landslide susceptibility areas. Engineers, contractors and local residents will benefits from the maps in designing the future of the areas and where best sites to execute their development plans. Planners will also benefit in identifying roads that have high landslide susceptibility so as to restrict any development in the high susceptible areas.

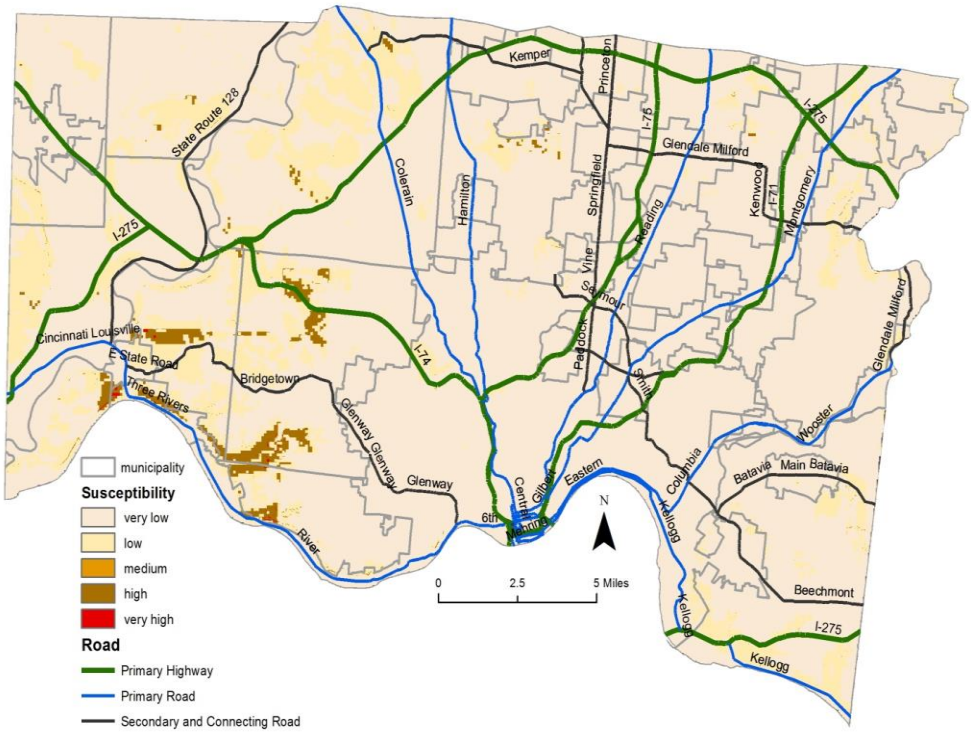


Figure 4. Landslide Susceptibility to Roads (Hamilton County, OH)

Landslide Susceptibility Analysis for Landslide Hazard

Critical Facilities

There are 11 critical facilities located within high landslide susceptibility. The analysis predicts that three waste water facilities, two emergency planning facilities, two dams, one port, one police station, one care center, and one communication. The affected facilities are identified in **Table 2**, and their geographic locations are shown in **Figure 5**.

Table 2. Hamilton County Landslide Critical Facility Damage

Facility	Number of Buildings Potentially Damaged	Exposed Facilities
Waste Water	3	Canterbury Row Condo. Asso. WWTP
		Northcrest Apartments WWTP
		Sky Ridge Condominiums WWTP
Emergency Planning	2	The Little Clinic of Ohio, LLC - Kroger
		Rainbow Day Care Center
Dam	2	Eagles Cliff Lake Dam
		Un-Named Dam No. 10
Port	1	Consolidated Terminal Logistics Contract
Police Station	1	Hamilton County Park Rangers
Care	1	The Little Clinic of Ohio, LLC - Kroger
Communication	1	Cincinnati Bell (6416 Harrison Ave)

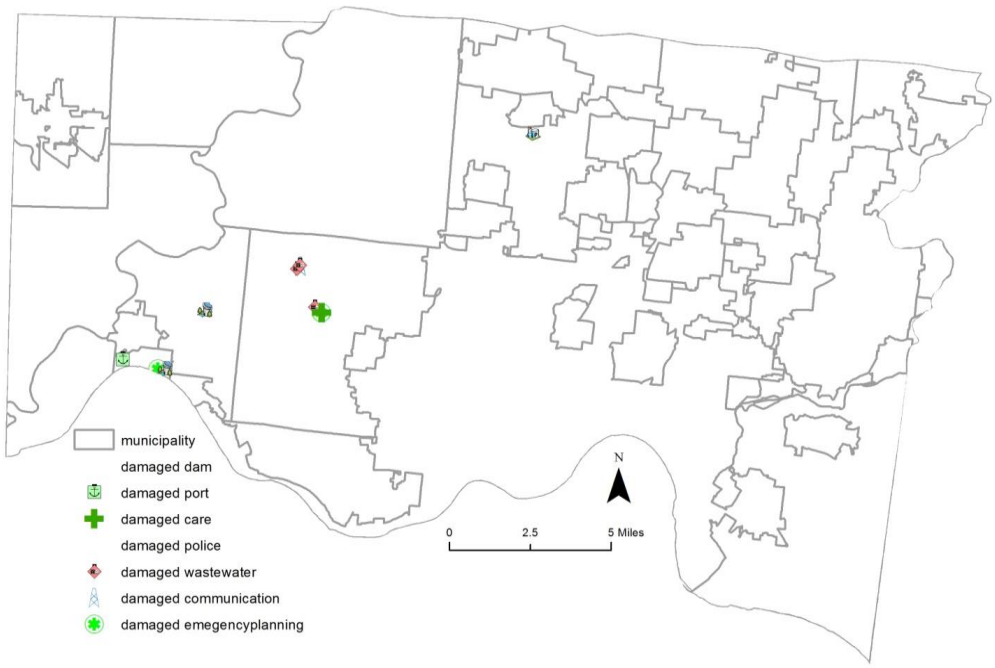


Figure 5. Critical Facilities within High Landslide Susceptibility

Building Inventory

Table 3. Hamilton County Landslide Building Damage

Municipal	Number of Buildings Potentially Damaged	Total Potential Building Damage
GREEN TOWNSHIP	980	$173,968,940
MIAMI TOWNSHIP	349	$57,827,780
NORTH BEND	292	$39,885,610
DELHI TOWNSHIP	91	$14,015,340
ADDYSTON	85	$5,585,320
CINCINNATI	76	$2,374,100
CLEVES	39	$2,746,350
COLERAIN TOWNSHIP	33	$2,874,550
CROSBY TOWNSHIP	5	$286,700
WHITEWATER TOWNSHIP	3	$27,640
BLUE ASH	2	N.A.
SPRINGFIELD TOWNSHIP	1	N.A.

Figure 6. Potential Building Damage by Landslide in Green Township

Green Township

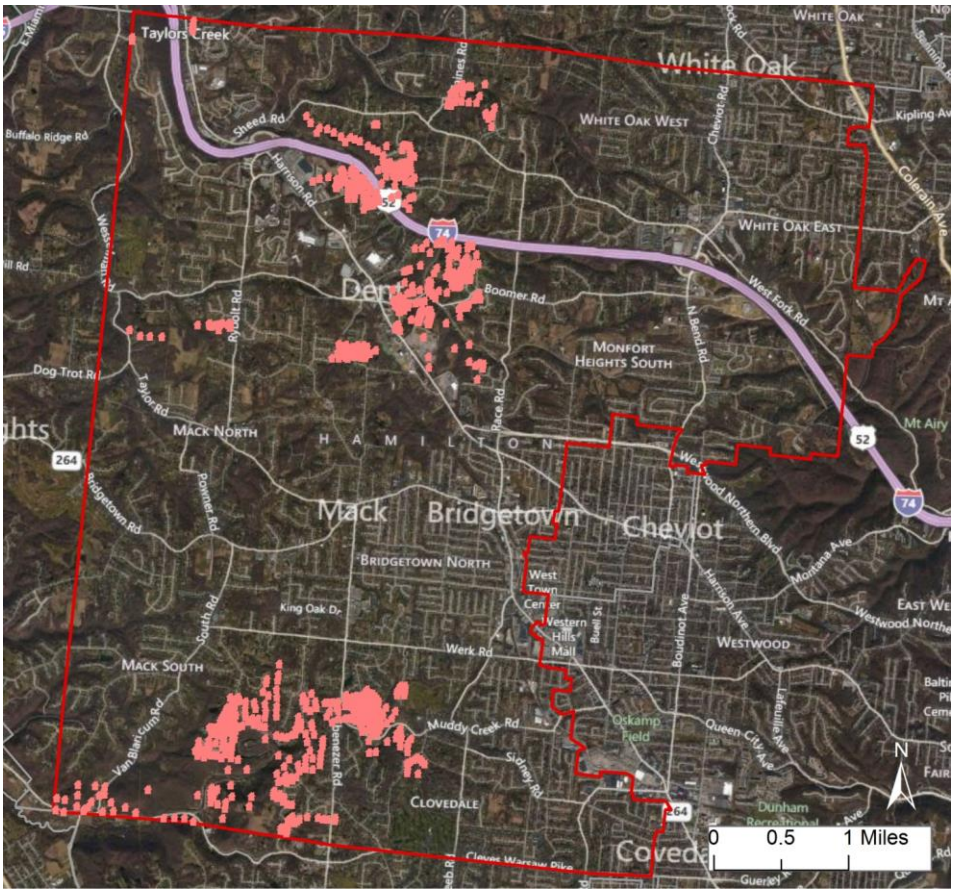


Figure 7. Potential Building Damage by Landslide in Green Township

Miami Township

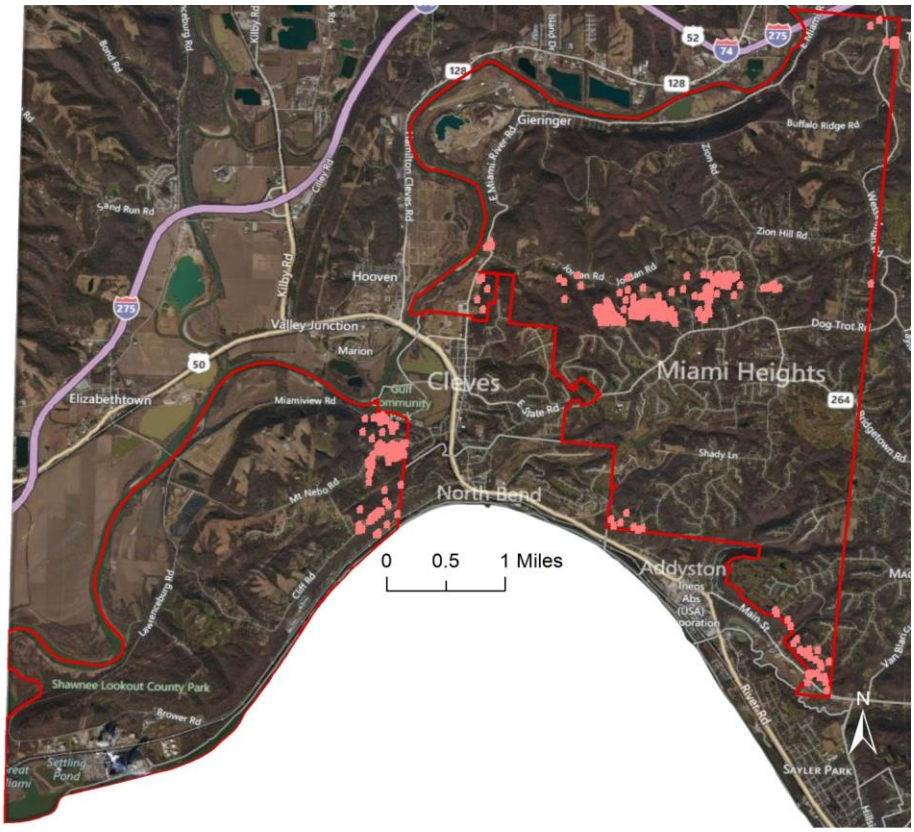


Figure 8. Potential Building Damage by Landslide in Miami Township

North Bend

Figure 9. Potential Building Damage by Landslide in North Bend

Delhi Township

Figure 10. Potential Building Damage by Landslide in Delhi Township

Addyston

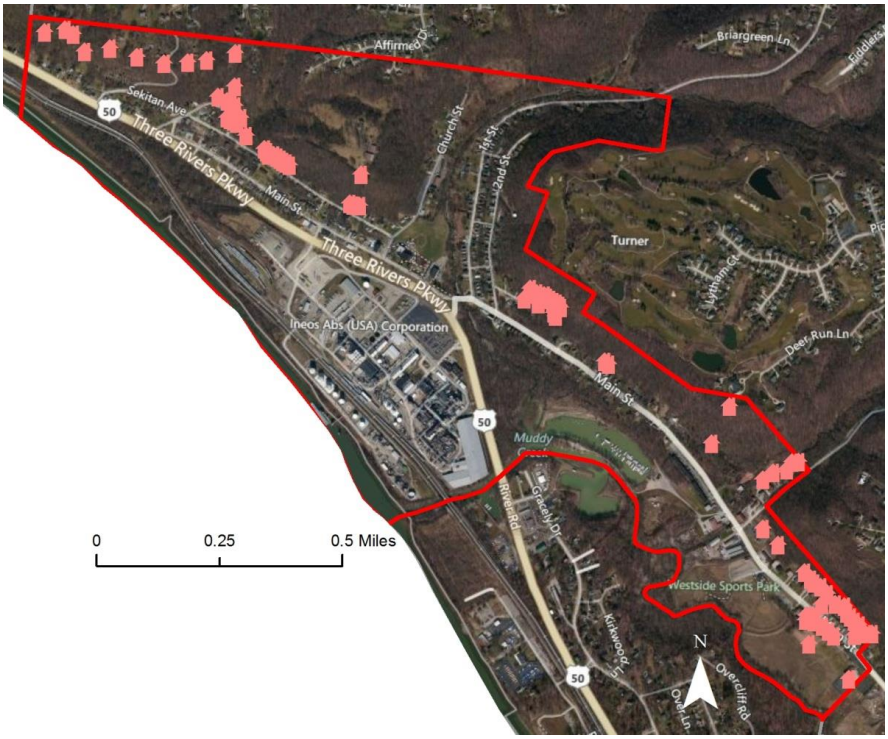


Figure 11. Potential Building Damage by Landslide in Addyston

Cincinnati

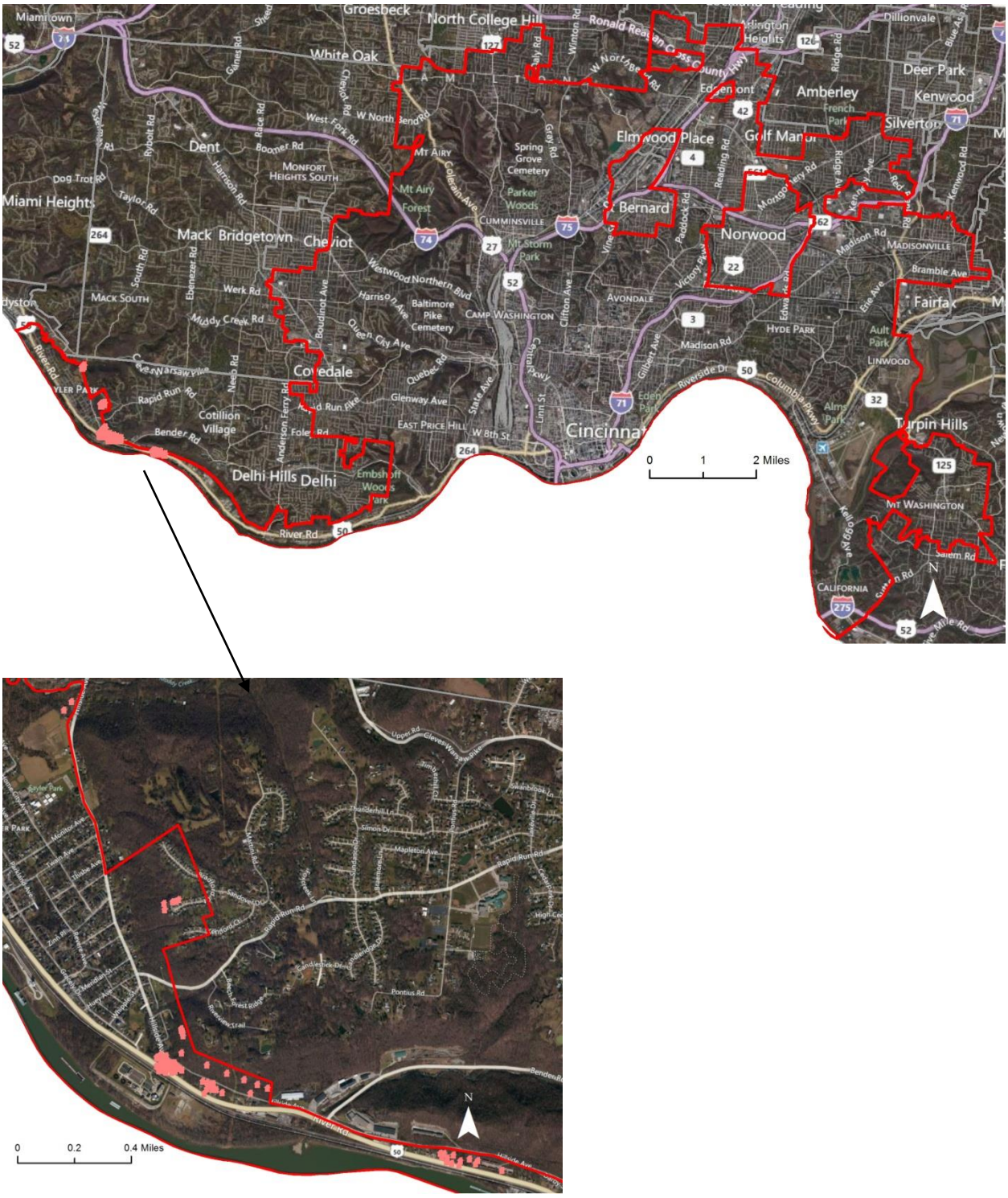


Figure 12. Potential Building Damage by Landslide in Cincinnati

Cleves

Figure 13. Potential Building Damage by Landslide in Cleves

Colerain Township

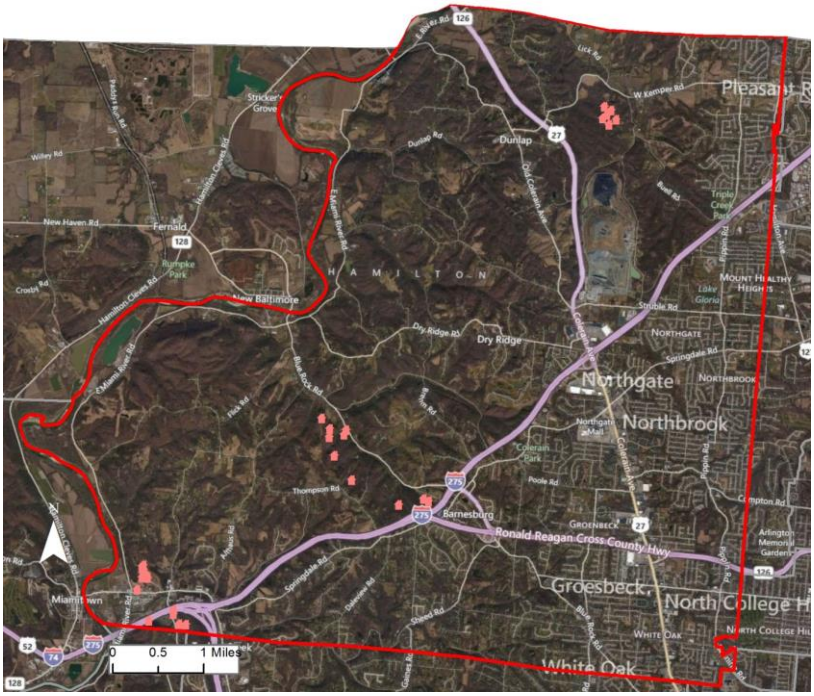


Figure 14. Potential Building Damage by Landslide in Colerain Township

Transportation Infrastructure

Road-fill failures and landslides constitute one of the major natural hazards for transportation networks in hilly and mountainous regions around the world (Wemple et al., 2001; Ayalew and Yamagishi, 2005; Sas et al., 2008). The road-fill failures and landslides can cause human causalities and serious road damage, which may lead to protracted road closures and costly repair expenditures. The debris flows from landslides may also disturb natural habitats and ecosystems and accelerate surface erosion and sediment transport in watersheds (Wu and Sidle, 1995; Wemple et al., 2001). To reduce the economic and humanitarian losses and maintain the operation of transportation networks, it is critical to monitor, identify and predict the occurrences of landslide hazards and to assess their impacts on buildings and roads so that we can respond to the landslide disasters in advance and save lives and resources.

Table 4 shows the primary roads in Hamilton County that pass through areas with high landslide susceptibility. Roads include segments of I-74, I-275, Colerain Ave., State Route 128, US Route 27, Bridgetown Rd., Batavia Rd., E. State Rd., Kemper Rd., W. State Rd., etc.

Table 4. Roads with high landslide susceptibility in Hamilton County

Municipality	Potentially Damaged Road Length (miles)
GREEN TOWNSHIP	24.51
MIAMI TOWNSHIP	12.89
COLERAIN TOWNSHIP	5.43
NORTH BEND	4.72
DELHI TOWNSHIP	4.30
CINCINNATI	3.96
WHITEWATER TOWNSHIP	2.36
SPRINGFIELD TOWNSHIP	2.30
ADDYSTON	2.08
CROSBY TOWNSHIP	0.42
CLEVES	0.34
GREENHILLS	0.32

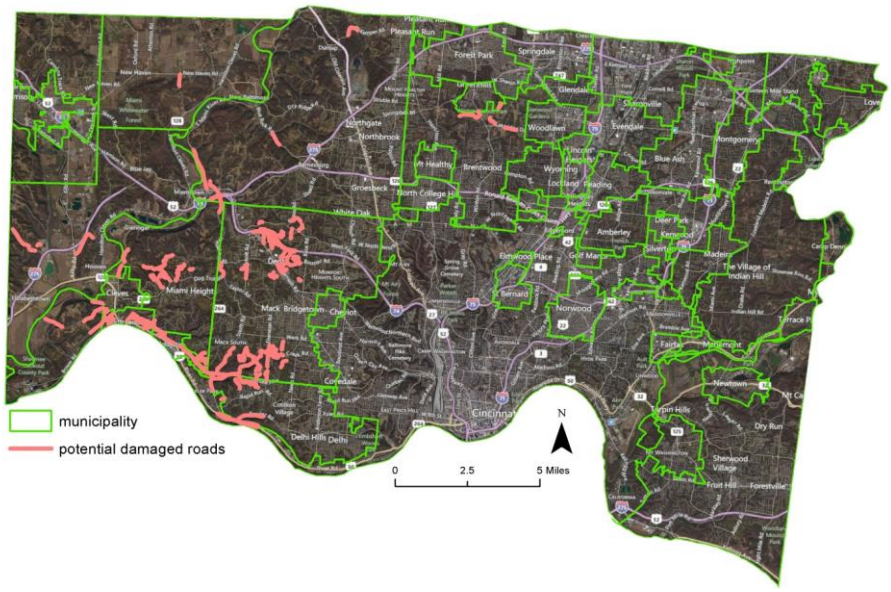


Figure 15. Roads with high landslide susceptibility in Hamilton County

Green Township

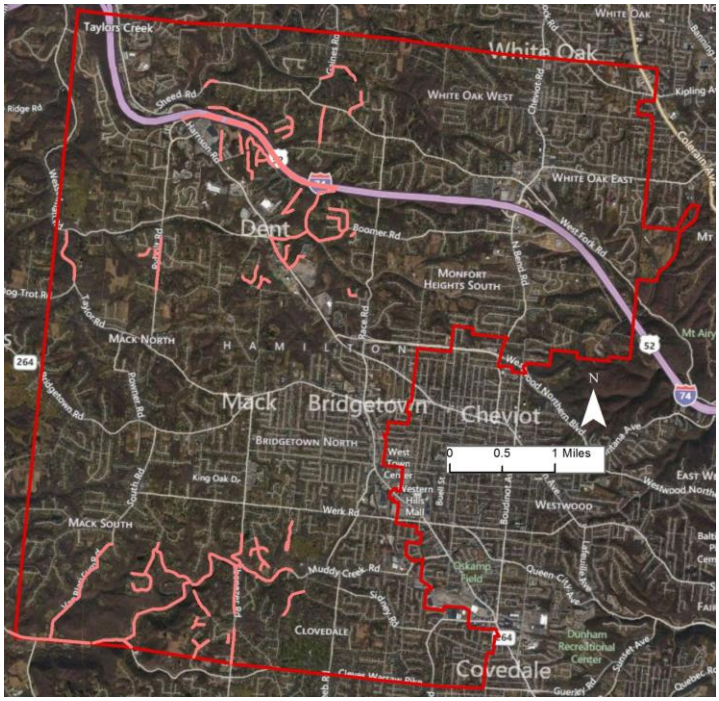


Figure 16. Potential Road Damage by Landslide in Green Township

Miami Township

Figure 17. Potential Road Damage by Landslide in Miami Township

Colerain Township

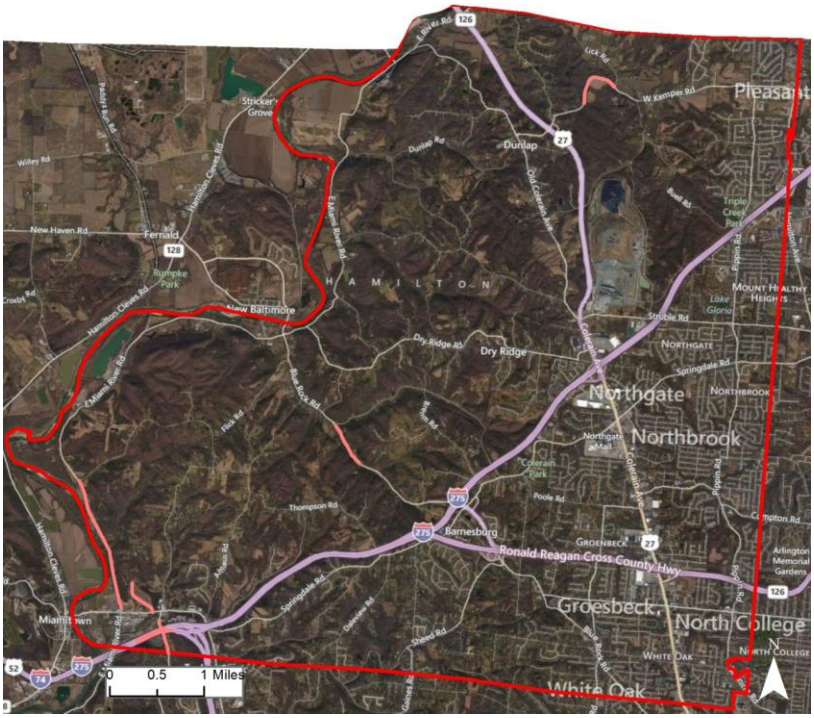


Figure 18. Potential Road Damage by Landslide in Colerain Township

Vulnerability to Future Assets/Infrastructure for Landslide Hazard

In the United States, it is estimated that the total dollar losses from landslides is between one and two billion dollars ($1.6 billion and $3.2 billion, year 2000 dollars). This figure is a conservative estimate, as there is no uniform method or overall agency that keeps track of or reports landslide losses. The costs and negative effects associated with the landslide problem in Hamilton County, OH are substantial. Landslides result in high monetary losses.

Analysis of Community Development Trends

Until recently, mitigation plans for landslides hazards have been mostly based on regional scales. The inadequacy of the previous plans limited county plans in preparing accurate and timely information for assessing the conditions and impacts of landslide occurrences at community or local scales. This constrained the management activities and decision making of transportation planners and managers and often delayed corrective actions of transportation engineers and maintenance crews.

The landslide susceptibility analysis provides Hamilton County with low-cost and effective tools for the preparation and assessment of landslide hazards in space and time in order to mitigate and avoid the threat and damage to the infrastructure and community. It will also provide a reliable assessment of landslide conditions and occurrences over a county-wide area. It will improve public safety and traffic efficiency because timely corrective and remediation measures are formulated and performed.

Source: CJ Kim, University of Cincinnati