Perry County, Illinois

Multi-Hazard Mitigation Plan

A 5-year Update to the Countywide MHMP originally adopted in 2009

Perry County, Illinois

Multi-Hazard Mitigation Plan

County Adoption Date: April 6, 2023

Written and prepared by Greater Egypt Regional Planning and Development Commission

Kelsey Bowe, Environmental Planner
Tyler Carpenter, GIS & Environmental Planning Director
Gabrielle Reed, Environmental Planner
Noah Scalero, Environmental Planner

Primary Contact

Charles Genesio
Director, Perry County Emergency Management Agency
Perry County Courthouse
1 Public Square
Pinckneyville IL, 62274
618-357-8220 Fax: 618-357-3923

Secondary Contact

Raymond Clark
Deputy Director, Perry County Emergency Management Agency
Perry County Courthouse
1 Public Square
Pinckneyville IL, 62274
618-357-8220 Fax: 618-357-3923

Contents

List of Tables

List of Figures

Acronyms

ASCE	American Society of Civil Engineers	**IBC**	International Building Code
ASDSO	Association of Dam Safety Officials	**IDPH**	Illinois Department of Public Health
BRIC	Building Resilient Infrastructure and Communities	**IEMA**	Illinois Emergency Management Agency
CARES	Coronavirus Aid, Relief, and Economic Security Act	**IEPA**	Illinois Environmental Protection Agency
CDC	Centers for Disease Control	**IL-CATT**	Illinois Capability and THIRA Tool
CDMS	Comprehensive Data Management System	**INDR**	Illinois Department of Natural Resources
CISA	Cybersecurity & Infrastructure Security Agency	**IPCC**	Intergovernmental Panel on Climate Change
CNEOS	Center for NEO Studies	**ISGS**	Illinois State Geological Survey
COVID-19	Coronavirus Disease-19	**ITTF**	Illinois Terrorism Task Force
CRS	Community Rating System	**MCS**	Mesoscale Convection System
CUSEC	The Central U.S. Earthquake Consortium	**MHMP**	Multi-Hazard Mitigation Plan
DI	Damage Indicators	**NASA**	National Aeronautics and Space Administration
DMA	Disaster Mitigation Act of 2000	**NEO**	Near Earth Object
DOD	Degrees of Damage	**NFIP**	National Flood Insurance Program
DRA	Delta Regional Authority	**NMSZ**	New Madrid Seismic Zone
EAP	Emergency Action Plan	**NOAA**	National Oceanic and Atmospheric Administration
EF	Enhanced Fujita (Tornado Scale)	**NORS**	National Outbreak Reporting System
EPCRA	Federal Emergency Planning and Community Right to Know Act of 1986	**NPDP**	National Performance of Dams Program
FAST	Fixing America's Surface Transportation Act of 2015	**NRCS**	National Resources Conservation Service
FEMA	Federal Emergency Management Agency	**NWS**	National Weather Service
FERC	Federal Energy Regulatory Commission	**PDM**	Pre-Disaster Mitigation Grant Program
		SFHA	Special Flood Hazard Areas
FMAG	Fire Management Assistance Grant Program	**THIRA**	Threat and Hazard Identification and Risk Assessment
GERPDC	Greater Egypt Regional Planning and Development Commission	**US EPA**	United States Environmental Protection Agency
GIS	Geographic Information System	**USACE**	United States Army Corps of Engineers
HAB	Harmful Algal Bloom	**USDA**	United States Department of Agriculture
Hazus-MH	Hazus Multi Hazard (modeling software)	**USFWS**	United States Fish and Wildlife Service
HHPD	Rehabilitation of High Hazard Potential Dam Grant Program	**USGS**	United States Geological Survey
HMGP	Hazard Mitigation Grant Program	**WVSZ**	Wabash Valley Seismic Zone

1. Introduction

The purpose of mitigation planning is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources. (Stafford Act Title 44, Chapter 1, Part 201).

Hazard mitigation planning is required by the Disaster Mitigation Act of 2000 (DMA), which replaced the Stafford Act. Local, tribal, territorial, and state governments must adopt hazard mitigation plans and update them every five years in order to be eligible for the following Federal Emergency Management Agency (FEMA) grant and insurance programs:

- Hazard Mitigation Grant Program (HMGP)
- Building Resilient Infrastructure and Communities (BRIC)
- Fire Management Assistance Grant Program (FMAG)
- Public Assistance Grant Program (PA)
- Pre-Disaster Mitigation Grant Program (PDM)
- Rehabilitation of High Hazard Potential Dam Grant Program (HHPD)
- National Flood Insurance Program (NFIP)

While this planning process is required for natural hazards, planning partners were encouraged to include any hazards in this plan that pose potential threats to their communities. In addition to FEMA funding, having Multi-Hazard Mitigation Plans (MHMPs) in place can streamline the process of applying for other federal, state, and local disaster mitigation and relief funding opportunities.

In order to help communities plan for natural hazards, FEMA developed Hazus Multi Hazard (MH), a geographic information system (GIS) based software that models earthquakes, floods, and other natural hazards. This software can estimate physical and economic losses and social impacts, help communities identify high risk areas, and provide the necessary information to create mitigation strategies for these natural hazards. Hazus-MH uses data from the US Census Bureau and allows for manual editing and additions of data. This ensures accuracy and relevancy to the county.

This Multi-Hazard Mitigation Plan, adopted by Perry County and all jurisdictions within, fulfills the requirement of the DMA, which amended Section 322 of the Stafford Act, 42 U.S.C. 5165. The First MHMP for Perry County was adopted in 2009. This will be the second update to the original plan.

2. Planning Process

Hazard Mitigation is any sustained action taken to reduce or eliminate long-term risk to human life and property from a natural hazardous event. Hazard Mitigation Planning involves communities in a four-step process to identify risks and vulnerabilities to natural hazards and develop long-lasting strategies that lead to the development of a comprehensive approach to risk reduction and an effective mitigation plan[1].

- Organize resources
- Assess risks
- Develop a mitigation plan
- Implement the plan and monitor progress

Planning Timeline

The planning process was be completed by Greater Egypt Regional Planning and Development Commission (Greater Egypt) and the Perry County Planning Team. The planning team consists of at least 1 member representing each jurisdiction within the county. The planning timeline involved partner and public meetings, the writing and review of the plan, finalization of plan and adoption by the county and all jurisdictions, and state and federal review and approval.

Figure 2.1: MHMP planning timeline for 2021-2022

Mitigation Planning Timeline	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
	1	2	3	4	5	6	7	8	9	10	11	12	13
Meetings: Goals and Objectives													
Meetings: Public involvement													
Meetings: Mitigation Activities													
Write Plan													
Review Plan													
Finalize Plan													
Print Plan													
State/ Federal Review													

[1] Illinois Emergency Management Agency, "Mitigation Planning".

Meeting 1: Goals and Objectives

- *Greater Egypt presented the planning process and review the responsibilities of planning partners.*
- *Greater Egypt presented historical, current, and possible hazards that are a threat to the county. Maps of risk areas within the county and southern Illinois were included in presentation.*
- *Greater Egypt reviewed the Hazus-MH hazard modeling process and reviewed essential and critical facilities data.*
  - *Planning partners were given the option to review and edit these datasets to provide the most accurate flood and earthquake models.*
- *Planning partners participated in a hazard ranking exercise to determine which hazards have the highest severity and probability of occurring.*
  - *The top ranked hazards from this exercise were modeled using Hazus-MH and other GIS based software to estimate physical damage, economic loss, and social impacts if the hazard occurred.*

Meeting 2: Public Involvement

- *Meeting 2 consisted of a review of hazard rankings, preliminary hazard models, and an introduction to the mitigation strategies exercise.*
  - *The public was notified of this meeting through a series of newspaper press releases (see Appendix 4 for full list of press releases).*
- *The public was encouraged to provide their input in the planning process, including providing suggestions of any additional hazards to include in the plan and any mitigation strategies.*
  - *No public comments were received for the Perry County MHMP*

Meeting 3: Mitigation Strategies

- *Greater Egypt reviewed the finalized hazard ranking list and summarized the mitigation strategies that were provided by planning partners.*
- *Planning partners provided final comments and ideas for mitigation strategies.*
- *This will be the final opportunity to provide mitigation strategies and update the Hazus essential facilities list.*

Meeting 4 (optional): Plan Review

- *If requested by the planning team, Greater Egypt hosted a 4th meeting to review the final MHMP before each jurisdiction adopts the plan.*
  - *This will be the final opportunity for planning partners to request any edits and additions to the MHMP.*

2.1. Responsibilities of Planning Partners

The planning partners are vital to completion of the MHMP, knowledge and expertise of local leaders is necessary to identify hazards and develop mitigation strategies. FEMA also requires the participation of partners in order for the plan to be approved and adopted.

There are 23 participating jurisdictions in Perry County. At least 1 member representing each jurisdiction is required to participate in the planning process. Planning partners were actively involved in the following activities (*minimum jurisdiction requirement by FEMA):

Attend at least two meetings during the planning process
Complete a hazard ranking exercise for your jurisdiction
Propose mitigation strategies for each hazard*
Assist with meeting match requirements
Review and provide comments on drafts of the full plan
Assist in coordinating public involvement
Review and update the county datasets
Integrate the MHMP into other planning and development initiatives as appropriate
Submit photographs, GIS files, and any other data relating to natural hazards, the county, or jurisdictions to improve the detail of the MHMP
Formally adopt the Franklin County MHMP as an official Plan* (Required for County and participating municipalities, optional for other organizations)

The full list of Planning Team members can be found in Appendix 1.

2.2. Neighboring Communities

Greater Egypt organized Planning Teams and wrote Multi-Hazard Mitigation Plans for the 5 Counties of its planning district: Franklin, Jackson, Jefferson, Perry, and Williamson. The EMA coordinators of these counties were in contact with each other and Greater Egypt throughout the planning process. EMA Coordinators, other County staff, and other jurisdictions attended meetings and assisted in planning for multiple counties. Meeting attendance can be found in appendix 5, other planning activities are recorded in county match documents and can be available upon request.

2.3. Review of Technical Documents

The planning process included review of local, state, federal, and academic resources. The 2015 Perry County Multi-Hazard Mitigation Plan was reviewed and incorporated into this updated version. Hazard background information is cited in footnotes throughout this Plan. GIS data sources are provided on every map. Data tables have sources listed below each table. Detailed GIS data can also be requested from Greater Egypt at any time from https://greateregypt.org/gis-services/

3. Perry County Profile

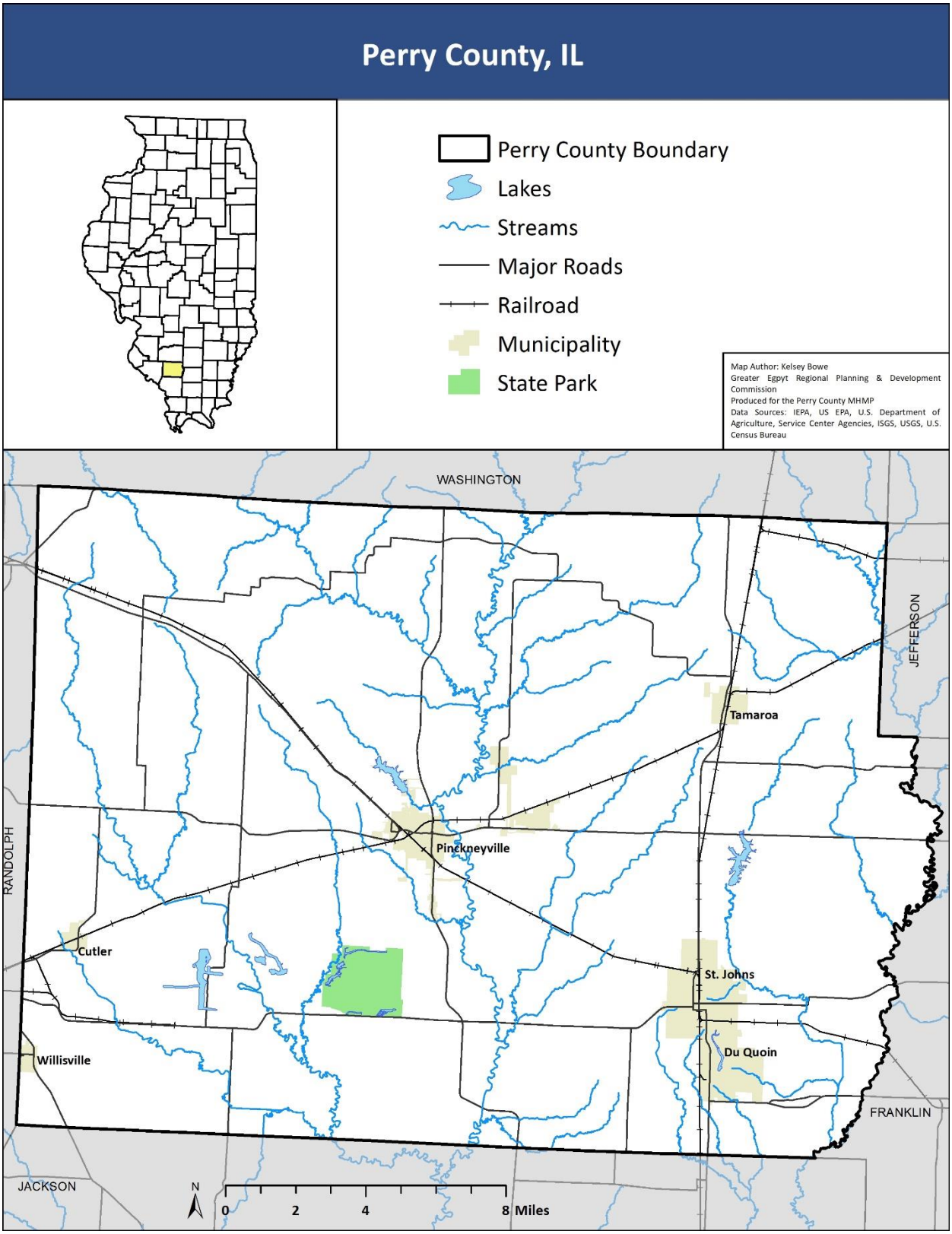
3.1. County Background

Perry County is located in southern Illinois; the county is bordered by Washington County to the north, Jefferson and Franklin counties to the east, Jackson County to the south, and Randolph County to the west. It is located roughly 70 miles southeast of St. Louis, Missouri and 140 miles south of Springfield, Illinois.

Perry County was founded in 1827 with land obtained from Jackson and Randolph counties. The county was named after Oliver Perry, an American naval war hero in the Battle of Lake Erie during the War of 1812. The population of Perry County grew exponentially in the 1850's with the discovery of coal deposits in the area as well as the development of the Illinois Central Railroad which allowed for transportation of people and goods. The population was also boosted by immigrants from Europe settling in the area through the 19th and 20th centuries.

Perry County, IL is part of the Delta Regional Authority (DRA) and is listed as a distressed county. The DRA is a federal-state partnership that encompasses 252 counties and parishes in the Mississippi River Delta and Alabama Black Belt regions. This organization is led by two president appointed chairpersons and the governors of the 8 participating states (Alabama, Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri, Tennessee). The goal of the DRA is to improve the economic opportunities for the counties involved, which are considered the most distressed in the U.S.; Federal funds are allocated to the DRA every year, where they are invested into local communities based on applications. The DRA's total funding allocation budget in 2021 was $14,847,923.00.

Figure 3.1


Perry County, IL
Perry County Boundary
Lakes
Streams
Major Roads
Railroad
Municipality
State Park
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Perry County MHMP
Data Sources: IEPA, US EPA, U.S. Department of Agriculture, Service Center Agencies, ISGS, USGS, U.S. Census Bureau
WASHINGTON
JEFFERSON
RANDOLPH
JACKSON
FRANKLIN
Tamaroa
Pinckneyville
Cutler
St. Johns
Du Quoin
Willisville
N
0
2
4
8 Miles

3.2. Demographics

Based on the U.S. Census Bureau 2020 population estimates, Perry County has approximately 20,945 residents. This is an estimated 6.4% decrease in population from 2010 figures. Perry County is divided into twenty-seven precincts; the population by precinct within Perry County can be seen in Table 3.1. According to the U.S. Census Bureau, 85.6% of residents in Perry County are white, 3.4% are Hispanic or Latino, and 8% are Black or African American. A full breakdown of race and Hispanic origins for Perry County is displayed in Table 3.2.

Table 3.1 - Perry County Population Estimates by Township

Precinct	Population
Du Quoin No. 2	465
Du Quoin No. 12	473
Du Quoin No. 6	518
Du Quoin No. 1	541
Pinckneyville No. 6	550
Cutler	578
Pinckneyville No. 1	635
Du Quoin No. 7	637
Du Quoin No. 5	663
Pinckneyville No. 5	664
Pinckneyville No. 2	668
Pinckneyville No. 4	670
Pinckneyville No. 3	675
Tamaroa No. 1	685
Du Quoin No. 9	698
Du Quoin No. 3	699
Tamaroa No. 2	717
Du Quoin No. 8	743
Du Quoin No. 11	764
Beaucoup	770
Swanwick	776
Du Quoin No. 4	888
Du Quoin No. 10	915
Willisville	921
Pinckneyville No. 8	956
Sunfield	1,103
Pinckneyville No. 7	2,573

Source: U.S. Census Bureau

Table 3.2 - Race and Hispanic Origin of Population in Perry County

Race and Hispanic Origins	Percentage of Population
American Indian and Alaska Native alone	0.2
Asian alone	0.6
Black or African American alone	8.0
Two or more races	3.7
Hispanic or Latino	3.4
White alone, not Hispanic or Latino	84.9
White alone	85.6
Native Hawaiian and Pacific Islander	0.0
Some other race	1.9

Source: U.S. Census Bureau

3.3. Economy and Industry

The two larger towns in Perry County are Du Quoin and Pinckneyville, which both have populations of ~ 5,500. Du Quoin is optimally located along US Highway 51 and Illinois Route 152 and Illinois Route 14. Pinckneyville is strategically located at the intersection of Illinois Routes 127, 13, and 154. Health care, educational services, retail trade, and manufacturing are the major industries by number of employees as shown in Table 3.3. Mining, public administration, and accommodation and food services are also major economic drivers in the region. The Perry County Jail and Pinckneyville Correctional Center, Pinckneyville Community Hospital, Marshall Browning Hospital, and Du Quoin CUSD #300 are some of the larger employers in the county.

According to the U.S. Census Bureau, Perry County has a median household income of $52,428 and a per capita income of $26,035. Roughly 14.4% of the population is below the poverty line – the national poverty rate is 10.5%.

Table 3.3 - Number of People Employed by Major Industries in Perry County

Industry	Estimated Number of Employees
Health Care & Social Assistance	1,342
Manufacturing	1,033
Retail Trade	990
Educational Services	663
Accommodation & Food Services	502
Public Administration	489
Mining, Quarrying, Oil & Gas	259

Source: U.S. Census Bureau ACS 5-year Estimate

3.4. Land Use and Development Trends

Before European settlement, Perry County was largely comprised of deciduous forest with small areas of prairie as well. Over recent centuries, the land cover has been transformed by agriculture, mining, and minor urban development. Agriculture currently dominates the land cover of Perry County. Major crops in the region are corn, soy, winter wheat, hay, and oats. However, much of the agricultural land in the region is not optimal, and thus much of the agricultural land use in the region is marginal. As a result, significant portions of the agricultural land are used for hay or pasture as seen in Figure 3.2.

Pockets of small urban development are located primarily along Highway 51 and Illinois Routes 127 and 154, namely the towns of Pinckneyville and Du Quoin. Further residential and industrial development in the county has been clustered around these towns. Major industry includes Prismian in Du Quoin and Eaton Contempri Industries in Pinckneyville. There is also minor development in Tamaroa, IL.

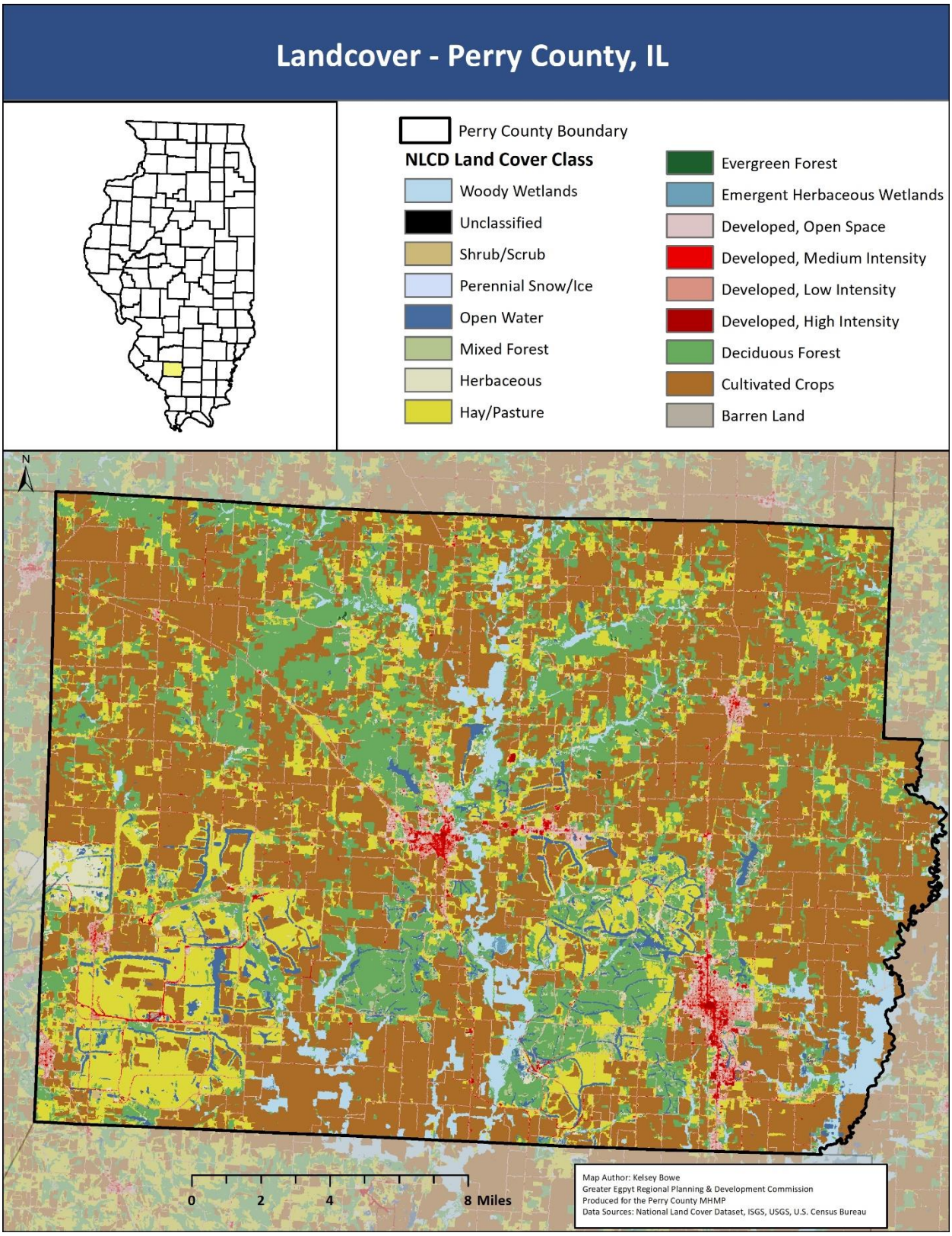
The coal mining industry was a driving economic force in Perry County during the 20th century. Whilst the coal industry has dwindled in the area in recent decades, there has been a small increase in mining activities in the county. There are small portions of Perry County that have been left unsuitable for development or agriculture as a result of un-reclaimed mining sites.

There are many areas in Perry County that are for public use. The most significant being Pyramid State Park, the Pinckneyville-Du Quoin Airport, Pinckneyville Fairgrounds, and the Du Quoin State Fairgrounds. Other public uses include schools, parks, public utilities, etc.

Perry County has not had any major development from 2015-2022.[2]

[2] Emails with Perry County Department of Planning and Development

Figure 3.2


Landcover - Perry County, IL
Perry County Boundary
NLCD Land Cover Class
Woody Wetlands
Unclassified
Shrub/Scrub
Perennial Snow/Ice
Open Water
Mixed Forest
Herbaceous
Hay/Pasture
Evergreen Forest
Emergent Herbaceous Wetlands
Developed, Open Space
Developed, Medium Intensity
Developed, Low Intensity
Developed, High Intensity
Deciduous Forest
Cultivated Crops
Barren Land
N
0
2
4
8 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Perry County MHMP
Data Sources: National Land Cover Dataset, ISGS, USGS, U.S. Census Bureau

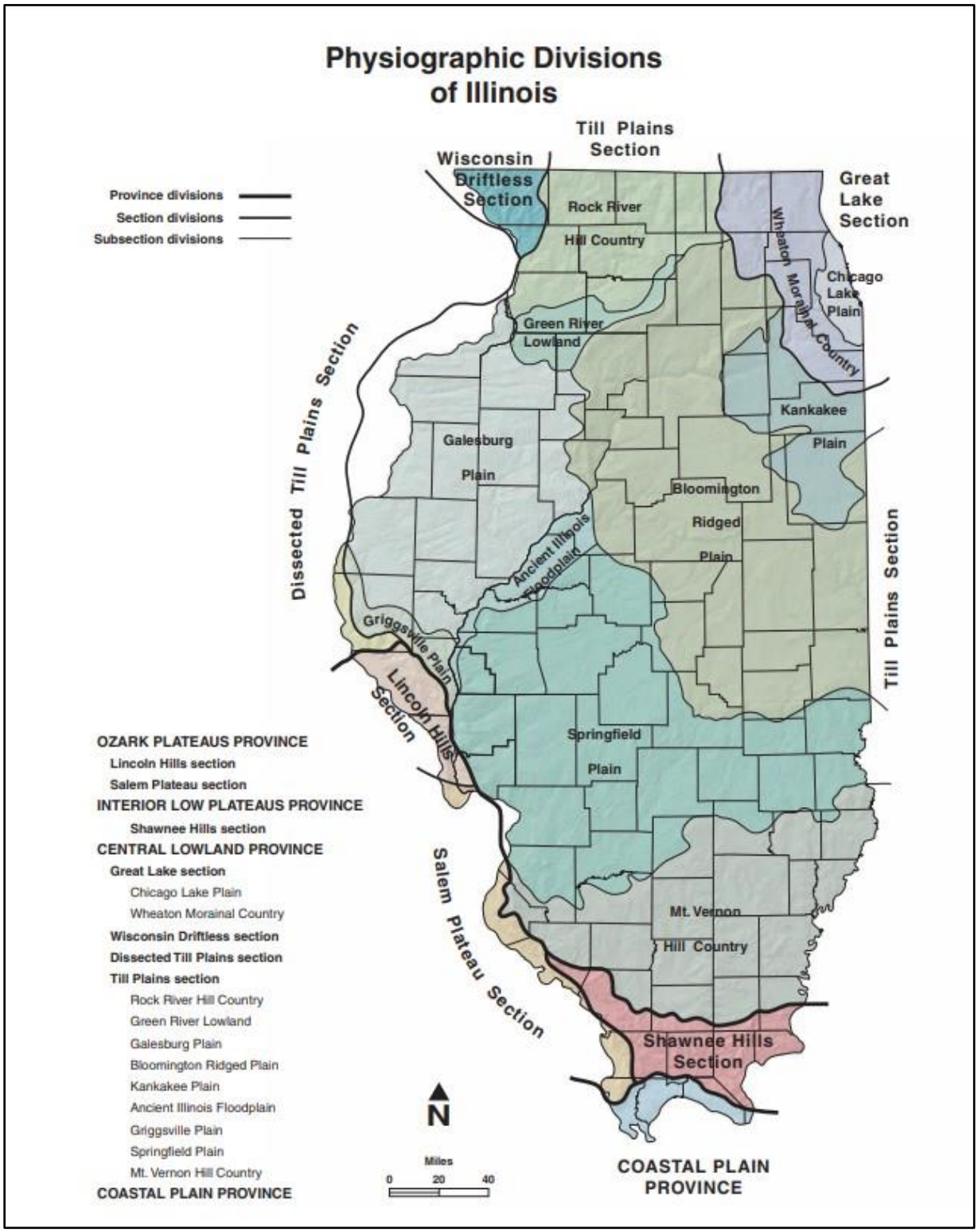
3.5. Climate

Perry County lies close to the border of Köppen climate classification Dfa (humid continental) and Köppen classification Cfa (humid subtropical). Summers are humid and warm, while winters are cool and wet. The warmest months are June – September with average highs reaching 89F and lows in the mid to high 60's. Average highs in the winter are well above freezing: the average high in January is 40F and the low is 24F. However, this region is subject to wildly variable weather, often leading to weeks of stifling heat in the summer and/or very cold conditions in the winter. Average annual precipitation is 43.18 inches. Though daytime highs in the winter are often above freezing, cold spells with significant snowfall and/or ice buildup are not uncommon in the winter. For details on climate change, see section 4.1.2

3.6. Topography & Hydrology

Perry County is located in the southern part of the Mt. Vernon Hill Country portion of the Till Plains region – just to the north of the Shawnee Hills physiographic division. The Till Plains topography resulted from the deposition of unsorted glacial sediments during the final stages of the Wisconsin glaciation. However, this region is predominantly controlled by bedrock and not deep sediment deposits. Despite being near the southern terminus of the glacier, Perry County has no significant moraine or esker deposits. The area is characterized by generally flat prairie with some rolling hills. Stream valleys tend to be broad and shallow. The northwest corner of Perry County contains the highest elevation (~576ft above sea level) while the lowest elevations (~388ft above sea level) are located near Pyatts, IL in the southern region of the county.

Figure 3.3



Source: ISGS

Perry County is drained by three HUC 8 Watersheds – The Big Muddy (HUC ID: 07140106), the Lower Kaskaskia (HUC ID: 07140204), and the Upper Mississippi-Cape Girardeau (HUC ID: 07140105). The majority of Perry is drained by the Big Muddy, while the other two watersheds drain small portions of the western edge of the county. The major lakes in the county are Pinckneyville Reservoir, Boulder North, Boulder South, Crystal, Big Beaver, Wesslyn Cut, Green River, and Du Quoin City Lake.

The Big Muddy watershed covers large portions of Franklin, Jackson, Jefferson, Perry, Washington, and Williamson Counties. It also drains small portions of Hamilton, Johnson, and Union Counties. In Perry County, Galum Creek, Beaucoup Creek, the Little Muddy River and their tributaries flow into the Big Muddy River, which eventually converges with the Mississippi River near Grand Tower, IL in Jackson County.

The northwest corner of Perry County is covered by the Lower Kaskaskia watershed. Precipitation in this portion of the county flows to Mud Creek which eventually converges with the Kaskaskia River which ultimately drains to the Mississippi River near Ellis Grove, IL. The western fringe of Perry County is covered by the Upper Mississippi-Cape Girardeau watershed. Precipitation in this portion of the county flows via many tributaries to Mary's River, which reaches the Mississippi near Chester, IL.

Figure 3.4

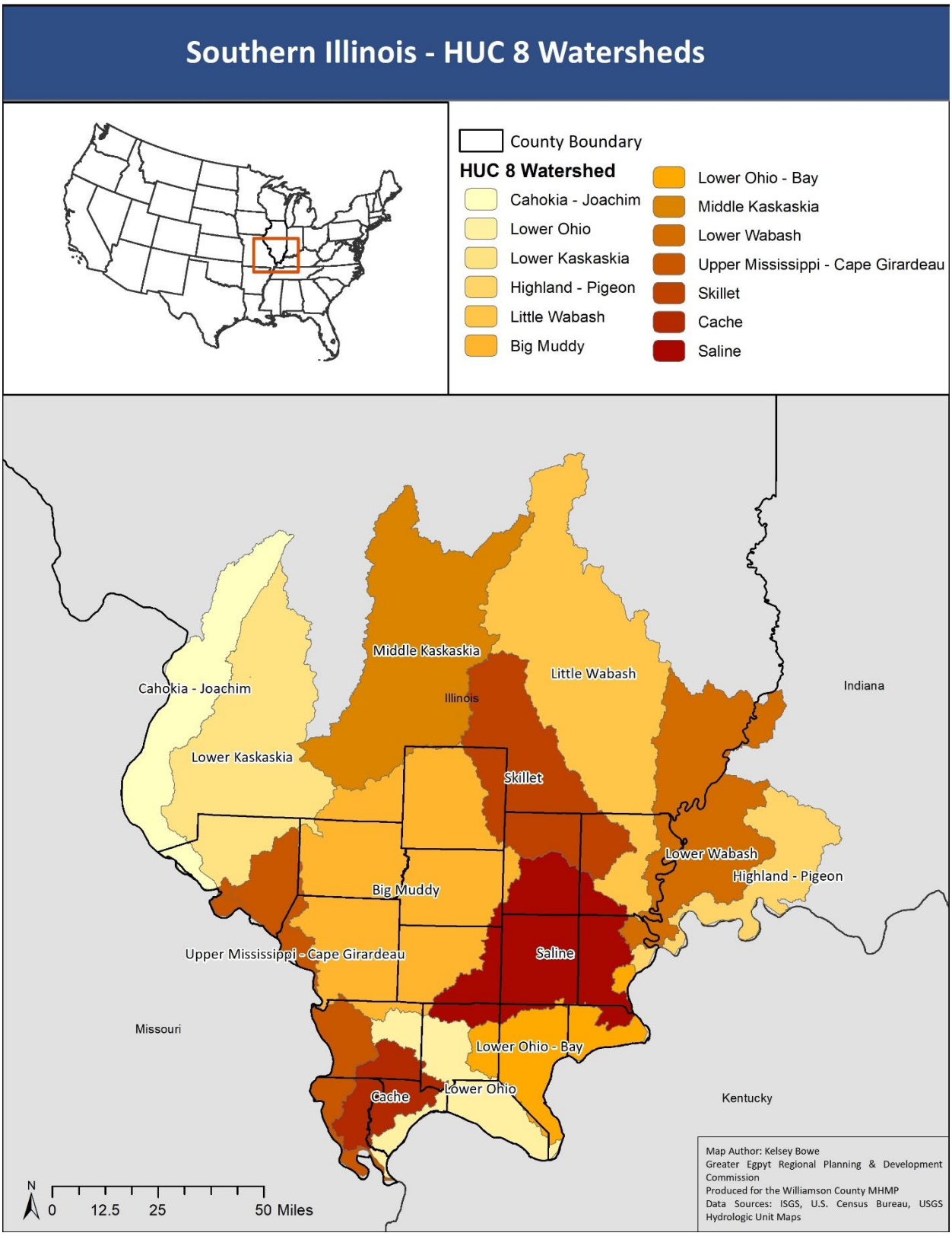
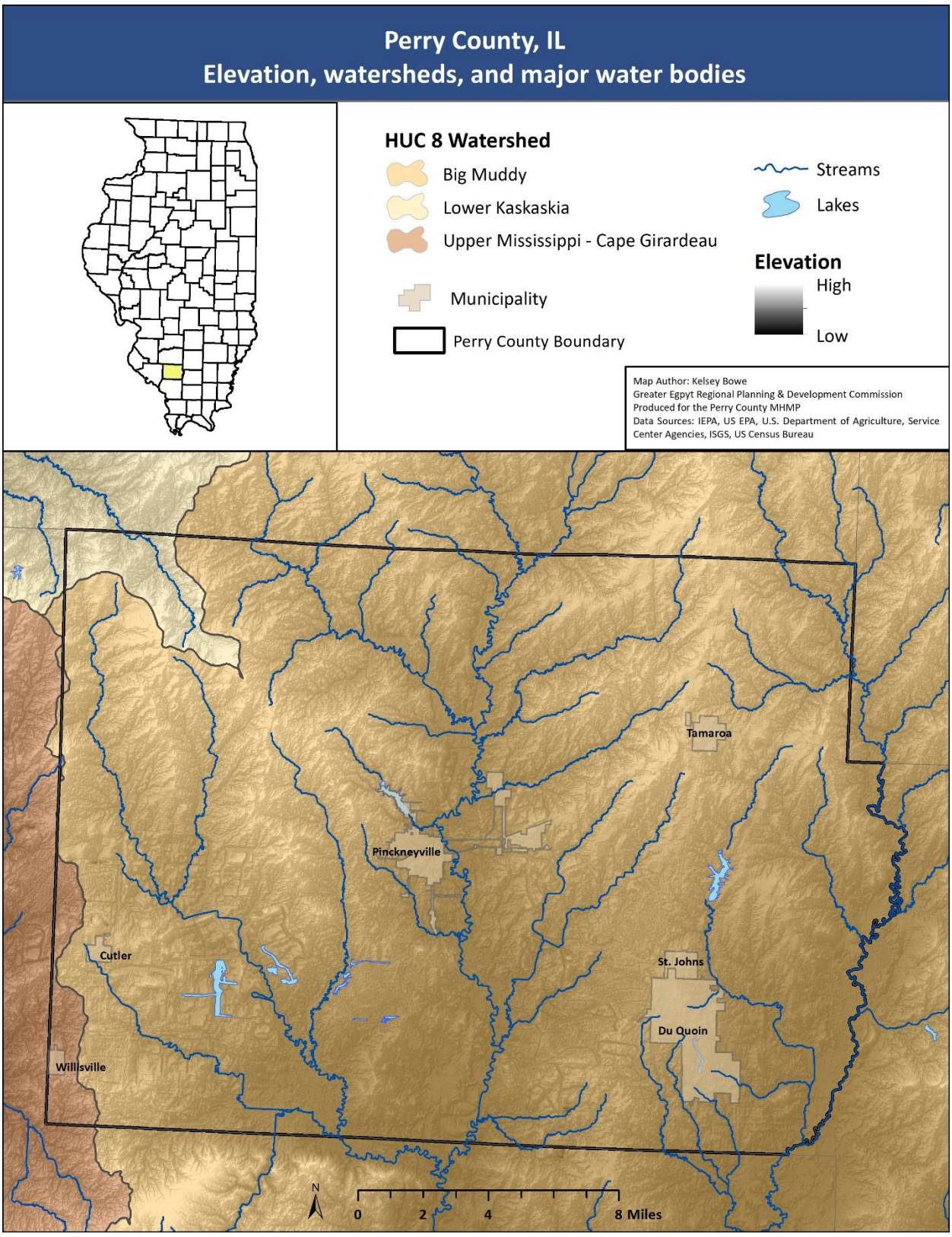

Southern Illinois - HUC 8 Watersheds
County Boundary
HUC 8 Watershed
Cahokia - Joachim
Lower Ohio
Lower Kaskaskia
Highland - Pigeon
Little Wabash
Big Muddy
Lower Ohio - Bay
Middle Kaskaskia
Lower Wabash
Upper Mississippi - Cape Girardeau
Skillet
Cache
Saline
Middle Kaskaskia
Little Wabash
Cahokia - Joachim
Illinois
Indiana
Lower Kaskaskia
Skillet
Lower Wabash
Highland - Pigeon
Big Muddy
Upper Mississippi - Cape Girardeau
Saline
Missouri
Lower Ohio - Bay
Cache
Lower Ohio
Kentucky
N
0
12.5
25
50 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Williamson County MHMP
Data Sources: ISGS, U.S. Census Bureau, USGS Hydrologic Unit Maps

Figure 3.5


Perry County, IL
Elevation, watersheds, and major water bodies
HUC 8 Watershed
Big Muddy
Lower Kaskaskia
Upper Mississippi - Cape Girardeau
Municipality
Perry County Boundary
Streams
Lakes
Elevation
High
Low
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Perry County MHMP
Data Sources: IEPA, US EPA, U.S. Department of Agriculture, Service Center Agencies, ISGS, US Census Bureau
Tamaroa
Pinckneyville
Cutler
St. Johns
Du Quoin
Willisville
N
0
2
4
8 Miles

4. Hazard Descriptions and Risk Assessments

4.1. Introduction

The following section will contain hazard definitions, examples of potential extent and impacts that may occur, details on historic occurrences within Perry County, and relevant maps and figures. When possible, all historic occurrences encompass hazard events from 1950-2021, but some databases may be missing records.

4.1.1. Relevant FEMA definitions

Hazard Extent: Strength or magnitude of hazard. Can be measured on scientific scales (Tornado EF Scale, Palmer drought severity index, etc.), measurements of the hazard (flood height, snow depth, etc.), or other factors such as duration and speed of onset.

Hazard Impacts: Consequences/effects of the hazard on a community and its assets. Examples include number of injuries/deaths, dollar amount of property/crop damage, number of days without power, etc.

Essential and Critical Facilities: The FEMA Hazus Software designates important facilities and infrastructure into two categories, which will be used throughout the plan:

Essential:

- Emergency Operations Centers
- Police stations
- Fire stations
- Schools
- Hospitals

Critical:

- Transportation – Airports, train & bus stations, ports, highways, railways, and bridges
- Utilities – wastewater treatment, potable water storage, water/sewer lines, gas pipelines, power plants (does not include power lines)
- Communication - TV & Radio Stations
- Dams*
- Military Facilities*
- User Defined**

*While Hazus has designated space for dams and military spaces, they are not currently part of the default datasets provided and were therefore not included in the hazard models.

**The user defined category is space for a community to input their own structures into Hazus, the Perry County Planning Team included ambulance stations and storm shelters in this category.

A complete list of Perry County's essential and critical facility data can be found in Appendix 2.

4.1.2. Emerging Hazard – Climate Change

Global average temperature has increased by 1.8°F from 1901 to 2016. Evidence consistently points to human related activities, mainly greenhouse gas emissions, as the cause[3]. Climate change is no longer a future problem as effects are being felt in the present time around the world, and events and trends associated with climate change are only expected to continue to increase in number of events and in severity[4] .

Our planet is a complex system of natural ecosystems and human infrastructure, and climate change can drive many different outcomes within a small area. In the Midwest, climate change is driving more dramatic shifts in seasonal hydrologic regimes. Areas are experiencing severe storms, floods, and extreme heat waves within generally short time periods. All of these factors can decrease infrastructure stability, agriculture productivity, water and air quality, and general community resiliency to natural hazards. Southern Illinois currently encompasses regions within Köppen-Geiger climate types Dfa (hot-summer humid continental) and Cfa (humid subtropical), but future models suggest most of the state will be classified as Cfa by 2071[5]. Figures 4.1 and 4.2 show the Köppen-Geiger climate classifications of Illinois and surrounding areas for present day (based on data from 1980-2016) and projected climate types for the future (based on 32 different climate models for years 2071-2100).

Illinois joined the U.S. Climate Alliance in January 2019. This is a bipartisan coalition of 24 governors with commitment to implementing policies that advance the goals the Paris Agreement, track and report progress of each state to the global community, and advance new and existing policies to promote clean energy and reduce carbon pollution.[6]

This Multi-Hazard Mitigation Plan will contain a sub section within each chapter, when relevant, to discuss the risks associated with climate change related increases of the specific hazard.

[3] Hayhoe, K. et al., 2018: Our Changing Climate. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II U.S. Global Change Research Program, Washington, DC, USA, pp. 72–144.
[4] Gray, E. and Merzdorf J. "Earth's Freshwater Future: Extreme Floods and Drought", NASA Global Climate Change, 2019.
[5] Beck, H.E., N.E. Zimmermann, T.R. McVicar, N. Vergopolan, A. Berg, E.F. Wood: Present and future Köppen-Geiger climate classification maps at 1-km resolution, Scientific Data 5:180214, doi:10.1038/sdata.2018.214 (2018).
[6] Igusky, K., "Illinois Governor J. B. Pritzker Joins U.S. Climate Alliance", United States Climate Alliance, 2019.

Table 4.1: Key to the Köppen-Geiger climate classifications

	1: Af Tropical, rainforest
	2: Am Tropical, monsoon
	3: Aw Tropical, savannah
	4: BWh Arid, desert, hot
	5: BWk Arid, desert, cold
	6: BSh Arid, steppe, hot
	7: BSk Arid, steppe, cold
	8: Csa Temperate, dry summer, hot summer
	9: Csb Temperate, dry summer, warm summer
	10: Csc Temperate, dry summer, cold summer
	11: Cwa Temperate, dry winter, hot summer
	12: Cwb Temperate, dry winter, warm summer
	13: Cwc Temperate, dry winter, cold summer
	14: Cfa Temperate, no dry season, hot summer
	15: Cfb Temperate, no dry season, warm summer
	16: Cfc Temperate, no dry season, cold summer
	17: Dsa Cold, dry summer, hot summer
	18: Dsb Cold, dry summer, warm summer
	19: Dsc Cold, dry summer, cold summer
	20: Dsd Cold, dry summer, very cold winter
	21: Dwa Cold, dry winter, hot summer
	22: Dwb Cold, dry winter, warm summer
	23: Dwc Cold, dry winter, cold summer
	24: Dwd Cold, dry winter, very cold winter
	25: Dfa Cold, no dry season, hot summer
	26: Dfb Cold, no dry season, warm summer
	27: Dfc Cold, no dry season, cold summer
	28: Dfd Cold, no dry season, very cold winter
	29: ET Polar, tundra
	30: EF Polar, frost

Figure 4.1

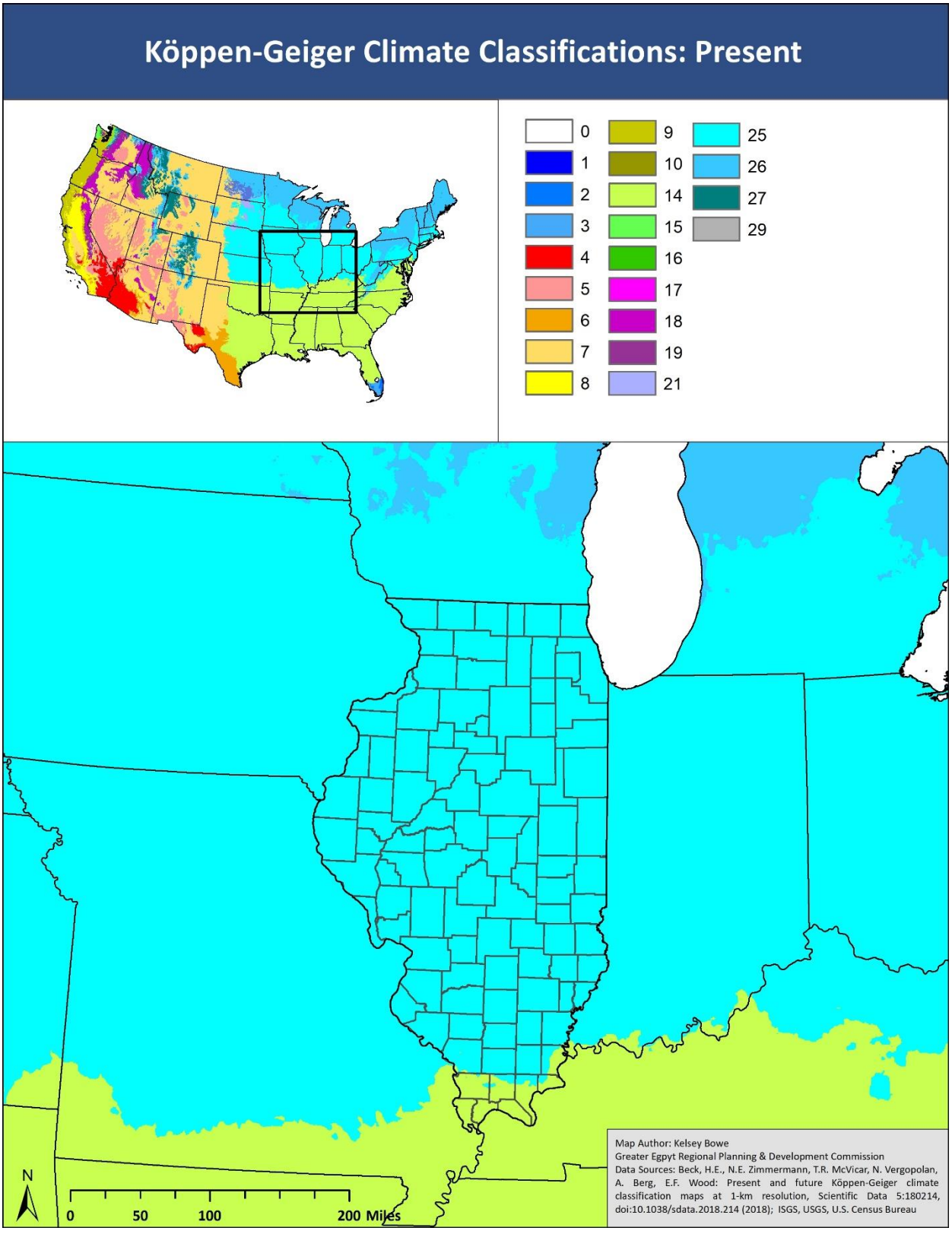
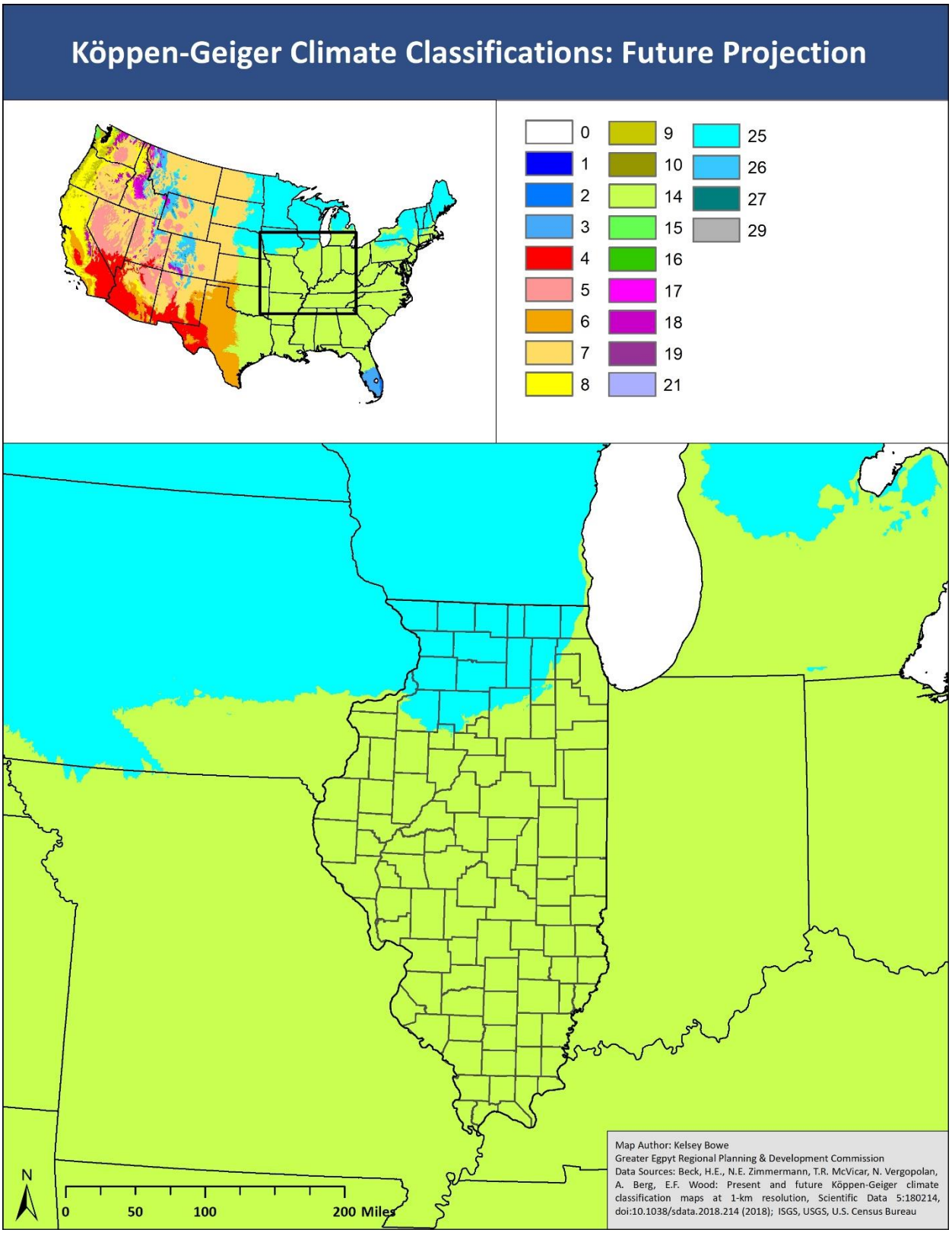

Köppen-Geiger Climate Classifications: Present
0
1
2
3
4
5
6
7
8
9
10
14
15
16
17
18
19
21
25
26
27
29
N
0
50
100
200 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Data Sources: Beck, H.E., N.E. Zimmermann, T.R. McVicar, N. Vergopolan, A. Berg, E.F. Wood: Present and future Köppen-Geiger climate classification maps at 1-km resolution, Scientific Data 5:180214, doi:10.1038/sdata.2018.214 (2018); ISGS, USGS, U.S. Census Bureau

Figure 4.2


Köppen-Geiger Climate Classifications: Future Projection
0
1
2
3
4
5
6
7
8
9
10
14
15
16
17
18
19
21
25
26
27
29
N
0
50
100
200 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Data Sources: Beck, H.E., N.E. Zimmermann, T.R. McVicar, N. Vergopolan, A. Berg, E.F. Wood: Present and future Köppen-Geiger climate classification maps at 1-km resolution, Scientific Data 5:180214, doi:10.1038/sdata.2018.214 (2018); ISGS, USGS, U.S. Census Bureau

4.1.3. Perry County Hazard Rankings

Hazards were ranked using the risk priority index equation:

$$\boldsymbol{Risk\ Index = probability * severity}$$

Where probability is how likely a hazard event will occur on a scale of 1-4:

Table 4.2

Probability	Characteristics
4 – Highly Likely	Event is probable within the next calendar year. These events have occurred, on average, once every 1-2 years in the past.
3 – Likely	Event is probable within the next 10 years. Event has a 10-15% chance of occurring in any given year. These events have occurred, on average, once every 3-10 years in the past.
2 – Possible	Event is probable within the next 50 years. Event has a 2-10% chance of occurring in any given year. These events have occurred, on average, once every 10-50 years in the past.
1 – Unlikely	Event is probable within the next 200 years. Event has a 0.5-2% chance of occurring in any given year. These events have occurred, on average, once every 50-200 years in the past.

Severity is the degree to which a hazard will cause injuries/deaths, affect functionality of essential and critical facilities, and cause property damage and/or utility disruptions on a scale of 2-8:

Table 4.3

Severity	Characteristics
8 – Catastrophic	Multiple deaths. Complete shutdown of facilities for 30 or more days. More than 50% of property is severely damaged.
4 – Critical	Injuries and/or illnesses result in permanent disability. Complete shutdown of critical facilities for at least 14 days. More than 25% of property is severely damaged.
2 – Limited	Injuries and/or illnesses do not result in permanent disability. Complete shutdown of critical facilities for more than seven days. More than 10% of property in severely damaged.
1 – Negligible	Injuries and/or illnesses are treatable with first aid. Minor quality of life lost. Shutdown of critical facilities and services for 24 hours or less. Less than 10% of property is severely damaged.

Hazards were then ranked in order of highest to lowest risk index; weighted by how many jurisdictions included the hazard in their list. Hazard rankings by jurisdiction can be found in Appendix 3.

The Perry County Emergency Management Agency (EMA) organized their hazard list to match the Perry County Illinois Capability and THIRA Tool (IL-CATT). There were no objections from the Planning Team on this hazard ranking.

1. Tornado
2. Severe Weather (thunderstorms, high winds, heatwaves)
3. Earthquake
4. Pandemic
5. Severe Winter Weather
6. HazMat Release/ Train Derailment
7. Cyberattack - Data
8. Cyberattack - Infrastructure
9. Terrorism
10. Utility Disruption

4.1.4. Disaster Declarations

2020: DR4489-IL Illinois COVID-19 Pandemic

- COVID-19 was declared a nationwide emergency on March 13, 2020 by President Trump, pursuant to section 501(b) of the Stafford Act, this declaration removed the need for individual governors to apply. All 50 states and five territories were covered under this initial declaration, on February 2, 2021 and March 29, 2021, the Navajo nation and Poarch Band of Creek Indians were also approved for Coronavirus Disease-19 (COVID-19) disaster declarations under President Biden.

No other disaster declarations have been made for Perry County, Illinois from 2016-2021.

4.2. Tornados & Derechos

4.2.1. Hazard Description

Tornados are violently rotating columns attached to the base of a cloud and extend to the ground. Tornados are most often produced at the trailing end of strong supercell thunderstorm systems; though the process of tornado formation is not fully understood[7]. Tornadoes can be brutally destructive when they move through densely populated areas. Severe tornados can reach winds speeds in excess of 300mph and cause paths of destruction 1 mile wide and more than 50 miles long. Due to the power of the rotating winds, buildings and human life are at great risk during a strong tornado.

Tornado intensity is measured on the Enhanced Fujita (EF) Scale (adopted by the National Weather Service (NWS) in 2007). EF rating is determined by the 3-second wind gust speed (table 4.12). It is important to note these speeds are estimates based on observations from the point of damage after the tornado has passed and are not direct measurements of wind speed. The NWS service uses 28 Damage Indicators (DI) (Table 4.5) on a scale of Degrees of Damage (DOD) to estimate expected, lower, and upper bounds of wind gusts that occurred[8]. The NWS has specific DOD scales for each type of DI and is the only agency with authority to give official EF ratings of tornado events. The scale ranges from EF0, characterized by wind gusts of up to 85 mph with light damage to buildings, to EF5 which is characterized by catastrophic damage and wind gusts over 200 mph.

Derechos are long-lived wind storms continuing in one direction, usually over large areas. To be classified as a derecho, the storm must extend for over 240 miles and reach wind gusts of 58mph[9]. Derechos are a unique weather phenomenon that almost exclusively occur in the eastern United States. They are also seasonal storms, with 70% occurring between May and August[6]. Both tornados and derechos develop from, and are associated with thunderstorms.

[7] "Severe weather 101," The National Severe Storms Laboratory, nssl.noaa.gov.
[8] "A Recommendation for an Enhanced Fujita Scale (EF-scale) Submitted to the National Weather Service and Other Interested Users," WIND SCIENCE AND ENGINEERING CENTER, Texas Tech University, 2004.
[9] "Derecho" National Weather Service

Table 4.4 - Enhanced Fujita Tornado Rating

Enhanced Fujita Number	3-Second Gust Speed (mph)	Selected Degrees of Damage Descriptions
0 Gale	65-85	Loss of <20% roofing material, loss of siding. Loss of rooftop HVAC.
1 Moderate	86-110	Broken glass, loss of >20% roofing material. Manufactured homes overturn but remain intact. Collapse of exterior walls of many types of building. Broken wood electrical poles. Trees uprooted or snapped.
2 Significant	111-135	Houses shift off foundations, collapse of roofs. Manufactured homes destroyed. Collapse of exterior walls of many types of building. Complete destruction of some isolated buildings. Bent or broken steel and concrete electrical poles. Trees snapped and debarked.
3 Severe	136-165	Top floor exterior and interior walls may collapse. Collapse of rigid frames in metal buildings. Damage to wall cladding and roof slabs of institutional buildings (hospitals, courthouses).
4 Devastating	166-200	Collapse of most walls, total destruction of residential houses. Destruction of large buildings such as shopping malls. Significant damage to institutional buildings.
5 Incredible	Over 200	Total destruction of residential houses, destruction of large buildings such as shopping malls. Significant damage to institutional buildings.

Source: National Weather Service/National Oceanic and Atmospheric Administration

Table 4.5 - Damage Indicators used to determine EF tornado rating

DI Number	Damage Indicator
1	Small Barns or Farm Outbuildings (SBO)
2	One- or Two-Family Residences (FR12)
3	Manufactured Home – Single Wide (MHSW)
4	Manufactured Home – Double Wide (MHDW)
5	Apartments, Condos, Townhouses [3 stories or less] (ACT)
6	Motel (M)
7	Masonry Apartment or Motel Building (MAM)
8	Small Retail Building [Fast Food Restaurants] (SRB)
9	Small Professional Building [Doctor's Office, Branch Banks] (SPB)
10	Strip Mall (SM)
11	Large Shopping Mall (LSM)
12	Large, Isolated Retail Building [K-Mart, Wal-Mart] (LIRB)
13	Automobile Showroom (ASR)
14	Automobile Service Building (ASB)
15	Elementary School [Single Story; Interior or Exterior Hallways] (ES)
16	Junior or Senior High School (JHSH)
17	Low-Rise Building [1-4 Stories] (LRB)
18	Mid-Rise Building [5-20 Stories] (MRB)
19	High-Rise Building [More than 20 Stories] (HRB)
20	Institutional Building [Hospital, Government or University Building] (IB)
21	Metal Building System (MBS)
22	Service Station Canopy (SSC)
23	Warehouse Building [Tilt-up Walls or Heavy-Timber Construction](WHB)
24	Transmission Line Towers (TLT)
25	Free-Standing Towers (FST)
26	Free-Standing Light Poles, Luminary Poles, Flag Poles (FSP)
27	Trees: Hardwood (TH)
28	Trees: Softwood (TS)

Source: National Weather Service/National Oceanic and Atmospheric Administration

Table 4.6 Average path size of tornados, based on all tornados reported in the United States from 2007-2013[10]

Enhanced Fujita Number	Average Path Length (miles)	Average Patch Width (feet)
0	1.41	180.12
1	4.41	537.40
2	8.88	1128.94
3	18.08	2415.68
4	32.65	3273.95
5	44.71	5366.79

4.2.2. Geographic Location and Historical Occurrences

Southern Illinois is sometimes included in definitions of "Tornado Alley" and "Dixie Alley", although the terms have no official boundaries and generally refer to the Southcentral and Southeast portions of the U.S. respectively. Both geographic areas have the highest frequency of tornados in the U.S. The infamous Tri-State Tornado of 1925 was one of the worst recorded tornados in the history of the Midwest. It went through Jackson County, Franklin County, and others in Illinois on its path from Missouri to Indiana. A rare weather event, the Tri-State Tornado had a path length of 219 miles and a width of ¾ mile. It continued for an estimated 3 ½ hours, and was an F5 on the Fujita scale. This event was the most destructive single tornado in United States history: 695 lives were lost, 2,027 were injured, and 15,000 homes were destroyed.

On May 29, 1982 an F3 tornado travelled through Perry County in southern Illinois, injuring 6 and destroying 9 homes in Conant[11]. An F4 tornado went through Williamson County, IL the same day- killing 10, injuring 181, and damaging 500 homes and 82 businesses[12]. The path in Williamson County was 17 miles long and nearly ¼ mile wide[13].

On December 11-12, 2021, a supercell thunderstorm travelled over 350 miles through Arkansas, Missouri, Tennessee, and Kentucky. 66 Tornados have been confirmed from this storm event, including an EF4 from Craighead County Arkansas to Obion County Tennessee with a path length of 80.3 miles and a max width of 5,249ft, and a second EF4 from Fulton County to Breckenridge County in Kentucky, with a path length of 165.7 miles and a max width of 7,874ft[14]. One EF3 and five EF2 tornados occurred in Illinois from this event; none occurred in Perry County. 89 deaths and nearly $4 billion in damages occurred across all of the states that were impacted[15].

[10] Elsner, James B et al. "Tornado intensity estimated from damage path dimensions." PloS one vol. 9,9 e107571. 17 Sep. 2014
[11] Koplowitz, H.B., The Southern Illinoisian, "9 of 11 Conant homes ruined" June 1, 1982.
[12] Staff Writers, The Southern Illinoisian, "Marion counts loss, plans future" June 1, 1982.
[13] National Weather Service, "1982 Marion Illinois Tornado".
[14] National Weather Service, "NWS Storm Damage Summaries - Dec 10-11, 2021 Tornado Outbreak".
[15] Wikipedia, "Tornado outbreak of December 10–11, 2021".

There have been two major derechos in Illinois in recent decades; one in May of 2009 in southern Missouri and Illinois, and one in 2020 that went through Nebraska, Iowa, northern Illinois and northern Indiana. The 2009 derecho had recorded wind speeds of 120mph in Murphysboro (Jackson County, IL). Many power outages occurred and there was 1 death from the storm[16]. In 2020 an estimated 850,000 acres of crops were damaged and 2 people were killed in Iowa. In Illinois alone 750,000 homes lost power[17].

The table below shows tornado history for Perry County.

Table 4.7 - Tornado Records for Perry County, IL

Location	Date	Rating	Deaths	Injuries	Property damage
	12/18/1957	F3	0	1	250000
	12/18/1957	F5	1	6	250000
	9/26/1959	F1	0	0	2500
	12/21/1967	F3	0	0	250000
	5/7/1973	F2	0	0	0
	6/17/1973	F0	0	0	0
	5/29/1982	F3	0	0	250000
	5/29/1982	F3	0	7	250000
OLD DUQUOIN	4/19/1996	F1	0	0	50000
SWANWICK	4/15/1998	F0	0	0	0
PINCKNEYVILLE	5/31/2001	F0	0	0	0
PINCKNEYVILLE	5/30/2004	F1	0	0	250000
CUTLER	3/11/2006	F2	0	2	1200000
SUNFIELD	6/8/2009	EF0	0	0	4000
DU QUOIN	6/8/2009	EF1	0	0	20000
DU QUOIN	6/19/2011	EF1	0	1	550000
SUNFIELD	6/19/2015	EF0	0	0	0
PINCKNEYVILLE	12/23/2015	EF1	0	0	175000
DU QUOIN	11/18/2017	EF0	0	0	250000
SUNFIELD	3/19/2020	EF1	0	1	300000

Source: NOAA Storm Events Database

4.2.3. Risk

Tornadoes and derechos can occur at any location in the county. Derechos are a seasonal weather phenomenon and typically occur during May-August. Historical tornadoes generally moved from southwest to northeast across the county, although many other tracks are possible. The extent of the hazard varies in terms of the EF rating of the tornado and location

[16] The Southern Illinoisian
[17] Foley and Funk, "Derecho leaves 2 dead, heavy crop damage across Midwest", The Southern Illinoisian, 8.12.2020.

and direction of its path. Based on the NOAA data listed above, Perry County has a 30% probability of a tornado occurring each year.

Structures most at risk of damage in the event of tornados include mobile and manufactured homes, unreinforced masonry structures, and facilities without storm window retrofits. Any homes and facilities constructed before building codes were widely enforced (pre-1970s) are more at risk for wind damage. The 2018 International Building Code (IBC) has wind load and impact resistance requirements for window installations specific for geographic area. The State of Illinois has not adopted statewide building code requirements[18]. Perry County adopted building standards in 2007, and the City of Du Quoin adopted the 2006 IBC, see section 6.2 for all hazard related codes and ordinances.

4.2.4. Climate Change

2021 had an above average number of tornados recorded, with December having a record-breaking number of 193 tornados across the United States[19]. National average tornado frequency has remained relatively constant, but the spatial distribution has been shifting; with positive trends in the Midwest and Southeast, and negative trends in the Great Plains region[20]. The Eastern U.S. is expected to see an increase in days with favorable conditions for severe thunderstorms with the changing climate, which could also lead to an increased risk of tornado occurrence[21].

4.2.5. Hazard Model

ArcGIS was used to simulate an EF4 tornado in Perry County, IL. A hypothetical path was created with a polyline from the county edge near Willisville heading northeast through Pinckneyville and Tamaroa. From the tornado path, four damage zones were created using the multiple ring buffer tool (table 4.8).

Table 4.8 - Buffer zones and damage estimates used for the EF4 tornado model

Zone	Buffer (feet)	Bridges & hospital damage	All other building damage
1	500	75%	100%
2	1000	50%	80%
3	2150	25%	50%
4	3300	5%	10%

Essential and critical facilities and infrastructure data comes from the Hazus Illinois State dataset and from local planning partner knowledge. Railroad bridges, highway bridges, and

[18] "Building Codes and Regulations", Capital Development Board, Illinois.gov.
[19] NOAA, "Contiguous U.S. ranked fourth warmest during 2021; 20 billion-dollar disasters identified", January 10, 2022.
[20] Gensini, V.A. and Brooks, H.E., Nature, "Spatial trends in United States tornado frequency", 2018.
[21] NASA - Global Climate Change, "Severe thunderstorms and climate change", April 7, 2013.

hospitals have lower damage percentages since they are generally designed to withstand severe weather better than other infrastructure and buildings.

Table 4.9 shows the total damage cost estimates. Tables 4.10-4.13 show the results and damage cost estimates for each buffer zone. Figure 4.3 shows the tornado path for Perry County. Figure 4.4 shows the path in detail through Pinckneyville. Figure 4.5 shows the path in detail through Willisville.

Table 4.9 – Total Damage Cost Estimates for EF4 Tornado Model

Total		
Category	**# Damaged**	**Total Cost of Damage**
highway bridges	12	7,710,586.29
railroad bridges	7	5,228,431.40
essential facilities	15	52,689,654.84
critical facilities	3	4,500,000.00

Figure 4.3

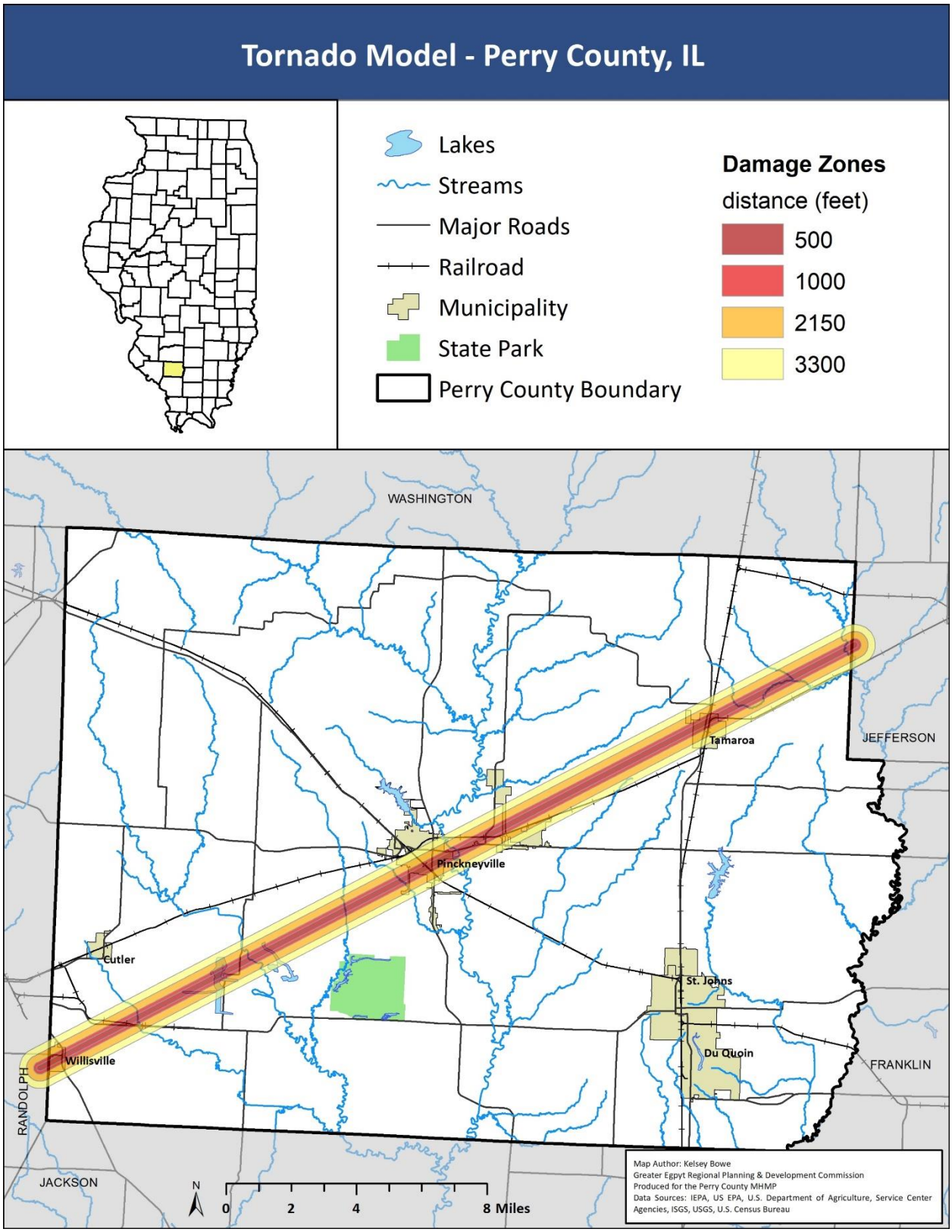

Tornado Model - Perry County, IL
Lakes
Streams
Major Roads
Railroad
Municipality
State Park
Perry County Boundary
Damage Zones
distance (feet)
500
1000
2150
3300
WASHINGTON
JEFFERSON
FRANKLIN
JACKSON
RANDOLPH
Tamaroa
Pinckneyville
Cutler
St. Johns
Du Quoin
Willisville
N
0
2
4
8 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Perry County MHMP
Data Sources: IEPA, US EPA, U.S. Department of Agriculture, Service Center Agencies, ISGS, USGS, U.S. Census Bureau

Table 4.10

Zone 1		
Category	**# Damaged**	**Total Cost of Damage**
highway bridges	2	5,819,085.53
railroad bridges	0	-
Pinckneyville Junior High School		3,898,372.31
Tamaroa Grade School		1,789,178.22
Pinckneyville Head Start		500,000.00
Willisville Police Department		2,800,000.00
Tamaroa Fire Protection District		600,000.00
Pinckneyville Ambulance Service		711,799.00

Table 4.11

Zone 2		
Category	**# Damaged**	**Total Cost of Damage**
highway bridges	2	478,433.40
railroad bridges	1	2,614,215.70
Pinckneyville Community High School		5,539,179.30
Willisville Volunteer Fire Department		640,000.00

Table 4.12

Zone 3		
Category	**# Damaged**	**Total Cost of Damage**
highway bridges	5	1,222,833.63
railroad bridges	1	1,307,107.85
Pinckneyville Community Hospital		12,760,000.00
Perry County Sheriff		8,000,000.00
Pinckneyville Police Department		6,000,000.00
Pinckneyville City Fire Department		5,000,000.00
Pinckneyville Rural Fire Protection District*		-

*Separate entity that rents space within city fire department, no building replacement value

Table 4.13

Zone 4		
Category	**# Damaged**	**Total Cost of Damage**
highway bridges	3	190,233.74
railroad bridges	5	1,307,107.85
Pinckneyville STP		1,500,000.00
Tamaroa STP		1,500,000.00
Willisville STP		1,500,000.00
Pinckneyville Elementary School		4,262,025.88
St Bruno Catholic School		189,100.13

Figure 4.4

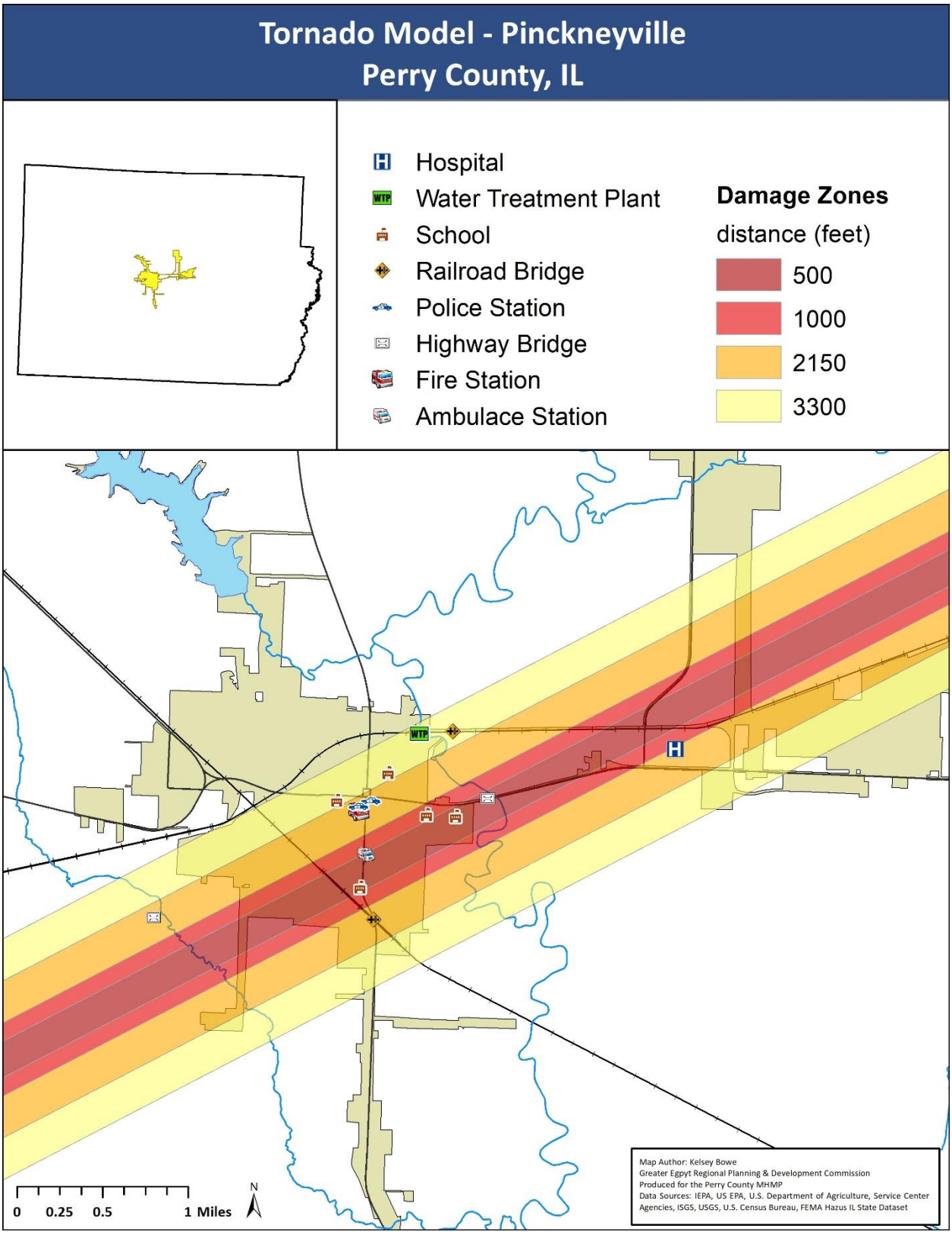
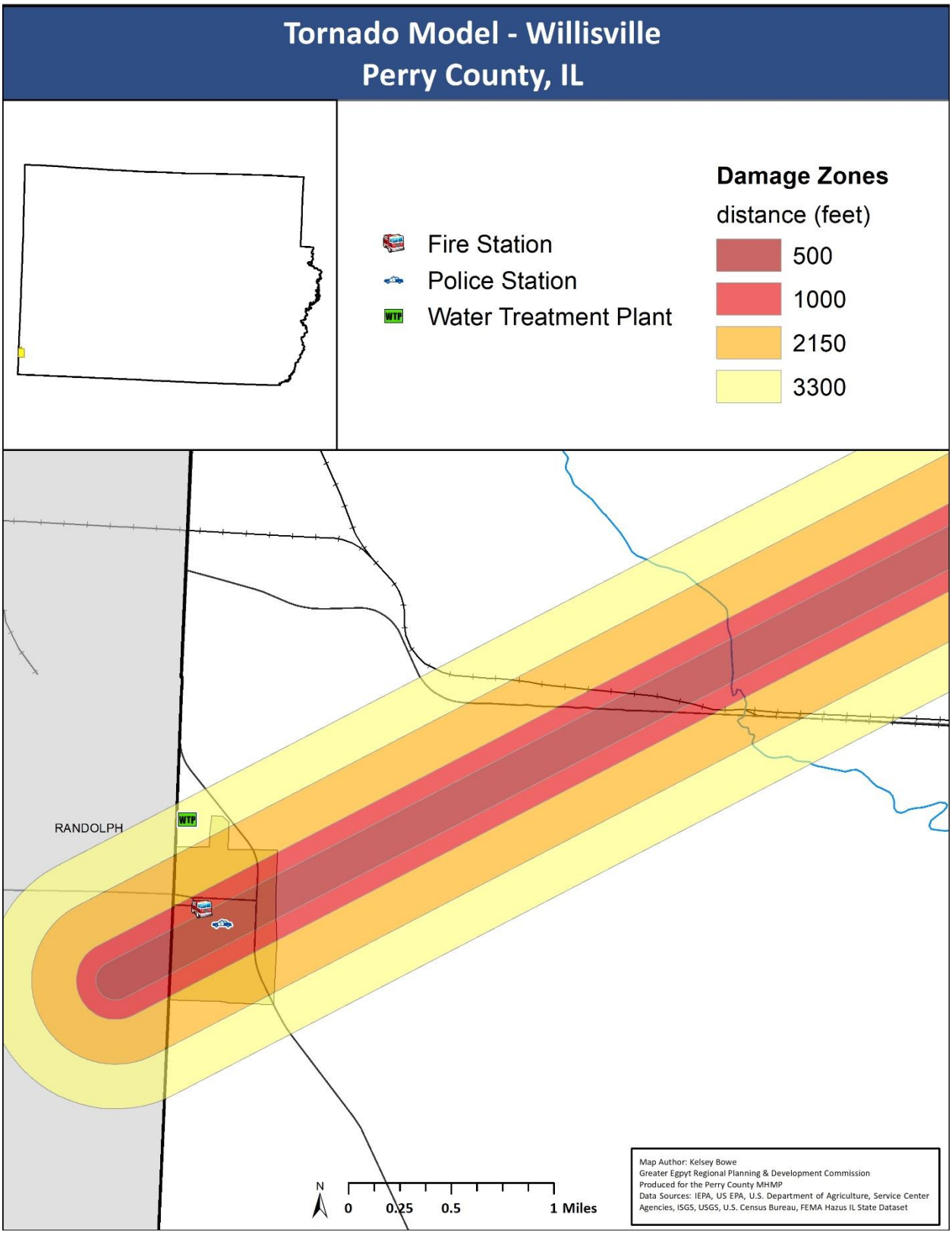

Tornado Model - Pinckneyville
Perry County, IL
Hospital
Water Treatment Plant
School
Railroad Bridge
Police Station
Highway Bridge
Fire Station
Ambulace Station
Damage Zones
distance (feet)
500
1000
2150
3300
WTP
0 0.25 0.5 1 Miles
N
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Perry County MHMP
Data Sources: IEPA, US EPA, U.S. Department of Agriculture, Service Center Agencies, ISGS, USGS, U.S. Census Bureau, FEMA Hazus IL State Dataset

Figure 4.5


Tornado Model - Willisville
Perry County, IL
Fire Station
Police Station
Water Treatment Plant
WTP
Damage Zones
distance (feet)
500
1000
2150
3300
RANDOLPH
WTP
N
0
0.25
0.5
1 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Perry County MHMP
Data Sources: IEPA, US EPA, U.S. Department of Agriculture, Service Center Agencies, ISGS, USGS, U.S. Census Bureau, FEMA Hazus IL State Dataset

4.3. Severe Weather

4.3.1. Hazard Descriptions

Thunderstorms

Thunderstorms are rain bearing clouds that produce lightning. The major thunderstorm categories are single cell, multi-cell, squall line, and supercells. Single-cell storms are short lived and can result in heavy rain and lightning. Multi-cell storms occur along a front and can cause hail, strong winds, tornados, and flooding. Squall storms are a composition of smaller cells that are oriented in a thin line. These systems can cause severe winds and heavy rain. A supercell is a highly energetic storm characterized by a strong rotating updraft. Supercells can cause rain, hail, lightning, high winds, and strong tornados. Thunderstorms can also move together as a system. These are known as Mesoscale Convective Systems (MCS) and may last over 12 hours and cover areas as large as a state[22].

Thunderstorm related hazards can be serious. Lightning can cause injury or death to humans, damage to structures, and start fires. The National Weather Service reports that lightning injures roughly 300 people per year and kills 80 people per year in the United States. High wind speeds caused by thunderstorms can result in damage to homes, buildings, trees, and infrastructure. Hail produced by thunderstorms can cause injury to people and damage to automobiles and infrastructure. According to the National Weather Service, for a thunderstorm to be severe it must either produce hail of at least one inch in diameter, winds of at least 58 mph, or produce a tornado. A combination of 40mph winds and 0.5” hail also qualifies as severe.

Drought and Extreme Heat

There are many different definitions of drought, but in general the term refers to conditions in which below average rainfall occurs and leads to water shortage problems in a given area. There is no official length of time for the conditions listed to be considered a drought, but they are generally measured in terms of weeks or growing seasons and may last over the span of several years[23].

Drought conditions are often accompanied and exacerbated by extreme heat events. Elevated temperatures result in faster rates of evaporation. This results in worsening of drought conditions and decreased soil moisture content. Drought and extreme heat conditions can negatively impact agricultural productivity, urban and natural landscapes, and human health. Severity of drought events depends on duration and geographical extent of the conditions and can also be affected by land use demands, landcover, and water supply.

[22] “Severe Weather 101”, NOAA National Severe Storms Laboratory.
[23] “Droughts: Things to Know” Water Science School, USGS

Specific Impacts

Human Health:

Heat Cramps- Muscular pains and spasms due to heavy exertion, is usually the first sign a person is experiencing heat-related illness.

Heat Exhaustion- Typically occurs when people have been exercising or working strenuously in hot, humid environments. Heavy sweating leads to rapid loss of body fluids, blood flow to the skin increases while blood flow to vital organs decreases- resulting in a form of mild shock. If left untreated, the victim may suffer from a heatstroke.

Heat and Sun Stroke- A life-threatening condition. The body's ability to produce sweat and cool itself stops working; body temperature can rise so high that brain damage and death may result if the victim is not treated quickly[24].

Urban:

Urban areas can suffer more from high temperatures than surrounding landscapes due to the Heat Island Effect, where built structures including roads and buildings absorb and re-emit the sun's energy more than natural landscapes. Urban areas can be 1-7°F warmer in the day and 2-5°F warmer during the night than outlying areas[25]. Trees and other vegetation provide shade and moisture, which keep areas cooler. In comparison, a parking lot absorbs heat and evaporates less water- leading to elevated temperatures. Side effects of living in urban heat islands can include higher home energy bills, increased exposure to air pollution, and higher risk of heat-related illness. Urban heat islands tend to have higher greenhouse gas emissions and impaired water quality.

Agriculture:

Severe drought can stress plants and disrupt normal growing cycles, leading to less productive crops and grazing pasture. This can cause many issues for ranchers, during droughts feed prices go up and cattle prices can plummet[26].

Prolonged drought combined with areas of heavy agriculture can also exacerbate groundwater/aquifer depletion. When groundwater is pumped for crop irrigation (along with other uses) faster than precipitation can recharge the water storage, the water table will lower. If the water table drawdown is significant, wells can run dry in peoples' home, costs associated with pumping water increase, and in severe cases land subsidence may occur. This is an issue in

[24] 2015 plan
[25] U.S. Environmental Protection Agency. 2008. Reducing urban heat islands: Compendium of strategies. Draft. https://www.epa.gov/heat-islands/heat-island-compendium.
[26] Larson, Debra "Drought Impacts on the Cattle Industry" University of Illinois Animal Sciences

Southwest and Great Plains states[27] and some areas of Chicago suburbs[28], but is less of a concern for southern Illinois.

Natural Landscapes:

Forested areas have increased risk of wildfires during droughts and extreme heat. Wildfires are necessary for some natural processes, but when they get out of control wildlife populations can drop to unhealthy levels, habitat loss can be great, and risk of fire spreading to human residences increases. Additionally, uncontrolled fires in natural areas may damage recreational areas such as campgrounds and picnic areas- leading to economic losses in the tourism industry.

Drought and excessive can severely harm freshwater habitats. Prolonged periods of both raise water temperature, increasing the risk of Harmful Algal Blooms (HABs). HABs in freshwater systems are usually a result of cyanobacteria, a type of blue-green algae that can reproduce, or bloom, rapidly in nutrient-rich warm waters such as ponds and reservoirs. Cyanobacteria occur naturally across the US, but HABs only occur under certain conditions. The other major factor that increases risk of HABs are fertilizer runoff from agricultural and urban areas.

Some but not all cyanobacteria produce toxins that cause skin irritation and can be deadly if ingested. Swimming and even playing on beaches are not recommended during HABs. Additionally, the EPA recommends waiting two weeks after a HAB ends before eating fish from the waterbody. Other side effects from HABs include lowered dissolved oxygen and increased turbidity of water, which can lead to die-offs of fish, invertebrates, and submerged freshwater plants. Drought can also dry up water bodies completely, with small streams and shallow wetlands being most at risk. This can result in loss of populations of freshwater organisms and altered community structure. The economic impacts from HABS can be significant, causing public beach closures and damaging fishery populations. One EPA report from Ohio estimated that a HAB caused an estimated loss of over $37million from decreased tourism.

4.3.2. Climate Change

The largest impacts the Midwest is experiencing from climate change are an increase in spring and summer precipitation and increased flooding. From 2010-2014, the state of Illinois experienced a record number of extreme precipitation events. There are predicted increases in temperature, precipitation, and evaporation in Illinois, leading to frequent and more intense floods and droughts[29]. The eastern U.S. is expected to have an increase in the number of days favorable for the formation of severe thunderstorms[30].

Evidence suggests that the frequency and severity of droughts in the US will increase with climate change; and in the Midwest specifically droughts are expected to occur in late summer

[27] "Groundwater depletion across the nation" USGS factsheet, 2003.
[28] Mannix et al., "Groundwater Depletion in Chicago's Southwestern Suburbs" Illinois State Water Survey
[29] "Climate Change in Illinois" Illinois State Water Survey/Prairie Research Institute
[30] NASA - Global Climate Change, "Severe thunderstorms and climate change", April 7, 2013.

months.[31] Increases in temperature, precipitation, and evaporation will continue in Illinois, leading to frequent and more intense floods and droughts[32].

4.3.3. Geographic Location and Historical Occurrences

Perry County has 69 total records of hail, three of which caused property damage, see table 4.14. There are two records of lightning causing property damage, see table 4.15.

There are 116 total records of thunderstorm winds, see table 4.16 for records with injuries or property damage over $15,000.

There are 22 total records of drought from 1998-2022. One drought in southern Illinois lasting through the month of September in 2007 caused $3,450,000 in crop damage across all of the counties affected[33]. There are 11 records of excessive heat from 2010-2019, all occurring in July or August[34].

Southern Illinois is home to many lakes, often surrounded by agriculture fields; creating ideal conditions for HABs in late summer. Illinois EPA has a statewide HAB testing and monitoring program, but data with locations of specific blooms are not available from their webpage. IEPA recommends ceasing aquatic recreation activities when Microcystin levels are greater than 10ug/L.

Table 4.14 – Hail records for Perry County, IL that have caused property damage.

Location	Date	Hail Diameter (In)	Property Damage
DU QUOIN	5/11/2016	1.5	50000
PINCKNEYVILLE	3/28/1997	1.75	10000
PINCKNEYVILLE	4/3/2007	1	6000

Source: NOAA Storm Events Database

Table 4.15 – Lightning records for Perry County, IL.

Location	Date	Property Damage
PINCKNEYVILLE	7/19/1996	50000
DU QUOIN	2/27/1999	50000

Source: NOAA Storm Events Database

[31] Angel, J. et al. 2018: Midwest. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II U.S. Global Change Research Program, Washington, DC, USA, pp. 872–940.
[32] "Climate Change in Illinois" Illinois State Water Survey/Prairie Research Institute
[33] NOAA Storm Events Database
[34] NOAA Storm Events Database

Table 4.16- Selected thunderstorm wind records for Perry County, IL.

Location	Date	Injuries	Property Damage
DU QUOIN	6/8/2009	2	1300000
PYATTS	4/19/2011	2	1000000
PINCKNEYVILLE	7/11/2008	1	75000
CUTLER	5/25/2020	1	20000
PINCKNEYVILLE	6/10/2003	1	0
DU QUOIN	10/17/2012	0	100000
PINCKNEYVILLE	6/17/2006	0	75000
TAMAROA	6/28/2018	0	60000
DU QUOIN	1/29/2013	0	50000
PINCKNEYVILLE	4/15/2011	0	50000
DU QUOIN	4/2/2006	0	50000
TAMAROA	4/15/1994	0	50000
PINCKNEYVILLE	4/19/2011	0	40000
CONANT	2/27/1999	0	40000
PINCKNEYVILLE	5/31/2018	0	30000
PINCKNEYVILLE	7/30/2011	0	30000
DU QUOIN	6/27/2008	0	30000
DU QUOIN	6/27/2008	0	30000
DU QUOIN	7/5/2004	0	30000
DU QUOIN	7/13/2016	0	25000
DU QUOIN	6/4/2008	0	25000
PINCKNEYVILLE	3/31/2014	0	20000
LAYFIELD	1/29/2013	0	20000
CUTLER	7/1/2012	0	20000
HOLDEN	6/15/2010	0	20000
PINCKNEYVILLE	6/8/2009	0	20000
DU QUOIN	1/29/2008	0	20000
PINCKNEYVILLE	7/13/2016	0	15000
DU QUOIN	8/12/2010	0	15000
RICE	8/17/2000	0	15000
PINCKNEYVILLE	9/6/1996	0	15000

Source: NOAA Storm Events Database

4.3.4. Risk

Perry County has equal risk for severe thunderstorms, heat waves, and drought events. Excessive heat may be exacerbated in urban areas due to the heat island effect. HABs are most likely to occur in small ponds and lakes, or in shallow stagnant fingers of larger reservoirs. Based on NOAA records, Perry County has an average of 1.78 thunderstorms per year, it can be expected the County will experience at least one severe storm every year. Drought and extreme

heat do not have enough historical records to calculate an accurate probability, but they are expected to increase with climate change.

4.4. Earthquakes

4.4.1. Hazard Description

Earthquakes occur when seismic energy in the earth's crust is quickly released, often due to large blocks of crust fracturing or slipping past one another. Tectonic earthquakes often occur along major geologic fault lines. However, earthquakes can also occur in the interior of major plates due to weaknesses in the crust or other factors.

Effects of earthquakes can include perceptible ground shaking, surface faulting, and ground failure. In general, ground shaking will be more vigorous as earthquake magnitude increases. Ground shaking can cause massive damage to buildings and infrastructure; though the amount of damage depends also on soil properties, building specifications, distance from the epicenter, and other factors. Surface faulting, classified as strike-slip, normal, or reverse/thrust, causes displacement of the earth's crust at the surface. This usually leads to a long, narrow zone of displacement, which can be catastrophic to buildings and infrastructure. However, these zones are often quite narrow and impact small areas if they do occur. Ground failure can be induced by liquefaction which is a phenomenon where coarse soils, comprised mainly of silts or sands, act as a liquid due to the seismic shear waves produced by the earthquake. Liquefaction can cause lateral spreads, flow failures, loss of bearing strength, and sand boils – all of which can be destructive to the built environment[35].

The impacts of large earthquakes on more densely populated areas can be severe. Buildings and major infrastructure may collapse, roadways may be impassable due to debris or road failure, and essential facilities may be damaged or unreachable. Injury and loss of life are also possible during an earthquake – often the result of building collapse or falling debris. Due to the possible crippling of transportation and essential facilities, pre-hazard contingency planning is crucial for adequate emergency response in the event of an earthquake.

Earthquakes are measured by intensity, magnitude and energy release. Intensity describes the effects of the earthquake at the surface. Intensity is measured by the Modified Mercalli Intensity Scale (figure 4.6) which ranges from I – XII, where "I" describes an earthquake almost imperceptible to people and "XII" describes extreme damage to the built and natural environments at the surface. Magnitude is a measurement of the physical size of the earthquake, calculated by multiplying the length, width, and slip. Slip is the displacement of the fault. Energy release is a measure of all frequencies of shaking produced for the duration of an earthquake and is estimated using a logarithmic conversion of the magnitude. Magnitude is measured by a logarithmic scale - an increase of a whole number on the magnitude scale represents a tenfold increase in amplitude and 32 times more energy release[36].

[35] Hays, W.W., ed., 1981, Facing Geologic and Hydrologic Hazards - Earth Science Considerations: U.S. Geological Survey Professional Paper
[36] "Earthquake Magnitude, Energy Release, and Shaking Intensity", Earthquake Hazards, USGS.

Figure 4.6

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

Source: U.S. Geological Survey (USGS)

4.4.2. Geographic Location and Historical Occurrences

Southern Illinois lies in the northwest region of the New Madrid Seismic Zone (NMSZ). This zone covers areas of Arkansas, Missouri, Mississippi, Tennessee, Kentucky, and Illinois (figure 4.7) and is characterized by a group of faults deeply buried by river sediment. The geology associated with the New Madrid Seismic zone is known as the Mississippi Embayment. This is underlain by Reelfoot Rift, a deep continental rift system formed roughly 600 million years ago, and by Paleozoic sedimentary rock formed around 570 million years ago. The upper layers of the Mississippi Embayment include marine sedimentary rock from 50-100 million years ago, and even more recently river sediments from 5 million to 60,000 years ago[37].

Historic data suggests that magnitude 7-8 earthquakes have occurred in the NMSZ roughly every 500 years since 900 CE. The worst recorded series of earthquakes occurred in 1811-1812. 3 large earthquakes occurred in December 1811, and January and February of 1812, with hundreds of aftershocks felt throughout the year and into 1813. The epicenter of the third earthquake occurred near and destroyed the town of New Madrid, Missouri. Other damage from the earthquakes and aftershocks included bank failure along the Mississippi River, landsides of surrounding bluffs, uplift and subsidence of large areas, and liquefication of subsurface sediment- resulting in sand blows that covers thousands of square kilometers.

[37] "The New Madrid Seismic Zone", Earthquake Hazards, USGS.

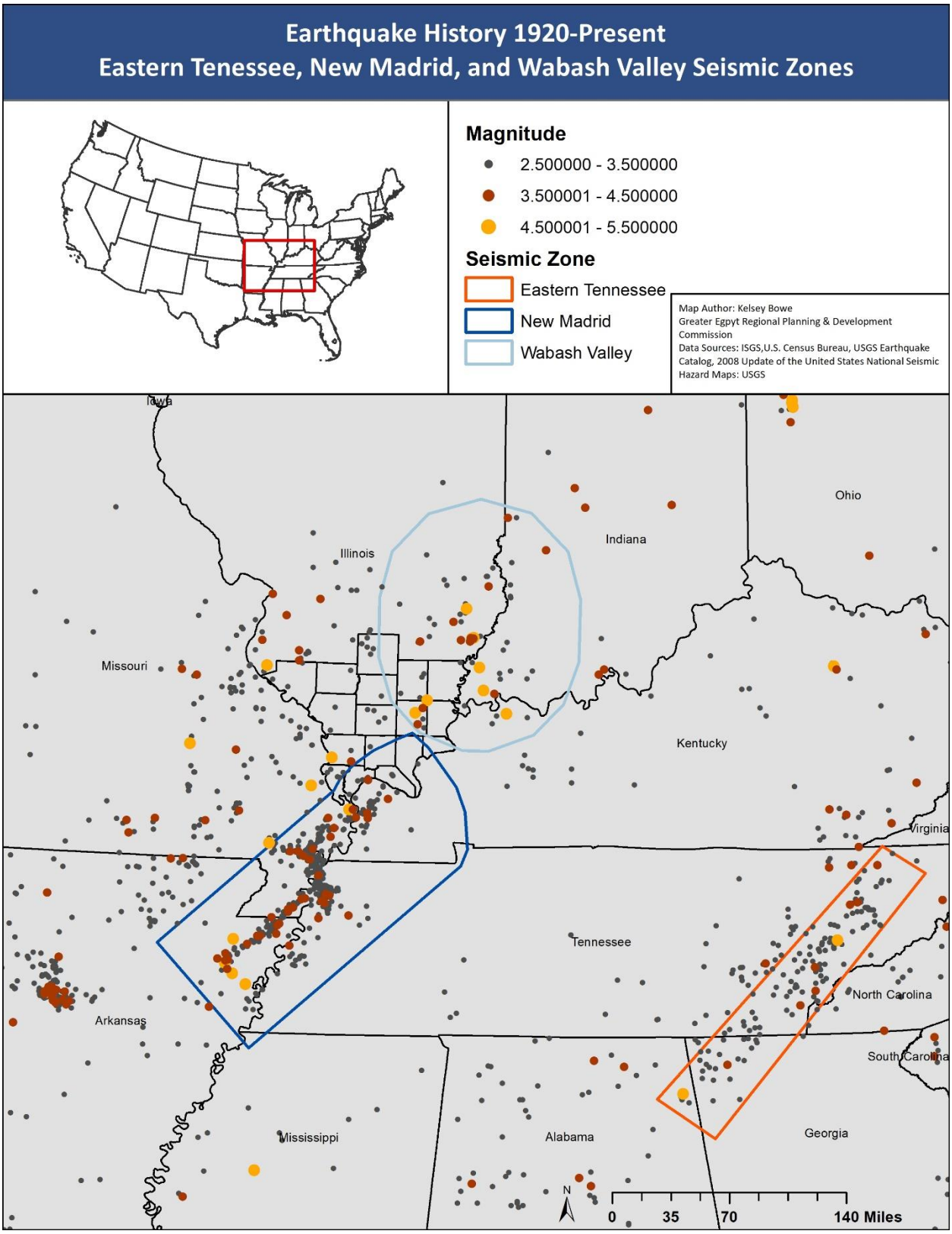
Sections of the Mississippi River are reported to have flown backwards temporarily as a result of uplift.

The Wabash Valley Seismic Zone (WVSZ) occurs around the conjunction of Kentucky, Indiana, and Illinois and may impact seismic activity of southern Illinois counties including Perry. Although a smaller region than New Madrid, it is estimated to be capable of magnitude 7 earthquakes. There is evidence of liquification sites dated at 6,100 years old, and more recently a magnitude 5.2 earthquake occurred in 2008 with an epicenter near Mt. Carmel, IL. Damage was reported from all three states in the seismic zone[38]. Figure 4.7 shows the seismic zones and earthquake history of southern Illinois and surrounding states.

Perry County has 1 recorded earthquake from 1920-present day, a magnitude 3.2 that occurred on 04/06/1991.

[38] "Wabash Valley Seismic Zone", Central United States Earthquake Consortium. https://cusec.org/wabash-valley-seismic-zone/

Figure 4.7


Earthquake History 1920-Present
Eastern Tenessee, New Madrid, and Wabash Valley Seismic Zones
Magnitude
2.500000 - 3.500000
3.500001 - 4.500000
4.500001 - 5.500000
Seismic Zone
Eastern Tennessee
New Madrid
Wabash Valley
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Data Sources: ISGS,U.S. Census Bureau, USGS Earthquake Catalog, 2008 Update of the United States National Seismic Hazard Maps: USGS
Iowa
Illinois
Indiana
Ohio
Missouri
Kentucky
Virginia
Tennessee
North Carolina
Arkansas
South Carolina
Mississippi
Alabama
Georgia
N
0
35
70
140 Miles

4.4.3. Risk

Figure 4.8 shows the most current USGS earthquake risk map. The values are expressed as a percentage of the acceleration of gravity (g). These values are a probability of 10% chance of exceeding the displayed ground acceleration within 50 years[39]. Perry county has a probability of 10-15%, while the center area of the New Madrid Seismic Zone has a probability of 40%.

Areas most at risk for liquefaction and sand blows are floodplains where the water table is within 5 feet of the surface. Perry County has areas with very high susceptibility for liquefaction in the floodplains of Beaucoup Creek, Galum Creek, and the Little Muddy River. Figure 4.9 shows liquefaction risk for the county.

While the county has equal risk of an earthquake occurring, older buildings and infrastructure have a higher risk of damage if one occurred. Construction before international building codes were widely adopted and enforced, and facilities that have not been seismically retrofitted are more likely to be damaged. Unreinforced masonry buildings were one of the most common structures for homes and commercial buildings from settlement through the mid-late 1970s; it is also the most dangerous building types for an earthquake hazard[40]. The Hazus software uses the year 1973 as a threshold for earthquake related building codes. However, in the eastern U.S. they were not widely enforced until much later and it can be difficult to determine the building codes used in old facilities. The Central U.S. Earthquake Consortium (CUSEC) states that most homes in the central U.S. were not built with seismic consideration until 1990.

[39] "USA Earthquake Risk", Layer Description, Map Image Layer by ESRI and USGS, ArcGIS Online.
[40] "Putting down roots in earthquake county- your handbook for earthquakes in the Central United States", U.S. Department of the Interior, U.S. Geological Survey, General Information Product 119.

Figure 4.8

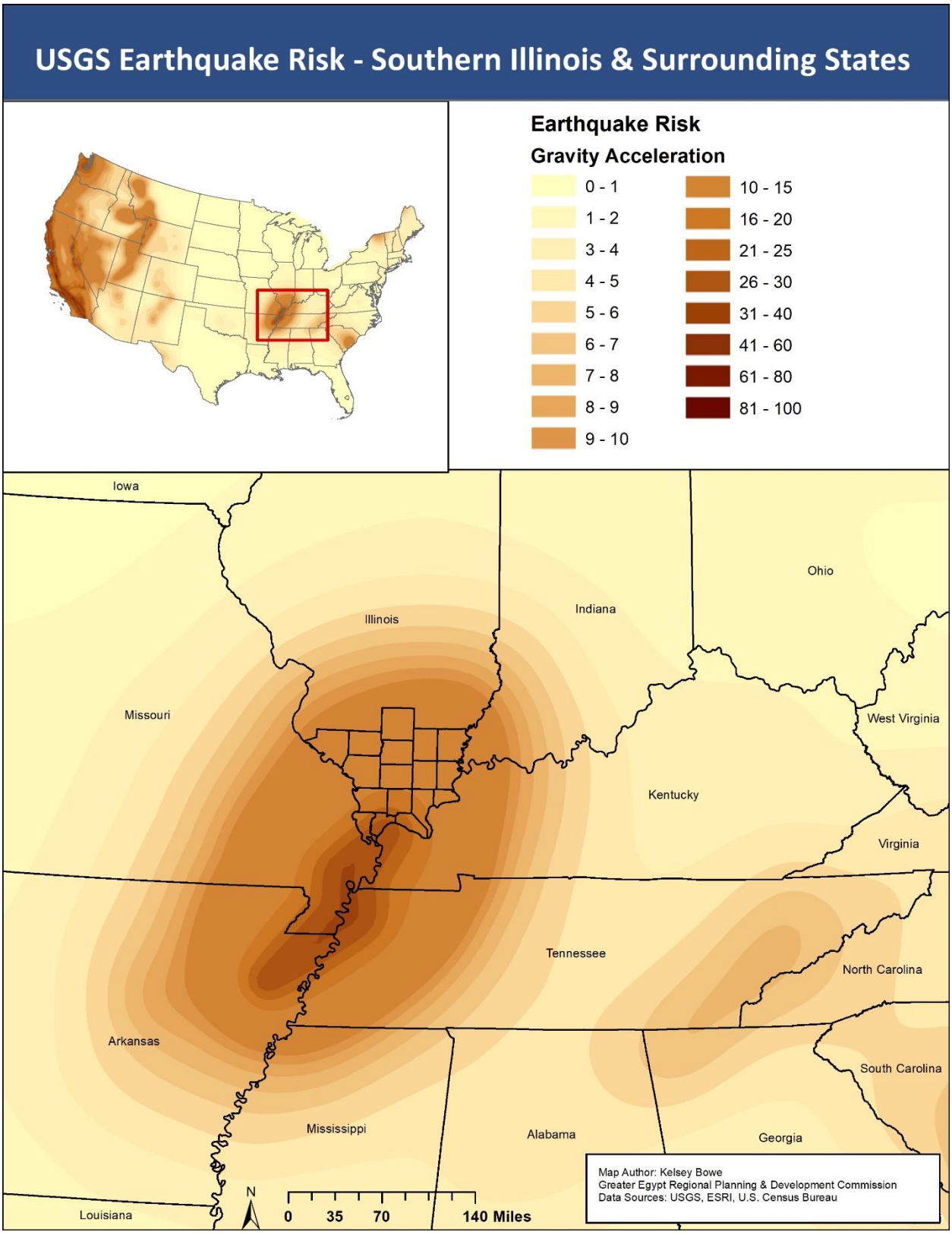
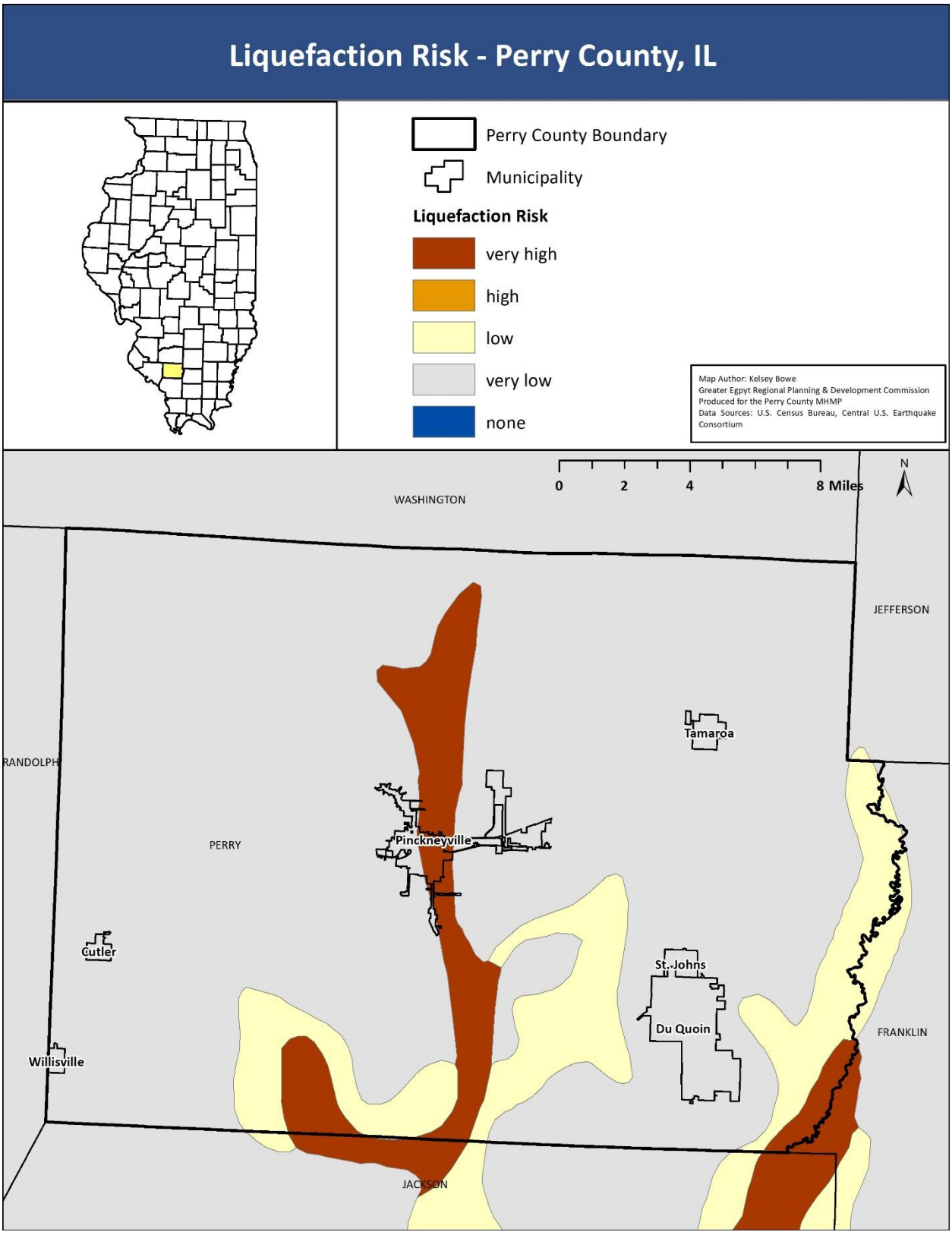

USGS Earthquake Risk - Southern Illinois & Surrounding States
Earthquake Risk
Gravity Acceleration
0 - 1
1 - 2
3 - 4
4 - 5
5 - 6
6 - 7
7 - 8
8 - 9
9 - 10
10 - 15
16 - 20
21 - 25
26 - 30
31 - 40
41 - 60
61 - 80
81 - 100
Iowa
Illinois
Indiana
Ohio
Missouri
West Virginia
Kentucky
Virginia
Tennessee
North Carolina
Arkansas
South Carolina
Mississippi
Alabama
Georgia
Louisiana
N
0 35 70 140 Miles
Map Author: Kelsey Bowe
Greater Egypt Regional Planning & Development Commission
Data Sources: USGS, ESRI, U.S. Census Bureau

Figure 4.9


Liquefaction Risk - Perry County, IL
Perry County Boundary
Municipality
Liquefaction Risk
very high
high
low
very low
none
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Perry County MHMP
Data Sources: U.S. Census Bureau, Central U.S. Earthquake Consortium
0
2
4
8 Miles
N
WASHINGTON
JEFFERSON
RANDOLPH
PERRY
FRANKLIN
JACKSON
Tamaroa
Pinckneyville
Cutler
St. Johns
Du Quoin
Willisville

4.4.4. Hazard Model

Hazus 5.1 was used to model two different scenarios for Perry County. Hazus uses data from the 2010 U.S. Decennial Census and the 2019 Homeland Infrastructure Foundation Level Data. Census tracts, population estimates, replacement values, and other data may not reflect the most current values.

Scenario 1: Magnitude 5.5 event in Perry County

Model Parameters:
Hazus Arbitrary Scenario - 5.5 magnitude
Depth - 10km
Latitude - 38.1223
Longitude - -89.3851

Total Households= 8,335

Physical Damage and Economic Losses

In this scenario, 2,078 buildings are estimated to be moderately or extensively damaged, and 153 buildings are estimated to be completely damaged. Table 4.17 shows the damage estimates by occupancy type. Essential facilities with at least moderate damage include one hospital, seven schools, two police stations, and two fire stations. Transportation systems with at least moderate damage include one railway facility, no railway or highway bridges are expected to be damaged. Utility systems that sustain at least moderate damage are four wastewater treatment plants, one electric power facility, and one communication facility. After seven days all critical facilities are expected to be functioning at greater than 50%. Damage to utility pipelines and the effect on households are displayed in tables 4.18 and 4.19.

Table 4.17 - Damage Estimate by Occupancy Type

	None		Slight		Moderate		Extensive		Complete	
Occupancy Type	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	37.66	0.73	21.65	0.97	29.6	1.95	17.22	3.07	4.88	3.2
Commercial	187.69	3.63	90.96	4.09	95.49	6.29	44.23	7.89	12.62	8.27
Education	9.64	0.19	4.18	0.19	4.53	0.3	1.98	0.35	0.66	0.43
Government	10.55	0.2	5.63	0.25	6.94	0.46	2.91	0.52	0.96	0.63
Industrial	51.41	0.99	25.2	1.13	31.1	2.05	16.64	2.97	4.66	3.05
Other Residential	511.86	9.9	319.32	14.35	442.73	29.17	212.53	37.93	46.56	30.5
Religion	34.84	0.67	15.05	0.68	13.57	0.89	6.54	1.17	2.01	1.31
Single Family	4326.97	83.68	1742.67	78.33	893.73	58.89	258.31	46.1	80.33	52.61
Total	**5,171**		**2,225**		**1,518**		**560**		**153**	

Table 4.18 – Utility Pipeline Damage Estimates

System	Total Pipeline Length (miles)	# of Leaks	# of Breaks
Potable Water	1,621	316	118
Waste Water	972	159	59
Natural Gas	18	1	1
Oil	0	0	0

Table 4.19 – Loss of Utility Service Estimates

Number of Households without Service					
	At Day 1	**At Day 3**	**At Day 7**	**At Day 30**	**At Day 90**
Potable Water	946	146	0	0	0
Electric Power	4,147	2,839	1,283	255	5

Physical damage will result in an estimated 70,000 tons of debris, requiring 2,800 truckloads to remove. Building-related economic losses are displayed in table 4.20.

In addition to the building related losses, there is an estimated $26.42 million economic loss to the transportation sector and $394.22 million economic loss to utility systems. Total Economic losses are estimated to be $685.78 million.

Table 4.20 – Building-related Economic Loss Estimates

Category	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses						
Wage	0	0.3044	5.6245	0.6184	0.6168	7.1641
Capital-Related	0	0.1295	3.9563	0.463	0.18	4.7288
Rental	2.8075	1.4716	2.1255	0.2153	0.3761	6.996
Relocation	9.8591	2.0221	4.2832	0.9876	2.7758	19.9278
Subtotal	**12.6666**	**3.9276**	**15.9895**	**2.2843**	**3.9487**	**38.8167**
Capital Stock Losses						
Structural	17.0583	4.7201	5.6442	4.1416	4.7863	36.3505
Nonstructural	68.8157	17.8807	16.5582	13.8859	10.5238	127.6643
Content	28.3314	4.8545	10.0921	10.3891	6.4469	60.114
Inventory	0	0	0.2324	1.7792	0.1845	2.1961
Subtotal	**114.2054**	**27.4553**	**32.5269**	**30.1958**	**21.9415**	**226.3249**
Total	**126.87**	**31.38**	**48.52**	**32.48**	**25.89**	**265.14**

Social Impacts

The model estimates 129 households will be displaced due to the earthquake, and of those, 96 will need temporary public shelter.

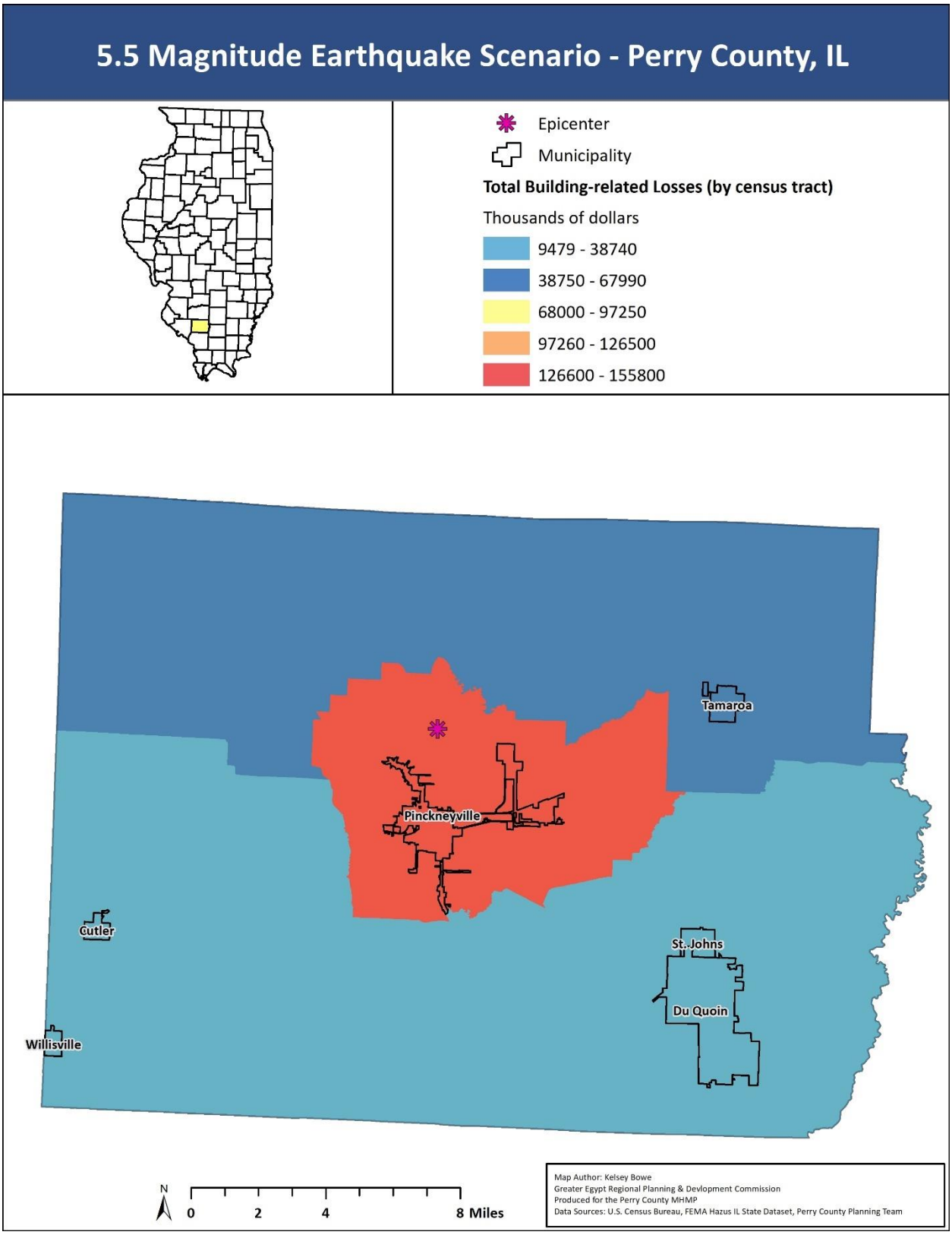
Table 4.8 displays injury and casualty estimates for 3 different occupancy load scenarios. 2am represents maximum residential occupancy load (most of population home in bed), 2pm represents peak educational, commercial, and industrial occupancy (most of population at work/school), and 5pm represents peak commuter occupancy. Injury severity levels are as follows:

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life threatening.
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

Table 4.21 – Injury and Casualty Estimates

Time of Earthquake	Occupancy Type	Level 1	Level 2	Level 3	Level 4
2:00 AM	Commercial	0.91	0.22	0.03	0.06
	Commuting	0	0	0.01	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	1.34	0.31	0.04	0.08
	Other-Residential	20.16	4.27	0.45	0.85
	Single Family	46.87	10.85	1.48	2.91
	Total	**69**	**16**	**2**	**4**
2:00 PM	Commercial	61.56	14.87	2.06	3.99
	Commuting	0.02	0.04	0.06	0.01
	Educational	24.44	6.13	0.9	1.74
	Hotels	0	0	0	0
	Industrial	9.89	2.31	0.3	0.57
	Other-Residential	5.59	1.23	0.14	0.26
	Single Family	13.77	3.31	0.47	0.89
	Total	**115**	**28**	**4**	**7**
5:00 PM	Commercial	44.66	10.82	1.51	2.9
	Commuting	0.33	0.62	0.82	0.17
	Educational	1.78	0.44	0.06	0.12
	Hotels	0	0	0	0
	Industrial	6.18	1.44	0.19	0.36
	Other-Residential	7.55	1.63	0.18	0.33
	Single Family	18.81	4.49	0.64	1.2
	Total	**79**	**19**	**3**	**5**

Figure 4.10


5.5 Magnitude Earthquake Scenario - Perry County, IL
Epicenter
Municipality
Total Building-related Losses (by census tract)
Thousands of dollars
9479 - 38740
38750 - 67990
68000 - 97250
97260 - 126500
126600 - 155800
Tamaroa
Pinckneyville
Cutler
St. Johns
Du Quoin
Willisville
N
0
2
4
8 Miles
Map Author: Kelsey Bowe
Greater Egypt Regional Planning & Development Commission
Produced for the Perry County MHMP
Data Sources: U.S. Census Bureau, FEMA Hazus IL State Dataset, Perry County Planning Team

Scenario 2: Magnitude 7.5 event in the New Madrid Seismic Zone

Model Parameters:
USGS ShakeMaps Scenario - M7.5-New Madrid central fault, version 5, bssc2014
Depth - 19.358km
Latitude - 35.83234
Longitude - -90.06303

This model estimates damages and social impacts of a magnitude 7.5 earthquake in the central fault of the NMSZ for Perry County, Illinois. An earthquake of this magnitude would be catastrophic to the population, infrastructure, and economy of northeast Arkansas, southeast Missouri, western Kentucky, southern Illinois, and surrounding areas; even though the effects in Perry County are expected to be mild. The Mid America Earthquake Center estimated that if a repeat of the 1811-1812 earthquakes occurred today, the NMSZ would suffer over 3,000 deaths, hundreds of hospitals could lose functionality, millions of households and businesses would lose water and electricity, and total economic losses would be in the hundreds of billions of dollars.

Results:

In this scenario, less than 500 buildings are estimated to be moderately or extensively damaged, and only four buildings are estimated to be completely damaged. Table 4.22 shows the damage estimates by occupancy type. No essential facilities are estimated to be damaged. No transportation systems are estimated to be damaged. No utility facilities are estimated to be damaged, but there is some damage to pipelines. Damage to utility pipelines is displayed in table 4.23. No households are expected to lose utility services as a result of the earthquake. Hazus only estimates utility losses for the county as a single unit, it does not take into account that power grids, water lines, and other pipelines may be interconnected across multiple counties or states.

Table 4.22 – Damage Estimates by Occupancy Type

	None		Slight		Moderate		Extensive		Complete	
Occupancy Type	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	90.27	1.08	12.08	1.46	7.12	1.86	1.45	2.78	0.08	1.91
Commercial	353.41	4.23	47.61	5.77	24.64	6.44	5	9.61	0.34	7.66
Education	17.16	0.21	2.34	0.28	1.26	0.33	0.21	0.41	0.03	0.59
Government	22.07	0.26	3.01	0.36	1.66	0.43	0.23	0.45	0.03	0.67
Industrial	105.03	1.26	14.17	1.72	8.08	2.11	1.63	3.13	0.09	1.94
Other Residential	1068.13	12.77	253.73	30.73	191.78	50.14	18.5	35.58	0.85	19.38
Religion	60.48	0.72	7.04	0.85	3.67	0.96	0.74	1.43	0.07	1.53
Single Family	6644.91	79.47	485.62	58.82	144.3	37.72	24.24	46.61	2.92	66.32
Total	**8,361**		**826**		**383**		**52**		**4**	

Table 4.23 – Utility Pipeline Damage Estimates

System	Total Pipeline Length (miles)	# of Leaks	# of Breaks
Potable Water	1,621	26	7
Waste Water	972	13	3
Natural Gas	18	0	0
Oil	0	0	0

This scenario estimates 8,000 tons of debris will be generated, requiring 320 truckloads to remove.

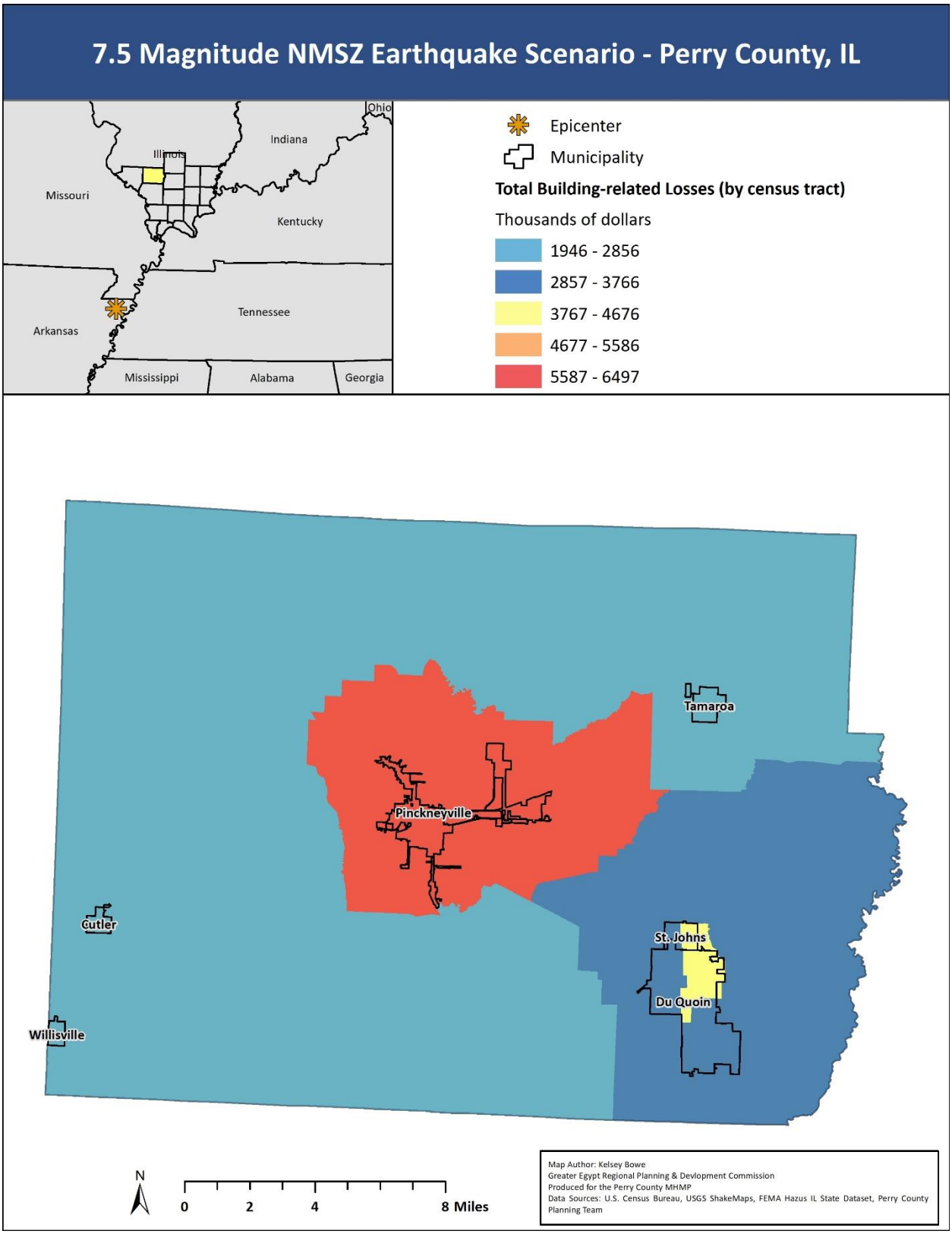
Seven households would be displaced as a result of the earthquake, and five of the households would be in need of temporary public shelter. This model estimates between six and nine level 1 injuries, one level 2 injury, and no severe injuries or deaths would occur from the earthquake, with the 2PM scenario having the highest estimates.

Table 4.24 – Building-related Economic Loss Estimates

Category	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses						
Wage	0	0.0253	0.8902	0.0744	0.1042	1.0941
Capital-Related	0	0.0107	0.639	0.0522	0.024	0.7259
Rental	0.3221	0.167	0.3549	0.0284	0.0465	0.9189
Relocation	1.1282	0.3994	0.6626	0.1385	0.3676	2.6963
Subtotal	**1.4503**	**0.6024**	**2.5467**	**0.2935**	**0.5423**	**5.4352**
Capital Stock Losses						
Structural	2.0367	0.6308	0.7635	0.4369	0.5582	4.4261
Nonstructural	4.8931	1.324	1.3511	0.7217	0.7877	9.0776
Content	1.1104	0.1895	0.6053	0.4458	0.3289	2.6799
Inventory	0	0	0.0126	0.0764	0.008	0.097
Subtotal	**8.0402**	**2.1443**	**2.7325**	**1.6808**	**1.6828**	**16.2806**
Total	**9.49**	**2.75**	**5.28**	**1.97**	**2.23**	**21.72**

In addition to the building related losses, there is an estimated $430,000 economic loss to the transportation sector and $8.69 million economic loss to utility systems. Total Economic losses are estimated to be $30.84 million.

Figure 4.11


7.5 Magnitude NMSZ Earthquake Scenario - Perry County, IL
Ohio
Indiana
Illinois
Missouri
Kentucky
Tennessee
Arkansas
Mississippi
Alabama
Georgia
Epicenter
Municipality
Total Building-related Losses (by census tract)
Thousands of dollars
1946 - 2856
2857 - 3766
3767 - 4676
4677 - 5586
5587 - 6497
Tamaroa
Pinckneyville
Cutler
St. Johns
Du Quoin
Willisville
N
0
2
4
8 Miles
Map Author: Kelsey Bowe
Greater Egypt Regional Planning & Devlopment Commission
Produced for the Perry County MHMP
Data Sources: U.S. Census Bureau, USGS ShakeMaps, FEMA Hazus IL State Dataset, Perry County Planning Team

4.5. Disease Outbreaks, Epidemics, & Pandemics

4.5.1. Hazard Description

This hazard is the spread of various diseases or other health problems that increase at rapid rates. The term disease outbreak is typically used when disease spread is limited to small communities or regions, such as a school system, city, or county; Although it can also be used when referring to large scale disease spread. Epidemics are disease outbreaks that infect people throughout a nation or several nations. Pandemics are disease outbreak at a global scale. Pandemics are usually the result of highly-infectious, rapidly spreading diseases. Disease outbreaks may last days to years, and the effects on public health and the economy may be long lasting and severe.

While disease outbreaks are often the result of contagious (human to human spread) diseases, such as influenza or measles they can stem from other origins. Other sources of disease outbreak include foodborne pathogens (such as E. coli or salmonella), zoonotic disease spread (Animal to human spread, such as Lyme disease and west Nile virus), and public health trends (such as the rise in obesity rates). Some disease outbreaks also become endemic, in which a disease is consistently present but limited to certain regions; or seasonal outbreaks where the same disease will resurface at high rates during certain times of the year.

Examples of pandemics include Spanish Influenza, HIV/AIDs, and most recently, COVID-19. Detailed information regarding COVID-19 is widely available from the Center for Disease Control (CDC), Illinois Department of Public Health (IDPH), and County Health Departments. Disease Outbreaks are not considered a natural hazard by FEMA, and rarely qualify for FEMA emergency funding or grant programs. COVID-19 was declared a federal disaster in all 50 states and relief funding has been distributed through the Coronavirus Aid, Relief, and Economic Security (CARES) Act, 2020 [P.L. 116-136]; the Coronavirus Preparedness and Response Supplemental Appropriations Act, 2020, [P.L. 116-123], and the Families First Coronavirus Response Act, 2020 [P.L. 116-127].

4.5.2. Geographical Location and Historical Occurrences

The Centers for Disease Control (CDC) maintains the National Outbreak Reporting System (NORS) for disease outbreaks in the U.S.

Table 4.14 - Disease Outbreaks in Illinois from 2009-2018

Type of Outbreak	# Outbreaks	# Illnesses	# Hospitalizations	# Deaths
Person to person	1221	34456	876	24
Foodborne	603	19635	2958	74
Waterborne	33	1862	107	21
Animal Contact*	58	5065	998	9
Environmental	4	142	5	0
Indeterminate/unknown	23	516	23	1
Total	1942	61676	4967	129

Source: CDC NORS

*The statistics for animal contact does not include diseases from invertebrate vectors such as mosquitos and ticks, nor does it contain diseases spread from animal bites; most cases are salmonella from touching reptiles and poultry.

Table 4.15 - Covid-19 cases and deaths in Illinois as of 6/16/22

Covid cases	Confirmed deaths	Probable deaths
3,376,596	33,979	4,413

Source: Illinois Department of Public Health

As of Tuesday, May 17, 2022 Johns Hopkins University data estimates over one million people in the United States have died as a result of COVID-19.

4.5.3. Risk

Since the nature of disease outbreaks vary depending on the type of illness, the risk varies as well. In general, the county has equal risk of an outbreak occurring although facilities such as schools or nursing homes have a higher risk due to the close density of people and vulnerability of children and elderly.

4.6. Severe Winter Weather

4.6.1. Hazard Description

Severe winter weather is any cold weather event that poses risk to human life and property. Severe winter weather may also significantly disrupt transportation and economic sectors. Types of severe winter weather are heavy snowfall, extreme low temperatures, freezing rain, sleet, blizzards, ice storms, and strong winds. Freezing rain refers to precipitation falling as a liquid that enters sub-freezing air or cold surfaces, forming ice while sleet refers to precipitation that freezes while falling. The typical definition of severe winter storm for Illinois is an event that produces six inches of snow or more in 48 hours. Severity of winter weather can also be classified by wind speeds and ice.

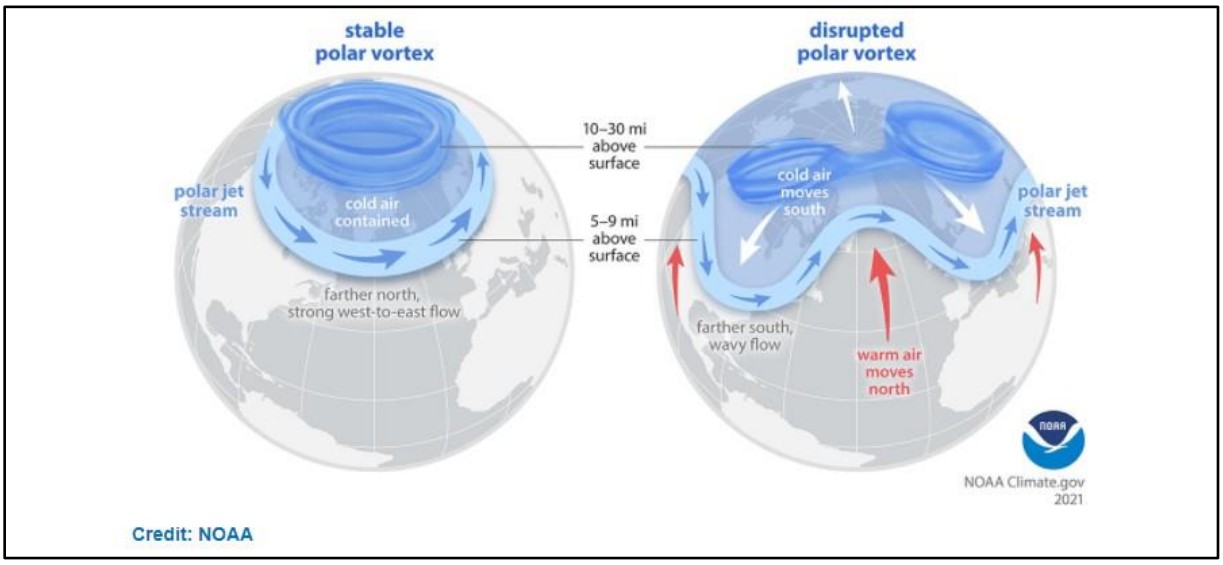
News and weather outlets have been using the term "Polar Vortex" more commonly in recent years. While some outlets are using the term loosely, this report will refer to the NOAA definitions:

- Polar vortex: A band of strong westerly winds that rotate in the stratosphere, 10-30 miles above the surface of the earth, over the north pole. These winds enclose extremely cold air
- Polar Jet Stream: a band of winds in the troposphere, 5-9miles above the earth's surface, over the north pole

Winter weather in the mid to southern United States associated with the polar vortex occurs when it weakens and becomes disrupted or "wobbles". This can in turn interact with the polar jet stream, causing it to move in more wavy forms than its traditional circulation around the north polar regions. These waves of polar jet stream air can dip down far into the U.S., causing severe cold outbreaks, along with ice and snow (figure 4.12)[41]. Some but not all winter storms in southern Illinois are associated with this natural phenomenon.

[41] Lindsey, Rebecca, "Understanding the Arctic polar vortex" NOAA climate.gov, 2021.

Figure 4.12



4.6.2. Specific Impacts

Agriculture

Severe winter weather can inflict heavy tolls on the agriculture industry. Planting or harvesting can be delayed. Crops and livestock can die in extreme cases, especially in southern regions where many farmers do not have barns to house their animals in the event of a storm. Unsafe roads can disrupt transportation of harvest and other products on time, and icy conditions can delay barge shipments as well, which is relied on heavily along the Mississippi corridor.

Urban

Snow, freezing rain, ice, and sleet can all cause dangerous road conditions, even in small amounts. Disruption of traffic and business closures due to winter weather can negatively impact local and broader economies. Transportation of goods and passengers can be delayed and schools may be shut down when roadways are covered in ice and snow. State, county, and local governments incur large costs for snow removal, salting the roads, and repairing roads that freeze and crack.

Freezing rain can cause immense property damage. When freezing rain comes into contact with surfaces, it forms an ice layer that can quickly become too heavy for power lines, trees, buildings, and roadways. Downed trees and power lines may disrupt power and communication for homes, business, and critical facilities without backup power options. Freezing temperatures can also cause pipes to freeze and burst, which can be very costly to repair.

Human Health

Traffic accident frequency increases during winter weather. Negative impacts due to an accident can be exacerbated by delayed medical care - from unsafe roads to health facilities and first responders being stretched thin during winter storm events.

Extreme cold temperature events can lead to frostbite or hypothermia for residents. Windy conditions during a cold weather event lower the wind chill factor, further increasing risk to humans.

Natural Landscapes

Effects of the hazard on natural areas are similar to the other sections. Freezing temperatures can cause frostbite and hypothermia in animals. Freezing over of waterbodies can kill some plants and animals. This most often occurs in areas of the south where less species are adapted to winter weather, or when a severe storm occurs later or earlier than normal in a season. Heavy snow and freezing rain can cause limbs to break or whole trees to fall, disrupting forest structure. Economic losses can stem from damaged park facilities, decreased tourism, delays in logging operations, and damaged timber stands.

4.6.3. Climate Change

As mentioned previously, a major effect of climate change in the Midwest is an increase in severe precipitation events, and an increase in heavy snowfalls has been an emerging pattern over the last decade for the eastern two-thirds of the continental US[42].

While some evidence suggests climate change can be causing the polar vortex to wobble and lead to severe winter weather in more southern latitudes, the relationship is not fully understood. One possibility is that global surface temperature increase, especially over Arctic Sea ice, can cause enough changes in surface temperature and pressure to influence the polar vortex. It is also possible these recent winter weather evets are just natural variations in the flows of the polar vortex and polar jet stream. There is limited historical data on patterns of the stratosphere, making it difficult to predict long-term trends for the future[43].

[42] "Climate Change and Extreme Snow in the U.S." NOAA National Centers for Environmental Information.
[43] Lindsey, Rebecca "Understanding the Arctic polar vortex", NOAA climate.gov, 2021.

4.6.4. Geographic Location and Historical Occurrences

Severe winter storms hold the record in Illinois for most total damage produced by any short-term weather event.

Table 4.27 - Severe winter weather and number of records for Perry County from 1996-2022.

Weather Type	Days
extreme cold	3
heavy snow	11
ice storm	3
winter storm	29

Source: NOAA Storm Events Database

Table 4.28 - Severe winter weather events that caused property damage in Perry County

Date	Weather Event	Property Damage
3/3/2008	Winter Storm	40000
1/26/2009	Winter Storm	75000
2/24/2016	Winter Storm	30000
2/23/2022	Winter Storm	5000

Source: NOAA Storm Events Database

4.6.5. Risk

Although the risk for severe winter weather is lower in more southern counties, it does occur, and often causes severe damage to property and infrastructure. Severe winter weather can occur anywhere in Perry County, the entire county has the same risk. Perry County only has records for winter storms dating from 1996-present; based on this short dataset, there is a probability of 111% of a winter storm occurring in any given year.

4.7. Hazardous Materials Release

4.7.1. Hazard Description

Hazardous materials release can take many forms, a general definition is the unintentional release of any material that may cause harm to human health or the environment or cause damage to critical facilities. Areas at highest risk of hazardous materials release are factories and warehouses where chemicals and other dangerous materials are produced or stored, major transportation routes including railways and interstate highways, and mines.

Depending on the type of incident and material released, the extent of such a hazard can range from mild chemical spills to dangerous explosions.

As per the Federal Emergency Planning and Community Right to Know Act (EPCRA) of 1986, IEMA implemented a statewide Hazardous Materials Emergency Planning Program in which any facility that uses or stores threshold amounts of federally mandated substances must report annually to state and local officials, and must immediately report any releases that occur.

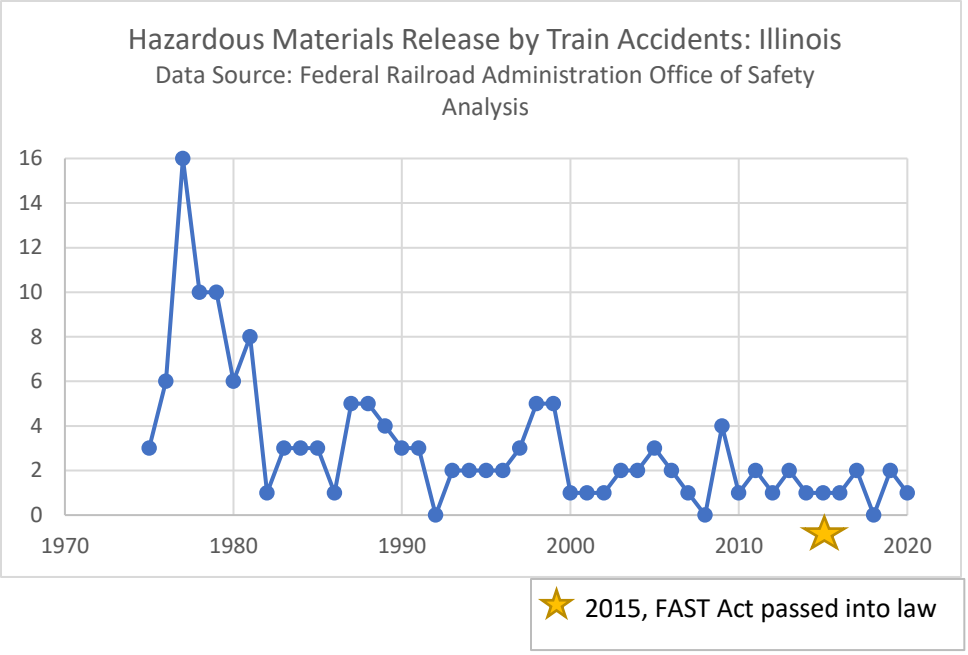
Train Derailments

Being in the central of the US, Illinois is a vital part of the transportation industry. The state has over 9,000 miles of railroads; with over 1,300 trains passing through Chicago every day[44]. Illinois leads the nation in number of carloads originating and terminating in the state each year, and has the second highest number of freight rail employees in the country. Additionally, millions of passengers use Amtrack services in the state each year.

Railway safety continues to improve in the United States. The Fixing America's Surface Transportation (FAST) Act of 2015 created new standards for tank cars that carry crude oil, ethanol, and other flammable liquids. These new tank cars, called DOT-117s and replace the older DOT-111 model. They are required to be built with thicker shells and shields, a ceramic thermal protection layer to prevent fire, and a fiberglass insulation layer to keep products at steady temperature and further reduce probability of tank punctures[45]. As of 2018, all DOT-111 crude oil tanks have been replaced. By 2023, all ethanol tanks will be phased out, and by 2025 all other tanks that carry flammable materials will be phased out of service[46]. Figure 4.11 shows number of train accidents that caused HazMat release in Illinois from 1975-2020.

[44] "Rail System" Illinois Department of Transportation
[45] Department of Transportation ""Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains" Final Rulemaking"
[46] Railway Supply Institute "HM-251/FAST Act Timeline"

Figure 4.13



Acid Mine Drainage

Acid mine drainage is caused by surface mining, most often for coal. When coal deposits are 100ft or less below the ground, surface mining is the most cost-effective way to extract it. This process involves stripping the surface materials (overburden) away, removing the coal, and refilling the pit back with the overburden. Surface mining is incredibly disruptive to the environment, accelerating the chemical breakdown of minerals and chemicals in the soil. When iron sulfide is exposed to air and water, ferrous sulfate and sulfuric acid are produced and drained into water bodies. Acidic water often dissolves metals present in sediments, including aluminum, iron, manganese, arsenic, cadmium, mercury, and zinc[47]. Sulfate loadings (and secondarily, concentrations of dissolved metals) are directly related to the area of land mined in southern Illinois. It was estimated in 1982 that about 3,500 tons of sulfate per square mile of surface mined land enter streams annually in the Big Muddy and Saline watersheds[11]. Some surface mines in these areas have since closed down, so the numbers may be lower today.

Surface coal mines are found in Gallatin, Jackson, Jefferson, Johnson, Perry, Pope, Randolph, Saline, and Williamson counties (see section 5.2 for more details on coal mining)

[47] L.G. Toler "Some Chemical Characteristics of Mine Drainage in Illinois" GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2078, US Department of the Interior, 1982.

4.7.2. Geographic Location and Historical Occurrences

The most recent IEMA public report on hazardous materials spills includes incidents from 1987-2011. During these years there were 106 reported incidents for Perry County, with the vast majority being spills of gasoline, diesel fuel, or crude oil[48].

There have been four train derailments in Perry County since 1972, only one of which involved hazardous materials. (Based on articles found in The Southern Illinoisian archives) In February of 2003, 21 cars from a Canadian National Railroad train derailed in Tamaroa. 95,000 gallons of hazardous materials spilled. Chemicals involved in the spill were hydrochloric acid, vinyl chloride, formaldehyde, and methanol. Around 1,000 residents were evacuated due to the hazards, no injuries or deaths occurred from this incident[49].

Most recently in neighboring Franklin County, a fire at Sugar Camp mine near Benton, IL in late August 2021 caused environmental problems. In order to extinguish the fire, the mining company pumped 46,000 gallons of foam containing perfluoroalkyl and polyfluoroalkyl substances (PFAS). These chemicals can be toxic when ingested, do not degrade in the environment, and are under the process of being restricted and phased out of use in many states. There is photo evidence of the foam spreading to above ground ditches and nearby farm fields. The IEPA tested water near the mines three weeks after workers had been evacuated and found PFAS levels up to 16 times higher than state health recommendations[50].

4.7.3. Risk

Transportation routes with the highest risk of hazardous materials release include IL-127, IL-13, other major roads, and all active railroads.

Other areas of high risk include factories and warehouses that use or store hazardous chemicals, hospitals, colleges, and universities that may store large amounts of cleaning supplies and other hazardous chemicals, and farms that store large amounts of fertilizer, herbicides, or pesticides.

FEMA Hazus Comprehensive Data Management System (CDMS) currently lists two Hazardous Materials Storage Sites for Perry County, see table 4.29.

[48] Data.illinois.gov "IEMA Hazardous Materials Spills"
[49] Mathis, C., "residents still displaced" The Southern Illinoisian, February 11, 2003.
[50] Hawthorne, Michael "Chemical nightmare" The Southern Illinoisian. October 3, 2021.

Table 4.29 – Hazardous Materials Storage Sites, Perry County, IL.

Facility Name	City	Address	Contact Person	Chemical Name	Chemical Quality (lbs.)
BICCGENERAL CABLE INDS. INC.	DU QUOIN	1453 S. WASHINGTON ST.	KEITH MCLAIN	ACETOPHENONE	4
BICCGENERAL CABLE INDS. INC.	DU QUOIN	1453 S. WASHINGTON ST.	KEITH MCLAIN	ANTIMONY	4
BICCGENERAL CABLE INDS. INC.	DU QUOIN	1453 S. WASHINGTON ST.	KEITH MCLAIN	COPPER	7
BICCGENERAL CABLE INDS. INC.	DU QUOIN	1453 S. WASHINGTON ST.	KEITH MCLAIN	DECABROMODIPHENYL OX	5
BICCGENERAL CABLE INDS. INC.	DU QUOIN	1453 S. WASHINGTON ST.	KEITH MCLAIN	LEAD	5
BICCGENERAL CABLE INDS. INC.	DU QUOIN	1453 S. WASHINGTON ST.	KEITH MCLAIN	ZINC COMPOUNDS	5
"HICKS OILS, DUQUOIN"	DU QUOIN	MILLER & HICKORY ST.		ZINC COMPOUNDS	0

Source: FEMA Hazus CDMS, Perry County EMA

4.8. Cyberattacks

4.8.1. Hazard Description

Cyberattacks are any unauthorized attempt to access or damage a computer or network system[51] The extent and impacts can vary widely depending on the motivations of the attacker. Common results of a cyberattack include:

- Monetary theft
- Identity theft including loss of personal, medical, business, and/or financial records
- Loss of access to computers, phones, and Bluetooth devices

Cyberattacks can be conducted on a large scale and are also a threat to businesses and government agencies. The Cybersecurity & Infrastructure Security Agency (CISA) (A Federal agency within the Department of Homeland Security formed in 2018) states that a growing concern in the United States is the cybersecurity of critical infrastructure. Facilities and infrastructure such as power grids and transportation routes are linked to cyber space in a number of ways, and our growing reliance on such technologies also increases risk of cyberattacks.

One method of cyberattack that is becoming increasingly common is the use of ransomware. This is a type of malware used to encrypt files, or render them unusable. These cyber attackers will then demand a ransom in return for decryption of the files, often with a threat of selling or releasing the files to another party[52]. Cybersecurity continues to be a top priority for the current administration, and bipartisan legislation is being written to require mandatory federal reporting of all ransomware attacks, although there are ongoing debates as to whether or not the U.S. should ban ransom payments[53]

CISA provides guides for business and local government leaders to learn about and begin implementing cybersecurity protocols within their organizations. The CISA Cyber Essentials Starter Kit includes six major actions that organizations should provide to build a culture of cyber readiness[54]:

- Leader: drive cybersecurity strategy and investment
- Staff: develop security awareness and vigilance
- Systems: protect critical assets and applications
- Surroundings: ensure only authorized users have access to digital workplaces
- Data: undergo scheduled backups to avoid data losses
- Crisis Response: develop and test incident response plans to limit damages and restore normal operations quickly

[51] Ready.gov Cybersecurity
[52] CISA "Ransomware Guidance and Resources"
[53] Bajak, Frank "Ransomware gangs get paid off as officials struggle for fix" Associated Press, June 21, 2021.
[54] Cybersecurity & Infrastructure Security Agency "Cyber Essentials Start Kit: The Basics for Building a Culture of Cyber Readiness" 2021.

In addition to federal resources, the Illinois Attorney General's office has a data breach reporting system for businesses and governments, as well as an identity theft hotline for all Illinois residents.

4.8.2. Geographic Location and Historical Occurrences

Cyberattacks are a continuous national threat. They can occur at any time to individuals, businesses, and government agencies. Cases of identity theft more than doubled from 2019-2020, with a 2,920% increase in cases of victim information being used to apply for government benefit programs[55]. According to the EMSIsoft State of Ransomware in the U.S. report, in 2020 there were ransomware attacks on 113 federal, state, and municipal governments, 560 healthcare facilities, and 1,681 schools, colleges, and universities[56]. The report states that these figures are likely understatements. They also state that the data come from multiple sources, although these sources are not listed.

The most recent cyberattack in the U.S. that gained national attention was the ransomware attack on Colonial Pipeline in May of 2021. The company provides gasoline to 13 states and Washington D.C., with 260 delivery points along the pipeline route. A criminal group locked up the pipeline company's corporate network. The company went offline and shut down their pipeline upon learning of the attack, and later paid a $4.4 million ransom to decrypt their data network. The day following the pipeline shutdown, over 9,500 gas stations ran out of fuel; the company was able to resume operations in a little less than a week[57].

Some recent cyberattacks in the state of Illinois are listed below:

- 2017- Data from Marion County Jail was removed including names, addresses, and social security numbers of former inmates[58]
- 2021- SIU School of Medicine lost patient data in the cyber-attack on Accellion's File Transfer Appliance[59]
- April-May 2021- Ransomware attack on the IL Attorney General's office, loss of case files and court records[60]

4.8.3. Risk

Cyberattacks can be difficult to predict and may be targeted at individuals, businesses, or government offices. Systems that do implement cybersecurity protocols, or have outdated, weaker protection are more at risk.

[55] Skiba, Katherine, "Pandemic Proves to Be Fertile Ground for Identity Thieves" AARP, February 5, 2020; Federal Trade Commission Consumer Sentinel Network Data Book 2020
[56] EMSISOFT Malware Lab "State of Ransomware in the US: Report and Statistics for Q1 and Q2 2020" July 8,2020
[57] Bussewitz, Cathy, "Colonial Pipeline confirms it paid $4.4M to hackers" May 19, 2021 Associated Press.
[58] "MARION COUNTY JAIL ADVISES FORMER INMATES OF DATA BREACH, POSSIBLE IDENTITY THEFT" X95radio news
[59] Davis, Jessica "Trillium, SIU Medicine Added to Tally of Accellion FTA Breach Victims" HealthITSecurity.com
[60] Goudie, Markoff, Tressel, and Weidner, "Cyber attack on Illinois Attorney General's office appears far worse than first thought", May 4,2021, abc7chicago news

4.9. Terrorism

4.9.1. Hazard Description

Terrorist attacks can take many forms, and stem from foreign or national groups or individuals. There are several types of terrorism that are potential threats to the United States[61]:

Attacks in public places

This hazard includes active shooters, intentional vehicle crashes, bombs and any other method of mass attack.

Bioterrorism

Bioterrorism involves the use of biological agents to harm or kill people, animals, or crops. Agents that may be used as biological weapons include bacteria, viruses, or other toxins.

The CDC maintains a list of potential biological weapons at https://emergency.cdc.gov/agent/agentlist.asp

Chemical attack

Similar to bioterrorism, this involves agents designed to harm people, animals, or crops. There are many different chemicals that may be toxic in vapor, liquid, or solid form.

Explosions

Explosive devices can come in many sizes and may be carried by individuals (suicide bombers), in vehicles, or hidden and detonated remotely.

Nuclear Explosions

These weapons use nuclear reactions to create explosions and may be incredibly destructive. Nuclear devices can be as large as missiles or small enough to be concealed and carried around.

Radiological dispersion device

RDDs are designed to scatter sub-lethal amounts of radioactive material with conventional explosive devices.

Other

Other acts of terrorism could include assassination, kidnapping, lynching, sabotage, and rioting.

1.1.1. Geographical Locations and Historical Occurrences

The events on September 11, 2001 was the deadliest single-day terrorist attack in U.S. history. There have been no large-scale attacks in the State of Illinois in recent decades; although gun violence continues to be an issue in many areas. It is difficult to report exact numbers of mass shootings in Illinois or for the whole country as definitions vary by agency. One report from USA Today states 350 “mass killings” occurred in the U.S. from 2006-2017, with 23 of the incidents being from Illinois[62].

[61] Ready.gov
[62] USA Today “Behind the Bloodshed” https://www.gannett-cdn.com/GDContent/mass-killings/index.html#title

1.1.2. Preparedness and survival

While it can be difficult to predict terrorist attacks, there are general steps that can be taken to stay safe. It is recommended to always have exit plans when outside of the home. This includes public places, work, and school. Suspicious packages should be reported instead of being opened. Seeking shelter and contacting law enforcement is the best course of action in the event of any attack. In the case of possible chemical, biological, or nuclear attacks it is imperative to find shelter and stay inside until it is announced safe from potential side effects[63].

Schools and workplaces should have emergency plans in place in the event of any emergency, including terrorist attacks.

The Illinois Terrorism Task Force (ITTF) is an advisory body to the Governor, The Governor's Homeland Security Advisor, and IEMA. They provide guidance for establishing and maintaining long term solutions to the threat of terrorism. The ITTF annual reports and other policies can be found at https://www2.illinois.gov/iema/ITTF/.

1.1.3. Risk

ITTF, IEMA, and County EMA Officials are in charge of monitoring terrorism risk in Illinois. Mass shootings could occur anywhere at any time; and have happened in a variety of places across the United States, including schools, grocery stores, churches, and many other locations.

[63] Ready.gov "Disasters and Emergencies"

4.10. Utility Disruptions and Power Outages

4.10.1. Hazard Description

This hazard includes short or long-term loss of essential utilities. Essential utilities include electricity, natural gas, potable water supply, wastewater treatment, and communication services (phone and internet). Constellation Energy Company lists the following as the 10 most common causes of power outages[64]:

- Severe weather
- Motor vehicle accidents
- Equipment failure
- Fallen trees
- Wildlife interference
- High energy demand
- Construction work damage
- Public damage (accidental and vandalism)
- Cyberattacks
- Planned outages

Impacts from utility disruptions can range from temporary inconveniences to a widespread public crisis. Loss of power during heat waves or winter storms can lead to weather related deaths. Loss of access to clean water for extended periods can lead to sickness and death. Inoperable communication towers and traffic signals can affect the efficiency of first responders. Local economies may suffer from loss of revenue and inability to pay workers during business closures.

4.10.2. Geographic Location and Historical Occurrences

Utility companies do not make historic records of outages and other issues publicly available. However, residents can search for and report currently active outages from both Ameren Illinois and Egyptian Electric Cooperative. Municipal water companies will publicly post current boil water orders when they occur. Additionally, the IEPA requires water suppliers to inform their customers of water outages and maintenance events that might disturb sediments containing lead.

4.10.3. Risk

Since power outages and other utility disruptions can be caused by a variety of factors, it is difficult to determine risk. In general risk of this hazard is highest during severe weather, and utility lines along highly trafficked roads have a higher risk of being damaged than those in more rural areas. There is also higher risk for older equipment to fail and cause outages.

[64] "10 common causes of power outages" Constellation, 2021.

5. Other Potential Hazards

The following hazards are not listed in the top 10, but still pose a minor risk to residents, infrastructure, agriculture, and natural resources of Perry County.

5.1. Flooding

5.1.1. Hazard Description

Flooding in southern Illinois is a significant and recurring hazard. This is a result of lying between the two largest rivers in the U.S. (when ranked by discharge), the Mississippi and Ohio; as well as climactic and seasonal factors. Characteristics of floods are uniquely influenced by precipitation intensity, infiltration rates, hydrogeologic features of a watershed, and interactions with the built environment.

There are 2 different types of floods that may occur in southern Illinois:

5.1.2. Flash/Upstream Floods

Flash flooding occurs when heavy rainfall leads to rapid flooding in upstream catchments and smaller tributaries. Urban flooding, when water overwhelms an area's drainage capacity is also a type of flash flood. Due to the fast-moving water inherent with flash floods, there can be significant hazards to people and the built environment. These can include loss of human life, destroyed buildings, downed trees, submerged vehicles, downed utilities, and more. Flash floods most often occur in the spring and early summer.

Flash flooding from extreme precipitation (defined as a weather event with more than two inches of precipitation) can have many widespread negative effects. Increased stormwater flow can lead to more pollutants in water bodies including excess nutrients from agriculture and urban fertilizers, pesticides and herbicides, sediments, motor oil and other vehicle pollution, and microbial pathogens.

Urban flooding is defined by the State of Illinois as "The inundation of property in a built environment, particularly in more densely populated areas, caused by rainfall overwhelming the capacity of drainage systems, such as storm sewers. 'Urban flooding' does not include flooding in undeveloped or agricultural areas."[65] A major concern with urban flooding is that it can be difficult to predict which areas have the highest risk, according to the summary report of the Urban Flooding Awareness Act, 90 percent of insurance payouts for urban flooding in Illinois occurred outside of FEMA's mapped 100-year floodplain. The report also states that mapping areas of urban flooding is not feasible on a statewide level and should be addressed by communities. Increased precipitation and urban flooding will also increase stormwater pollution. There are currently no counties in southern Illinois that have stormwater ordinances.

[65] IL General Assembly Public Act 098-0858 "Urban Flooding Awareness Act"

5.1.3. Riverine/Downstream Floods

Riverine floods occur along major rivers and develop more slowly. These floods typically form as a result of widespread, long-lasting rainfalls. Riverine floods in smaller tributaries can occur, but they often runoff and lead to larger downstream flooding. The lag between rainfall and elevated river levels provides more warning of an impending flood event, generally allowing for evacuation, some property protection, and other emergency measures to be made. Riverine floods can have a wide variety of side effects, from immediate damage due to the force of water and debris moving to secondary and tertiary effects such as disruption of power and services, disease spread, change in hydrology of river channels, and many others[66]. The total damages to human health, property, the economy, and the environment depend on the height, duration, and distribution of flood waters.

Flooding and Agriculture

Agriculture is a large component of southern Illinois's economy, especially along the Mississippi, Big Muddy, and Ohio rivers. Both flash and riverine floods can have major impacts on farming and ranching. More intense and frequent spring rains can delay planting, overly saturated soil can harbor harmful fungi and other microbes, and stormwater flow can erode necessary top soils. Long-term riverine floods can destroy a harvest completely, damage buildings and equipment, flood out pasture fields, and drown livestock.

5.1.4. Climate Change

Extreme precipitation is expected to increase with the warming climate, which in turn increases the frequency and intensity of floods. Springtime precipitation is expected to increase in southern Illinois by 10-15% by 2050, with Illinois already experiencing dramatic increases in extreme precipitation events over the past two decades [67]. 2019 was the second wettest year ever documented in the U.S., with extreme flooding events occurring along the Arkansas, Missouri, and Mississippi river basins. These floods affected 15 states, and had an estimated combined cost of $20 billion[68]. The Mississippi River experienced its longest lasting flood in 2019, with river gauges at or above flood stage for record breaking periods in Iowa, Illinois, Mississippi, and Louisiana[69]. Similarly, the Big Muddy River at Murphysboro (USGS Stream Gauge 05599490) was at or above flood stage (22ft) for a total of 143 days during 2019. Peak water height was recorded at 31ft on June 11, 2019[70].

[66] Nelson, S.A., "Flooding Hazards, Prediction, & Human Intervention", Tulane University, 2015.
[67] Frankson, R.K. et al., Illinois State Climate Summary, NOAA Technical Report, 2017.
[68] National Oceanic and Atmospheric Administration, "2019 was the 2nd wettest year on record for the U.S." January 8, 2020.
[69] Donegan, Brian, The Weather Channel, "2019 Mississippi River Flood the Longest-Lasting Since the Great Flood of 1927 in Multiple Locations" May, 22, 2019.
[70] USGS National Water Information System: Web Interface, USGS 05599490 Big Muddy River at RTE 127 at Murphysboro, IL

5.1.5. Geographic Location and Historical Occurrences

Table 5.1 - Flood records for Perry County, IL

Location	Date	Injuries	Property Damage
DU QUOIN	4/3/1999	0	0
PINCKNEYVILLE	7/12/2000	0	0
DU QUOIN	7/18/2001	0	0
COUNTYWIDE	5/8/2002	0	7000
PINCKNEYVILLE	12/18/2002	0	0
SWANWICK	3/18/2008	0	250000
DENNY	4/10/2008	0	0
TODDS MILL	12/25/2009	1	5000
DU QUOIN	4/24/2011	0	0
DU QUOIN	5/1/2011	0	30000
DU QUOIN	12/28/2015	0	0
ST JOHNS	8/14/2016	0	0
DU QUOIN	9/16/2016	0	0
PINCKNEYVILLE	5/18/2018	0	0
SUNFIELD	12/15/2018	0	0
DU QUOIN	3/24/2019	0	0
CUTLER	7/28/2022	0	0

Source: NOAA Storm Events Database

There are 36 records of flash floods in Perry County, table 5.2 shows records of events that caused property damage.

Table 5.2 - Flash flood events in Perry County that caused property damage

Location	Date	Property Damage
PINCKNEYVILLE	4/28/1996	220000
DU QUOIN	6/29/1998	50000
OLD DUQUOIN	4/30/2017	30000
DU QUOIN	7/16/2021	30000
DU QUOIN	7/29/2016	20000
DU QUOIN	9/8/2018	15000
DU QUOIN	6/16/2000	10000
DU QUOIN	7/11/2009	10000
CUTLER	1/12/2013	10000
PINCKNEYVILLE	5/11/2016	10000

Source: NOAA Storm Events Database

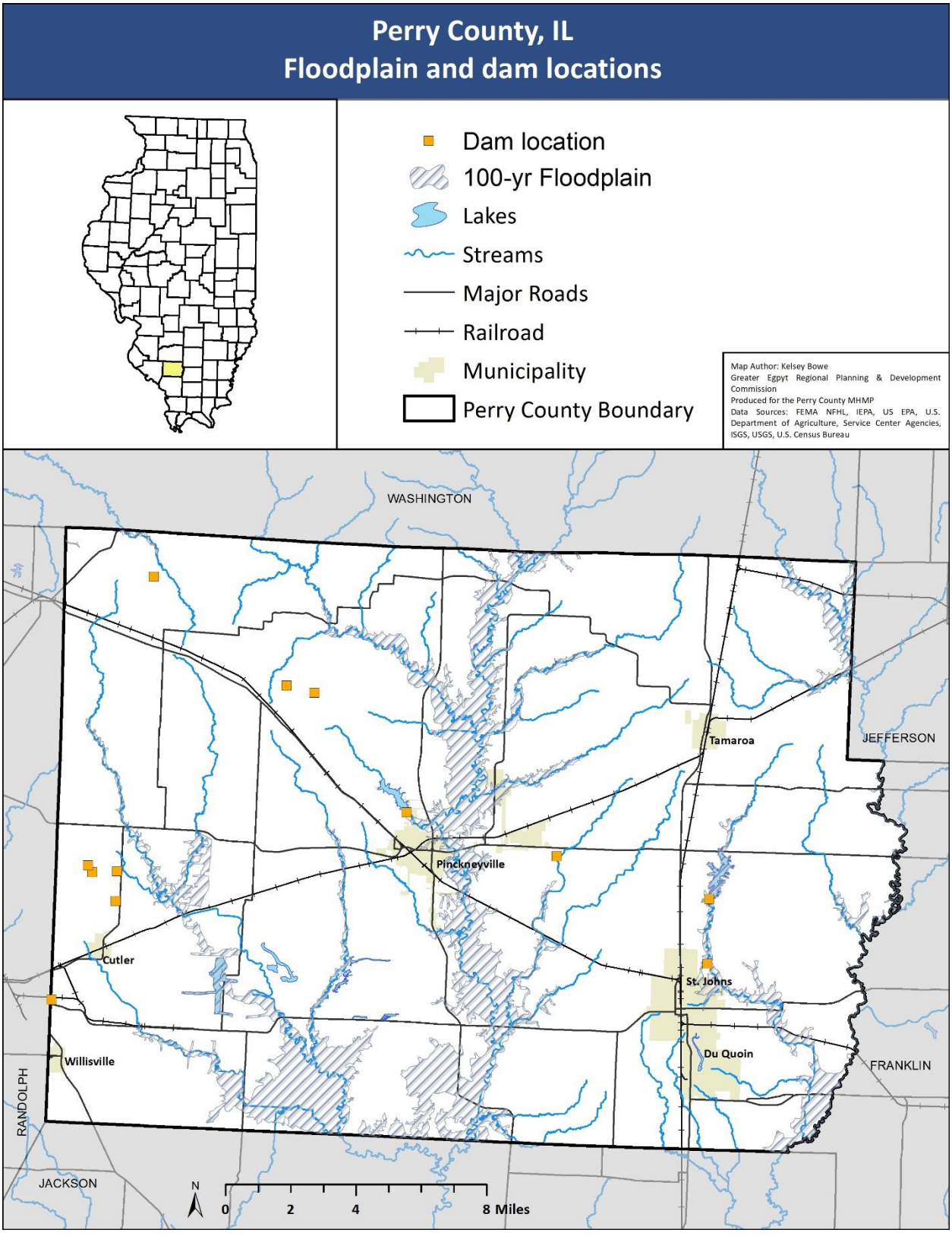
5.1.6. Risk

Flooding may occur anywhere during and following heavy precipitation events; In Perry County, riverine floods are most likely to occur near the larger streams in the county: Beaucoup Creek, Little Muddy River, and Galum Creek. Flash and urban floods are most likely to occur along low-lying roadways and in areas with a high percentage of impervious surfaces- such as Du Quoin and Pinckneyville. Figure 5.1 shows the 100-year floodplain, major water bodies, and dam locations for the county. Based on available data from NOAA, Perry County experiences an average of 0.74 floods per year and 1.48 flash floods per year.

There are no essential facilities located in the floodplain, the following critical facilities are located within the floodplain:

- Pinckneyville Wastewater Treatment Plant
- Pinckneyville-Du Quoin Airport

Figure 5.1


Perry County, IL
Floodplain and dam locations
Dam location
100-yr Floodplain
Lakes
Streams
Major Roads
Railroad
Municipality
Perry County Boundary
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Perry County MHMP
Data Sources: FEMA NFHL, IEPA, US EPA, U.S. Department of Agriculture, Service Center Agencies, ISGS, USGS, U.S. Census Bureau
WASHINGTON
JEFFERSON
Tamaroa
Pinckneyville
Cutler
St. Johns
Du Quoin
FRANKLIN
Willisville
RANDOLPH
JACKSON
N
0
2
4
8 Miles

5.2. Ground Failure

5.2.1. Hazard Description

Ground failure may refer to any consequence of shaking that affects the stability of the ground[71]. In southern Illinois this is usually caused by subsidence of the land due to sinkholes from karst features or underground mines.

Karst

Karst is a type of topography where soluble bedrock (also called carbonate rock) exists. There are different types of soluble bedrock, the most common found in Illinois are limestone and dolomite. Sinkholes form when an area of karst does not have external surface drainage of stormwater. Instead of flowing into waterbodies, rain infiltrates deep into the soil and can dissolve the bedrock over a period of years to decades. As the rock dissolves and forms cracks, soil particles sink into the bedrock and can eventually form visible depressions in the ground. This formation acts as a funnel for stormwater, speeding up formation of the sinkhole. In some cases, the top soil layer will not sag, and instead form a bridge over the void, or shallow cave, that has been forming as the bedrock dissolves. These soil bridges can collapse suddenly and without warning, also leading to sinkholes. Sinkhole collapse usually occurs after intense storm events, but can also occur with severe drought or other causes of water table alteration[72].

While karst sinkholes form naturally, they can be exacerbated by human influence on the landscape. Structures that alter natural drainage and increase stormwater runoff such as paved roads and parking lots, construction sites, and roof downspouts are all examples.

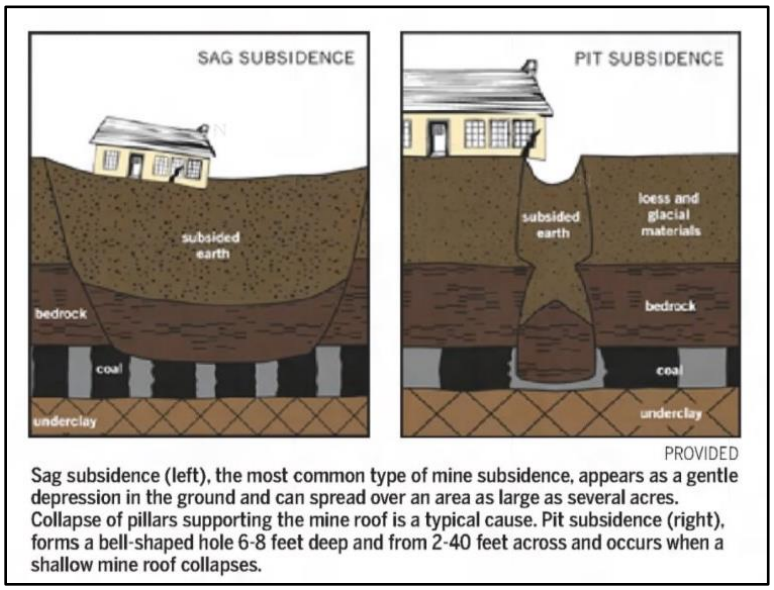
Underground Mining

Mining has been a part of Illinois's economy since the state was settled. Mined resources include lead, zinc, fluorites, shale, clay, stone, limestone, dolomite, and coal. Commercial coal mining began around 1810, and since then over 7,400 coal mines have been operated in the state. Much of Illinois contains coal-bearing rock strata.

There are two main types of mine subsidence that may occur. Pit subsidence usually occurs over shallow mines (less than 100ft deep) where bedrock is thin (less than 50ft thick) or composed of weak minerals such as shale. Pits form when the roofs of these shallow mines cave in, and the ground materials above it collapse. This type of subsidence can occur rapidly, the resulting pits are usually 6-8ft deep and less than 16ft across[73]. Sag or trough subsidence occurs when pillars of mine shafts collapse, the size of the subsidence can vary widely depending on how may pillars fall. Sag subsidence may be hundreds of feet long and affect several acres of property. Instead of a single, deep pit forming; sag subsidence produces a low depression in the ground over a large area. Both can cause significant building and property damage.

[71] "ground failure", Earthquake Glossary, USGS.
[72] White, W.B., "Geomorphology and Hydrology of Karst Terrains", Oxford University Press, New York, 1988.
[73] Bauer, R.A., "Mine Subsidence in Illinois: Facts for Homeowners" Illinois State Geological Survey, Prairie Research Institute, 2013.

Figure 5.2 - Diagrams of mine subsidence



Source: Illinois Mine Subsidence Insurance Fund

5.2.2. Geographic Location and Historical Occurrences

Many towns and residences are built on top of or adjacent to underground mines. Therefore, there is always a risk of land subsidence on such properties. Additionally, many abandoned mines do not have historical records or were never adequately mapped. The Illinois State Geological Survey (ISGS) provides a free interactive map online to search for underground mine locations throughout the state[74] (see figures 5.4 and 5.5). This mapping tool is up kept updated with mine records and areas of suspected abandoned mine sites. While a useful tool to search for mine sites in your area, the ISGS states there may be inaccuracies, and landowners concerned about subsidence on their property should contact their insurance company.

Perry County rests over a geologic area with predominantly shale, limestone and coal bearing bedrock. While areas of limestone exist, karst sinkholes are not a major concern. Figure 5.3 shows karst bedrock types and known sinkhole areas for southern Illinois. Some developed areas of the county sit directly over underground coal mines, figures 5.4 and 5.5 show known and suspected coal mines for southern Illinois and Perry County.

There is no national or state database with records of ground failure events, however some records have been found from local news sources, these are displayed in table 5.3.

[74] "Illinois Coal Mines", Illinois State Geological Survey, Prairie Research Institute, https://isgs.illinois.edu/illinois-coal-mines-ilmines.

5.2.3. Risk

Areas most at risk for ground failure are highly developed areas over abandoned mines or karst bedrock. The following essential and critical facilities may be on top of or very near underground coal mines, based on the ISGS mine dataset, but detailed assessments would need to be conducted to confirm the mine locations and assess risk of subsidence.

- 1st Baptist Church, Cutler
- Du Quoin Elementary School
- Du Quoin Middle School
- St Bruno Catholic School
- Tamaroa Grade School
- Pinckneyville Head Start
- Illinois State Police District 13
- Du Quoin Fire Department Station 1
- Willisville Volunteer Fire Department
- Pinckneyville Ambulance Service
- Pinckneyville Ambulance Service (Du Quoin Division)
- Pinckneyville WTP
- Pinckneyville WTP 2
- Cutler WTP
- Coulterville WTP

Probability of ground failure is not possible to calculate at the county scale; boundaries and ages of abandoned coal mines are not known for all areas. Factors such as bedrock types, surface structures and construction activities, and water seepage may affect sinkhole formation and other types of ground failure.

Table 5.3 – Ground failure records from southern Illinois

County	Municipality	Year	# of subsidence events	Type	Diameter	Depth	Other notes	Date	Source
Perry	Du Quoin	1954	1	Mine	50ft		Occurred at 202N Line St, abandoned section of Jupiter Coal and Coke Co mine	December 1954	The Southern, Dec 15, 1954
Franklin	Zeigler	1970	1	Mine	no visible hole formed	NA	mine squeeze- ceiling of mine collapses and ground above shifts, Zeigler No 1 mine, closed in 1948, cracks and other damage to several buildings, street, and water mains	September 1970	The southern, Sept 25, 1970
Williamson	Energy	1979	2	Mine			NW part of village	1979	The Southern, Jun 22, 1981, 3
Williamson	Energy	1981	1	Mine	100ft		Sycamore road closed; water line snapped	March 1981	The Southern, March2, 1981 1
Williamson	Energy	1981	1	Mine	25ft	50ft	Energy village park, formed near playground, took several days to fill, Taylor No1 coal mine	June 1981	The Southern, Jun 22, 1981, 3
Williamson	Energy	1981	1	Mine	25ft	15ft	Energy village park, formed near playground, filled with dirt the day it was discovered, Taylor No 1 coal mine	May 1981	The Southern, Jun 22, 1981, 3
Franklin	Sesser	1986	1	Mine	5ft	27ft	suspected to be caused by subsidence of Old Ben 21 mine, blocked city's sewer system	February 1986	The Southern, Feb 07, 1986, E21
Jackson	Dowell	1986	1	Mine			entire block on NW part of village, multiple areas sinking, hole has been visible since 1971	Oct 1986	The Southern, Oct 10, 1986
Williamson	Energy	1992	1	Mine	20ft	12ft	Energy village park	January 1992	The southern, Jan 15, 1992 5W
Union	Dongola	1993	3	Karst	10ft,10ft,	6ft, 6ft, 50ft	Sinkholes were filled with water, holding the land up, construction of a new well drew down the water table, causing the surface to collapse into the holes	March-May 1993	The southern, June 14, 1993, 3A
Williamson	Cambria	1996	1	Mine	22 by 12 ft	81ft	Madison coal co No 12 mine shaft	April 1996	The Southern Apr 27, 1996 A3
Williamson	Johnston City	2007	1	Mine	NA	NA	active mine roof collapsed from moisture, no workers injured, Mach Mine	September 2007	The Southern, Sep 13, 2007
Jackson	Grand tower	2012	2	Levee pipes burst		deepest 19.5 ft		June 2012	the southern June 17, 2013,1
Jackson	Grand Tower	2020	1	Karst	30ft	5ft	sinkhole formation sped up by flooding on Mississippi, caused sewers to back up, road closures	June 2020	The Southern, June 11, 2020 A3
Perry	Du Quoin	2020	1	Mine	8ft	14ft	Smith Ave	February 2020	Benton News, Feb 29, 2020
Williamson	Carterville	2020	1	Mine	25ft	15ft		2020	Benton News, Feb 29, 2020
Franklin	Macedonia	2020	1	Mine	Planned longwall subsidence	NA	road closures on I-14	June 2020	The Southern, Jun 18,2020 A3

Figure 5.3

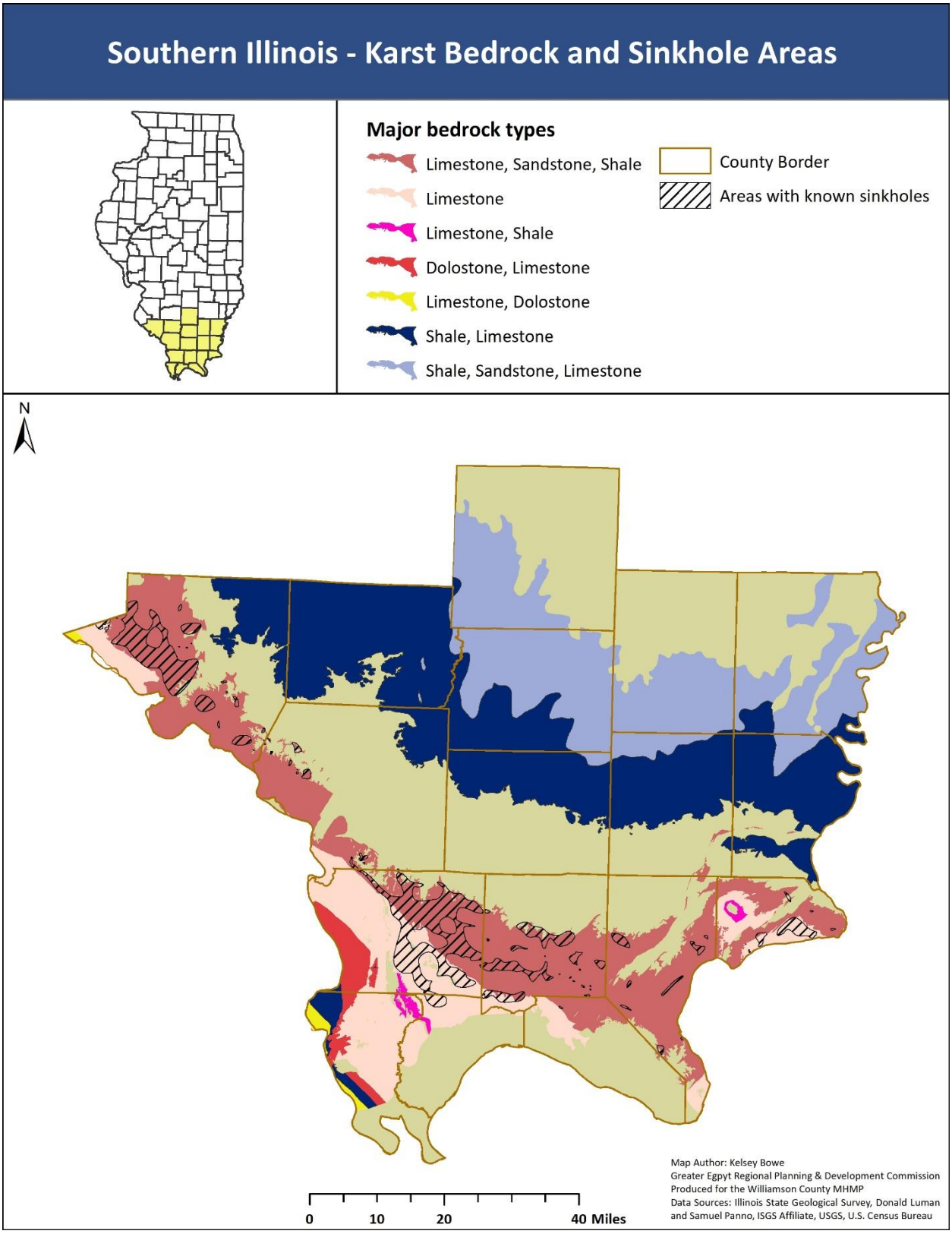

Southern Illinois - Karst Bedrock and Sinkhole Areas
Major bedrock types
Limestone, Sandstone, Shale
Limestone
Limestone, Shale
Dolostone, Limestone
Limestone, Dolostone
Shale, Limestone
Shale, Sandstone, Limestone
County Border
Areas with known sinkholes
N
0
10
20
40 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Williamson County MHMP
Data Sources: Illinois State Geological Survey, Donald Luman and Samuel Panno, ISGS Affiliate, USGS, U.S. Census Bureau

Figure 5.4

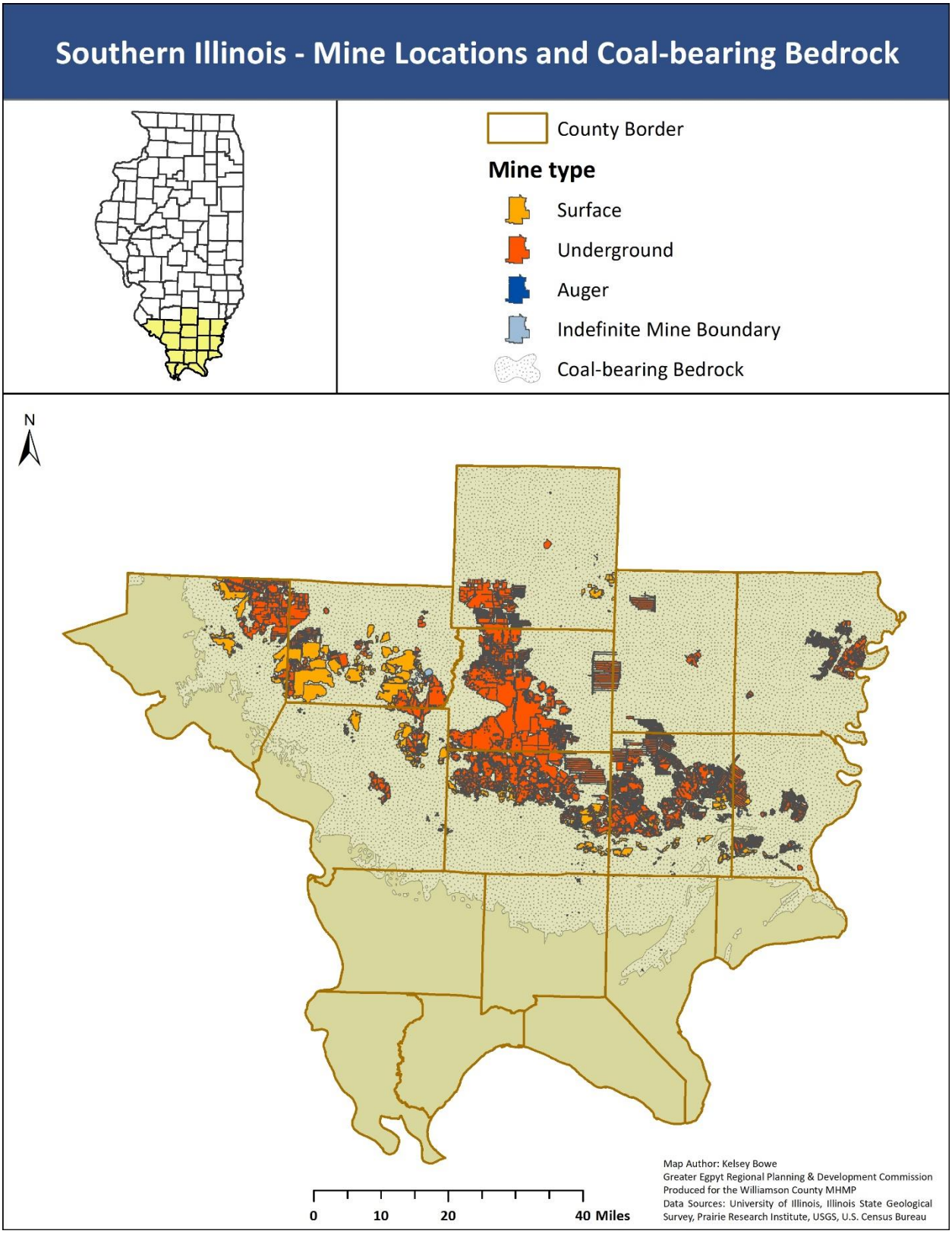
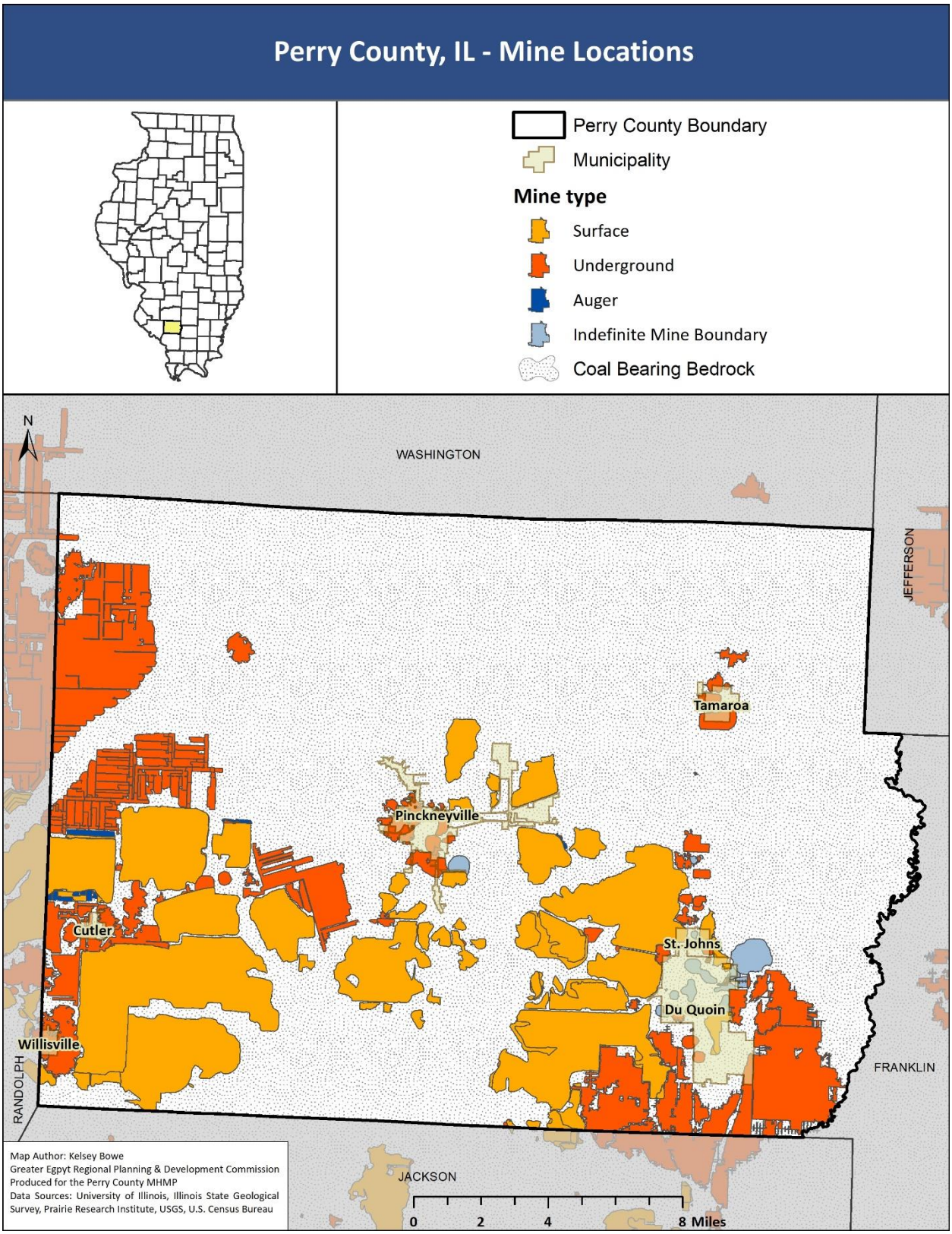

Southern Illinois - Mine Locations and Coal-bearing Bedrock
County Border
Mine type
Surface
Underground
Auger
Indefinite Mine Boundary
Coal-bearing Bedrock
N
0
10
20
40 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Williamson County MHMP
Data Sources: University of Illinois, Illinois State Geological Survey, Prairie Research Institute, USGS, U.S. Census Bureau

Figure 5.5


Perry County, IL - Mine Locations
Perry County Boundary
Municipality
Mine type
Surface
Underground
Auger
Indefinite Mine Boundary
Coal Bearing Bedrock
N
WASHINGTON
JEFFERSON
Tamaroa
Pinckneyville
Cutler
St. Johns
Du Quoin
Willisville
RANDOLPH
FRANKLIN
JACKSON
0
2
4
8 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Perry County MHMP
Data Sources: University of Illinois, Illinois State Geological Survey, Prairie Research Institute, USGS, U.S. Census Bureau

5.3. Dam and Levee Failure

5.3.1. Hazard Description

Dams and levees are both river engineering structures used to control the path and movement of water. Reservoirs created from damming waterways are used for flood control, recreation, storing municipal water supply, and various other purposes. Dam failure can be a significant hazard to surrounding communities depending on the size of the reservoir, age, and structural integrity of the dam in question.

Most dam failures are caused by overtopping (floods that exceed the capability of the dam), internal erosion, and mechanical failure. Because there is so much variation and uncertainty, it is difficult to predict if or when a dam will fail. Detailed risk assessments are not available for all dams in the United States, although the average rate of large dam (greater then 40ft in height) failure in the US is 0.0001 dams/year[75] This rate does not take into account any factors other than dam height and age and should not be used as a replacement for detailed risk assessments performed on individual dams.

The risk of an incident or failure depends of many factors including height of the dam, size of reservoir, age of dam, and frequency of floods and seismic events that can weaken the structural integrity of dams. The amount of damage also depends on the amount or type of infrastructure and number of people living in the potential hazard zone.

Levees are used to contain a river or waterbody to a certain area, protecting the area behind from flooding events. Most large river levees in the U.S. were built by the United States Army Corps of Engineers (USACE) and are maintained by local levee commissions. 97% of levees are earthen embankments, the remaining 3% are concrete and rock levees as well as floodwalls[76].

Issues that can lead to levee breaches include, seepage, undersizing from floods, erosion, damage from tree roots and burrowing animals, and development projects near the levee. In cases of severe floods, levees can also be overtopped. Levee systems also pose a unique issue to riverine flooding. While they are designed to protect communities and property from flood events, the structures themselves can also exacerbate flood events downstream. Levee systems make river channels narrower, when heavy precipitation occurs the water flows faster and higher than it would without the structures in place.

There are many outdated and deteriorating infrastructures in the U.S. including dams and levees. The average age of all dams in Illinois is 53 years. The American Society of Civil Engineers (ASCE) gives the total of Illinois's infrastructure a grade of C-, with dams receiving a C.[77] This grade is mostly due to aging systems, increased usage, and inadequate funding to inspect, maintain, and repair infrastructures.

[75] Ferrante et al. "Uncertainty Analysis for Large Dam Failure Frequencies Based on Historic Data" nrc.gov
[76] "Overview of Levees" 2021 Report Card for America's Infrastructure
[77] Illinois Section of the American Society of Civil Engineers "Report Card for Illinois Infrastructures", 2018.

The extent of dam failure can be defined in terms of percentage of the structure that fails, the area of land that was flooded, or the monetary value that was damaged as a result of the event.

5.3.2. Climate Change

As of the most recent National Climate Assessment, there are no comprehensive climate change related risk assessments for water infrastructure of the U.S.[78], but refer to the flooding and thunderstorm sections for specific information regarding climate change and these hazards, where increases in both can lead to weakening of dams and levees.

5.3.3. Geographic Location and Historical Occurrences

There are no levees listed for Perry County in the USACE National Levees Database, however there are levee systems along the Mississippi River in neighboring counties of southern Illinois. A failure of these may impact emergency services, traffic, and the economy within Perry County.

The USACE National Dams inventory lists 12 dams for Perry County (table 5.4), none of which have a high hazard potential. They have an average age of 47 years. None of the dams in Perry County are used for hydropower. All of the Dams are regulated and inspected by IDNR.

Dam hazard potential is not the probability of failure, rather it is an estimation of the types and cost of damages that would occur in the event of failure. High hazard potential dams would likely cause loss of human life; in addition, large economic loss, environment and utility damages are also expected. Significant hazard potential would lead to heavy economic loss, environmental damage, or disruption of lifeline facilities but no deaths. Low hazard potential dams would have very small economic damage, typically limited to the owner's property[79].

Many dams have an Emergency Action Plan (EAP) although it is not currently required by USACE or any Illinois regulatory agency. EAPs list potential emergency situations and have detailed instructions to be followed to minimize loss of life and damage to facilities and surrounding properties in the event of a dam failure or other emergency[80].

The Association of Dam Safety Officials (ASDSO) and the National Performance of Dams Program (NPDP) both maintain databases that hold records of dam incidents and failures. There are currently no recorded incidents for any dams in Perry County.

A recent example of a dam failure in the Midwest occurred in May 2020 in Midland County, Michigan. Edenville dam, owned by Boyce Hydro Power company, failed after heavy rains produced a 500-year flood event. The earthen dam was originally constructed in 1925. Old age, the need for a series of repairs, and pressure from the rising reservoir caused the sand embankment to liquefy[81], leading to the failure. 10,000 people had to be evacuated, 2,000

[78] Lall, U.T. et. Al. 2018: Water. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II U.S. Global Change Research Program, Washington, DC, USA, pp. 145–173.
[79] FEMA, "Federal Guidelines for Dam Safety", April 2004.
[80] Illinois Dam Safety Report 2018
[81] House, K, "Report: Shoddy construction, ignored threats led to Edenville Dam collapse", Bridge Michigan, September 2021.

homes, multiple businesses, and several roads and bridges were damaged. The Federal Energy Regulatory Commission (FERC) had issued the owner multiple violations from 2005-2015; and in 2018 revoked their hydroelectric license entirely for lack of compliance with repair requests and failure to meet safety standards. 2019-2020 consisted of a series of permitting arguments and lawsuits between Boyce Hydro and the State, but repairs were never completed[82].

The reservoir size in Midland was 66,200 acre-feet. For comparison, Rend Lake (Franklin and Jefferson Counties) is 607,910 acre-feet. Rend Lake Dam is relatively young compared to the average for the U.S., it is owned by the USACE and inspected on a 5-year schedule.

5.3.4. Risk

Risk area for dam failure depends on the size of the reservoir. The area that could be flooded is known as the dam breach inundation area. Risk area for levee failure includes the floodplain that is protected by the levee system. Probability of dam or levee failure varies considerably. Factors including age of the structure, repair history, and weather must be taken into account. Detailed probabilities do not exist for the dams in Perry County.

In a scenario of a maximum high pool dam breach at Rend Lake an estimated 1,603 (daytime) to 2,982 (nighttime) people would be at risk, 1,119 buildings are at risk, and total damages could exceed $97 million[83].

[82] Roth, C, "Timeline: The Edenville Dam saga, before, during and after the break" MLive.com, September 2020.
[83] "Risk Characteristics," Rend Dam, National Inventory of Dams

Table 5.4 – Dam inventory of Perry County

Dam Name	River	City	Year Built	Hazard Potential	EAP
LAKE DU QUOIN DAM	REESE CREEK	DUQUOIN	1937	S	N
PINCKNEYVILLE RESERVOIR DAM	OPOSSUM CREEK	PINKNEYVILLE	1953	S	Y
NEW CHERRY LAKE DAM	REESE CREEK	DU QUOIN	1969	S	N
KNIGHT HAWK COAL/PRAIRE EAGLE MINE/010B SLURRY DAM	TRIB GALUM CREEK	CUTLER	2006	S	Y
KNIGHT HAWK/PRAIRIE EAGLE/SLURRY 012C DAM	TRIB GALUM CREEK	CONANT	2016	S	Y
KNIGHT HAWK/PRAIRIE EAGLE/NORTH REFUSE AREA DAM	TRIB GALUM CREEK	CUTLER		S	Y
MILLERS CAMPGROUND LAKE DAM	TRIB COX CREEK			S	N
RED HAWK DAM	PANTHER CREEK	VERGENNES	1930	L	N
FOERICH POND DAM	TRIB MUD CREEK	NEW ATHENS	1953	L	N
KNIGHT HAWK COAL/PRAIRIE EAGLE MINE/SLURRY DAM 010	NONE	CUTLER	2006	L	N
PRAIRIE COAL/LOST PRAIRIE MINE/SEDIMENT POND 1	TRIB WOLF CR	PINCKNEYVILLE		L	N
PRAIRIE COAL/LOST PRAIRIE MINE/SLURRY POND 1	TRIB WOLF CR	PINCKNEYVILLE		L	N

Source: USACE National Inventory of Dams

5.4. Wildland fires

5.4.1. Hazard Description

While not as severe or frequent as wildfires in the western United States, Illinois does experience both prescribed and unintentional wildland fire throughout the state. From 2002-2014, Illinois experienced an average of 57 fires per year with an average of 881 acres burned per year[84]. Wildfires are a naturally occurring phenomenon, and can be vital to ecosystem health. Fire is an especially important tool in managing Illinois's remnant tallgrass prairies. The term "wildfire" is used to describe any wildland fire that is unwanted and unplanned. Wildfire usually starts from human caused activities, mostly campfires that spread rapidly. They can also start naturally under the right conditions, or stem from prescribed management fires that get out of control. The extent of a wildfire is generally defined by the number of acres that burned. This is influenced by weather, topography, and amount of fuel available.

5.4.2. Geographic Location and Historical Occurrences

The most recent wildfire to occur in southern Illinois occurred in March 2021 in the Shawnee National Forest Fountain Bluff area. The fire burned about 27 acres. Other small wildfires have occurred in the Shawnee throughout the years, and prescribed management burns take place seasonally, with schedules and alerts available from the National Forest webpage.

5.4.3. Risk

Perry County has an 48% risk of wildfire to homes by the state ranking system, and 12% by the national rank. There is a 79% wildfire hazard potential by state rank and a 10% wildfire hazard potential by national rank[85].

Risk is highest in camping areas and along the Wildland Urban Interface (WUI). Risk is elevated during droughts and high wind. Many state and federal natural areas have fire danger signs posted that are adjusted daily.

[84] "Wildfires" Living With Weather, mrcc.illiois.edu
[85] "Community Wildfire Defense Grant Risk Dataset" Wildfire Risk to Communities, 2022.

5.5. Near Earth Object Impact

5.5.1. Hazard Description

Near Earth Objects, or NEOs, are any small Solar System Body that comes into proximity with Earth. This can include comets, asteroids, and meteoroids. NEOs are considered potentially hazardous if they are over 459 feet in diameter and their orbit crosses the orbit of Earth. In general, anything smaller than that is expected to burn up in the atmosphere[86] (although small meteorites do sometimes make contact with the surface).

For clarification a meteoroid is a very small solar system body, usually a piece that broke off of a comet or asteroid. A meteor is a meteoroid that enters Earth's atmosphere, and a meteorite is a meteor that lands on the surface.

The United States and other nations have been undergoing projects to scan for and assess the risk of NEOs since the 1990s under the umbrella term "Spaceguard".[81] The National Aeronautics and Space Administration (NASA) Center for NEO Studies (CNEOS) utilizes Sentry, "a highly automated collision monitoring system that continually scans the most current asteroid catalog for possibilities of future impact with Earth over the next 100 years.[87]" NEOs discovered are ranked on the Palermo and Torino scales. These scales give the NEO a hazard rating based on the probability of impact and the estimated damage. As of January 2019, 19,470 NEOs have been discovered; of these 107 are comets and the rest are asteroids[88].

5.5.2. Geographic Location and Historical Occurrences

There are over 160 known impact craters on the surface of the Earth. Two notable locations are Meteor Crater in Arizona and the Chicxulub Crater in Mexico. Meteor Crater was caused an estimated 50,000 years ago by a meteorite around 150 ft in diameter. The crater is 550 ft deep and nearly a mile wide. The Chicxulub Crater is located in the Gulf of Mexico, just off the coast of the Yucatán Peninsula. The asteroid which caused the crater hit Earth an estimated 66 million years ago, and is widely accepted as the cause of the mass extinction event which led to the demise of the non-avian dinosaurs.

There have been 10 meteorites in Illinois, four from observed falls and the rest were discoveries[89]. The largest of these is known as the Tilden meteorite, which fell on July 13, 1927. It split into three fragments while still in the atmosphere, and landed in three separate counties. The largest of the fragments weighed 110 pounds[90]. The most recent observed meteorite fall occurred in 2003.

5.5.3. Risk

NEO impact could occur anywhere, the county has equal risk. Table 5.5 below shows approximate impact probability (interval) and damage for different size classes of NEOs. MT

[86] NASA.gov "NASA on the Prowl for Near-Earth Objects" May 25, 2004.
[87] "Sentry: Earth Impact Monitoring", NASA Jet Propulsion Laboratory, Center for Near Earth Object Studies.
[88] NASA CNEOS "Discovery Statistics"
[89] "Meteorites from Illinois" Washington University in St Louis: Earth and Planetary Sciences
[90] Cargile, Clint, "This Week In Illinois History: Stars Fell On Illinois (July 13, 1927)" WNIJ New, Northern Public Radio, July 12, 2021.

stands for megatons, which refers to the chemical energy release of a million tons of TNT. Actual risk varies greatly, data on individual NEOs can be viewed from the "Impact Risk Data" table from the CNEOS website.

Table 5.5 - Approximate Average Impact Interval and Impact Energy for NEOs

Type of Event	Characteristic Diameter of Impacting Object	Approximate Impact Energy (MT)	Approximate Average Impact Interval (years)
Airburst	25m	1	200
Local scale	50m	10	2000
Regional scale	140m	300	30,000
Continent scale	300m	2,000	100,000
Below global catastrophe threshold	600m	20,000	200,000
Possible global catastrophe	1km	100,000	700,000
Above global catastrophe threshold	5km	10,000,000	30million
Mass extinction	10km	100,000,000	100million

Source: The table is adapted from Table 2.1 in "Defending Planet Earth: Near-Earth Object Surveys and Hazard Mitigation Strategies" published by the National Academy of Sciences in 2010.

5.6. Landslides

5.6.1. Hazard Description

Parts of Illinois have a medium to high landslide potential. While these events in Illinois are usually on a smaller scale than landslides in the west, they have been known to cause significant property and infrastructure damage. Most landslides in Illinois are not life threatening. ISGS defines 6 types of landslides that occur in our state[91]:

- **Rock falls-** These occur when blocks of rock fall freely from a steep slope or cliff. Blocks of loess or till that fall from an undercut bluff face are also considered rock falls. Rock falls are most common along bedrock bluffs of the Mississippi river.
- **Slumps -** Slumps occur when a mass of rocks or earth move down along one or more buried failure planes. Almost 60% of recorded landslides in IL were slumps.
- **Rock slump** – usually a permeable bedrock such as limestone sliding on underlying impermeable bedrock, such as shale.
- **Earth slump –** fine textured glacial materials that slide after failure planes form.
- **Earth slumps on bedrock-** Mass of glacial material sliding down bedrock – often shale, usually caused by water percolating the glacial material until reaching the impermeable shale.
- **Earth flows-** Any flow of sand or unconsolidated earth material
- **Rock creeps-** Blocks of rock that slide slowly over a gentle slope, generally very slow and takes place over the course of years.

5.6.2. Geographic Location and Historical Occurrences

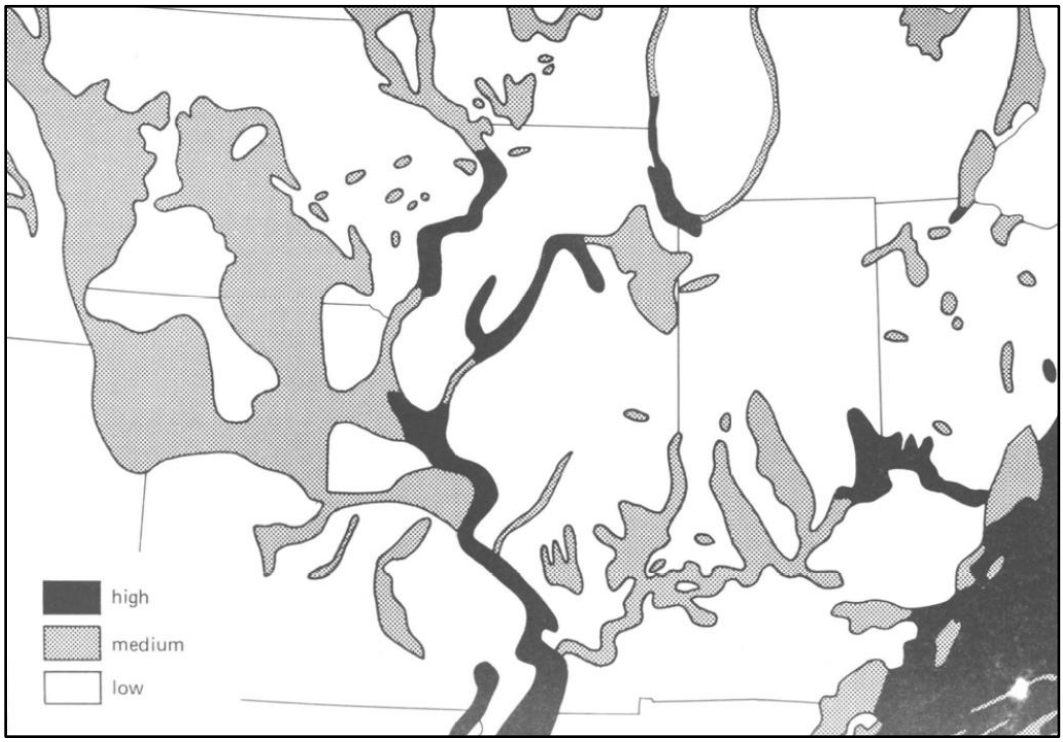
The most recent inventory of landslides in southern Illinois was competed in 1992. During this inventory, ISGS identified 221 landslides that occurred along the Mississippi and Ohio Rivers from Chester to Olmstead[92]. Most of the identified landslides were considered ancient landforms that had occurred during seismic activity of the New Madrid Seismic Zone. Besides earthquakes, heavy rainfall and alteration of risk areas, such as construction projects along bluffs and shorelines can also lead to landslides in southern Illinois.

5.6.3. Risk

Risk of landslide depends on a number of factors including depth and type of bedrock, depth and type of materials overlaying bedrock, slope angle, precipitation, freeze and thaw cycles, and vegetation. Most landslides in Illinois occur near Lake Michigan, and the Mississippi, Illinois, and Ohio Rivers. Perry County has a low to medium risk of landslides, see figure 5.6 for a map of landslide probability in the State.

[91] Killey, Hines, and DuMontelle "Landslide Inventory of Illinois" Illinois Department of Energy and Natural Resources, State Geological Survey Division, 1985.
[92] Wen June S, "Inventory of landslides in southern Illinois near the New Madrid Seismic Zone and the possible failure mechanism at three sites", Journal Volume: 24:7; Conference: 1992 annual meeting of the Geological Society of America (GSA), 1992.

Figure 5.6: Landslide potential in Illinois



Source: ISGS

5.7. Invasive Species and Infestations

5.7.1. Infestations

An infestation usually refers to a home, business, or farm being overrun or invaded by pests or parasites. This hazard can be caused by native and nonnative species. Home infestations can have a risk of disease spread from the pests. Infestations in agriculture can take many forms and may result in diseased crops or significant loss of crop from pests feeding in large numbers.

The CDC lists the following household pests as potential disease vectors and human health hazards[93]:

- Rodents
- Cockroaches
- Fleas
- Flies
- Fire ants
- Mosquitos
- Termites are also listed as a household threat for the amount of property damage an infestation can cause. In the U.S., termites cause more property damage annually than fires and windstorms combined.

Agricultural Infestations

The University of Illinois State Water Survey has a degree day calculator and seasonal maps for estimating peak emergence of common agriculture invertebrate pests, see table 4.35[94]:

Other animals that may cause enough crop damage to be considered an infestation are feral hogs, white-tailed deer, rodents, and birds. Fungal or viral infections and weeds may also be considered agricultural infestations.

[93] Marshall, Carter L MD "Chapter 4: Disease Vectors and Pests" CDC Healthy Housing Reference Manual
[94] "Pest Degree Day Calculators" Illinois State Water Survey: Prairie Research Institute

Table 5.6 – Agricultural Invertebrate Pests of Illinois

Pest	Native Species?
Alfalfa Weevil	no
Armyworm	yes
Bean Leaf Beetle	yes
Black Cutworm	yes
Corn Earworm	yes
Corn Rootworm	yes
European Corn Borer	no
Stalk Borer	yes
Two-spotted Spider Mite	found worldwide, original geographic distribution thought to be Eurasia
Western Bean Cutworm	native to western U.S., has been spreading east
Apple Maggot	yes
Codling Moth	found worldwide, origins unclear
Colorado Potato Beetle	native to Rocky Mtns
Emerald Ash Borer	no
European Red Mite	no
Fruit Tree Leafroller	yes
Grape Berry Moth	no
Oriental Fruit Moth	no
Peachtree Borer	yes
Potato Leafhopper	yes
San Jose Scale	no
Spotted Wing Drosophillia	no
Squash Vine Borer	yes
Brown Marmorated Stink Bug	no
Corn Flea Beetle	yes
Japanese Beetle	no

Source: University of Illinois State Water Survey

5.7.2. Invasive Species

Invasive species are any organism non-native in an ecosystem whose introduction causes or is likely to cause harm to the economy, environment, or human health (Executive Order 13112). Illinois defines exotic weeds as plants not native to North America that when planted, spread vegetatively or naturalize and degrade natural communities, reduce the value of fish and wildlife habitat, or threaten Illinois endangered or threatened species (525 ILCS 10).

Invasive plants and invertebrates can cause significant property damage, decrease crop yields, decrease value of timber stands, as well as disrupt natural communities and impact forest health. Similarly, aquatic invasive species can alter ecosystem structure, decrease water quality, and damage infrastructure. Zebra mussels can be particularly destructive; they breed profusely (a single female may produce 1million eggs/year) and attach to any hard surface in large clusters. Zebra mussels can clog intake pipes of water treatment and power facilities, costing millions of dollars in repair and cleanup[95].

Adopted in 2016, The National Invasive Species Management Plan identifies actions to prevent, eradicate, and control invasive species. It also lists guidelines for restoring ecosystems and other areas affected by invasive species[96].

Illinois has many exotic and invasive species. The Illinois Exotic Weed Act lists 26 species of plant that are illegal to buy, sell, offer to sell, distribute or plant seeds, plants, or parts of plants unless issued a permit by IDNR (Table 4.36). There are many other exotic and invasive plants in Illinois that are not covered by this law, as well as exotic and invasive animals (Tables 4.37, 4.38) Note that these tables may not be complete lists as many species are lacking observation data; additionally, game and agriculture species that are intentionally released (such as honeybees and brown trout) are not included.

[95] "Exotic Aquatic Invertebrates in Illinois" Illinois Department of Natural Resources.
[96] "National Invasive Species Management Plan", USDA National Invasive Species Information Center

Table 5.7 - Plants Listed in the Illinois Exotic Weed Act

Common Name	Scientific Name
Amur honeysuckle	*Lonicera maackii (Rupr.) Herder*
Autumn olive	*Elaeagnus umbellata Thunb.*
Bohemian knotweed	*Reynoutria x bohemica Chrtek & Chrtková*
Buckthorn	*Rhamnus arguta Maxim.*
Chinese buckthorn	*Rhamnus utilis Dcne.*
Common buckthorn, European buckthorn	*Rhamnus cathartica L.*
Dahurian buckthorn	*Rhamnus davurica Pallas*
Giant hogweed	*Heracleum mantegazzianum Sommier & Levier*
Giant knotweed	*Reynoutria sachalinensis F. Schmidt ex Maxim.*
Glossy buckthorn	*Frangula alnus Mill.*
Japanese buckthorn	*Rhamnus japonica Maxim.*
Japanese honeysuckle	*Lonicera japonica Thunb.*
Japanese knotweed	*Reynoutria japonica Sieb. & Zucc.*
Kudzu	*Pueraria montana var. lobata (Willd.) Maesen & S. Almeida*
Lesser celandine, fig buttercup	*Ficaria verna Huds.*
Morrow's honeysuckle	*Lonicera morrowii Gray*
Multiflora rose	*Rosa multiflora Thunb.*
Oriental bittersweet	*Celastrus orbiculatus Thunb.*
Poison hemlock	*Conium maculatum L.*
Purple loosestrife	*Lythrum salicaria L.*
Russian olive	*Elaeagnus angustifolia L.*
Sweet breath of spring	*Lonicera fragrantissima Lindl. & Paxton*
Tamarisk	*Tamarix spp. L.*
Tatarian honeysuckle	*Lonicera tatarica L.*
Teasel	*Dipsacus spp. L.*
Thorny olive	*Elaeagnus pungens Thunb.*

Table 5.8 -Terrestrial Invasive Animal Species

Common Name	Scientific Name
wild boar (feral hog)	*Sus scrofa*
Eurasian collard dove	*Streptopelia decaocto*
European starling	*Sturnus vulgaris*
emerald ash borer	*Agrilus planipennis*
Japanese beetle	*Popillia japonica*
nightcrawler	*Lumbricus terrestris*
southern worm	*Aporrectodea trapezoides*
woodland white worm	*Octolasion tyrtaeum*
soybean aphid	*Agrilus planipennis*
Asian longhorned beetle	*Anoplophora glabripennis*
gypsy moth	*Lymantria dispar*

Sources: IDNR, Invasive.org

Table 5.9 - Aquatic Invasive Animal Species

Common Name	Scientific Name
zebra mussel	*Dreissena polymorpha*
Asian clam	*Corbicula fluminea*
spiny water flea	*Bythotrephes longimanus*
rusty crayfish	*Orconectes rusticus*
bighead carp	*Hypophthalmichthys nobilis*
Silver carp	*Hypophthalmichthys molitrix*
common carp	*Cyprinus carpio*
goldfish	*Carassius auratus*

Sources: IDNR, Invasive.org

5.7.3. Geographic Location and Historical Occurrences

There are not detailed databases that track outbreaks and spread of every pest or invasive species. Agricultural resources and technical assistance can be found from various groups, including the National Resources Conservation Service (NRCS) and University of Illinois Extension offices.

The IL Department of Natural Resources and National Forest Service provide information about invasive species that harm our native ecosystems, and occasionally provide updates on current projects to manage or remove invasives.

5.7.4. Risk

Risk of infestation or spread of invasive species is variable. Factors include location, time of year, and weather.

6. Mitigation Strategies

"The purpose of mitigation planning is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources." Stafford Act Title 44, Chapter 1, Part 201.

This chapter will review current mitigation strategies and ordinances, and list new suggestions for further hazard mitigation. The Perry County Planning Team worked to develop these strategies specific to each jurisdiction based on the MHMP goals listed below:

Goal 1: Lessen the impacts of hazards to new and existing infrastructure	
Objective:	Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.
Objective:	Equip public facilities and communities to guard against damage caused by secondary effects of hazards.
Objective:	Minimize the amount of infrastructure exposed to hazards.
Objective:	Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.
Objective:	Improve emergency sheltering in Perry County.

Goal 2: Create new or revise existing plans/maps for Perry County	
Objective:	Support compliance with the NFIP for each jurisdiction in Perry County.
Objective:	Review and update existing, or create new, community plans and ordinances to support hazard mitigation.
Objective:	Conduct new studies/research to profile hazards and follow up with mitigation strategies.

Goal 3: Develop long-term strategies to educate Perry County residents on the hazards	
Objective:	Raise public awareness on hazard mitigation.
Objective:	Improve education and training of emergency personnel and public officials.

6.1. National Flood Insurance Program Statistics

The National Flood Insurance Program (NFIP) is a federal program managed by FEMA and delivered by a network of multiple insurance agencies. Flood insurance is available to businesses, home & property owners, and renters in communities that participate in the NFIP. Homes and businesses in Special Flood Hazard Areas (SFHA) with government backed mortgages are required to have flood insurance. Flood insurance is also required for some other federal programs, including qualifying for flood-related disaster relief funds and qualifying for grants through the Flood Mitigation Assistance (FMA) Program. Perry County participates in the NFIP, table 6.1 shows the municipalities that also participate. The floodplain map for Perry County can be found on page 74.

Table 6.1 – NFIP participation by municipality

Municipality	Participation	Reason for Non-participation	Current FIRM Effective Date
Cutler	no	Not within SFHA	8/5/2010
Du Quoin	yes		8/5/2010
Pinckneyville	yes		8/5/2010
St Johns	no	Not within SFHA	8/5/2010
Tamaroa	no	Not within SFHA	8/5/2010
Willisville	no	Not within SFHA	8/5/2010

6.1.1. Community Rating System (CRS)

The Community Rating System (CRS) is a federal incentive program that offers discounts to communities in the NFIP whose floodplain management requirements and practices exceed the minimum standards set forth in the NFIP. The goals of the program are as follows[97]:

- Reduce and avoid flood damage to insurable property
- Strengthen and support the insurance aspects of the National Flood Insurance Program
- Foster comprehensive floodplain management

Currently, Carbondale in Jackson County is the only community in southern Illinois with CRS status.

[97] "Community Rating System", FEMA.gov

6.1.2. Repetitive Loss Structures

FEMA defines repetitive loss structures as having at least 2 paid flood losses over $1,000 each in any 10-year period since 1978. Table 6.2 shows the summary of repetitive loss structures in Perry County from 1985-2021.

Table 6.2 – Repetitive Loss Structures

Jurisdiction	Occupancy Type	Number of Losses	Total paid
Pinckneyville	Single Family	2	$9,903.14
Pinckneyville	Single Family	3	$17,994.61
Du Quoin	Single Family	2	$12,415.68
		TOTAL	$40,313.43

Source: IEMA

6.2. Jurisdiction Ordinances

Hazard Mitigation related ordinances, such as zoning, burning, or building codes, have the potential to reduce the risk from known hazards. These types of regulations provide many effective ways to address resiliency to known hazards. Table 6.3 lists Perry County's current ordinances that directly pertain, or can pertain, to hazard mitigation. It is important to evaluate the local building codes and ordinances to determine if they have the ability to reduce potential damages caused by future hazards.

Table 6.3 – Jurisdictional Ordinances

Community	Building	Electrical	Stormwater	Flooding	Subdivision	Fire	Land Use	Zoning
Perry County	Building Standards (2007)	NFPA Electric Code (Current)	-	State Model (Current)	State Standard (Current)	Burning Ordinance (2008)	Comp. Plan (1965)	State Standard (Current)
Cutler	-	-	-	-	County Standard (Current)	State Standard (Current)	-	County Standard (Current)
Du Quoin	IBC (2006)	NFPA Electric Code (2005)	Stormwater Ordinance (2005)	-	State Standard (Current)	Burning Ordinance (2008)	Comp. Plan (2008)	State Standard (Current))
Pinckneyville	Building Standards (1953)		Stormwater Ordinance (1964)	State Model (Current)	Subdivision Control (1964)	Burning Ordinance (1969)	Comp. Plan (1965)	-
St. Johns	-	-	-	-	-	-	Comp. Plan (1964)	-
Tamaroa	-	NFPA Electric Code (Current)	-	-	County Standard (Current)	State Standard (Current)	-	County Standard (Current)
Willisville	-	NFPA Electric Code (Current)	State Standard (Current)	-	Subdivision Control (2000)	State Standard (Current)	-	Zoning Ordinance (2008)

6.3. Mitigation Strategies

The following tables display all hazard mitigation strategies proposed by the Perry County Planning Team. Strategies were created with county goals and FEMA STAPLEE criteria. Strategies from the 2015 Plan are noted in the tables. No strategies from the previous plan were removed in this update.

The timeline for these projects is based on priority ranking and subject to availability of funding. Jurisdictions are strongly encouraged to apply for grants upon final Plan review and adoption, however it is not a requirement of the Plan that these mitigation strategies are completed.

High priority: 1-3 years, Medium Priority: 4-6 years, Low Priority: 7-10 years

For details on specific grant programs, see appendix 6.

Table 6.4 - FEMA STAPLEE criteria

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.
Technical	Mitigation actions are technically most effective if they provide a long-term reduction of losses and have minimal secondary adverse impacts.
Administrative	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
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.
Legal	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
Economic	Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost benefit review, and possible to fund.
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.

Source: FEMA

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
All Hazards							
AH1	Keeping written/photo/video records of key infrastructure maintenance. These records are vital in the event a disaster damages infrastructure, there are records that the damage was due to the event and not negligence, and can be reported to FEMA accurately in assistance applications	Proposed/Ongoing	l,s,f,p	High	IDOT, Road Commissions, Levee Commissions, Dam Personal, Water Plant managers, etc.	IEMA Downstate Disaster workshop 2022	This would likely be part of normal operating budgets for various agencies
AH2	Forming & training local damage assessment teams and COADs (Community Organizations Active in Disaster)	Proposed	l,s,f,p	High	IEMA, County EMA, Community Members	IEMA Downstate Disaster workshop 2022	IEMA Preparedness Funding, DOT ALERT
AH3	Saving emergency funds at the county and municipal level to increase resiliency should a disaster occur.	Proposed/Ongoing	l,s	High	County & Municipal Governments	IEMA Downstate Disaster workshop 2022	
AH4	Create/maintain an animal welfare disaster planning committee in order to properly follow requirements of IL PETs Act, and to have protocols in place for rescuing and sheltering pets and livestock during natural disasters. Provide training to staff/volunteers regarding animal rescue procedures and safety.	Proposed	l,s,f,p	Low	County Animal Control & Sheriff's Office, Local Animal Rescue Groups	Jenny Richardson, Project Paws of Southern Illinois (PPSI)	Private donations, animal control
AH5	Promote Disaster Resilience Through Workshops, Education Materials, and Planning Guides Continue liaison groups that meet regularly to discuss hazard mitigation Enhance emergency communication system infrastructure, warning system enhancements Develop a Vulnerable Population List Prepare essential facilities: equip with back-up generators, emergency survival and first aid supplies, etc. Create and update list of emergency equipment and parts for utility services, emergency vehicles, other Increase redundant infrastructure systems Improve aging infrastructure Update/maintain list of temporary shelters. Develop strategies for on scene surveillance Increase capabilities of intelligence and information sharing.	Ongoing/Proposed	l,s,f	Medium	Perry County EMA//FEMA//IEMA//IEPA	From 2015 MHMP and Reviewed by: Chuck Genesio (Director of Perry County EMA), Dan Curry (village of Cutler), Ruth Hale (City Clerk Du Quoin), Dave Perradotto (DuQuoin Wastewater Superintendent), Chris Lacy (Du Quoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	Local and County funds, IEMA, FEMA BRIC
AH6	Review and update county & municipality building & zoning codes/ordinances to improve disaster resiliency, community safety, and energy efficiency	Proposed	L,s,f	Medium	County Board, Municipalities	2022 National Initiative to Advance Building Codes	Local funds

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
			All Hazards				
AH7	**Develop Social Media Techniques to Provide Critical Information:** The Perry County EMA and Du Quoin ESDA utilizes various social media platforms (Facebook and Pinckneyville Press) to notify the public about hazard mitigation and potential threats. The County will work to enhance notification, specifically targeting schools, area hospitals and the general public. Currently the County and Du Quoin ESDA utilize Nixel, an open communication and engagement platform that connects public safety, municipalities, schools, businesses, and residents. Information distributed by the Nixel system is immediately available over cell phones by text message, email and over the web. All Perry County School Districts continue to work with local weather stations to provide up-to-date information for students and families.	Ongoing	l,s,f,p	High	Perry County, Du Quoin, CCSD #204, Du Quoin CUSD #300, Pinckneyville CHSD #101, Pinckneyville SD #50, Tamaroa SD #5, Rend Lake College	from 2015 MHMP	
AH8	Improve Communication Between Utility Companies: County and Local Agencies continue to maintain contact with utility companies (e.g., Ameren) before during and after hazardous events.	Ongoing	l,p	Medium	Various Agencies	from 2015 MHMP	
AH9	Pinckneyville CHSD #101 will work with the Perry County EMA to enhance Emergency Response Communication System and Infrastructure by implementing IP devices to provide off-site access to school security cameras and facilities maps.	Proposed	l,s,f	High	Perry County EMA, Du Quoin ESDA, Pinckneyville CHSD #101	from 2015 MHMP	Local/county funds, IEMA preparedness grant
AH10	The Christian Fellowship School would like to install an intercom system in the school, bell system in the gym and cafeteria, and upgrade their telephone system.	Proposed	l,s,f	High	Perry County EMA, Du Quoin ESDA, Christian Fellowship School	from 2015 MHMP	Local/county funds, FEMA/IEMA preparedness grant
AH11	Distribute/Program NOAA Weather Radios: Perry County initiated a NOAA Weather Radio program utilizing ISEMA funding.	Ongoing	l,s	Low	Perry County EMA	from 2015 MHMP	
AH12	Develop/maintain mutual aid agreements	Ongoing	l,s	High	Perry County EMA, Various Emergency Response Agencies	from 2015 MHMP	
AH13	Create an Alternative Emergency Operations Center: Within Perry County there are several alternate EOCs: Du Quoin EOC, Mobil Command Center Vehicle, Perry County Health Dept., Marshall Browning Hospital, and Pinckneyville Community Hospital. The County will investigate the potential for a future alternative EOC. Funding has not been secured, but additional funding will be sought from Federal, State, and Local resources.	Proposed	l,s,f	Low	Perry County EMA, Du Quoin ESDA	from 2015 MHMP	BRIC, CDBG
AH14	Identify and Procure Backup Potable Water Supplies: Perry County will partner with Greater Egypt Regional Planning and Development Commission to seek out potential funding sources to procure a back-up potable water supply.	Proposed	s,f	High	Perry County, Cutler, Du Quoin, Pinckneyville, St. Johns, Tamaroa, Willisville, Rend Lake Conservancy District	from 2015 MHMP	BRIC, CDBG, USDA, IEPA PWSLP, other Infrastructure Bill grants
AH15	Acquire Portable Lighting for Mass Casualty Preparation: The Perry County EMA will oversee the implementation of this project. Funding has not been secured as of 2015.	Proposed	s,f	Low	Perry County EMA and LEPC	from 2015 MHMP	FEMA/IEMA preparedness grant, BRIC, CDBG

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
Flooding, Dam Failure							
F1	Regularly perform drainage system maintenance. Review/update evacuation protocols/map for flooding prone areas of campus.	Ongoing	Local; Private	High	Perry County EMA/ILDNR/MBH	Melissa Sprenger, Marshall Browning Hospital	
F2	Protect dam catchments with good ground cover and maintain a grassed filter strip at the dam inlet. Flooding: Conversion of flood prone areas back to wetlands.	Ongoing	Local; Private	Medium	Perry County EMA// ILDNR	Melissa Sprenger, Marshall Browning Hospital	
F3	Continue to improve public awareness on the NFIP, buyout programs, and flood mitigation; Culvert Replacement.	Ongoing	Local; State; Federal	Medium	Perry County EMA// ILDNR	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC	
F4	Implement alert systems to send notification of an identified potential or imminent threat. An Emergency Action Plan (EAP) can be developed/implemented to address how at-risk populations downstream will be notified in the event of a dam failure or potential failure. This may require working with adjacent counties who are also at risk. Develop/Mark Emergency Evacuation Routes.	Ongoing	State; Federal	Low	Perry County EMA// ILDNR	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC	
F5	Maintain necessary inspections/maintenance to the dam at the City reservoir. Also maintain the drainage system below the dam. Identify locations that could be affected from a dam failure and update evacuations plans. Include public awareness.	Ongoing	State; Federal	Medium	Perry County EMA// ILDNR	Jim Gielow (Pinckneyville Fire Chief)	
F6	Regularly perform drainage system maintenance Culvert replacement Update urban areas to withstand storm water (rain gardens, bioswales, urban tree planting, permeable pavement) Outreach/education for homeowners regarding flood insurance options, and home/landscape improvements that can reduce flooding impacts Update flood plain mapping when appropriate.	Proposed	State; Federal	Low	Perry County EMA// ILDNR	Chuck Genesio (Director of Perry County EMA), Ruth Hale (City Clerk Du Quoin), Dave Perradotto (Du Quoin Wastewater Superintendent), Chris Lacy (DuQuoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (StJohns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	FMA, CRA CIF, IEPA GIGO, BRIC, CDBG

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
			Flooding, Dam Failure				
F7	Maintain Participating Status in the NFIP by Enforcing a Flood Damage Prevention Ordinance: The Perry County EMA is responsible for the general administration of the Perry County Flood Damage Prevention Ordinance. Each participating jurisdiction has a representative responsible for the administration of the individual Flood Damage Prevention Ordinances.	Ongoing	l	High	Perry County, Du Quoin, Pinckneyville	from 2015 MHMP	
F8	Institute a Buyout Plan for Repetitive Loss Properties or Flood Prone Properties: The Perry County EMA will oversee the implementation of buyout and relocation projects in the county. Currently there are several Repetitive Loss Structures in Pinckneyville.	Proposed	s,f	High	Perry County, Du Quoin, Pinckneyville	from 2015 MHMP	FEMA
F9	Elevate Low-Lying Roads: The Perry County Highway Dept. will oversee the implementation of projects on County roads. Village/Townships will be responsible for their respective projects.	Proposed	l,s,f	High	Perry County EMA, Perry County Highway Dept. or City/Village/Townships Street Depts.	from 2015 MHMP	IDOT, DOT, Infrastructure Bill programs, FMA
F10	Flood Proof or Elevate Critical Facilities and Utilities: The Perry County EMA will oversee the implementation of this project in the county.	Proposed	s,f	High	Perry County, Du Quoin, Pinckneyville	from 2015 MHMP	FMA
F11	Retrofit Water Supply Systems: The Perry County EMA would oversee this project. Implementation, If HMA funding is available, is forecasted to be initiated within approximately one- three years.	Proposed	s,f	High	Perry County EMA	from 2015 MHMP	FMA, IEPA, USDA
F12	Maintain a List of Floodprone Structures: The Perry County EMA oversees this project with the assistance of SIU. After each mitigation plan update, the geographical database is updated to include new information about hazard events and the number of structures within the 100-year floodplain.	Ongoing	l	Low	Perry County EMA	from 2015 MHMP	

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
			Tornados, Severe T-Storms				
T1	Conduct biennial staff training to familiarize staff with their respective rolls during an alert or event. Keep programmed weather radio on for alerts. Joint Commission and CMS standards. Include as part of EOP plan and re-evaluate biennially.	Ongoing	Private	High	Perry County EMA/MBH	Melissa Sprenger, Marshall Browning Hospital	
T2	Keep programmed weather radio on for alerts. Designated staff to announce immediate area alerts. Prepare essential facilities: equipment with back-up generators, emergency survival and first aid supplies, etc. in case of power outage or need to shelter in place. Supplies and MOUs for emergencies.	Ongoing	Local;Private	High	Perry County EMA/MBH	Melissa Sprenger, Marshall Browning Hospital	
T3	Construct additional community safe rooms. Provide jurisdiction-wide siren warning coverage.	Proposed	Local;State; Federal	High	Perry County EMA	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC, also a 2015 strategy	FEMA/IEMA preparedness grant, County EMA funds
T4	Install lightning detection system; Retrofit structures to withstand high winds.	Proposed	Local;State; Federal	High	Perry County EMA	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC, also a 2015 strategy	FEMA/IEMA preparedness grant, County EMA funds
T5	Some areas of the town lack in coverage from the current outdoor sirens. Grants could possibly be used to help cover the cost. Add additional outdoor warning sirens. Building does have a basement, but the main level would possibly need additional support. Reinforcement to the community center and add a generator to have a location to go to during a tornado threat.	Proposed	Local;State; Federal	Medium	Perry County EMA	Jim Gielow (Pinckneyville Fire Chief)	FEMA/IEMA preparedness grant, County EMA funds

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
Tornados, Severe T-Storms							
T6	Construct safe rooms in essential facilities and other community buildings Retrofit existing buildings to withstand high winds Alternate EOC facilities Enhance emergency communication system infrastructure, warning system enhancements Prepare essential facilities: equip with back-up generators, emergency survival and first aid supplies, etc. Improve aging infrastructure Update/maintain list of temporary shelters	Proposed	L,s,f	Medium	Perry County EMA// Public Service Departments	Chuck Genesio (Director of Perry County EMA), Ruth Hale (City Clerk DuQuoin), Dave Perradotto (Du Quoin Wastewater Superintendent), Chris Lacy (Du Quoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	FEMA/IEMA Preparedness grant, BRIC, CDBG
T7	Enhance surveillance and warning systems for impacted areas Increase spotter capabilities throughout the jurisdictions Increase communications	Proposed	L,s,f	High	Perry County EMA// Public Service Departments	Chuck Genesio (Director of Perry County EMA), Dan Curry Village of Cutler, Ruth Hale (City Clerk DuQuoin), Dave Perradotto (Du Quoin Wastewater Superintendent), Chris Lacy (Du Quoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	EMA funds/volunteers, FEMA/IEMA Preparedness grant

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
Tornados, Severe T-Storms							
T8	Re-design of facilities emergency plan post-construction to identify safe areas for tornado shelter.	Ongoing	L,s,p	High	Pinckneyville Community Hospital//Perry County EMA	Blake Thornton and Eva Hopp (Director of Quality and Risk Management/ CNE of Pinckneyville Community Hospital)	
T9	Cutler has a centralized siren to alert the village in the event of a tornado. The village has agreements with the local church to shelter those individuals who either need shelters of have inadequate structures to withstand the storms.	Ongoing	l,s		Village of Cutler, EMA, Fire, L/E, ARC, EMS, P/W	Dan Curry (Village of Cutler)	
T10	Construct safe rooms in essential facilities and other community buildings, Retrofit existing buildings to withstand high winds, Alternate EOC facilities, Install Generators in Primary EOC, Identify infrastructure needs (generators) for alternate EOC's, The village needs to construct a safe rooms within the EOC. In the event of a power failure we have two generators to power the EOC and the alternate EOC. Establish a program to have storm spotters available	Proposed	l,s	Medium	Village of Cutler, EMA, Fire, L/E, ARC, EMS, P/W	Dan Curry (Village of Cutler)	EMA funds/volunteers, FEMA/IEMA Preparedness grant
T11	Adopt building codes to reduce damage from the impact of tornados. Retrofit critical facilities to reduce impact of a tornado/derecho.	Proposed	l,s,f	Medium	Elected officials and structural engineer.	Raymond D. Clark (Du Quoin EMA)	BRIC, CDBG
T12	Promote preparedness and steps that businesses and citizens can take to reduce damage to property from damaging wind events.	Proposed	l,s,f	Medium	Local, state, and federal emergency management	Raymond D. Clark (Du Quoin EMA)	EMA funds/volunteers, FEMA/IEMA Preparedness grant
T13	Improve warning and notification systems to warn members of the community of approaching severe thunderstorms.	Ongoing	l	Medium	Local EMA and Jurisdictions.	Raymond D. Clark (Du Quoin EMA)	EMA funds/volunteers, FEMA/IEMA Preparedness grant

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
			Earthquakes				
EQ1	Plan for staff earthquake response to be included in EOP. Biennial review and training on hospital earthquake plan. Annual drill/education during "Great ShakeOut" day/month. Joint Commission and CMS standards	Ongoing	Private	High	MBH	Melissa Sprenger, Marshall Browning Hospital	
EQ2	Install automatic shut off valves. Retrofit/Harden Critical Facilities to Protect Against Damages from Earthquakes.	Proposed	Local; State: Federal	High	Perry County EMA	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC, also proposed in 2015	BRIC, CDBG
EQ3	Coordinate the plan with the County to utilize their assets. Develop an emergency action plan. Encourage any new construction and upgrades to consider building to standards pertaining to earthquakes. Provide information to the public to increase awareness.	Proposed	Local; State: Federal	High	Perry County EMA // City of Pinckneyville	Jim Gielow (Pinckneyville Fire Chief)	EMPG
EQ4	Provide information to residents on structural and non-structural retrofitting Develop earthquake emergency action plans Construct new safe rooms Install automatic shutoff valves Construct backup water @ wastewater mains water pumping and filling capabilities from ground storage and elevated tanks Identify and update EOP's for water and sewer operations Generators for sewage lift stations Alternate EOC facilities Improve aging infrastructure Update/maintain list of temporary shelters.	Proposed	Local; State: Federal	Low	Perry County EMA//IEMA// Public Service Departments	Chuck Genesio (Director of Perry County EMA), Dan Curry (Village of Cutler), Ruth Hale (City Clerk Du Quoin), Dave Perradotto (DuQuoin Wastewater Superintendent), Chris Lacy (Du Quoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	BRIC, CDBG, FEMA/IEMA Preparedness grant
EQ5	Addition of another main water source to create redundancy for PCH. Although not identified as an "earthquake mitigation", PCH is working to add redundancy to its water source (Washington County Water District).	Proposed	Local; State	High	Pinckneyville Community Hospital//Perry County EMA	Blake Thornton and Eva Hopp (Director of Quality and Risk Management/ CNE of Pinckneyville Community Hospital)	USDA, IEPA PWSLP, BRIC
EQ6	The village is in the process of establishing information on earthquake safety to educate the public on how to make their home safe during an earthquake, and what to do after an earthquake. The village keeps an updated list of the shelters for emergencies.	Proposed	l,s,f,p	Low	Village of Cutler	Dan Curry (Village of Cutler)	Local funds, FEMA/IEMA Preparedness grant
EQ7	Educate home and business owners how to strap or attach down items in their facilities that could cause secondary damage. For example gas water heaters	Proposed	l,s,f,p	Low	Du Quoin EMA	Raymond D. Clark (Du Quoin EMA)	Local funds, FEMA/IEMA Preparedness grant
EQ8	Update current critical infrastructure facilities	Proposed	l,s,f,p	Low	Local Emergency Management, Local structural engineers.	Raymond D. Clark (Du Quoin EMA)	BRIC, CDBG, USDA
EQ9	Install Automatic Shutoff Valves: Perry County will seek federal funding, if HMA funding is available, to install automatic shutoff values in the Perry County facilities including Marshall Browning Hospital and Pinckneyville Community Hospital.	Proposed	l,s,f,p	Medium	Perry County, Marshall Browning Hospital, Pinckneyville Community Hospital	from 2015 MHMP	BRIC
EQ10	Retrofit Water Supply Systems: The Perry County EMA would oversee this project. Implementation, If HMA funding is available, is forecasted to be initiated within approximately one- three years.	Proposed	s,f	High	Perry County, Cutler, Du Quoin, Pinckneyville, St. Johns, Tamaroa, Willisville, Rend Lake Conservancy District	from 2015 MHMP	USDA, IEPA PWSLP, BRIC

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
			HazMat Release				
HM1	Develop and biennial review/update of HazMat emergency action plans. Conduct organizational or regional drills for staff training. Regional exercises usually conducted through Shawnee Preparedness and Response Coalition (SPARC). Joint Commission and CMS standards	Ongoing	Private	High	Perry County EMA/SPARC/MBH	Melissa Sprenger, Marshall Browning Hospital	
HM2	Develop/update HAZMAT Emergency Response Plan; Train and recruit Hazmat Response Teams. Acquire protective equipment.	Ongoing	Local; State; Federal	High	Perry County EMA//SPARC	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC	
HM3	Identify local equipment/operators that could assist in a haz-mat situation. Coordinate with the County to have the plan that would coincide with theirs. Update emergency action plan. Work with all the fire departments in the County to develop a team that could respond quicker than other agencies from outside of the County so that initial actions could possibly minimize threats to the public. Develop a county wide haz-mat team.	Proposed	Local; State; Federal	Medium	Perry County EMA//SPARC	Jim Gielow (Pinckneyville Fire Chief)	EMPG, DOT Safety grant
HM4	Acquire protective gear for first responders and locations with high probabilities of occurrence (colleges, factories/warehouses, energy plants) Develop and update HazMat emergency action plans Equip facilities with centralized positive-pressure HVAC systems Develop strategies for on scene surveillance Increase capabilities of intelligence and information sharing.	Proposed	Local; State; Federal	Low	Perry County EMA//FEMA//IEMA//IEPA	Chuck Genesio (Director of Perry County EMA), Dan Curry (village of Cutler), Ruth Hale (City Clerk DuQuoin), Dave Perradotto (Du Quoin Wastewater Superintendent), Chris Lacy (Du Quoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	EMPG, DOT Safety grant
HM5	Enhance safety by placing Hazmat placards on structures that use and maintain hazardous materials. Ensure that all first responders have the proper protection when responding to a known Hazmat spill or release.	Proposed	l,s	Low	Village of Cutler, Cutler Fire Dept	Dan Curry (village of Cutler)	EMPG, DOT Safety grant
HM6	Create a hazardous material training and exercise program, that includes members of the business community that houses or transports hazardous materials.	Proposed	l,s	Medium	EMA, Fire, LEPC	Raymond D. Clark (Du Quoin EMA)	EMPG, DOT Safety grant

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
Drought, Extreme Heat							
D1	Provide cooling centers for vulnerable population. City Hall opens up in extreme heat days for vulnerable population. Establish wildfire prevention management strategies.	Ongoing	Local	High	Perry County EMA	Melissa Sprenger, Marshall Browning Hospital	Local funds, EMPG, USDA CWDG
D2	Develop/enforce strict burn ordinances; Create additional heating/cooling shelters.	Ongoing	Local	Medium	Perry County EMA	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC, also a 2015 strategy	BRIC, CDBG
D3	review and update cooling center locations throughout the county Develop planning strategy for water conservation with primary water supplier and communities served. Develop a Vulnerable Population List Update/maintain list of temporary shelters.	Proposed	Local	Medium	Perry County EMA	Chuck Genesio (Director of Perry County EMA), Ruth Hale (City Clerk Du Quoin), Dave Perradotto (Du Quoin Wastewater Superintendent), Chris Lacy (Du Quoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin) , Dan Curry (Cutler)	Local funds, EMPG
D4	Review and update cooling center locations throughout the county. Develop planning strategy for water conservation with primary water supplier and communities served. Make a list of all vulnerable individuals to check on them during extreme heat.	Proposed	l,s	Low	Village of Cutler	Dan Curry (village of Cutler)	Local funds, EMPG
D5	Maintain a list of locations that could be used for cooling centers times of extreme heat.	Proposed	l	Low	City of Du Quoin	Raymond D. Clark (Du Quoin EMA)	Local funds
D6	Prepare ordinances that can be utilized to address water usage if long-term drought begins to effect local water supply.	Proposed	l	Low	Local elected officials, local water system operators.	Raymond D. Clark (Du Quoin EMA)	Local funds

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
			Ground Failure				
GF1	Refer to map of underground mines in area and compare to campus. Illinois State Geological Survey, Prairie Research Institute: Coal Mines and Industrial Mineral Mines Perry County July 20, 2018. Maintain a list of buildings constructed over underground mines.	Proposed	Local; Private	High	Perry County EMA/MBH	Melissa Sprenger, Marshall Browning Hospital	Local/hospital funds
GF2	Maintain a list of buildings constructed over underground mines; Map and access community vulnerability to ground failure hazards	Ongoing	Local	Medium	Perry County EMA	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC, also a 2015 strategy	
GF3	Identify areas and buildings of higher risk. Include public awareness on areas of higher risk. Require core drilling prior to new development and construction. Establish a database of the soil and possible underground mine shafts.	Proposed	Local; State; Federal	Low	Perry County EMA //IDNR	Jim Gielow (Pinckneyville Fire Chief)	Local funds, EMPG
GF4	Maintain a list of buildings constructed over underground mines Education programs/brochures regarding mine subsidence insurance for home and landowners Monitor infrastructure for possible effects of subsidence Strengthen infrastructure systems for impacts. Improve aging infrastructure	Ongoing/proposed	Local; State; Federal	Low	Perry County EMA //IDNR//USGS	Chuck Genesio (Director of Perry County EMA)	EMPG, BRIC, CDBG, Infrastructure Bill grants
GF5	Compile a record of the ages of the buildings and track any damages done by mining.	Ongoing	L,s,	Low	Village of Cutler	Dan Curry (village of Cutler)	
GF6	Stabilize Areas Vulnerable to Ground Failure: The Perry County EMA would oversee this project.	Proposed	s,f	Medium	Perry County EMA	from 2015 MHMP	BRIC, CDBG, Infrastructure Bill grants

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
	Winter Storms						
W1	Prepare essential facilities: equipment with back-up generators, emergency survival and first aid supplies, etc. in case of power outage or need to shelter in place. Plan is reviewed/revised with staff training biennially. Have a shelter-in-place plan in case staff, visitors, patients are unable to leave campus due to weather.	Ongoing	Private	High	Perry County EMA/MBH	Melissa Sprenger, Marshall Browning Hospital	
W2	Purchase deicing chemicals; Develop alternative traffic routes; maintain roadways with a street plow and salt trucks.	Proposed	Local; State; Federal	High	Perry County EMA	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC	Local, IDOT
W3	Establish the Community Center as a location for shelter if needed. Included supplies for extended care if needed. Create a list of operators/equipment that could assist with snow removal/clean up. Additional supplies stockpiled for needed use.	Proposed	Local; State; Federal	Medium	Perry County EMA	Jim Gielow (Pinckneyville Fire Chief)	Local, EMPG
W4	Purchase/maintain stockpiles of salt and other de-icing chemicals Build snow fencing in areas vulnerable to dangerous snow drifts Collaborate with neighboring counties to keep an updated list of available plow/salt trucks and parts Increase redundant infrastructure systems Enhance emergency communication system infrastructure, warning system enhancements Develop a Vulnerable Population List Create and update list of emergency equipment and parts for utility services, emergency vehicles, other Update/maintain list of temporary shelters.	Ongoing	Local; State; Federal	Medium	Perry County EMA// FEMA//IEMA	Chuck Genesio (Director of Perry County EMA), Dan Curry (Village of Cutler), Ruth Hale (City Clerk Du Quoin), Dave Perradotto (Du Quoin Wastewater Superintendent), Chris Lacy (DuQuoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	Local, EMPG, IDOT, other Infrastructure Bill grants
W5	Have a list of vulnerable individuals to check on during severe winter weather	Proposed	l,p	Medium	Fire,L/E, Village of Cutler	Dan Curry (village of Cutler)	Volunteers, EMPG funds
W6	Maintain adequate supplies and equipment for snow and ice removal during major winter storms and have public safety equipment capable or responding in winter weather. Promote preparedness steps that businesses and citizens can take to prepare for when a major winter storm is forecast.	Ongoing	l	Medium	Local EMA, Road commission, NWS, local media	Raymond Clark (Du Quoin EMA)	

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
			Winter Storms				
W7	Install Signs that Direct Traffic Towards Shelters and Safe Travel Routes: The Perry County EMA install signs on an as-need basis at various locations within the county during critical times.	Ongoing	l	Low	Perry County EMA	from 2015 MHMP	
W8	Establish a network of 4WD/Off-road vehicles to access stranded people: Five Star Industries Inc. and Perry County Counseling would like to acquire 4WD/Off-road vehicles to assist in allow staff to reach the residential facility and assist clients with intellectual and developmental disabilities in their own homes during winter storms. The Christian Fellowship School will develop available staff and parents with appropriate equipment and develop a contact network for those individuals.	Proposed	s,f,p	High	Five Star Industries Inc., Perry County Counseling, Christian Fellowship School	from 2015 MHMP	IDOT, EMPG, COAD between agencies that already own plows/ off road vehicles

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
			Pandemic/Disease Outbreak				
P1	Enhance reporting protocols to state. Illinois Department of Public Health. Update pandemic plans specific to COVID-19 to share with staff.	Ongoing	Private	High	Perry County EMA/IDPH/EMS; RHCC/MBH	Melissa Sprenger, Marshall Browning Hospital	
P2	Build a robust strategic stockpile of medical and non-medical supplies. Implement non-pharmaceutical intervention programs to slow the spread of disease outbreak.	Proposed	Local; State; Federal	High	Perry County EMA// IL DHS // IL CDC	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC	IDPH, CDC
P3	Identify locations that could be used for additional medical treatment if the hospital reached capacity. Locations could be outside of the City or other towns if available, identify locations that could be used for additional medical treatment if the hospital reached capacity. Depending on the nature of the disease/outbreak would determine actions needed. Public awareness on how to self-isolate and obtain needed supplies if necessary.	Proposed	Local; State; Federal	Medium	Perry County EMA// IL DHS // IL CDC	Jim Gielow (Pinckneyville Fire Chief)	Local, hospital funds, IDPH, CDC
P4	Develop a Vulnerable Population List Update/maintain list of temporary shelters. Enhance reporting and contract tracing protocols Capability of intelligence sharing with all stakeholders Develop/update plans for mass care situations Develop plan and mutual aid agreement for use of portable morgue Coordination of mass Vaccination sites Location strategies for PPE procurement and storage.	Ongoing	Local; State; Federal	Medium	Perry County EMA// IL DHS // IL CDC	Chuck Genesio (Director of Perry County EMA), Dan Curry (Village of Cutler), Ruth Hale (City Clerk DuQuoin), Dave Perradotto (Du Quoin Wastewater Superintendent), Chris Lacy (DuQuoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	
P5	Conversion of all inpatient rooms to negative pressure rooms. PCH is currently undergoing a study with our engineering consultants to study the feasibility of re-designing the air pressures and returns (and related cost), and is currently seeking funding to support this project from the county Covid-19 related funding. New rural health clinic is currently being constructed. Negative pressure rooms (3) are being added to the new rural health clinic that is under construction.	Ongoing	Local	High	Pinckneyville Community Hospital//Perry County EMA	Blake Thornton and Eva Hopp (Director of Quality and Risk Management/ CNE of Pinckneyville Community Hospital)	
P6	During an outbreak or epidemic/pandemic the village will follow the guidelines set by the IDPH and the CDC. The village has the ability to establish a mass care center in needed. The village is in the process of establishing a mitigation plan for the treatment and care of it citizens.	Ongoing	l,s,f,p	Medium	Village of Cutler	Dan Curry (Village of Cutler)	
P7	Locate or secure a facility that can be used as a alternative housing location for individuals who may need to be isolated to prevent exposure from or exposing other to the disease. Procure and develop a plan to procure maintain a 30 day supply of personal protective equipment that may be required in the response to a disease outbreak.	Ongoing	l,s,f,p	Medium	EMA, Local Public Health Office, Local Hospitals and Medical Offices. IEMA/FEMA	Raymond D. Clark (Du Quoin EMA)	

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	
			Terrorism				
TR1	Identify possible threats, and local threats. Conduct a local vulnerability assessment.	Proposed	Local; Private	High	Perry County EMA/Local Law Enforcement/MBH	Melissa Sprenger, Marshall Browning Hospital	IEMA/FEMA Preparedness grant, hospital funds, Sheriff's Offices, ISP
TR2	Promote disaster resilience through workshops, education materials, and training. Improve emergency response training, staff, resources and equipment.	Proposed	Local; Private; Federal	High	Perry County EMA// Local Law Enforcement	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC	Local, FEMA/IEMA preparedness grant
TR3	Monitor sources of intelligence regarding possible credible threats Harden infrastructure systems for security Exercise scenarios for possible occurrences Increase intelligence and information sharing capabilities.	Proposed	Local; Private; Federal	Low	Perry County EMA// Local Law Enforcement	Chuck Genesio (Director of Perry County EMA), Dan Curry (Village of Cutler), Ruth Hale (City Clerk Du Quoin), Dave Perradotto (Du Quoin Wastewater Superintendent), Chris Lacy (Du Quoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	Local, FEMA/IEMA preparedness grant, Infrastructure Bill
TR4	Monitor sources of intelligence regarding possible credible threats. Harden infrastructure systems for security. Exercise scenarios for possible occurrences. Increase intelligence and information sharing capabilities	Proposed	l,s,f,p	Low	Village of Cutler, EMA,Fire,L/E,EMS,IEMA,Fema	Dan Curry (Village of Cutler)	Local, FEMA/IEMA preparedness grant, Infrastructure Bill
TR5	Monitor sources of intelligence for ongoing and future threats; Training and exercising for terrorism incidents.	Proposed	l,s,f,p	Low	Local law enforcement, EMA in coordination with state and federal partners.	Raymond D. Clark (Du Quoin EMA)	Local, FEMA/IEMA preparedness grant

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
Cyberattack							
C1	Conduct a risk assessment to determine vulnerabilities. Implement firewalls and antivirus software.	Ongoing	State:Private	High	Perry County EMA // IDPH// County IT Department/MBH	Melissa Sprenger, Marshall Browning Hospital	
C2	Establish liaison/groups that meet regularly to discuss hazard mitigation. Promote disaster resilience through workshops, education materials, and planning guides.	Proposed	Local	Medium	Perry County EMA // IDPH// County IT Department	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC	EMPG, Health Depts, Hospital funds
C3	Maintain the necessary security measures to lessen the chance of a cyberattack to the City's computer systems. Educate employees on computer security measures. Public awareness to cyberattacks and the resources available for prevention.	Ongoing	Local;State; Federal	Medium	Perry County EMA // IDPH// County IT Department	Jim Gielow (Pinckneyville Fire Chief)	
C4	Encourage businesses and government offices to review and utilize the steps in the Cybersecurity & Infrastructure Security Agency (CISA) Cyber Essentials Starter Kit- this is free educational material provided by the Federal Government Make local businesses and government offices aware of the Illinois Attorney General's office data breach reporting system Provide resources for the public on cyber security for home computers and smartphones; make residents aware of the IL identity theft hotline Encourage backup systems for all critical infrastructures Increase communications and intelligence across all jurisdictions for system protections.	Proposed	Local	High	Perry County EMA // IDPH// County IT Department	Chuck Genesio (Director of Perry County EMA), Dan Curry (Village of Cutler), Ruth Hale (City Clerk Du Quoin), Dave Perradotto (Du Quoin Wastewater Superintendent), Chris Lacy (Du Quoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	
C5	Maintain the capability to ensure that the Alternate EOC has power and the computers are backed up with the protection in order to keep all records protected. Follow the guidelines by CISA to prevent data breach.	Proposed	l,s,f	High	Village of Cutler	Dan Curry (Village of Cutler)	
C6	Prepare and adopt necessary policies and procedures to properly secure local networks for critical facilities. Training for employees on cyber-security and on actions that should be avoided that could lead to an intrusion on the local computer networks	Proposed	l,s,f	High	Local jurisdictions with guidance from local Internet technology personnel or contractors	Raymond D. Clark (Du Quoin EMA)	

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
	Power outage/ utility disruption						
PO1	Write a procedure for standby services until power returns. Sign MOUs with local businesses for fuel, generator, etc.	Ongoing	Private	High	Perry County EMA// Utility Department/MBH	Melissa Sprenger, Marshall Browning Hospital	
PO2	Equip critical facilities with back-up generators; Develop vulnerable population list that may be affected by a disruption or an outage. Perry County can update the Empower site frequently and educate the public. This site provides de-identified data for persons with functional and access needs, which include individuals with electricity-dependent medical and assistive equipment.	Proposed	Local; State; Federal	High	Perry County EMA// Utility Department	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC	HMGP, BRIC
PO3	Continue to pursue funding for systems needing backup power generating capabilities Continue to improve public information and warning capabilities Generators for EOC and alternates Generators for all critical infrastructure facilities including water pumping and sewage lift stations. Enhance emergency communication system infrastructure, warning system enhancements Develop a Vulnerable Population List Prepare essential facilities: equip with back-up generators, emergency survival and first aid supplies, etc. Create and update list of emergency equipment and parts for utility services, emergency vehicles, other Improve aging infrastructure Update/maintain list of temporary shelters.	Ongoing	Local; State; Federal	High	Perry County EMA// Utility Department	Chuck Genesio (Director of Perry County EMA), Dan Curry (Village of Cutler), Ruth Hale (City Clerk Du Quoin), Dave Perradotto (Du Quoin Wastewater Superintendent), Chris Lacy (DuQuoin Water Superintendent), David Searby (States Attorney), Ken Kelly (Pinckneyville Police Chief), John Stanhouse (St Johns Mayor), Bill Place (Village of Tamaroa Mayor), Doug Hill (Street Superintendent Du Quoin)	HMGP, BRIC, FMA
PO4	Ensure that the village can generate power to the primary EOC, Alternate EOC, and the Pump station for water and sewage.	Ongoing	l,s	HIgh	Village of Cutler, EMA,Fire,L/E,IEMA,FEMA	Dan Curry (Village of Cutler)	
PO5	Train the population what to do if the power is disrupted, and how to keep warm during the winter and cool in the summer, the importance of generator and the proper use.	Ongoing	l,s	High	Village of Cutler, EMA,Fire,L/E,IEMA,FEMA	Dan Curry (Village of Cutler)	
PO6	Acquire secondary power sources to support critical infrastructure in the event of power outages to maintain continuity of operations and sheltering activities; Develop a list of locations that and prioritize their level of power restoration.	Ongoing	l,s,f	High	Municipalities, Power providers, County/City EMA	Raymond D. Clark (Du Quoin EMA)	
PO7	Backup generators for Du Quoin fire station 2/ EOC and sewer lift stations at Du Quoin wastewater treatment facility	Proposed	l,s,f	High	Du Quoin EMA, County EMA, Water treatment plant manager, Du Quoin Fire Chief	Raymond D. Clark (Du Quoin EMA)	HMGP, BRIC, FMA

Code	Mitigation Strategy	Status	Funding Source	Priority	Responsible Organization/ Agency	Strategy Proposed by	Potential Grants
			Other Hazards				
OH1	Wildfire: Check weather and drought conditions. Educate public regarding campfire safety.	Proposed	Local; Private	High	Perry County EMA //IDNR	Melissa Sprenger, Marshall Browning Hospital	Local, hospital
OH2	Wildfire: Establish fire/landslide/erosion preventative management techniques.	Proposed	Local; Private	High	Perry County EMA //IDNR	Tamara Caffey-Bey and Arien Hermann (Regional Emergency Planning Coordinator) SPARC	USDA CWDG
OH3	NEO: Conduct asteroid deflection mission concept studies. Conduct impact effects studies.	Proposed	Federal	High	Perry County EMA	Melissa Sprenger (EMA Coordinator)	NASA CNEOS already conducts similar studies
OH4	During landslide events; Consider modifying slope geometry. Install structures such as piles and retaining walls.	Ongoing	Local	High	Perry County EMA // USGS// IDNR	Melissa Sprenger, Marshall Browning Hospital	
OH5	During infestations; Learn to identify invasive species.	Ongoing	Local; State; Federal	High	Dept. of Agriculture // IL DHS// IL CDC	Melissa Sprenger, Marshall Browning Hospital	
OH6	Conduct study regarding risk factors for local population. Educate public on risks and signs/ suicide awareness. Conduct a risk assessment for current population/culture. Build partnerships involving law enforcement, EMS, etc.	Ongoing	Local	High	Perry County EMA// EMS/MBH	Melissa Sprenger, Marshall Browning Hospital	
OH7	In the case of a building being on fire; implement a plan for all areas of building/campus and train employees. Perform drills so staff know what to do and where to report.	Ongoing	Local; State; Federal	High	Local Fire Department// Perry County EMA//Local Police Department/MBH	Melissa Sprenger, Marshall Browning Hospital	
OH8	Wildfire: Create a Community Wildfire Protection Plan	Proposed	Local,state,federal	High	County EMA, All fire depts	US Forest Service, Greater Egypt	USDA CWDG

7. Plan Implementation

7.1. Implementation through Existing Programs

Throughout the planning process, the Perry County Planning Team worked to identify existing hazard mitigation policies, develop mitigation goals, and a create a comprehensive range of mitigation strategies specific to each jurisdiction. This work provides a blueprint for reducing the potential loses identified in the Risk Assessment (Section 4). The ultimate goal of this plan is to incorporate the mitigation strategies proposed into ongoing planning efforts within the County. The Perry County Emergency Management Agency will be the local champion for the mitigation actions. The Perry County Board and the city and village councils will be an integral part of the implementation process. Federal and state assistance will be necessary for a number of the identified actions.

Greater Egypt will use the MHMPs from all 5 counties in the region as guidance in other planning initiates including the Comprehensive Economic Development Strategy (CEDs), Transportation Planning, and Environmental Planning. It is recommended that the County and municipalities also incorporate this document into their local planning efforts.

Continued public involvement is also critical to the successful implementation of the MHMP. Comments from the public on the MHMP will be received by the Perry County EMA and forwarded to the Planning Team for discussion. Education efforts for hazard mitigation will be an ongoing effort of Perry County. The public will be notified of periodic planning meetings through notices in the local newspaper. Once adopted, a copy of the MHMP will be maintained in each jurisdiction and in the Perry County Emergency Management Agency.

7.2. Monitoring, Evaluation, and Updating the MHMP

Throughout the five-year planning cycle, the Perry County EMA will reconvene the Planning Team to monitor, evaluate, and update the plan on an annual basis. Members of the planning committee are readily available to engage in email correspondence between annual meetings. If there is a need for a special meeting, due to new developments or the occurrence of a declared disaster 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.

As part of the update process, the Planning Team will 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 team will also review the risk assessment portion of the plan to determine if this information should be updated or modified. The plan revision will also reflect changes in local development and its relation to each hazard. 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 Perry County Board.

Appendix 1: Perry County Planning Team

Name of Municipality/Organization	Participation Type	Name(Last,First)	Title
EMA			
Perry County		Genesio, Chuck	EMA coordinator
IEMA Region 11		Hendrix, Brandon	Acting Regional Coordinator
County			
		Koester, Jodi	Treasurer
		Searby, David Jr.	State's Attorney
		Bareis, Steve	Sherriff
		Otten, Brian	County Engineer
Cities & Villages			
Cutler	Jurisdiction	Pat	village clerk
		Loucks, Jo	mayor
		Dan Curry	Village Trustee
Du Quoin	Jurisdiction	Clark, Doug (Raymond)	EMA Coordinator
		Hill, Doug	Superintendent- Street Dept
		Alongi, Guy	Mayor
		Hale, Ruth	City Clerk
		Ingram, Steve	Chief of Police
		Durkota, David	Fire Chief
		Peradotto, David	Wastewater Superintendent
		Lacy, Chris	Water Superintendent
Pinckneyville	Jurisdiction	Gielow, Jim	Fire Chief
		Kelley, Kenneth	Chief of Police
St Johns	Jurisdiction	John Stanhouse	Mayor
Tamaroa	Jurisdiction	Place, Bill	Mayor
Willisville	Jurisdiction	Warner, Clarence	Mayor

Name of Municipality/Organization	Participation Type	Name(Last,First)	Title
Schools			
Pinckneyville High School	Jurisdiction	Wilson, Tony	Principal
Du Quoin CUSD #300	Jurisdiction	Hickam, Matthew	Superintendent
CCSD 204	Jurisdiction	Travelstead, Jerry	Superintendent
Tri County Special Education	Jurisdiction	Connet, Michelle	TC Ward School Principal
		Gross, Lisa Marie	Administrative Assistant
district 50	Jurisdiction	Wagner, Scott	Superintendent
ROE district30	Jurisdiction	Graff, Sheryl	Regional Superintendent
Tamaroa school district 5	Jurisdiction	Brink, Brian Dr	Superintendent
Health/ Emergency Services			
Regional Hospital Coordinating Center	Stakeholder	Herrmann, Arien	Region V manager
		Caffrey-Bey, Tamara	Regional Emergency Planning Coordinator
Marshall Browning Hospital	Stakeholder	Feltmeyer, Brooke	Manager
Pinckneyville Community Hospital	Stakeholder	Thornton, Blake	Director of Quality and Risk Management
		Hopp, Eva	CNE
Pinckneyville Ambulance Service	Stakeholder	Lipe, Patsy	Coordinator
Pinckneyville Nursing and Rehab	Stakeholder	Wilder, Julie	Administrator
Marshall Browning Hospital	Stakeholder	Sprenger, Melissa	Emergency Management Coordiantor
		Juhl, Ryan	Plant Operations
		Bunton, Ralph	Director of Plant Operations
Perry County Counseling Center/ Five Star	Stakeholder	Engelhardt, Susan	Executive Director
Perry County 911	Stakeholder	Morris, Alan	Chairman
Other			
Marshall Browning Estates	Stakeholder	Spiller, Vicki	Director
Jackson County EMA	Neighboring Jurisdiction	Burns, Robert	Sherriff, EMA Coordinator
		Rowe, Orval	Deputy EMA Coordinator
Jefferson County EMA	Neighboring Jurisdiction	Lueker, Steve	Coordinator
		Hertenstein, Keith	Assistant Coordinator
Williamson County EMA	Neighboring Jurisdiction	Burgess, Brian	Director
		Creek, Pat	Deputy Director
Franklin County EMA	Neighboring Jurisdiction	Buckingham, Ryan	Director

Appendix 2: Perry County Essential Facilities

Following is the list of essential facilities as determined by the Perry County Planning Team. In the event that building area and replacement values could not be provided, the CDMS/Hazus software provides default values based on census tract and square feet, or by essential facility type. Detailed spreadsheets and GIS shapefiles for essential facilities can also be requested at greateregypt.org/gis-services

Emergency Operation Centers

Name	Address	City	Zip	Yr Built	Backup Power	Kitchen	Notes	Sq Ft	Replacement Value
Du Quoin EMA/EOC	1534 S Washington St	Du Quoin	62832	1978	No	No	In Du Quoin Fire Station 2	12550	1.4 million

Ambulance Stations

Name	Address	City	Zip	Yr Built	Backup Power	Kitchen	Shelter Capacity	Equipment	Sq Ft	Replacement Value
Pinckneyville Ambulance Service	508 S Main St	Pinckneyville	62274		No	Y, Small		3 ambulances	5553	$711,799.00
Pinckneyville Ambulance Service (Du Quoin Division)	10 S West St	Du Quoin	62832		No	Y, Small		4 ambulances	4065	$454,320.00

Hospitals

Name	Address	City	Zip	Yr Built	# beds	Backup Power	Kitchen	Shelter Capacity	Equipment	Sq Ft	Replacement Value
Pinckneyville Community Hospital	5383 IL-154	Pinckneyville	62274	2015	20	Y	Y, Commercial	50		131,807	$51,040,000
Marshall Browning Hospital	900 N Washington St	Du Quoin	62832	2008	25	Y	Y, Commercial	1070	Van, RHCC Emergency Trailer	107065	$48,891,000

Fire Stations

Name	Address	City	Zip	Yr Built	Backup Power	Kitchen	Shelter Capacity	Equipment	Notes	Sq Ft	Replacement Value
Cutler Community Fire Protection District	111 N Main St	Cutler	62238	1979	Yes	Yes		1 Brush Truck, 2 Engines		4400	800,000
Du Quoin Fire Department Station 1	30 S Division St	Du Quoin	62832	1987	Yes	Yes		2 Engines, 1 Ladder, 1 Brush Truck		5625	4 million
Du Quoin Fire Department Station 2	1534 S Washington St (Highway 51)	Du Quoin	62832	1978	No	No		Unified Command Post, 2 command trailers, 3 support trailers, 9 generators, 2-prime movers, 3 response vehicles, Fire engine, 1 response van, Generator support trailer		12,550	1.4 million
Pinckneyville City Fire Department	110 S Walnut St	Pinckneyville	62274	1991	Yes	Yes		2 - Engines, 1 - Rescue Vehicle		7200	5 million
Pinckneyville Rural Fire Protection District	110 S Walnut St	Pinckneyville	62274	1991	Yes	Yes		2 - Engines,1 - Tanker,1 - Brush Truck,1- Command Vehicle	Separate entity that rents space in Pinckneyville City Fire Station		
Tamaroa Fire Protection District	39 West 2nd North Street	Tamaroa	62888	1983	Yes	Yes		2 engines, 1 tanker		3600	600,000
Willisville Volunteer Fire Department	407 Peach St	Willisville	62997	1968						4400	800,000

Police Stations

Name	Address	City	Zip	Yr Built	Backup Power	Kitchen	Sq Ft	Replacement Value
Du Quoin Police Department	304 E Poplar St	Du Quoin	62832	1989	Yes	No	4450	1.5 Million
Illinois State Police District 13	1391 S Washington St	Du Quoin	62832	1971			11000	2.8 Million
Perry County Sheriff	12 E Water St	Pinckneyville	62274	1985	Yes	Yes	22,500	8 Million
Pinckneyville Police Department	104 S Walnut St	Pinckneyville	62274	1991	Yes	Yes	6000	6 Million
Willisville Police Department	906 Broadway St	Willisville	62997	1968			11000	2.8 Million

Community Storm/Emergency Shelters

Name	Address	City	Zip	Yr Built	Backup Power	Kitchen	Shelter Capacity	Sq Ft	Replacement Value
Cutler Community Center	409 S Main St	Cutler	62238	1920	No	Y, Small		6451	$976,218.00
Reformed Presbyterian Church	321 S Ervin St	Cutler	62238	1920	No	Y, Small		4285	$824,585.00
First Baptist Church	306 E 3rd St	Cutler	62238	pre-1973	No	Y, Small		5252	$200,000.00
Liberty Church	680 W Main St	Du Quoin	62832	unknown	No	Y, Small	600	18343	$3,529,840.75

Schools

County	District/Type	Name	Address	City	Zip	Yr Built	Backup Power	Kitchen	Shelter Capacity	Sq Ft	Replacement Value
Perry	College	John A. Logan Alongi Extension Center	72 Southtowne Shopping Center	Du Quoin	62832		N			7,840	$1,000,000.00
Perry	College	Rend Lake College Murphy-Wall Pinckneyville Campus	5680 IL-154	Pinckneyville	62274	1962				50000	$8,638,025.39
Perry	Community Consolidated School District #204	Community Consolidated School District #204	6067 State Route 154	Pinckneyville	62274	1962				35,750	$2,240,109.13
Perry	Du Quoin CUSD #300	Du Quoin Elementary School	845 East Jackson Street	Du Quoin	62832	1999				40,714	$8,291,313.48
Perry	Du Quoin CUSD #300	Du Quoin High School	500 E South St	Du Quoin	62832	2011-13	N	Y, commercial		109,000	$42,739,658.00
Perry	Du Quoin CUSD #300	Du Quoin Middle School	845 East Jackson Street	Du Quoin	62832	1999				119,000	$20,875,439.00
Perry	Du Quoin CUSD #300	Du Quoin Ward School	200 N Division St	Du Quoin	62832	1960	N	Y, Small		13,800	$4,590,000.00
Perry	Pinckneyville Community High School District 101	Pinckneyville Community High School	600 E Water St	Pinckneyville	62274	1962				34000	$6,923,974.12
Perry	Pinckneyville District 50 Schools	Pinckneyville Elementary School	301 West Mulberry Street	Pinckneyville	62274	1962				53,970	$4,262,025.88
Perry	Pinckneyville District 50 Schools	Pinckneyville Junior High School	700 East Water Street	Pinckneyville	62274	1962				53,690	$3,898,372.31
Perry	Private	St Bruno Catholic School	210 N Gordon St	Pinckneyville	62274	1962				9,286	$1,891,001.34
Perry	Private School	Du Quoin Christian Fellowship	616 U.S. Rt. 51 South	Du Quoin	62832	1961				5,571	$1,134,600.71
Perry	Tamaroa Public School District #5	Tamaroa Grade School	200 W Main St	Tamaroa	62888	1968				23,400	$1,789,178.22
Perry	Western Egyptian Economic Opportunity Council, Inc.	Perry County Head Start	3747 Hitt Road	Tamaroa	62888					7020	$1,000,000.00
Perry	Western Egyptian Economic Opportunity Council, Inc.	Pinckneyville Head Start	1001 S Main St	Pinckneyville	62274					2350	$1,000,000.00
Jackson	Trico CUSD #176	Trico Elementary School	16343 Highway 4	Campbell Hill	62916	1975				31357.14	$6,322,541.02
Jackson	Trico CUSD #176	Trico High School	16533 Highway 4	Campbell Hill	62916	1975				19071.43	$3,845,372.31
Jackson	Trico CUSD #176	Trico Junior High School	16533 Highway 4	Campbell Hill	62916	1975				20928.57	$4,219,828.13

Appendix 3: Risk Indices

Summary Table

Hazard	Avg risk index	# Lists included	total lists received	% Importance	weighted risk index
Tornado	10.47	17	17	1.00	10.47
Earthquake	10.13	16	17	0.94	9.53
Cyberattack	8.00	7	17	0.41	3.29
Epidemic	7.31	16	17	0.94	6.88
Thunderstorm	7.31	17	17	1.00	7.31
Hazmat	6.94	16	17	0.94	6.53
Utility disruption	6.00	1	17	0.06	0.35
Terrorism	5.91	11	17	0.65	3.82
Winter Storm	5.75	16	17	0.94	5.41
NEO	4.67	2	17	0.12	0.55
Extreme heat	4.50	8	17	0.47	2.12
Flood	4.36	11	17	0.65	2.82
Ground failure	4.15	13	17	0.76	3.18
Wildfire	3.60	5	17	0.29	1.06
Infestation	2.00	4	17	0.24	0.47
landslide	2.00	1	17	0.06	0.12
Civil disruption	2.00	1	17	0.06	0.12
Dam failure	1.83	6	17	0.35	0.65
Invasive spp	1.5	2	17	0.12	0.18
Levee failure	1	1	17	0.06	0.06

Indices by Jurisdiction

County EMA	
Hazard	Risk Index
Tornado	10
Earthquake	8
Thunderstorm	8
Cyberattack	8
Epidemic	6
HazMat	6
Winter Storm	6
Flood	4
Terrorism	4
Ground Failure	3.5
Dam failure	1

Other County Officials	
Hazard	Risk Index
Earthquake	16
Terrorism	16
HazMat	8
Thunderstorm	8
Tornado	8
Flood	6
Ground failure	4
Wildfire	4
Winter Storm	4
Epidemic	3.3
Extreme Heat	2.7
Dam Failure	1.3
Levee Failure	1

Cutler	
Hazard	Rank (did not calculate index)
Earthquake	1
Ground failure	2
Flood	2
HazMat	2
Winter Storm	3
Thunderstorm	4
Tornado	4

Du Quoin	
Hazard	Risk Index
epidemic	10.7
thunderstorm	10
Tornado	10
earthquake	8
Cyberattack	8
HazMat	7.7
Terrorism	7
Winter Storm	6
extreme heat	4
ground failure	4
Flood	4
Wildfire	4
Dam failure	2
infestation	1
Invasive spp	1
NEO	1

Pinckneyville	
Hazard	Risk Index
Earthquake	24
Tornado	12
Epidemic	6
HazMat	6
Winter storm	6
Dam failure	4
Ground failure	4
cyberattack	4

Perry Co 911	
Hazard	Risk Index
epidemic	16
hazmat	16
Winter Storm	16
earthquake	12
Tornado	12
thunderstorm	8
extreme heat	6
ground failure	6
wildfire	4

St. Johns	
Hazard	Risk Index
Tornado	12
Earthquake	8
Epidemic	8
Thunderstorm	8
Cyberattack	8
Winter Storm	6
Flood	4
Terrorism	4
HazMat	3

Pinckneyville Hospital	
Hazard	Risk Index
tornado	12
earthquake	8
ground failure	8
flood	8
Tstorm	8
extreme heat	6
Winter Storm	6
epidemic	4
hazmat	4
Wildfire	2
infestation/invasive spp	2
terrorism	2

Tamaroa	
Hazard	Risk Index
Tornado	12
Earthquake	8
Epidemic	8
Thunderstorm	8
Cyberattack	8
Winter Storm	6
Flood	4
Terrorism	4
HazMat	3

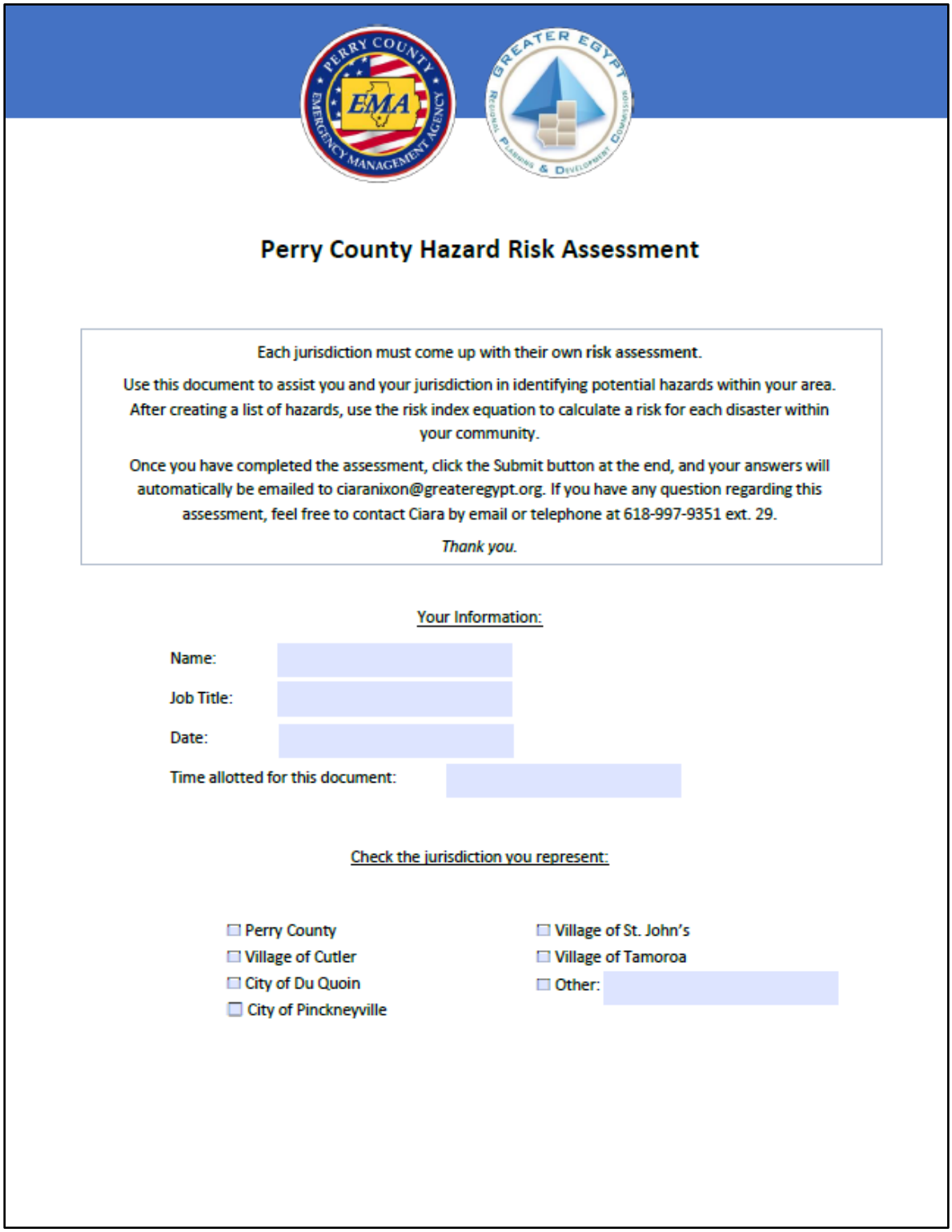
Du Quoin Christian fellowship school	
Hazard	Risk Index
Tornado	16
Epidemic	8
Terrorism	8
NEO	8
Earthquake	6
HazMAt	4
Thunderstorm	4
Winter Storm	4
Flood	1
Infestation	1

Du Quoin CUSD 300	
Hazard	Risk Index
Tornado	8
Earthquake	4
HazMat	4
Thunderstorm	4
Winter Storm	4
Flood	3
Epidemic	1
Ground Failure	1
Terrorism	1

RHCC	
Hazard	Risk Index
cyber attack	12
epidemic	12
hazmat release	12
dam failure	8
earthquake	8
extreme heat	8
tornado	8
flooding	6
utility disruption	6
ground failure	4
infestation/invasives	4
NEO	4
terrorism	4
wildfire	4
Civil disruption	2

Risk Assessment Worksheets

Below is the example worksheet of the Perry County Risk Assessment and responses from Planning Team members.



Perry County Hazard Risk Assessment

Each jurisdiction must come up with their own risk assessment.

Use this document to assist you and your jurisdiction in identifying potential hazards within your area. After creating a list of hazards, use the risk index equation to calculate a risk for each disaster within your community.

Once you have completed the assessment, click the Submit button at the end, and your answers will automatically be emailed to ciaranixon@greateregypt.org. If you have any question regarding this assessment, feel free to contact Ciara by email or telephone at 618-997-9351 ext. 29.

Thank you.

Your Information:

Name:

Job Title:

Date:

Time allotted for this document:

Check the jurisdiction you represent:

- ☐ Perry County
- ☐ Village of Cutler
- ☐ City of Du Quoin
- ☐ City of Pinckneyville
- ☐ Village of St. John's
- ☐ Village of Tamoroa
- ☐ Other:

Let's start by thinking about any and all-natural hazards that have affected your community in the past. Do any historical natural hazard events come to mind? If so, start your list of possible natural hazards with experiences that you have been through or have heard of within your community. What happened previously is a great guide in planning and preparing for what may happen again. Even for events that took place 100 or more years ago, there is still the possibility that is could happen again.

Though this list may start with your own personal experiences or based off of stories you've heard, this should not be the only way you come up with a list of natural hazards. There are other natural hazards that may be possible in the future, that may not have happened yet. The nature of some threats may change overtime, whether that is due to weather pattern changes, or just the rarity of that threat happening. It's always good to be prepared for anything and everything, and remember:

*It's not **IF** it happens, it's **WHEN** it happens.*

Below are two different lists of hazards. The first list is of hazards that have historic data in the state of Illinois. The second list of hazards are less probable to happen in Illinois, but are still possible.

Check the box next to each hazard you feel your community should be prepared for.

List of Possible Hazard:

- ☐ Dam Failure
- ☐ Earthquake
- ☐ Epidemic
- ☐ Extreme Heat
- ☐ Flooding
- ☐ Ground Failure (mine subsidence/karst/sinkhole)
- ☐ Hazardous Materials Event
- ☐ Infestation
- ☐ Invasive Species
- ☐ Landslide
- ☐ Levee Failure
- ☐ Meteor Impact
- ☐ Terrorism
- ☐ Thunderstorm
- ☐ Tornado
- ☐ Volcanic Eruption
- ☐ Wildfire
- ☐ Winter storm/Ice storm

Are there any other hazards that your community would like to add to their list?

Now, to rank the hazards from the list that you have created, we first need to understand the **Risk Index** equation.

RISK INDEX = PROBABILITY * SEVERITY

The **PROBABILITY** of an event is how likely the event will occur.

The **SEVERITY** of the event is the degree to which a hazard affects the functionality of society and the natural environment.

Use the table below to give each hazard a probability and severity ranking. Then, use the above equation to complete the hazard risk assessment by giving each hazard a risk index. Use the risk index of each hazard to then rank each hazard by most threatening/important to least threatening/importance.

Probability	Characteristics
4 – Highly Likely	Event is probable within the next calendar year. These events have occurred, on average, once every 1-2 years in the past.
3 – Likely	Event is probable within the next 10 years. Event has a 10-15% chance of occurring in any given year. These events have occurred, on average, once every 3-10 years in the past.
2 – Possible	Event is probable within the next 50 years. Event has a 2-10% chance of occurring in any given year. These events have occurred, on average, once every 10-50 years in the past.
1 – Unlikely	Event is probable within the next 200 years. Event has a 0.5-2% chance of occurring in any given year. These events have occurred, on average, once every 50-200 years in the past.

Severity	Characteristics
8 – Catastrophic	Multiple deaths. Complete shutdown of facilities for 30 or more days. More than 50% of property is severely damaged.
4 – Critical	Injuries and/or illnesses result in permanent disability. Complete shutdown of critical facilities for at least 14 days. More than 25% of property is severely damaged.
2 – Limited	Injuries and/or illnesses do not result in permanent disability. Complete shutdown of critical facilities for more than seven days. More than 10% of property in severely damaged.
1 – Negligible	Injuries and/or illnesses are treatable with first aid. Minor quality of life lost. Shutdown of critical facilities and services for 24 hours or less. Less than 10% of property is severely damaged.

Jurisdiction Hazard Risk Assessment

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank

Pinckneyville, Jim Gielow and Kenneth Kelley

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Tornado	3	4	12	2
Hazardous Materials Event	3	2	6	3
Earthquake	3	8	24	1
Epidemic	3	2	6	4
Ground Failure	2	2	4	7
Dam Failure	2	2	4	8
Cyber Attack	2	2	4	6
Winter Storm	3	2	6	5

Pinckneyville Ambulance Service, Patsy Lipe

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Thunderstorm	4	1		
Tornado	3	4		
Ground Failure	2	2		
Earthquake	2	2		

Perry County EMA, Charles Genesio

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Thunderstorm	4	2	8	1
Tornado	3	4	12	3
Flooding	2	2	4	5
Hazardous Materials Event	3	1	6	11
Earthquake	1	8	8	4
Terrorism	2	2	4	8
Winter Storm/Ice Storm	3	2	6	6
CYBER ATTACK	4	2	8	2
Epidemic Pandemic	2	4	4	7
Dam Failure	1	1	2	9
Ground Failure	2	2	4	10

Perry County State's Attorney, David Searby Jr.

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Thunderstorm	4	4	16	1
Tornado	3	4	12	2
Winter Storm/Ice Storm	3	2	6	4
Dam Failure	1	2	2	6
Earthquake	2	8	16	1
Epidemic	2	4	8	3
Extreme heat	2	2	4	5
Flooding	2	2	4	5
Ground Failure	2	2	4	5
Hazardous Materials Event	2	8	16	1
Terrorism	2	8	16	1
Wildfire	2	2	4	5

City of Du Quoin, Ruth Hale

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Thunderstorm	4	4	16	1
Tornado	3	4	12	2
Winter Storm/Ice Storm	3	2	6	4
Dam Failure	1	2	2	6
Earthquake	2	8	16	1
Epidemic	2	4	8	3
Extreme heat	2	2	4	5
Flooding	2	2	4	5
Ground Failure	2	2	4	5
Hazardous Materials Event	2	8	16	1
Terrorism	2	8	16	1
Wildfire	2	2	4	5

City of Du Quoin, David Peradotto

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Thunderstorm	4	2	8	1
Tornado	3	4	12	3
Flooding	2	2	4	5
Hazardous Materials Event	3	1	6	11
Earthquake	1	8	8	4
Terrorism	2	2	4	8
Winter Storm/Ice Storm	3	2	6	6
CYBER ATTACK	4	2	8	2
Pandemic	2	4	4	7

Village of St, John's, John Stanhouse

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Thunderstorm	4	2	8	1
Tornado	3	4	12	3
Flooding	2	2	4	5
Hazardous Materials Event	3	1	6	11
Earthquake	1	8	8	4
Terrorism	2	2	4	8
Winter Storm/Ice Storm	3	2	6	6
CYBER ATTACK	4	2	8	2
Pandemic	2	4	4	7

City of Du Quoin, Chris Lacy

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Thunderstorm	4	2	8	1
Tornado	3	4	12	3
Flooding	2	2	4	5
Hazardous Materials Event	3	1	6	11
Earthquake	1	8	8	4
Terrorism	2	2	4	8
Winter Storm/Ice Storm	3	2	6	6
CYBER ATTACK	4	2	8	2
Pandemic	2	4	4	7

Village of Tamaroa, Bill Place

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Thunderstorm	4	2	8	1
Tornado	3	4	12	3
Flooding	2	2	4	5
Hazardous Materials Event	3	1	6	11
Earthquake	1	8	8	4
Terrorism	2	2	4	8
Winter Storm/Ice Storm	3	2	6	6
CYBER ATTACK	4	2	8	2
Pandemic	2	4	4	7

City of Du Quoin, Steve Ingram

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Earthquake	1	8	8	
Epidemic	2	8	16	
Extreme Heat	2	2	4	
Flooding	2	2	4	
Ground Failure	2	2	4	
Hazmat	2	2	4	
Infestation	1	1	1	
Invasive Species	1	1	1	
Meteor Impact	1	2	2	
Terrorism	1	2	2	
Thunderstorm	3	2	6	
Tornado	3	2	6	
Winter/Ice Storm	3	2	6	

Du Quoin EMA/911, Raymond Clark

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Earthquake	1	8	8	4
Epidemic/Pandemic	2	2	4	7
Ground Failure	3	1	3	8
Hazardous Material Event	3	2	6	5
Thunderstorm	4	2	8	1
Tornado	2	4	8	3
Winter Storm	3	2	6	6
Cyberattack	4	2	8	2

Du Quoin CUSD 300, Matthew Hickman

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Earthquake	1	4	4	2
Epidemic	1	1	1	7
Flooding	3	1	3	6
Ground failure	1	1	1	7
Hazardous materials	2	2	4	2
Thunderstorm	4	1	4	2
Tornado	4	2	8	1
Winter storm	4	1	4	2
Terrorism	1	1	1	7

County Treasurer, Jodi Koester

Hazard	Probability */1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P•JJ*	Rank
EARTHQUAKE	2	8	16	1
TORNADO	3	2	6	2
FLOODING	3	2	6	3
THUNDERSTORM	4	1	4	4
I- GROUNDFAJLURE	2	2	4	5
Haz Mat Event	2	2	4	6
Winter Storm	3	1	3	7
EXTREME HEAT	2	1	2	8
DAM FAILURE	1	1	1	9
EPIDEMIC	1	1	1	10

Village of Cutler, Pat

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Earthquake				1
Flooding				2
Ground Failure				2
Hazardous Material Event				2
Thunderstorm				4
Tornado				4
Winter Storm				3

County Engineer, Brian Otten

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Dam Failure	1	1	1	9
Earthquake	2	8	16	1
Epidemic	1	1	1	10
Extreme Heat	2	1	2	8
Flooding	3	2	6	3
Ground Failure	2	2	4	5
Hazardous -	2	2	4	6
Materials Event				
Levee Failure	1	1	1	
Thunderstorm	4	1	4	4
Tornado	3	2	6	2
Winter Storm	3	1	3	7

Pinckneyville Hospital, Blake Thornton and Eva Hopp

Hazard	Probability *(1-4)*	Severity *{1,2,4, or 8}*	Risk Index *(P*J)*	Rank
Earthquake	2	4	12	
Epidemic	2	2	4	
Extreme Heat	3	2	6	
Flooding	2	4	8	
Ground Failure	2	4	8	
Hazardous Materials Event	2	2	4	
Infestation	2	1	2	
Invasive Species	2	1	2	
Terrorism	1	2	2	
Thunderstorm	4	2	8	
Tornado	3	4	12	
Wildfire	1	2	2	
Winter storm/Ice storm	3	2	6	
Drought	3	1	3	

RHCC, Arien Hermann

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Earthquake	1	8	8	2
Epidemic	3	4	12	1
Extreme Heat	4	2	8	2
Ground Failure	2	2	4	4
HAZMAT Event	3	4	12	1
Infestation	2	2	4	4
Landslide	2	1	2	6
Space Weather	2	2	4	4
Terrorism	1	4	4	4
Thunderstorm	3	1	3	5
Tornado	2	4	8	2
Wildfire	1	4	4	4
Winter Storms	2	1	2	6
Draught	2	1	2	6
Cyber Attack	3	4	12	1
Utility Disruption	3	2	6	3
CBRN	1	1	1	7
Civil Disruption	2	1	2	6

Perry County 911, Alan Morris

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
EARTHQUAKE	3	4	12	4
EPIDEMIC	4	4	16	3
EXTREME HEAT	3	2	6	7
GROUND FAILURE	3	2	6	8
HAZARDOUS MATERIALS	4	4	16	2
THUNDERSTORM	4	2	8	6
TORNADO	3	4	12	5
WILDFIRE	2	2	4	9
WINTER STORM	4	4	16	1

Christian Fellowship School, Stuart Davis

Jurisdiction Hazard Risk Assessment

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Earthquake	2	2-4	6	2
Epidemic	4	2	8	3
Flooding	1	1	1	8
Hazardous Materials Event	2	2	4	5
Infestation	1	1	1	9
Meteor Impact	1	8	8	10
Terrorism	1	8	8	7
Thunderstorm	4	1	4	4
Tornado	2	8	16	1
Winterstorm / Ice Storm	4	1	4	6

Appendix 4: Meeting Announcements

The following ad was printed in Southern Illinoisian, The Du Quoin Evening Call, and the Pinckneyville Weekly-Press on October 8, 2021

PUBLIC MEETING NOTICE

Perry County EMA and Greater Egypt will host a public meeting Tuesday, October 12 at 10:00 AM to provide information and receive public input on the update to the Perry County Multi-hazard Mitigation Plan. The meeting will be held through Zoom. You can find the meeting information by visiting greateregypt.org /hazard-mitigation-planning.

22960 10/8

Appendix 5: Meeting Minutes & Attendance

Perry County Multi-Hazard Mitigation Plan
Meeting 1 Minutes

June 29, 2021 - 10:00 AM
County EMA Coordinator: Chuck Genesio
Zoom (Virtual) Meeting
Planning Team Attendance: 26

Tyler Carpenter (Greater Egypt) opened the meeting and introduced Chuck Genesio, EMA Coordinator for Perry County, and Cary Minnis, Executive Director with Greater Egypt. They both gave opening remarks regarding the history of the Multi-hazard Mitigation Planning (MHMP) process and the importance of the planning team.

Tyler Carpenter reviewed the MHMP process which includes: hazard mitigation history and assistance, local MHMP process, and adoption of the plan. He explained the planning process involves forming a planning team to assist in identifying hazards, developing mitigation strategies, and match requirements. An emphasis was placed on participation in the plan and funding for jurisdictions.

Kelsey Bowe (Greater Egypt) presented historical hazards in Perry County. She also identified hazards that have been included in previous plans for Perry County. Kelsey introduced the critical facilities data. This dataset will need to be updated for the HAZUS models to be more accurate. The Planning Team will need to review the critical facilities map.

Ciara Nixon (Greater Egypt) explained the process to assess risk from hazards. The Planning Team will be required to complete the Hazard Ranking exercise for their jurisdiction. This utilizes the Risk Priority Index Equation. Planning partners were given time to complete the exercise. Partners will also be able to finish the exercise outside of the meeting. Greater Egypt will provide assistance for the exercise. Meeting materials will be available at: http://greateregypt.org/hazard-mitigation-planning/

The meeting was adjourned.

Meeting Attendance
Meeting 1: June 29, 2021 10:00AM
Name
Alongi, Guy
Bareis, Steve
Ciara Nixon
Clark, Doug
Engelhardt, Susan
Feltmeyer, Brooke
Genesio, Chuck
Gielow, Jim
Hendrix, Brandon
Hickam, Matthew
Hill, Doug
Hopp, Eva
Juhl, Ryan
Kelsey Bowe
Koester, Jodi
Lipe, Patsy
Morris, Alan
Otten, Brian
Rowe, Orval
Searby, David
Spiller, Vicki
Sprenger, Melissa
Thornton, Blake
Tyler Carpenter
Wilder, Julie
Wilson, Tony

Perry County Multi-Hazard Mitigation Plan

Meeting 2 Minutes

October 12, 2021 - 10:00 AM

County EMA Coordinator: Chuck Genesio

Zoom (Virtual) Meeting

Planning Team Attendance: 14

Tyler Carpenter (Greater Egypt) opened the meeting. He gave remarks about the planning updates and what to expect in the upcoming months. Mr. Carpenter reviewed Meeting 1, and the timeline of the MHMP planning committee. It was emphasized that the planning partners meet the match requirements of FEMA and stay conscious of the responsibilities of the planning partners.

Kelsey Bowe (Greater Egypt) reviewed the MHMP key elements such as historical data, statistical data base on 100 and 500-year occurrences of floods, tornadoes, and earthquakes. Ms. Bowe explained the planning process that involves the planning team to assist in identifying hazards, developing mitigation strategies, and planner partner participation. Ms. Bowe covered the hazard ranking review that must be filled out and submitted before the upcoming deadline. Ms. Bowe reviewed the different modeling software and how they help to understand the consequences of a natural hazard event.

Ms. Bowe presented historical hazards in Perry County. She also identified hazards that have been included in previous plans for Perry County. She introduced the critical facilities data. This dataset will need to be updated for the HAZUS models to be more accurate. The Planning Team will need to review the critical facilities map, in order to have accurate data from the models. Ms. Bowe informed the planning partners about the possible funding sources available through BRIC and the EPA. There is extra attention paid to projects that represent underserved communities. Ms. Bowe's last remarks covered the importance of the mitigation strategies worksheet to be filled out with two different strategies, and submitted by the planning partners

Planning partners were given time to complete the exercise. Partners will also be able to finish the exercise outside of the meeting. Greater Egypt will provide assistance for the exercise. Meeting materials will be available at: http://greateregypt.org/hazard-mitigation-planning/

The meeting was adjourned.

Meeting Attendance
Meeting 2: October 12, 2021 10:00 AM
Name
Tyler Carpenter
Kelsey Bowe
Gabrielle Reed
Blake Thornton
Brooke Feltmeyer
Chuck Genesio
Jim Gielow
Brandon Hendrix
Matthew Hickham
Melissa Sprenger
Ralph Bunton
Raymond Clark (Doug)
Ryan Juhl
Steve Ingram

Perry County Multi-Hazard Mitigation Plan

Meeting 3 Minutes

March 8, 2022- 10:00 AM

County EMA Coordinator: Chuck Genesio

Zoom (Virtual) Meeting

Planning Team Attendance: 11

Kelsey Bowe (Greater Egypt) opened the meeting and gave introductory remarks. Meeting attendees were encouraged to introduce themselves through the chat feature. Kelsey covers what to expect in the following months for MHMP planning and the expectations of the planning committee.

Ms. Bowe reviewed the Planning Updates and the timeline of the MHMP. She explained the planning process involves collaboration within the jurisdictions in order to assist in identifying hazards, developing mitigation strategies, and match requirements. An emphasis was placed on participation in the plan and the match funding for officials in the jurisdictions. Ms. Bowe discussed the appropriate forms for salary and benefits request for partner participation. Perry County is nearing their match expectations.

Kelsey Bowe (Greater Egypt) reviewed the ranking for each hazard for Perry County; based on the responses of the planning partners. She also discussed the updates for any essential facility within the county; giving planning partners a moment to review and make changes. Ms. Bowe presented the mitigation strategies that each jurisdiction has completed. The importance of submitting adequate mitigation strategies, and essential facilities data was discussed and explained further by Ms. Bowe.

Ms. Bowe explained what to expect in the future for Perry County MHMP plans, and offered an opportunity to reach out to her about any last-minute changes being made for the strategies. The team was given time during the meeting to make any comments or changes based on the essential facilities list information, and the mitigation strategies information.

The meeting was adjourned.

This document has been requested per jurisdiction, in order to meet the responsibilities of the planning team. Greater Egypt will provide assistance for the exercise. Meeting materials will be available at: http://greateregypt.org/hazard-mitigation-planning/.

Meeting Attendance
Meeting 3: March 8 2022, 10:00AM
Name
Kelsey Bowe
Gabrielle Reed
Chuck Genesio
David Searby
Melissa Sprenger
Jim Gielow
Blake Thornton
Matthew Hickham
Tamara Caffey-Bey
Eva Hopp
Dan Curry

Appendix 6 Mitigation Related Grant Opportunities

Below is a list of current federal and state grant programs related to various hazard mitigation topics. This list may not be exhaustive and planning partners are encouraged to conduct their own searches for grants to match a project idea. Please note these programs may not be active at all times of the year, and some programs may be cancelled during the 5-year cycle that this Plan is active. A detailed excel spreadsheet can be downloaded for free at https://greateregypt.org/hazard-mitigation-planning/

FEMA Grants

Program Name	Grants Available (if multiple)	Projects Covered	Who Can Apply
Hazard Mitigation Grant Program (HMGP)		Available after federally declared disasters, provides funding to rebuild structures in a way to mitigate future problems	state, local, tribal and territorial governments
Flood Mitigation Assistance (FMA) Grant		Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage, competitive grant, projects are chosen for cost effectiveness and eligibility	state, local, tribal and territorial governments that have FEMA approved hazard mitigation plans in place and are part of the NFIP
Building Resilient Infrastructure and Communities (BRIC)		variety of hazard mitigation projects can be approved under this program	state, local, tribal and territorial governments
Emergency Food and Shelter Program (EFSP)		funds projects to provide shelter, food, and supportive services to individuals and families who are experiencing, or at risk of experiencing, hunger and/or homelessness	funds dispersed to local nonprofit and governmental social service organizations through EFSP National Board allocations
Resilience Grants	National Dam Safety Program (NDSP) State Assistance		
	Rehabilitation Of High Hazard Potential Dam (HHPD) Grant Program		
	National Earthquake Technical Assistance Program (NETAP)		
	Multi-State and National Earthquake Assistance (MSNEA)		nonprofit organizations and institutions of higher education that possess the critical skills necessary to develop and implement regional (multi-state) and/or national earthquake risk mitigation activities.

FEMA Preparedness Grants

*In Illinois, IEMA must apply for these funds on behalf of state and local organizations

- Emergency Management Performance Grant
    - Enhancing and sustaining all-hazards emergency management capabilities.

- Tribal Homeland Security Grant
    - Preventing, preparing for, protecting against and responding to acts of terrorism.

- Transit Security Grant
    - Protecting critical public transportation systems (intra-city bus, ferries and all forms of passenger rail) from acts of terrorism.

- Intercity Passenger Rail Grant – Amtrak
    - Protecting Amtrak rail system from acts of terrorism.

- Homeland Security Grant
    - Preventing, preparing for, protecting against and responding to acts of terrorism.

- Nonprofit Security Grant
    - Fund physical security enhancements and activities for nonprofit organizations that are at high risk of a terrorist attack.

- Intercity Bus Security Grant
    - Protecting private operators of intercity over-the-road bus transportation systems from acts of terrorism.

- Port Security Grant
    - Protecting ports from acts of terrorism.

- Assistance to Firefighters Grants
    - Three grant programs focused on enhancing the safety of the public and firefighters in fire-related hazards.

- Presidential Residence Protection Assistance Grant
    - Reimbursements to state and local law enforcement agencies for costs incurred while protecting any non-governmental residence of the president being secured by the United States Secret Service.

- Regional Catastrophic Grant Program
    - Funding for local governments to encourage innovative regional solutions to catastrophic incidents.

- National Earthquake Hazards Reduction Program Grant
    - Funding to support the establishment of earthquake hazards reduction programming and implementation of earthquake safety, mitigation and resilience activities at the local level.

Other Federal Grants

Agency	Program Name	Grants Available (if multiple)	Projects Covered	Who Can Apply
U.S. Dept of Housing and Urban Development	Community Development Block Grant (CDBG) Program	Public Infrastructure, Housing Rehabilitation Program, Economic Development, Disaster Response	Community Based projects in communities that do not receive HUD allocations	Communities/Local government
U.S. Dept of Agriculture	USDA Direct Community Facility Loan & Grant Program	Loan and Grant programs offered for various projects	provides affordable funding to develop essential community facilities in rural areas	Public organizations, community-based non-profits, or federally recognized Tribes in rural areas (less than 20,000 residents
U.S. Dept of Agriculture	Rural Utilities Service Water and Environmental Programs (WEP)		construction of water and waste facilities in rural communities	rural communities with populations of 10,000 or less
U.S. Environmental Protection Agency	Brownfields Program	Brownfields Assessment Grants, Brownfields Revolving Loan Fund (RLF) Grants, Brownfields Cleanup Grants, Multipurpose (MP) Grants, Job Training (JT) Grants, Technical Assistance, Training, and Research Grants, State and Tribal Response Program Grants	Various projects related to assessment, outreach, cleanup and research of Brownfield sites impacted by hazardous materials	Varies by grant, check NOFOs, states, tribes, communities and stakeholders may be eligible
Delta Regional Authority	States' Economic Development Assistance Program (SEDAP)	provides direct investment into community-based and regional projects that address the DRA's congressionally mandated four funding categories	FUNDING PRIORITIES: basic public infrastructure, transportation infrastructure, business development & entrepreneurship, workforce development	Greater Egypt handles DRA applications for Franklin, Jackson, Williamson, and Perry counties *Jefferson County does not qualify for DRA funding
Delta Regional Authority	Community Infrastructure Fund (CIF)	This funding is set aside for physical infrastructure projects, may be used on construction projects for flood control, basic public infrastructure, and transportation infrastructure		Greater Egypt handles DRA applications for Franklin, Jackson, Williamson, and Perry counties *Jefferson County does not qualify for DRA funding
Delta Regional Authority	Public Works and Economic Adjustment Assistance (PWEAA) program.			Greater Egypt handles DRA applications for Franklin, Jackson, Williamson, and Perry counties *Jefferson County does not qualify for DRA funding

Agency	Program Name	Grants Available (if multiple)	Projects Covered	Who Can Apply
U.S. Dept of Transportation	Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grants		Projects for RAISE funding will be evaluated based on merit criteria that include safety, environmental sustainability, quality of life, economic competitiveness, state of good repair, innovation, and partnership. Within these criteria, the Department will prioritize projects that can demonstrate improvements to racial equity, reduce impacts of climate change and create good-paying jobs.	regional and local governments
U.S. Dept of Transportation-pipeline and hazardous materials safety administration	Assistance for Local Emergency Response Training (ALERT)		hazmat response training for volunteer or remote emergency responders.	The ALERT grant is competitively awarded to non-profit organizations capable of delivering an established curriculum to emergency responders.
U.S. Dept of Transportation-pipeline and hazardous materials safety administration	Hazardous Materials Instructor Training (HMIT) Grant		train-the-trainer program that facilitates the training of hazmat instructors who then conduct training in Hazardous Materials Regulations (HMR) for hazmat employees.	competitively awarded to non-profit organizations that satisfy both of the following eligibility requirements: 1) expertise in conducting hazmat employee training programs and 2) capable of reaching a target population of hazmat employees and including them in the training program.
U.S. Dept of Transportation-pipeline and hazardous materials safety administration	Supplemental Public Sector Training (SPST) Grant		a train-the trainer program that facilitates the training of instructors who then conduct training in hazmat response for individuals with a statutory responsibility to respond to hazmat accidents and incidents.	competitively awarded to national non-profit fire service organizations
U.S. Dept of Transportation-pipeline and hazardous materials safety administration	Community Safety (CS) Grant		enhances the capability of communities to prepare for and respond to hazmat accidents and incidents and supports the training of state and local enforcement personnel who are responsible for enforcing the safe transportation of hazmat	competitively awarded to non-profit organizations
U.S. Dept of Transportation-pipeline and hazardous materials safety administration	State Damage Prevention Grants		establish comprehensive state programs designed to prevent damage to underground pipelines	state authority (or municipality with respect to intrastate gas transportation) that is or will be responsible for preventing damage to underground pipeline facilities is eligible as long as 1) the state participates in the oversight of pipeline transportation pursuant to an annual 49 U.S.C. §60105 certification or 49 U.S.C. §60106 agreement in effect with the Pipeline and Hazardous Materials Safety Administration, and 2) is designated by the state's governor, in writing, as the eligible recipient of the grant funding.

Illinois Specific Grants

Agency	Program Name	Grants Available (if multiple)	Projects Covered	Who Can Apply
Illinois Clean Energy Community Foundation	Energy Program	K-12 Solar and Wind Schools Grant, First Responders Resilience Pilot Program, PV for Nature/welcome centers, Solar Thermal, Biomass, Advancing Renewable Energy and Emerging Technology Grants, Net Zero Energy Wastewater Treatment Plant Grants	various, see website	various, see website
IEMA and Illinois Terrorism Task Force	Preparedness and Response (PAR) Grant Program		helps enhance statewide emergency preparedness and response	state agencies, public universities, units of local government, and statewide mutual aid organizations
IEMA	Hazardous Materials Emergency Preparedness (HMEP) - IEMA		funds projects designed to increase effectiveness in safely and efficiently handling hazardous materials incidents	state, territorial, tribal, and local governments that have IEMA approved LEPCs in place
Rebuild Illinois capital infrastructure plan of 2019, IDOT	Rebuild Illinois	Rebuild Illinois Transit Capital Grant Program, Rebuild Illinois for Distressed Communities Grant, Fast-Track Public Infrastructure (FTPI) component	$45 billion worth of investments in roads, bridges, railroads, universities, early childhood centers and state facilities over the next six years	Funding allocated to various groups as laid out in the bill, 3 Grant cycles will open to accept proposals for IDOT projects **cannot find a webpage that lays out all contents of bill with grant application info, some have expired and the new fiscal year openings are not online
IL American Water	ENVIRONMENTAL GRANT PROGRAM	funding for innovative, community-based environmental projects that improve, restore or protect the watersheds, surface water and groundwater supplies in our local communities.	Located within an American Water service area Completed between May and November of the grant funding year Be a new or innovative community initiative, or serve as significant expansion to an existing program.	Local, State, Federal government bodies. 501c certified non profit organizations

IEPA Grants

Agency	Program Name	Grants Available (if multiple)	Projects Covered	Who Can Apply
IEPA	Unsewered Communities	Planning Grant Program, Construction Grant Program	Project planning and construction for unsewered communities to develop and/or update wastewater treatment programs	Local government units
IEPA	Wastewater/Stormwater and Drinking Water Loans	Water Pollution Control Loan Program (WPCLP),Public Water Supply Loan Program (PWSLP)	Our programs provide financial assistance to eligible public or private applicants for the design and construction of a wide variety of projects that protect or improve the quality of Illinois' water resources. We assist applicants with projects that address human health and failing water infrastructure. Eligible projects include new drinking water or wastewater infrastructure construction; upgrading or rehabilitating existing infrastructure; storm water-related projects that benefit water quality; and a variety of other projects that protect or improve the quality of Illinois's rivers, streams, and lakes.	local government and private entities
IEPA	Energy Efficiency at Waste Water Treatment Plants	Public Water Infrastructure Energy Assessments, Waste Water Treatment Plant (WWTP) Energy Efficiency Grant	no-cost energy usage assessments to publicly owned water facilities. The final assessment reports break down recommendations for energy efficiency improvements at each facility and include upfront costs for equipment upgrades or retrofits, estimated time for return of investment, and savings resulting from upgrades and retrofits.	local governments, grant funds available only if municipality has completed an energy assessment within last 5 years
IEPA	Water Quality	Water Quality Management (604b), Nonpoint source Pollution (319), and green infrastructure grants	development of watershed-based plans, outreach/education related to water quality, develop preliminary management practices, implementation of BMPs; (stormwater management, flood control, pollution control, and other projects may be covered)	Greater Egypt applies for water quality grants on behalf of municipalities or other groups in our counties
IEPA	Low Income Residential Energy Efficiency Program	Energy Efficiency Trust Fund (EE Trust Fund)	Building Envelope insulation Window replacement Space heating and cooling equipment retrofit Heating and cooling distribution system retrofit Installation of efficient domestic hot water equipment Lighting upgrades (indoor and/or outdoor) High-efficiency appliance installation/replacement Programmable thermostats installation Energy metering changes	local governments, public housing authorities, other non-profits

Appendix 7: Adopting Resolutions

Resolution #16

ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, Perry County, Illinois recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, Perry County participated jointly in the planning process with the other local units of government within the County to update the 2015 Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that Perry County, Illinois hereby adopts the updated Perry County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Perry County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS 4th Day of April, 2023.

County Commissioner, Chairperson

County Commissioner

County Commissioner

Attested by: County Clerk & Recorder

Resolution # 2023-2

ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Cutler, Illinois recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, the Village of Cutler participated jointly in the planning process with the other local units of government within the County to update the 2015 Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village of Cutler, Illinois hereby adopts the updated Perry County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Perry County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS 3rd Day of August, 2023.

Village President

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Attested by: Village Clerk

Resolution 2023-R03-05

ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the City of Du Quoin, Illinois recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, the City of Du Quoin participated jointly in the planning process with the other local units of government within the County to update the 2015 Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the City of Du Quoin, Illinois hereby adopts the updated Perry County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Perry County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS 27th Day of March, 2023.

Mayor

Charles Genesio
City Council Member

Bob Karnes
City Council Member

Jill Kirkpatrick
City Council Member

Michael Ward
City Council Member

Ruth Hale
Attested by: City Clerk

City of Du Quoin IL
INCORPORATED
July 14th 1873

RESOLUTION NO. R-2023-32

A RESOLUTION ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the City of Pinckneyville, Perry County, Illinois, recognizes the threat that natural hazards pose to people and property; and,

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and,

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and,

WHEREAS, the City of Pinckneyville participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Pinckneyville, Perry County, Illinois, as follows:

SECTION 1: The City Council hereby finds that all the recitals contained in the preambles of this Resolution are full, true and correct and does hereby incorporate them into this Resolution by reference.

SECTION 2: The City of Pinckneyville hereby adopts the Perry County Multi-Hazard Mitigation Plan as an official plan.

SECTION 3: The Perry County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

SECTION 4: This Resolution shall be in full force and effect from and after its passage and approval as provided by law.

INTRODUCED this 24th day of July, 2023.

PASSED this 24th day of July, 2023.

APPROVED this 24th day of July, 2023.

Robert L. Spencer, Mayor

ATTEST:

Melissa S. Kellerman, City Clerk

	AYE	NAY	ABSENT	ABSTAIN
Commissioner Kevin B. Hicks	X			
Commissioner Joshua L. Kuhnert	X			
Commissioner Sammy D. Peradotta	X			
Commissioner William B. Stotlar	X			
Mayor Robert L. Spencer	X			

Resolution # 23-01

ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of St. Johns, Illinois recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, the Village of St. Johns participated jointly in the planning process with the other local units of government within the County to update the 2015 Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village of St. Johns, Illinois hereby adopts the updated Perry County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Perry County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS 13th Day of July, 2023.

Village President

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Attested by: Village Clerk

FILED
JUL 14 2023
COUNTY CLERK
PERRY CO. IL

Resolution # 621

ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Tamaroa, Illinois recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, the Village of Tamaroa participated jointly in the planning process with the other local units of government within the County to update the 2015 Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village of Tamaroa, Illinois hereby adopts the updated Perry County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Perry County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS 14th Day of June, 2023.

Village President

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Attested by: Village Clerk

Resolution # 2023-R79

ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Willisville, Illinois recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHERAS, the Village of Willisville participated jointly in the planning process with the other local units of government within the County to update the 2015 Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village of Willisville, Illinois hereby adopts the updated Perry County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Perry County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS 16th Day of May, 2023.

Village President

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Village Trustee

Attested by: Village Clerk

RESOLUTION NO. R-2023-4

A RESOLUTION ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Pinckneyville Rural Fire Protection District, Perry County, Illinois, recognizes the threat that natural hazards pose to people and property; and,

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and,

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and,

WHEREAS, the Pinckneyville Rural Fire Protection District participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED by the Board of Trustees for the Pinckneyville Rural Fire Protection District as follows:

SECTION 1: The Board hereby finds that all the recitals contained in the preambles of this Resolution are full, true and correct and does hereby incorporate them into this Resolution by reference.

SECTION 2: The Pinckneyville Rural Fire Protection District hereby adopts the Perry County Multi-Hazard Mitigation Plan as an official plan.

SECTION 3: The Perry County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois

Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

SECTION 4: This Resolution shall be in full force and effect from and after its passage and approval as provided by law.

Todd Kellerman, President

STATE OF ILLINOIS)
)SS.
COUNTY OF PERRY)

I, Jeff Suchomski, the duly elected, qualified and acting Secretary of the Board of Trustees of the Pinckneyville Rural Fire Protection District, Perry County, Illinois, DO HEREBY CERTIFY that attached hereto is a true and correct copy of "**A RESOLUTION ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN**," passed and approved at a regular meeting of the Board of Trustees of said Pinckneyville Rural Fire Protection District, Perry County, Illinois, held on the 5th day of September, 2023, as the same appears of record in the official Journal of Proceedings of said Board of Trustees.

IN WITNESS WHEREOF, I have hereunto set my hand and seal this 5th day of September, 2023.

Jeff Suchomski, Secretary (SEAL)

RESOLUTION NO. R-2023-5

A RESOLUTION ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Tamaroa Community Fire Protection District, Perry and Jefferson Counties, Illinois, recognizes the threat that natural hazards pose to people and property; and,

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and,

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and,

WHEREAS, the Tamaroa Community Fire Protection District participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED by the Board of Trustees for the Tamaroa Community Fire Protection District as follows:

SECTION 1: The Board hereby finds that all the recitals contained in the preambles of this Resolution are full, true and correct and does hereby incorporate them into this Resolution by reference.

SECTION 2: The Tamaroa Community Fire Protection District hereby adopts the Perry County Multi-Hazard Mitigation Plan as an official plan.

SECTION 3: The Perry County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Illinois

Emergency Management Agency and the Federal Emergency Management Agency for final review and approval.

SECTION 4: This Resolution shall be in full force and effect from and after its passage and approval as provided by law.

Michael Davison, President

STATE OF ILLINOIS)
)SS.
COUNTY OF PERRY)

I, Timothy Bronke, the duly elected, qualified and acting Secretary of the Board of Trustees of the Tamaroa Community Fire Protection District, Perry and Jefferson County, Illinois, DO HEREBY CERTIFY that attached hereto is a true and correct copy of "**A RESOLUTION ADOPTING THE PERRY COUNTY MULTI-HAZARD MITIGATION PLAN**," passed and approved at a regular meeting of the Board of Trustees of said Tamaroa Community Fire Protection District, Perry and Jefferson County, Illinois, held on the 14th day of September, 2023, as the same appears of record in the official Journal of Proceedings of said Board of Trustees.

IN WITNESS WHEREOF, I have hereunto set my hand and seal this 14th day of September, 2023.

Timothy Bronke, Secretary (SEAL)