Jefferson County, Illinois

Multi-Hazard Mitigation Plan

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

FEMA

IEMA

Mitigation Preparedness Response Recovery
EMA
Jefferson County, Illinois

Greater Egypt Regional Planning & Development Commission

Jefferson County, Illinois

Multi-Hazard Mitigation Plan

County Adoption Date: 03/27/2023

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Acronyms

ASCE	American Society of Civil Engineers	**HMGP**	Hazard Mitigation Grant Program
ASDSO	Association of Dam Safety Officials	**IBC**	International Building Code
BRIC	Building Resilient Infrastructure and Communities	**IDPH**	Illinois Department of Public Health
CARES	Coronavirus Aid, Relief, and Economic Security Act	**IEMA**	Illinois Emergency Management Agency
CDC	Centers for Disease Control	**IEPA**	Illinois Environmental Protection Agency
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
FMAG	Fire Management Assistance Grant Program	**US EPA**	United States Environmental Protection Agency
GERPDC	Greater Egypt Regional Planning and Development Commission	**USACE**	United States Army Corps of Engineers
GIS	Geographic Information System	**USDA**	United States Department of Agriculture
HAB	Harmful Algal Bloom	**USFWS**	United States Fish and Wildlife Service
Hazus-MH	Hazus Multi Hazard (modeling software)	**USGS**	United States Geological Survey
HHPD	Rehabilitation of High Hazard Potential Dam 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 Jefferson 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 Jefferson 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 Jefferson 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 6 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 Jefferson 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 29 participating jurisdictions and stakeholders in Jefferson 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 (* indicates required participation):

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 Jefferson 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 Jefferson 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/

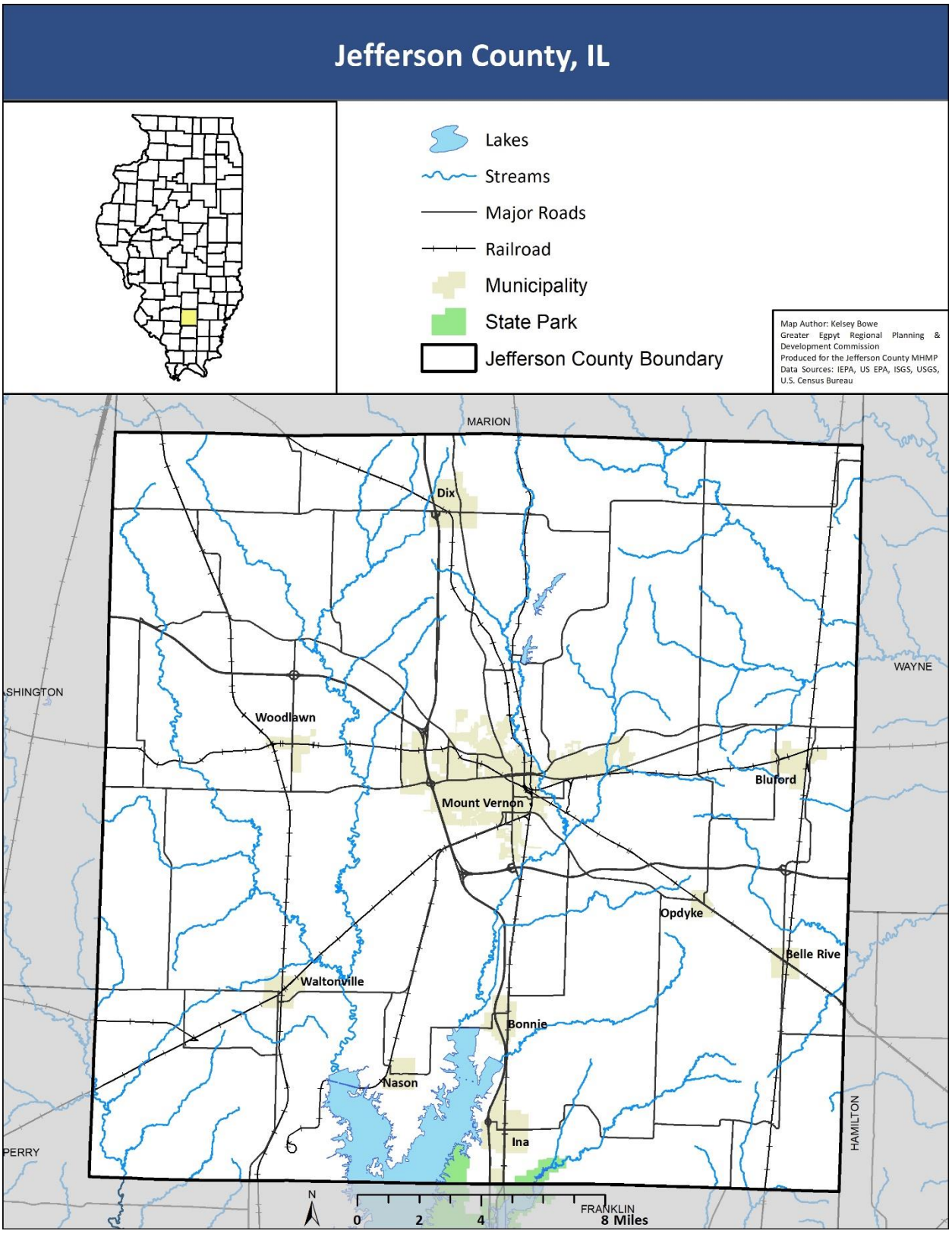
3. Jefferson County Profile

3.1. County Background

Named after Thomas Jefferson, Jefferson County was formed in 1819 from the acquisition of portions of Edwards, White, and Franklin Counties. In 1823 the county's area was reduced when Marion County acquired the northern portion of Jefferson County - its boundaries remain the same today. Mount Pleasant, renamed Mount Vernon to honor the home of George Washington, became the county seat. In the latter half of the 19th century, the Illinois Supreme Court was located in Mt. Vernon but would be moved in 1896. Railway development in the 1870's sparked industrial growth in Mt. Vernon including metal manufacturing, milling, and brewing. Mt. Vernon also became a prolific producer of railway cars in the beginning of the 20th century. In 1888, a direct hit by a tornado wiped out roughly 500 buildings - though the city was quickly repaired.

Jefferson County is located in southern Illinois and is bordered by Marion County to the north, Franklin County to the south, Washington and Perry counties to the west, and Wayne and Hamilton counties to the east. The county is split by Interstate 57 which runs north to south from Chicago, IL to Sikeston, MO. Interstate 64, which runs from Virginia to Missouri, runs east to west through the center of the county. These major highways are crucial to the economic vitality of Mt. Vernon, as well as the rest of the county.

Figure 3.1


Jefferson County, IL
Lakes
Streams
Major Roads
Railroad
Municipality
State Park
Jefferson County Boundary
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Jefferson County MHMP
Data Sources: IEPA, US EPA, ISGS, USGS, U.S. Census Bureau
MARION
Dix
WAYNE
SHINGTON
Woodlawn
Bluford
Mount Vernon
Opdyke
Belle Rive
Waltonville
Bonnie
Nason
Ina
HAMILTON
PERRY
FRANKLIN
N
0
2
4
8 Miles

3.2. Demographics

Based on the 2020 decennial census, Jefferson County has 37,113 residents. This is an 4.4% decrease from 2010 figures. Jefferson County is divided into sixteen townships, The population by township within Jefferson County can be seen in table 3.1. According to the U.S. Census Bureau, 84.7% of residents in Jefferson County are white, 7.7% are Black or African American, 2.4% are Hispanic or Latino, and 1% are Asian. A full breakdown of race and Hispanic origins for Jefferson County is displayed in Table 3.2.

Table 3.1 - Jefferson County 2020 Population Estimate by Township

Township	Population
Moores Prairie	372
Blissville	400
Farrington	599
Elk Prairie	701
Bald Hill	800
Grand Prairie	900
Pendleton	1,191
Casner	1,209
McClellan	1,269
Field	1,482
Rome	1,710
Webber	2,104
Spring Garden	2,586
Dodds	2,690
Shiloh	6,524
Mount Vernon	12,576

Source: U.S. Census Bureau

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

Race and Hispanic Origins	Percentage of Population
American Indian and Alaska Native alone	0.2
Asian alone	1.0
Black or African American alone	7.7
Two or more races	5.5
Hispanic or Latino	2.4
White alone, not Hispanic or Latino	84.0
White alone	84.7
Native Hawaiian and Pacific Islander	0.0
Some other race	0.9

Source: U.S. Census Bureau

3.3. Economy and Industry

Mount Vernon is the hub of economic activity and development within Jefferson County. The Village of Ina, positioned along Rend Lake also has minor development, catering to tourists visiting Rend Lake. The Big Muddy River Correctional Facility is also located in Ina.

Table 3.3 displays the industries in Jefferson County by the estimated number of people employed per industry. Health care, manufacturing, retail trade, educational services, accommodation & food services, and transportation & warehousing are some of the largest sectors of employment. The Good Samaritan Regional Health Center and Crossroads Community Hospital, both located in Mount Vernon, are the largest healthcare employers in the county. The Continental Tire Inc. manufacturing site in Mount Vernon is the largest employer in the manufacturing industry in Jefferson County. The Mount Vernon School District and Rend Lake Community College are the largest educational employers. There is also a Walgreen's Distribution Center in Mount Vernon which is the largest employer in the transportation & warehousing industry.

Jefferson County has not had any new industrial construction nor housing developments since 2015. Development has been largely to existing structures[2].

According to the U.S. Census Bureau, Jefferson County has a median household income of $49,896. Roughly 17% of the population is below the poverty line – the national poverty rate is 11.4%

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

Industry	Estimated Number of Employees
Health Care & Social Assistance	2860
Manufacturing	2466
Retail Trade	2111
Educational Services	1223
Accommodation & Food Services	1219
Transportation & Warehousing	1049

Source: Data from the Census Bureau ACS 5-year Estimate

[2] Information from Jefferson County IL. Development Corporation

3.4. Land Use and Development Trends

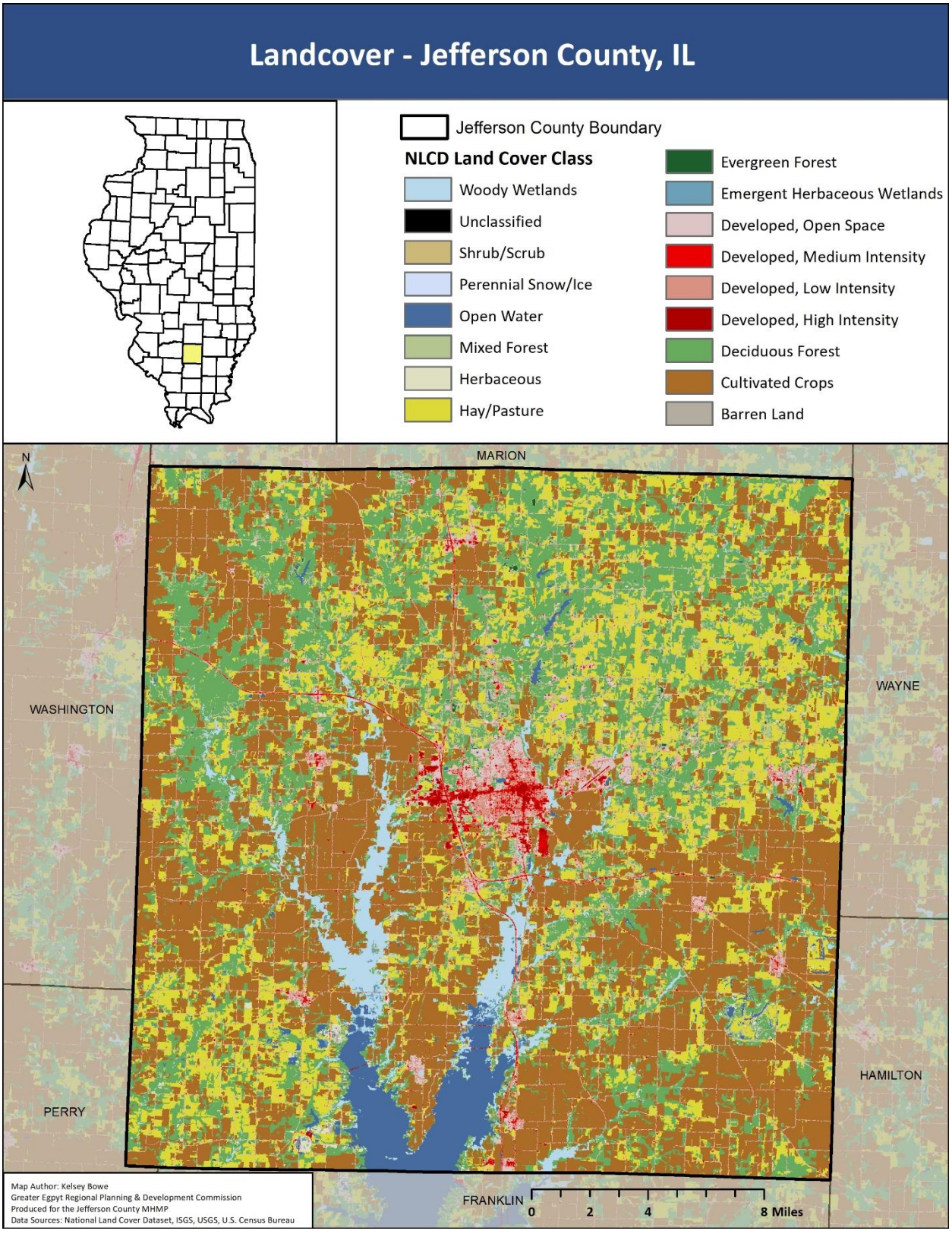
Before European settlement, Jefferson County was largely comprised of deciduous forest with small areas of prairie as well. Over recent centuries, the land cover has been transformed by agriculture, mining, and urban development. Agriculture currently dominates the land cover of Jefferson County. Major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

The coal mining industry was a driving economic force in Jefferson County during the 19th and 20th centuries. While the coal industry has dwindled in the area in recent decades, ramifications of historic mining are still present today. There are small portions of the county that have been left unsuitable for development or agriculture as a result of un-reclaimed mining sites. Abandoned strip mines are generally concentrated within Moores Prairie, Elk Prairie, and Bald Hill Townships.

Urban Development in Jefferson County has focused around Mt. Vernon which resides along Interstate 57. It is home to many amenities such as health services, retail trade, restaurants, and lodging. Industrial development is primarily located in the Mt Vernon Industrial Centre and the Fountain Place Industrial Park. Continental Tire, National Railway, and the Walgreens Distribution Center are the primary manufacturing operations in the region. Mount Vernon's Comprehensive Plan illustrates future industrial, commercial, and residential development around the city.

Public land use in the county includes schools, parks, public utilities, etc. Major areas of note are the Rend Lake Conservancy District, Mount Vernon State Game Farm, and Rend Lake College.

Figure 3.2


Landcover - Jefferson County, IL
Jefferson 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
MARION
WAYNE
WASHINGTON
HAMILTON
PERRY
FRANKLIN
0
2
4
8 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Jefferson County MHMP
Data Sources: National Land Cover Dataset, ISGS, USGS, U.S. Census Bureau

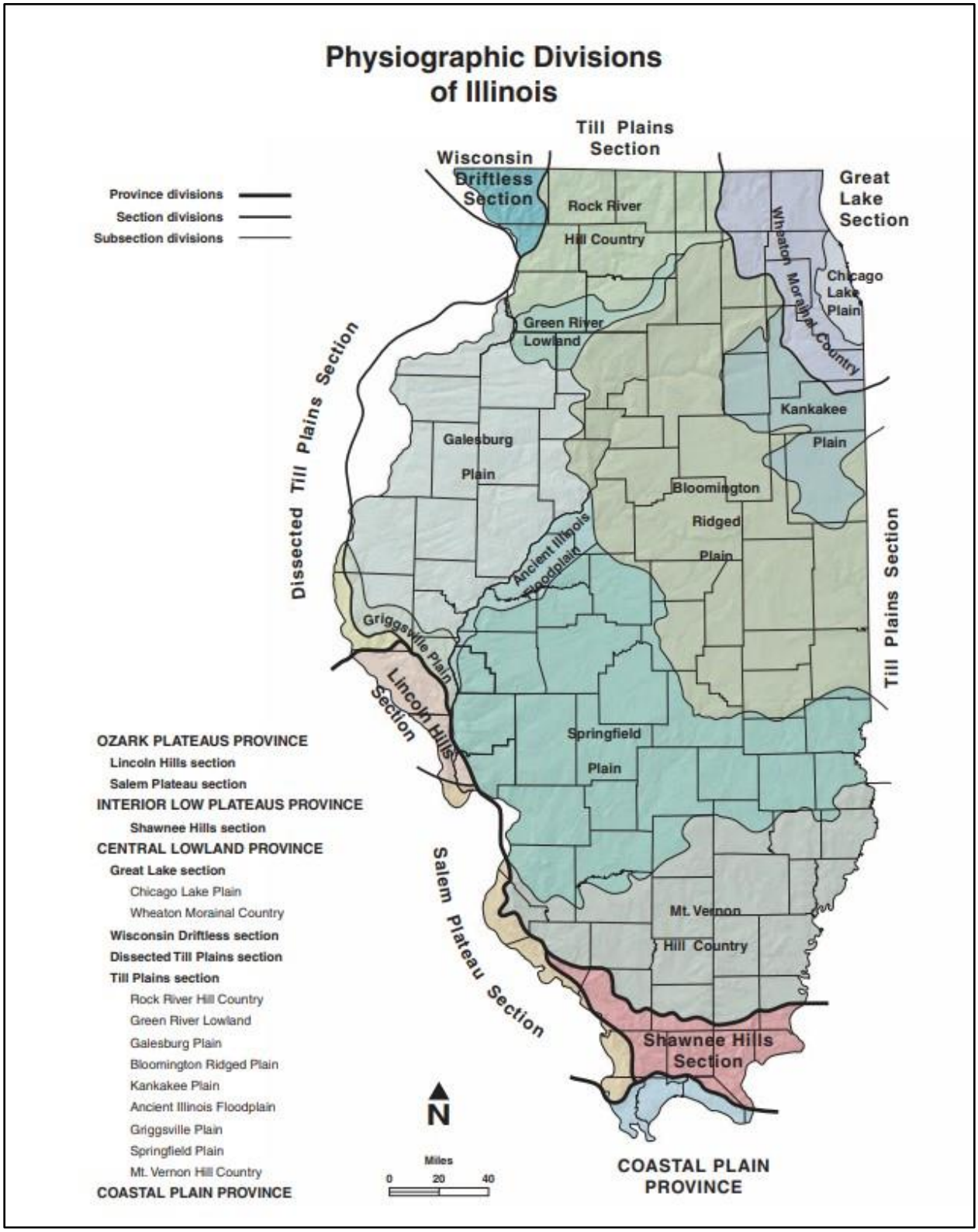
3.5. Climate

Jefferson County is within the Dfa (hot-summer humid continental) Köppen-Geiger climate zone. Summers are humid and warm, while winters are cool and wet. The warmest months are June – September with average highs reaching 89°F and lows in the mid to high 60s. Average highs in the winter are well above freezing: the average high in January is 40°F and the low is 24°F. However, this region is subject to wildly variable weather, often leading to weeks of stifling heat in the summer and 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

Jefferson County is located in the southern part of the Mt. Vernon Hill Country portion of the Till Plains region, though a very small part of the northwest corner of the County is in the Springfield Plains physiographic division. The Till Plains topography resulted from the deposition of unsorted glacial sediments during the final stages of the Wisconsin glaciation. Despite being near the southern terminus of the glacier, Jefferson County has no significant moraine or esker deposits. The area is characterized by low rolling hills. The highest elevation in the county is located near Dix, IL (600 ft above sea level) in the northern portion of Jefferson, while the lowest elevation (approx. 413ft above sea level) is in the southern portion of the county near Rend Lake.

Figure 3.3



Source: Illinois State Geological Survey

Jefferson County is drained by three HUC 8 Watersheds - The Big Muddy (HUC ID: 07140106), The Skillet (HUC ID: 05120115), and the Middle Kaskaskia watershed (HUC ID: 07140202) (Figure 3.4). Jefferson County straddles the divide between the Ohio and Mississippi river watersheds. The Big Muddy and the Middle Kaskaskia watersheds drain to the Mississippi River; the Skillet watershed drains to the Ohio River. Rend lake is the largest reservoir in southern Illinois and the second largest in the state, it encompasses 20,633 acres in Franklin and Jefferson counties.[3]

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. The Big Muddy River and Casey Fork flow into the northernmost portions of Rend Lake. The Little Muddy River converges with the Big Muddy south west of Rend Lake. The Big Muddy River eventually converges with the Mississippi River near Grand Tower, IL in Jackson County.

The Middle Kaskaskia watershed drains only a small portion of the northwest part of the county. The many small tributaries in this watershed converge with the Kaskaskia River, which meets the Mississippi River north of Chester, IL.

The Skillet watershed drains the eastern third of the county via the Skillet Fork River and other tributaries. These streams meet with the Wabash River, which empties into the Ohio River north east of Shawneetown.

[3] Illinois Department of Natural Resources, “REND LAKE”, Ifishillinois.org.

Figure 3.4

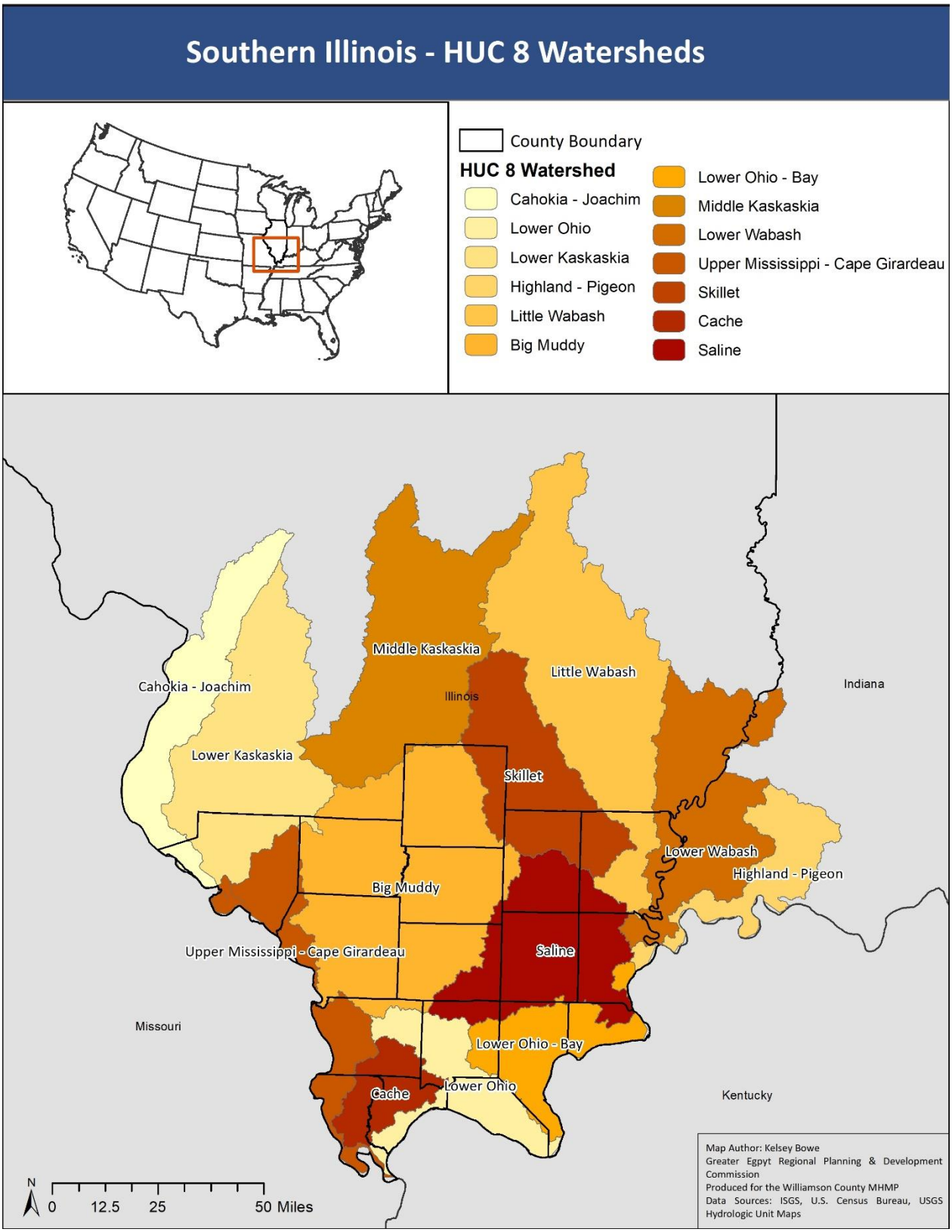
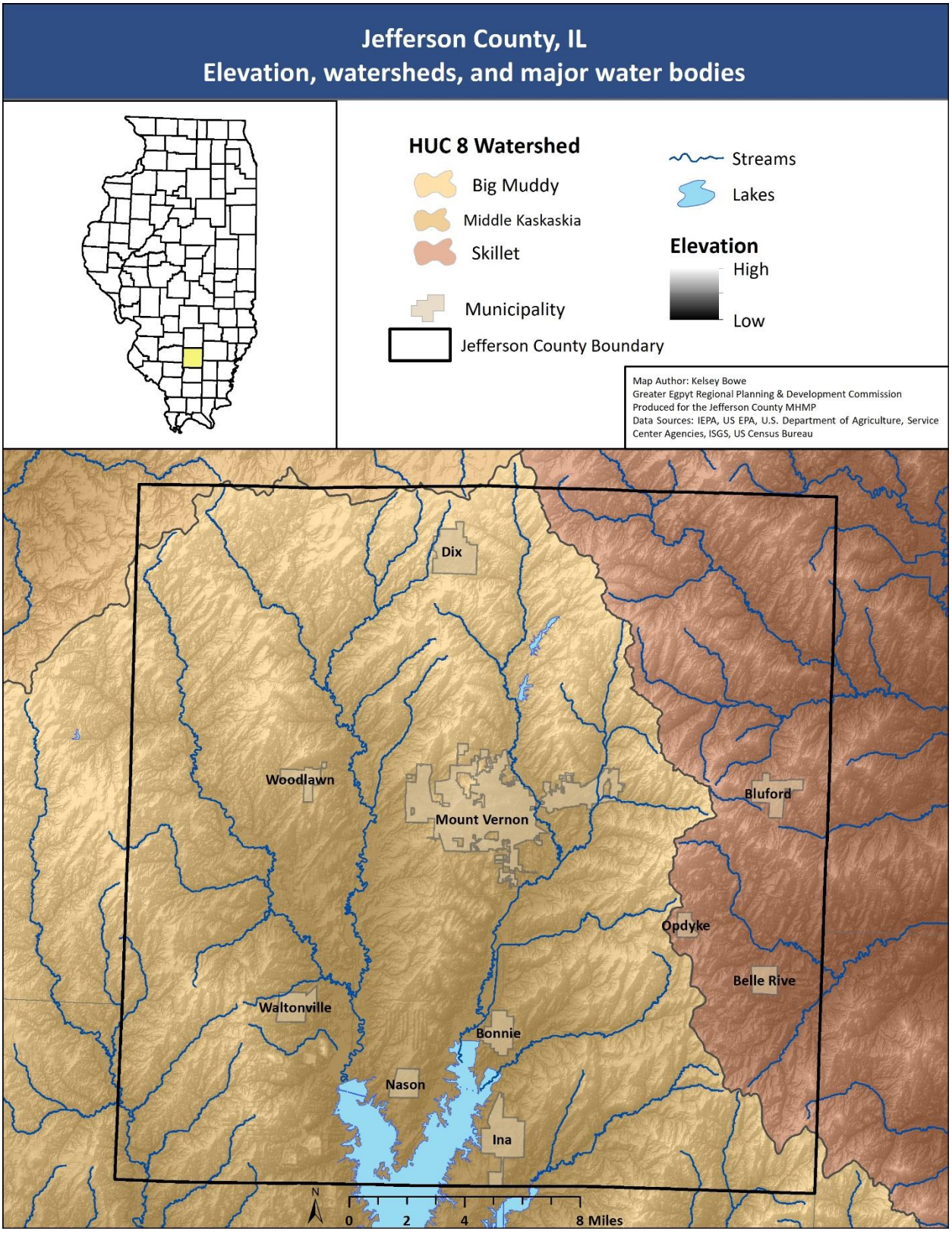

Southern Illinois - HUC 8 Watersheds
County Boundary
HUC 8 Watershed
Cahokia - Joachim
Lower Ohio
Lower Kaskaskia
Highland - Pigeon
Little Wabash
Big Muddy
Lower Ohio - Bay
Middle Kaskaskia
Lower Wabash
Upper Mississippi - Cape Girardeau
Skillet
Cache
Saline
Middle Kaskaskia
Little Wabash
Cahokia - Joachim
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


Jefferson County, IL
Elevation, watersheds, and major water bodies
HUC 8 Watershed
Big Muddy
Middle Kaskaskia
Skillet
Municipality
Jefferson County Boundary
Streams
Lakes
Elevation
High
Low
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Jefferson County MHMP
Data Sources: IEPA, US EPA, U.S. Department of Agriculture, Service Center Agencies, ISGS, US Census Bureau
Dix
Woodlawn
Mount Vernon
Bluford
Opdyke
Belle Rive
Waltonville
Bonnie
Nason
Ina
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 Jefferson 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 Jefferson County Planning Team included ambulance stations and healthcare facilities in this category.

A complete list of Jefferson 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[4]. 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[5] .

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[6]. 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.[7]

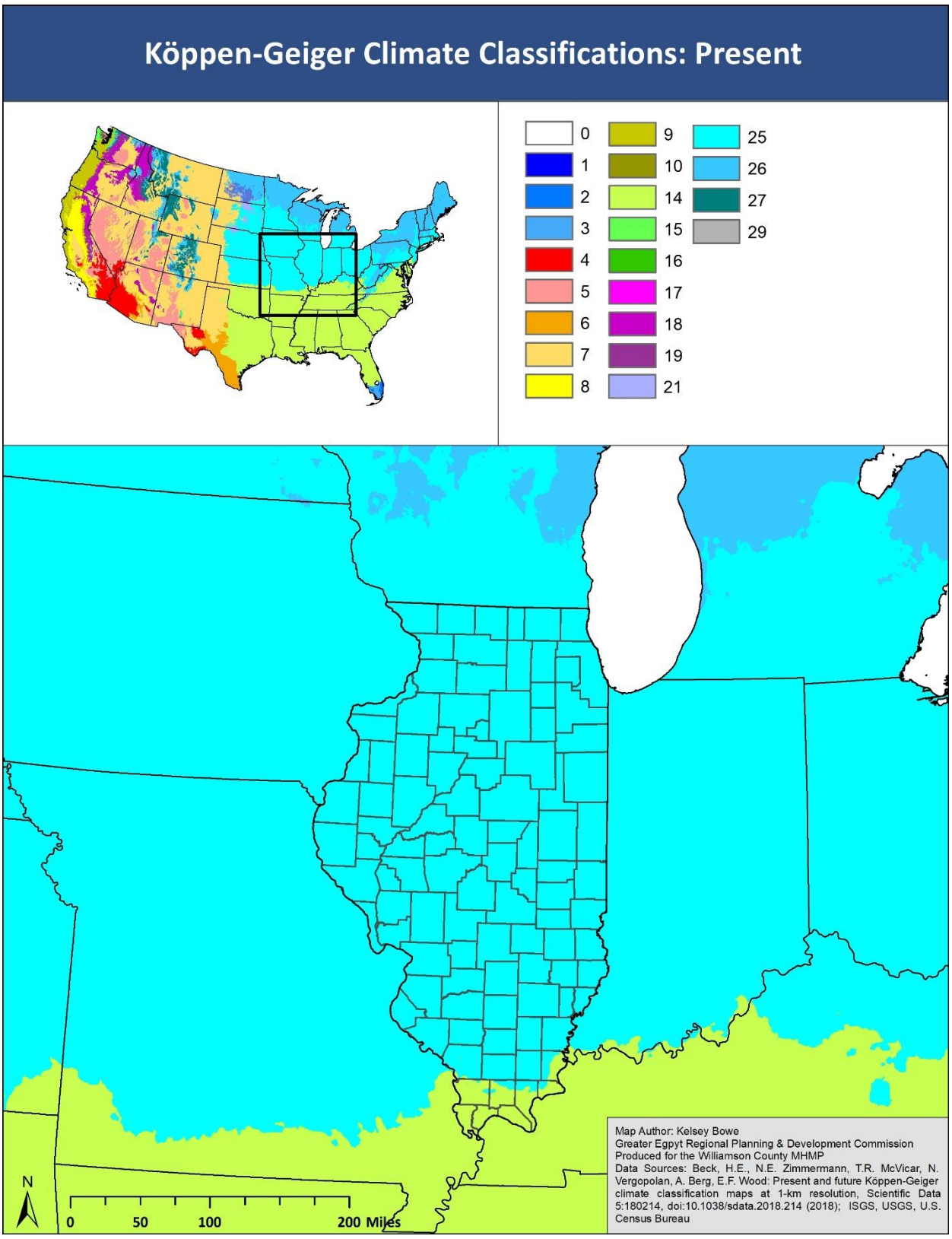
This Multi-Hazard Mitigation Plan will contain a sub section within each chapter, when relevant, to discuss the risks associated with climate change related increases of the specific hazard.

[4] 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.
[5] Gray, E. and Merzdorf J. "Earth's Freshwater Future: Extreme Floods and Drought", NASA Global Climate Change, 2019.
[6] 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).
[7] 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
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15
16
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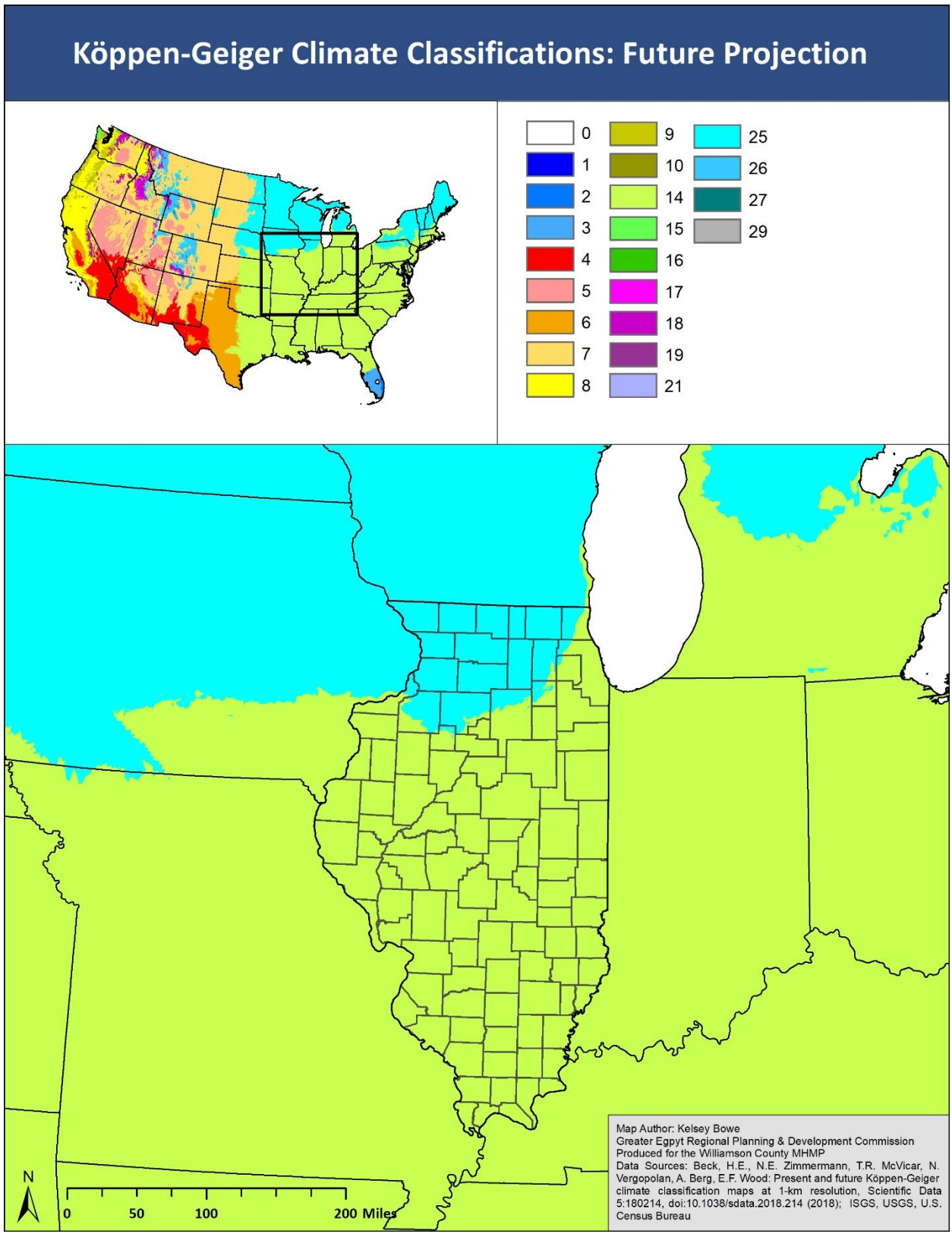
27
29
N
0
50
100
200 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Williamson County MHMP
Data Sources: Beck, H.E., N.E. Zimmermann, T.R. McVicar, N. Vergopolan, A. Berg, E.F. Wood: Present and future Köppen-Geiger climate classification maps 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
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200 Miles
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4.1.3. Jefferson 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.

The Jefferson County Planning Team members completed a hazard ranking exercise. The County hazard list is as follows:

1. Tornados & Derechos
2. Disease outbreak, epidemics, and pandemics
3. Earthquakes
4. Severe winter weather
5. Hazardous Materials release
6. Flooding
7. Severe thunderstorms
8. Drought and excessive heat
9. Ground failure (mine subsidence)
10. Terrorism
11. Dam failure
12. Cyberattack
13. Wildfire
14. Utility disruption & power outages
15. Infestation/invasive species
16. Landslide
17. Near Earth Object Impact (meteor)

Hazard rankings by jurisdiction can be found in appendix 3.

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 Jefferson County, Illinois from 2016-2021.

4.2. Tornados and 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[8]. 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 4.4). 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[9]. 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[10]. 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.

[8] "Severe weather 101," The National Severe Storms Laboratory, nssl.noaa.gov.
[9] "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.
[10] "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[11]

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 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[12]. An F4 tornado went through Williamson County, IL the same day- killing 10, injuring 181, and damaging 500 homes and 82 businesses[13]. The path in Williamson County was 17 miles long and nearly ¼ mile wide[14].

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[15]. One EF3 and five EF2 tornados occurred in Illinois from this event; none occurred in Jefferson County. 89 deaths and nearly $4 billion in damages occurred across all of the states that were impacted[16].

[11] Elsner, James B et al. "Tornado intensity estimated from damage path dimensions." PloS one vol. 9,9 e107571. 17 Sep. 2014
[12] Koplowitz, H.B., The Southern Illinoisian, "9 of 11 Conant homes ruined" June 1, 1982.
[13] Staff Writers, The Southern Illinoisian, "Marion counts loss, plans future" June 1, 1982.
[14] National Weather Service, "1982 Marion Illinois Tornado".
[15] National Weather Service, "NWS Storm Damage Summaries - Dec 10-11, 2021 Tornado Outbreak".
[16] 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[17]. 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[18].

There have been 30 recorded tornados in Jefferson County, IL (NOAA storm events database from 1957 to 2021), with 26 of those causing death, injuries, and/or property damage (table 4.7).

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

Table 4.7 Tornados in Jefferson County IL that have caused death, injury, or property damage.

Location	Date	Rating	Deaths	Injuries	Property Damage
	12/18/1957	F4	1	45	2500000
	12/18/1957	F2	0	2	25000
	12/18/1957	F2	0	0	25000
	12/19/1957	F2	0	0	25000
	5/9/1959	F1	0	0	25000
	2/9/1960	F2	0	1	250000
	4/20/1966	F0	0	0	25000
	5/7/1973	F1	0	3	0
	3/30/1982	F2	1	3	2500000
	5/1/1983	F1	0	0	2500000
INA	4/19/1996	F3	0	0	200000
CRAVAT	4/15/1998	F2	0	1	400000
BLUFORD	4/21/2002	F1	0	0	2000
WOODLAWN	5/30/2004	F1	0	0	100000
MT VERNON	6/27/2008	EF0	0	0	5000
TEXICO	3/8/2009	EF1	0	0	60000
STRATTON	3/8/2009	EF0	0	0	12000
SHIRLEY	6/27/2010	EF0	0	0	2000
BLUFORD	4/19/2011	EF1	0	0	90000
MT VERNON	4/19/2011	EF1	0	0	70000
WOODLAWN	5/25/2011	EF2	0	0	4000000
SHIRLEY	3/23/2012	EF2	1	2	150000
OPDYKE	11/17/2013	EF1	0	0	3000
BLUFORD	10/13/2014	EF1	0	0	50000
DIX	10/13/2014	EF1	0	0	10000
BELLE RIVE	3/19/2020	EF0	0	0	3000

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 and direction of its path. Based on NOAA data, Jefferson County has a 47% probability of experiencing a tornado in any given 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[19]. Franklin County has also not adopted any building codes; some individual municipalities do have building code enforcements, see section 5.2 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[20]. 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[21]. 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[22].

4.2.5. Hazard Model

ArcGIS was used to simulate an EF4 tornado in Jefferson County, IL. A hypothetical path was created with a polyline starting in the southwest corner and traveling northeast across the county. The damage path goes through the northwest corner of Waltonville and the middle of Mount Vernon. From the tornado path, 4 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. Residential parcel data is from the Jefferson County Assessor's Office. Railroad bridges, highway bridges, and hospitals have lower damage percentages since they are generally designed to withstand severe weather better than other infrastructure and buildings. The residential category includes single family homes, duplexes, mobile homes, and apartment buildings (Occupancy codes 0040 and 0050). Damage costs could not be determined for residential buildings with the data available.

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

Figure 4.3 shows the tornado path for Jefferson County. Tables 4.10-4.13 show the results and damage cost estimates for each buffer zone, table 4.9 shows the total damage cost estimates. Figure 4.4 shows the path in detail through Mount Vernon.

Table 4.9 – Total Damage Cost Estimates for EF4 Tornado Model

Total		
Category	**# Damaged**	**Total Cost of Damage**
highway bridges	20	9,428,315.43
railroad bridges	18	14,639,607.92
residential buildings	3221	NA
essential facilities	18	25,235,165.78
critical facilities	0	0
TOTAL		49,303,089.13

Figure 4.3

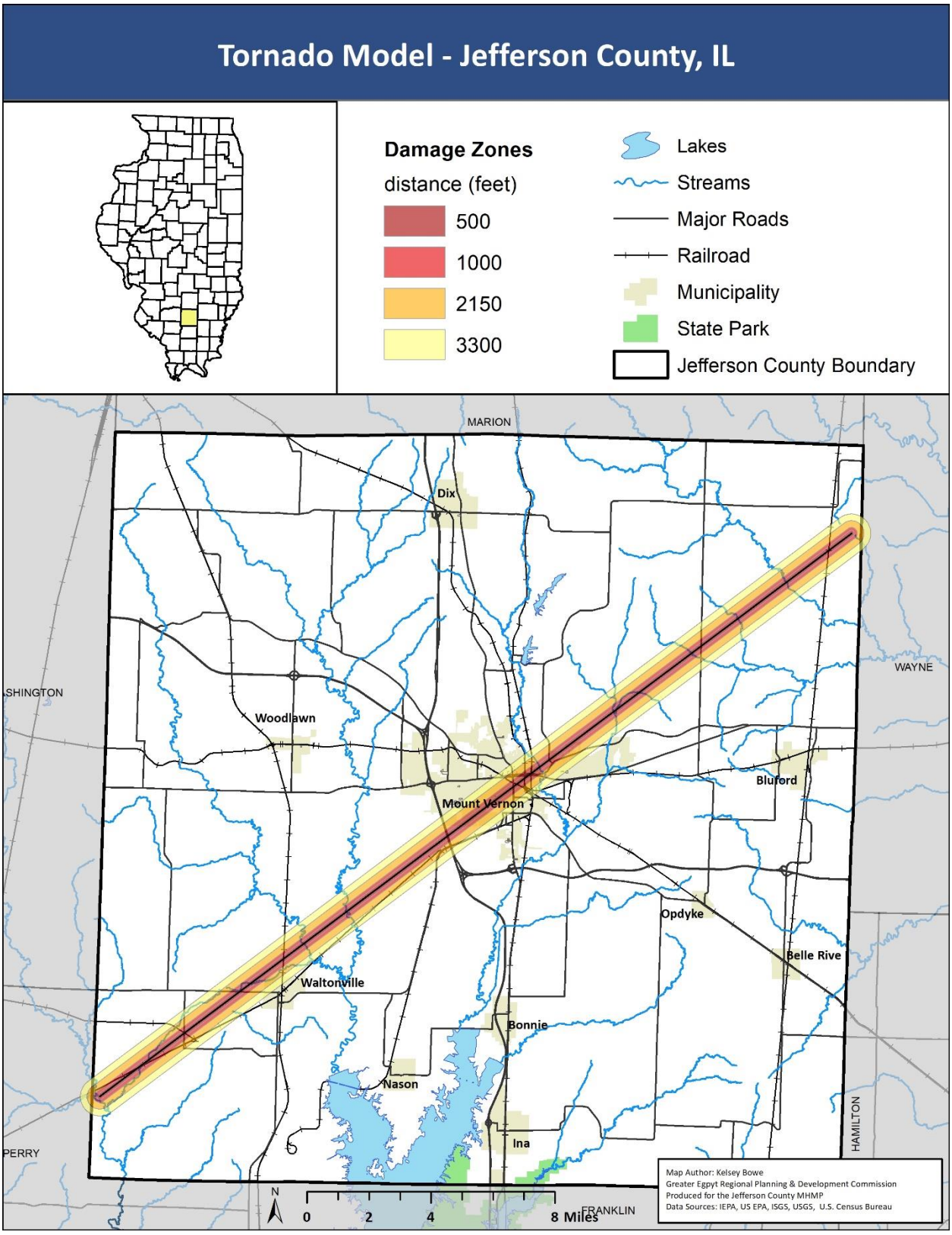

Tornado Model - Jefferson County, IL
Damage Zones
distance (feet)
500
1000
2150
3300
Lakes
Streams
Major Roads
Railroad
Municipality
State Park
Jefferson County Boundary
MARION
Dix
WAYNE
SHINGTON
Woodlawn
Bluford
Mount Vernon
Opdyke
Belle Rive
Waltonville
Bonnie
Nason
Ina
PERRY
HAMILTON
FRANKLIN
N
0
2
4
8 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Jefferson County MHMP
Data Sources: IEPA, US EPA, ISGS, USGS, U.S. Census Bureau

Figure 4.4

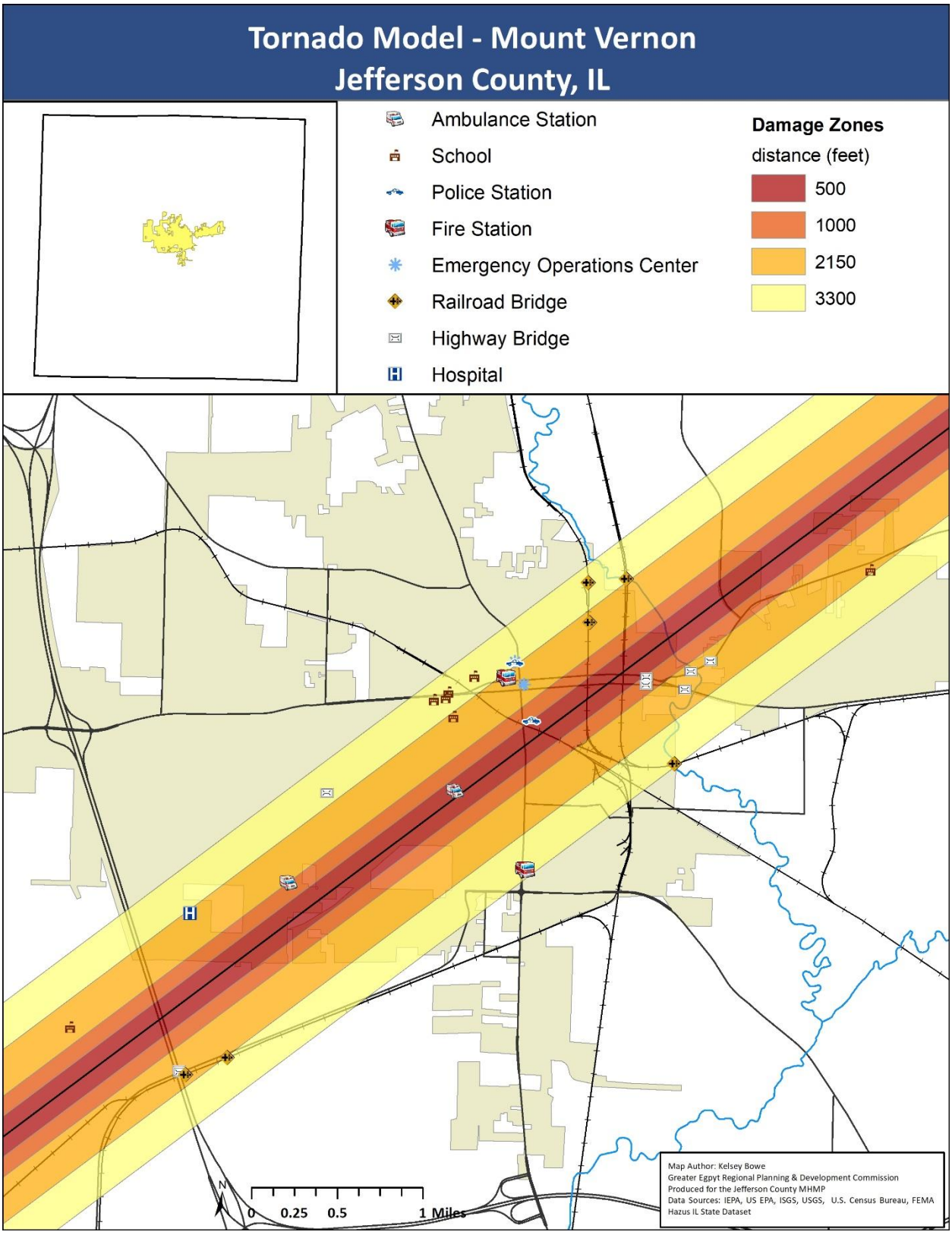

Tornado Model - Mount Vernon
Jefferson County, IL
Ambulance Station
School
Police Station
Fire Station
Emergency Operations Center
Railroad Bridge
Highway Bridge
Hospital
Damage Zones
distance (feet)
500
1000
2150
3300
N
0
0.25
0.5
1 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Jefferson County MHMP
Data Sources: IEPA, US EPA, ISGS, USGS, U.S. Census Bureau, FEMA Hazus IL State Dataset

Table 4.10

Zone 1		
Category	**# Damaged**	**Total Cost of Damage**
highway bridges	0	-
railroad bridges	1	3,921,323.55
residential buildings	372	NA
Litton Ambulance		2,796,530.03
Jefferson County Sheriff's Office		2,796,530.03

Table 4.11

Zone 2		
Category	**# Damaged**	**Total Cost of Damage**
highway bridges	6	1,374,619.75
railroad bridges	0	-
residential buildings	443	NA
United Medical Response Division 5		2,237,224.02

Table 4.12

Zone 3		
Category	**# Damaged**	**Total Cost of Damage**
highway bridges	8	7,891,926.48
railroad bridges	6	7,842,647.10
residential buildings	1179	NA
SSM Health Good Samaritan Hospital		4,157,312.50
Mt Vernon Township High School		3,700,000.00
Dr. Andy Hall Early Childhood Center		2,304,343.02
Summersville Grade School		2,225,131.35
Mt Vernon Fire Department Station 1		1,398,265.02
Jefferson County Emergency Operations Center		1,398,265.02

Table 4.13

Zone 4		
Category	**# Damaged**	**Total Cost of Damage**
highway bridges	6	161,769.20
railroad bridges	11	2,875,637.27
residential buildings	1227	NA
Zadok Casey Middle School		612,091.11
St. Mary's Catholic School		34,565.14
Victory Christian Academy		34,565.14
Alternative Learning Center		115,217.15
Waltonville Grade School		406,140.45
Waltonville High School		180,026.78
Mt. Vernon Police Department		279,653.00
Jefferson Fire Protection District Station 1		279,653.00
City of Mt. Vernon Emergency Operations Center		279,653.00

4.3. Disease Outbreaks, Epidemics, & Pandemics

4.3.1. 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].

4.3.2. 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.

4.3.3. 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.

4.4. 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[23].

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 4.5) 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[24].

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

Figure 4.5

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 4.6) 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[25].

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.

[25] "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 Franklin. 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[26]. Figure 4.6 shows the seismic zones and earthquake history of southern Illinois and surrounding states.

There have been six recorded earthquakes in Jefferson County from 1920-present day (Table 4.16).

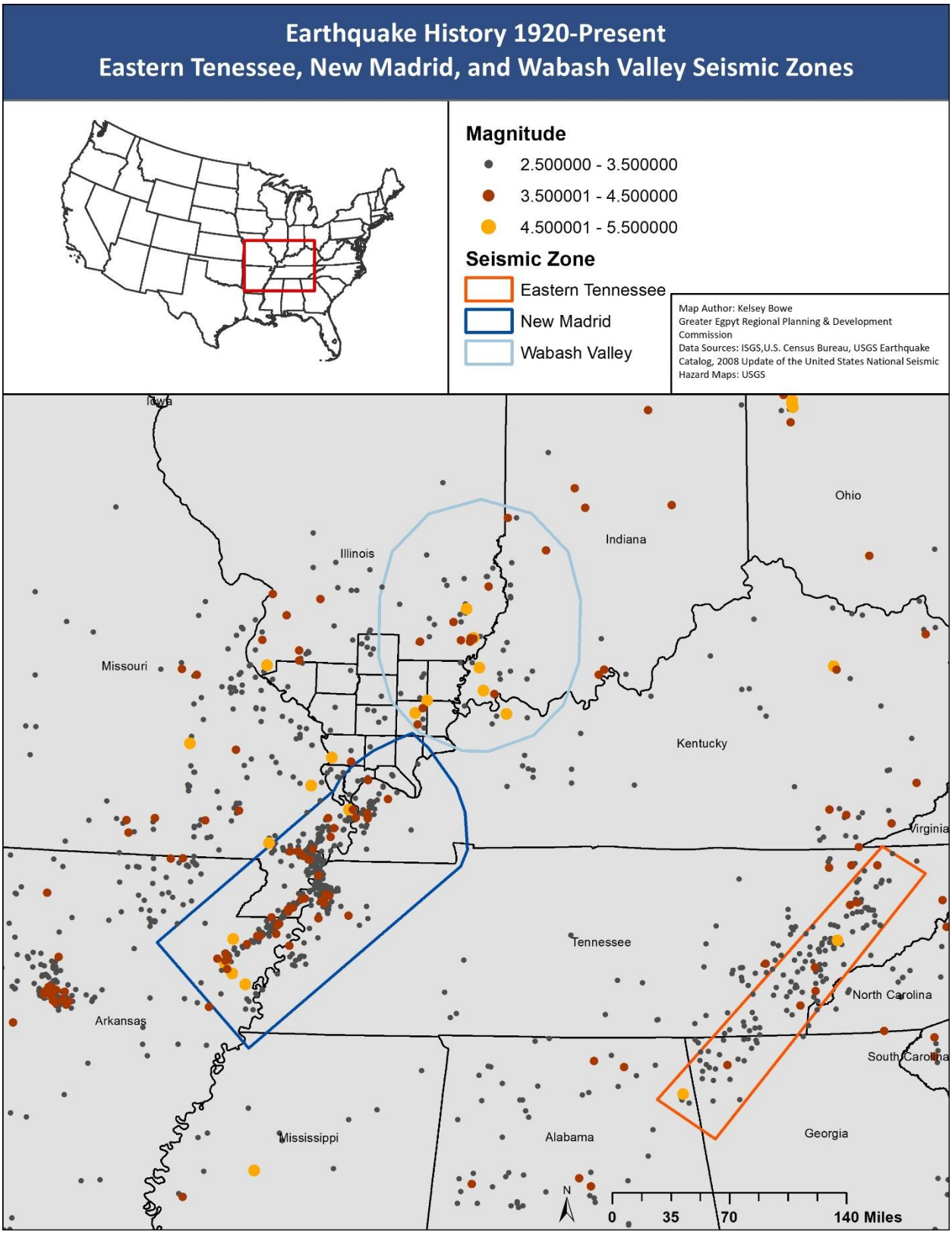
Table 4.16 - Earthquake records for Jefferson County, IL.

Date	Magnitude
2/26/1986	2.7
10/29/1986	3.0
3/15/1988	2.8
10/24/1990	3.2
9/5/1995	2.9
05/16/2022	2.5

Source: USGS Earthquake Catalog

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

Figure 4.6


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 4.7 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[27]. Jefferson 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 five feet of the surface. Jefferson County has a small area of very high liquefaction risk east of Belle Rive, Figure 4.8 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[28]. 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.

[27] "USA Earthquake Risk", Layer Description, Map Image Layer by ESRI and USGS, ArcGIS Online.
[28] "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 4.7

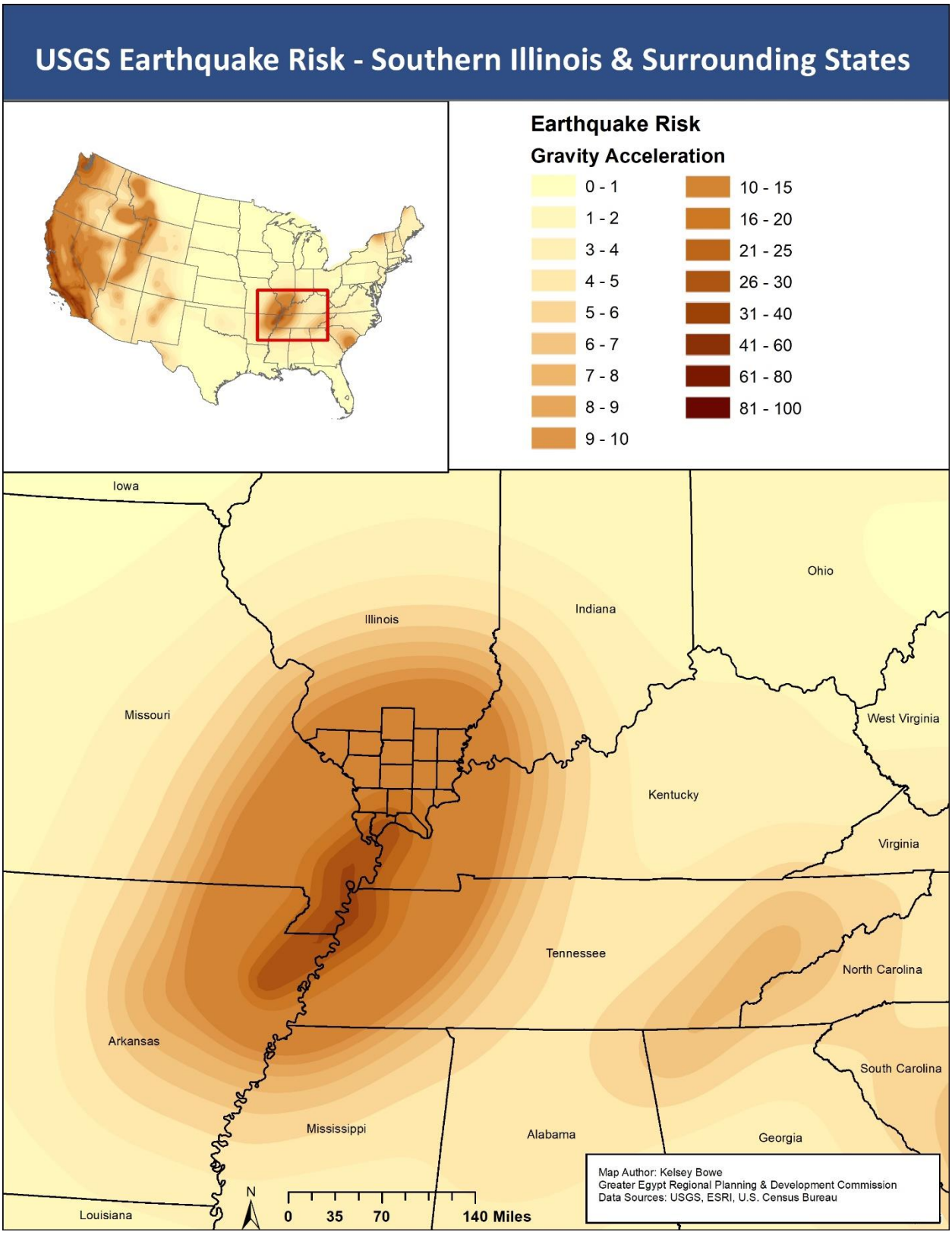
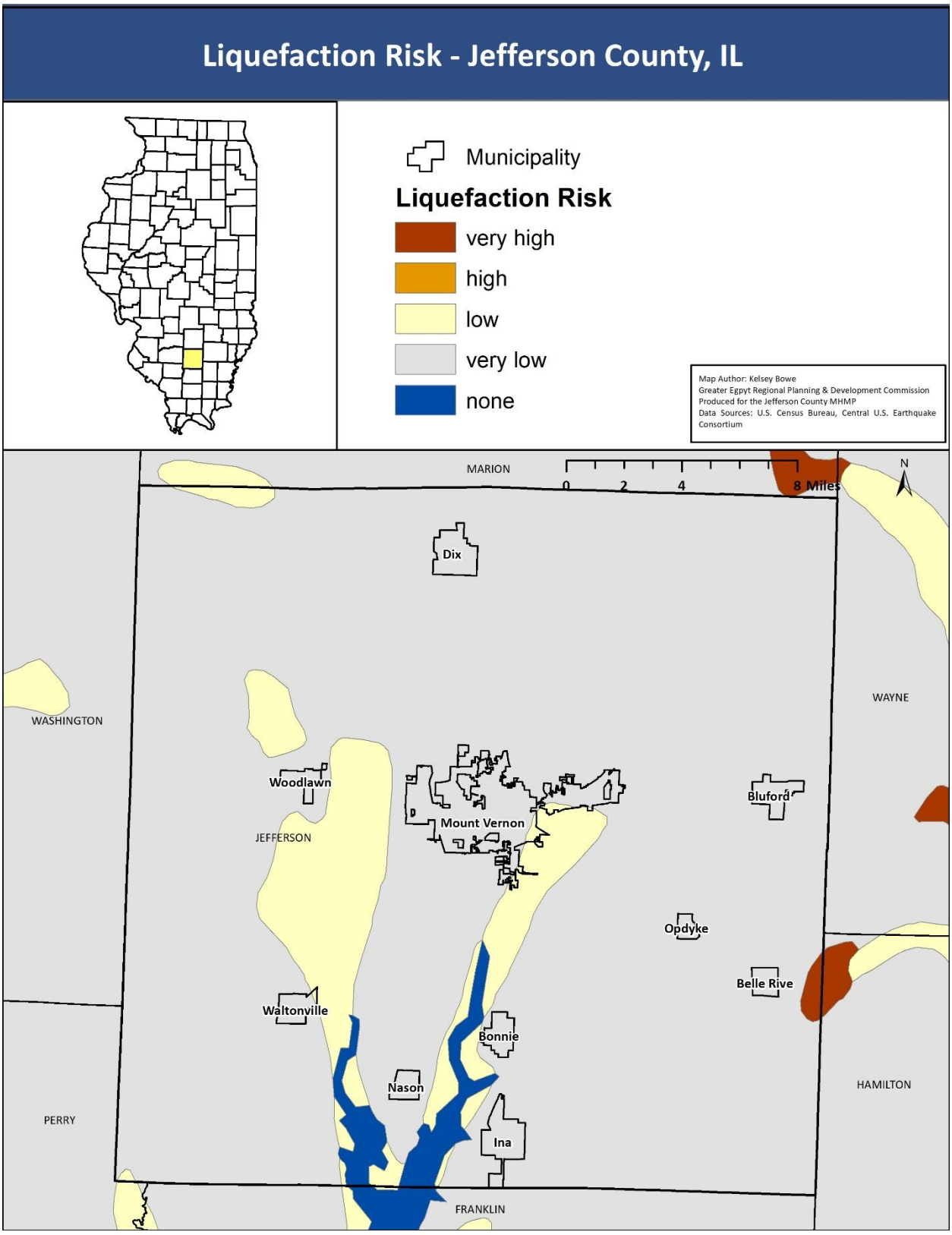

USGS Earthquake Risk - Southern Illinois & Surrounding States
Earthquake Risk
Gravity Acceleration
0 - 1
1 - 2
3 - 4
4 - 5
5 - 6
6 - 7
7 - 8
8 - 9
9 - 10
10 - 15
16 - 20
21 - 25
26 - 30
31 - 40
41 - 60
61 - 80
81 - 100
Iowa
Illinois
Indiana
Ohio
Missouri
West Virginia
Kentucky
Virginia
Tennessee
North 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 4.8


Liquefaction Risk - Jefferson County, IL
Municipality
Liquefaction Risk
very high
high
low
very low
none
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Jefferson County MHMP
Data Sources: U.S. Census Bureau, Central U.S. Earthquake Consortium
MARION
0 2 4 8 Miles
N
Dix
WASHINGTON
WAYNE
Woodlawn
Mount Vernon
Bluford
JEFFERSON
Opdyke
Belle Rive
Waltonville
Bonnie
Nason
HAMILTON
PERRY
Ina
FRANKLIN

4.4.4. Hazard Model

Hazus 5.1 was used to model 2 different scenarios for Jefferson 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 Jefferson County

Model Parameters:
Hazus Arbitrary Scenario - 5.5 magnitude
Depth - 10km
Latitude - 38.3122
Longitude - -88.9382

Total Households= 15,365

In this scenario, nearly 4,500 buildings are estimated to be moderately or extensively damaged, and 342 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 nine schools, one Emergency Operations Center, two police stations, and three fire stations. Transportation systems with at least moderate damage include three highway bridges, one bus station, and one airport. Utility systems that sustain at least moderate damage are six wastewater treatment plants and four communication facilities. After seven days all critical facilities are expected to be functioning at greater than 50% except for the highway bridges. 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	54.41	0.72	25.69	0.61	29.91	0.93	14.63	1.19	3.36	0.98
Commercial	233.81	3.08	193.99	4.59	261.33	8.13	141.87	11.54	46.99	13.76
Education	14.48	0.19	8.42	0.2	10.4	0.32	4.95	0.4	1.75	0.51
Government	12.19	0.16	6.71	0.16	8.36	0.26	3.54	0.29	1.2	0.35
Industrial	59.53	0.78	41.67	0.99	58.97	1.83	34.4	2.8	10.42	3.05
Other Residential	1051.99	13.87	780.52	18.47	1099	34.18	502.35	40.88	105.14	30.78
Religion	41.15	0.54	23.9	0.57	24.22	0.75	13.17	1.07	4.56	1.33
Single Family	6116.76	80.65	3143.99	74.42	1723.05	53.59	514.02	41.83	168.18	49.23
Total	**7,584**		**4,225**		**3,215**		**1,229**		**342**	

Table 4.18 – Utility Pipeline Damage Estimates

System	Total Pipeline Length (miles)	# of Leaks	# of Breaks
Potable Water	4,304	602	151
Waste Water	2,582	303	76
Natural Gas	1,722	104	26
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	344	72	0	0	0
Electric Power	9,755	6,412	2,771	542	12

Physical damage will result in an estimated 162,000 tons of debris, requiring 6,480 truckloads to remove. Building-related economic losses are displayed in table 4.20.

In addition to the building related losses, there is an estimated $22.16 million economic loss to the transportation sector and $25.30 million economic loss to utility systems. Total Economic losses are estimated to be $694.55 million.

Table 4.20 – Building-related Economic Loss Estimates

Category	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses						
Wage	0	1.4232	27.0247	0.5777	1.0544	30.08
Capital-Related	0	0.6065	19.0049	0.3586	0.3524	20.3224
Rental	5.5839	3.939	9.223	0.1992	0.6204	19.5655
Relocation	19.608	5.3484	18.4696	1.0551	5.4589	49.94
Subtotal	**25.1919**	**11.3171**	**73.7222**	**2.1906**	**7.4861**	**119.9079**
Capital Stock Losses						
Structural	33.7149	10.16	26.9761	3.9125	6.8266	81.5901
Nonstructural	137.9232	48.5122	79.9223	13.9151	19.3193	299.5921
Content	57.4198	14.2301	49.5584	10.0809	11.5767	142.8659
Inventory	0	0	1.2447	1.7616	0.1271	3.1334
Subtotal	**229.0579**	**72.9023**	**157.7015**	**29.6701**	**37.8497**	**527.1815**
Total	**254.25**	**84.22**	**231.42**	**31.86**	**45.34**	**647.09**

Social Impact

The model estimates 365 households will be displaced due to the earthquake, and of those, 233 will need temporary public shelter.

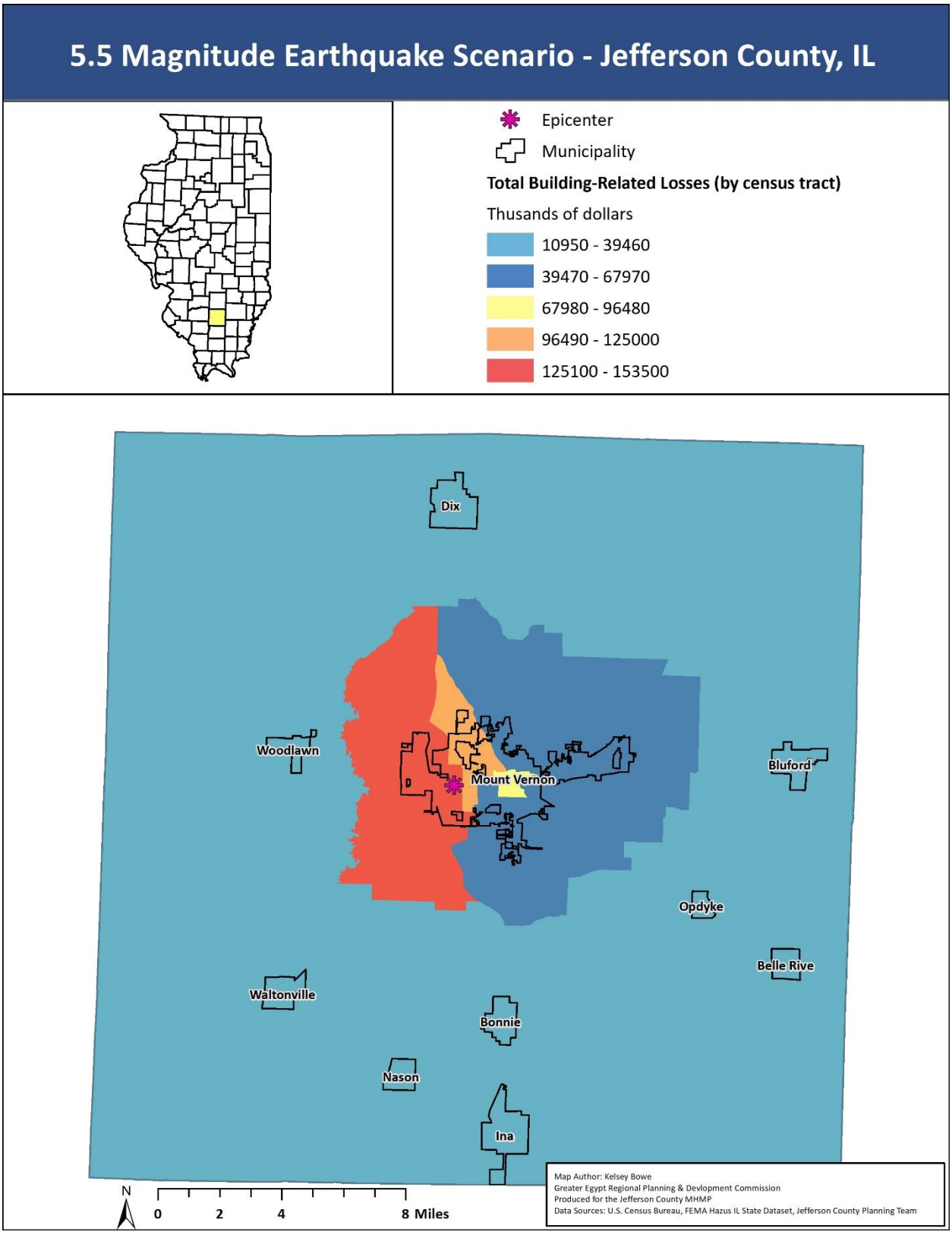
Table 4.21 displays injury and casualty estimates for 3 different occupancy load scenarios. 2am represents maximum residential occupancy load (most of population home in bed), 2pm represents peak educational, commercial, and industrial occupancy (most of population at work/school), and 5pm represents 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	2	0.48	0.06	0.13
	Commuting	0	0	0.01	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	2.16	0.51	0.07	0.13
	Other-Residential	42.69	8.7	0.86	1.62
	Single Family	82.8	19.31	2.65	5.21
	Total	**130**	**29**	**4**	**7**
2:00 PM	Commercial	119.85	28.6	3.89	7.56
	Commuting	0.03	0.04	0.07	0.01
	Educational	37.31	9.37	1.37	2.66
	Hotels	0	0	0	0
	Industrial	15.92	3.76	0.5	0.96
	Other-Residential	10.15	2.13	0.23	0.42
	Single Family	20.5	4.93	0.71	1.32
	Total	**204**	**49**	**7**	**13**
5:00 PM	Commercial	83.64	20.05	2.76	5.29
	Commuting	0.56	0.68	1.23	0.23
	Educational	2.48	0.63	0.09	0.18
	Hotels	0	0	0	0
	Industrial	9.95	2.35	0.31	0.6
	Other-Residential	16.02	3.35	0.35	0.65
	Single Family	33.23	7.99	1.15	2.15
	Total	**146**	**35**	**6**	**9**

Figure 4.9


5.5 Magnitude Earthquake Scenario - Jefferson County, IL
Epicenter
Municipality
Total Building-Related Losses (by census tract)
Thusands of dollars
10950 - 39460
39470 - 67970
67980 - 96480
96490 - 125000
125100 - 153500
Dix
Woodlawn
Mount Vernon
Bluford
Opdyke
Belle Rive
Waltonville
Bonnie
Nason
Ina
N
0
2
4
8 Miles
Map Author: Kelsey Bowe
Greater Egypt Regional Planning & Devlopment Commission
Produced for the Jefferson County MHMP
Data Sources: U.S. Census Bureau, FEMA Hazus IL State Dataset, Jefferson 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 Jefferson 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 Jefferson 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 three 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	112.02	0.74	10.06	1.01	5	1.23	0.87	2.23	0.05	1.64
Commercial	788.57	5.21	60.17	6.03	24.93	6.11	4.08	10.48	0.24	8.73
Education	35.41	0.23	3.01	0.3	1.35	0.33	0.21	0.54	0.02	0.77
Government	28.53	0.19	2.31	0.23	1.01	0.25	0.13	0.34	0.01	0.49
Industrial	183.62	1.21	14.06	1.41	6.26	1.54	1.01	2.59	0.05	1.64
Other Residential	2877.26	18.99	420.08	42.12	229.89	56.39	11.53	29.6	0.24	8.47
Religion	96.76	0.64	6.75	0.68	2.95	0.72	0.5	1.3	0.04	1.43
Single Family	11026.09	72.79	480.83	48.21	136.32	33.44	20.62	52.92	2.14	76.83
Total	**15,148**		**997**		**408**		**39**		**3**	

Table 4.23 – Utility Pipeline Damage Estimates

System	Total Pipeline Length (miles)	# of Leaks	# of Breaks
Potable Water	4,304	46	11
Waste Water	2,582	23	6
Natural Gas	1,722	8	2
Oil	0	0	0

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

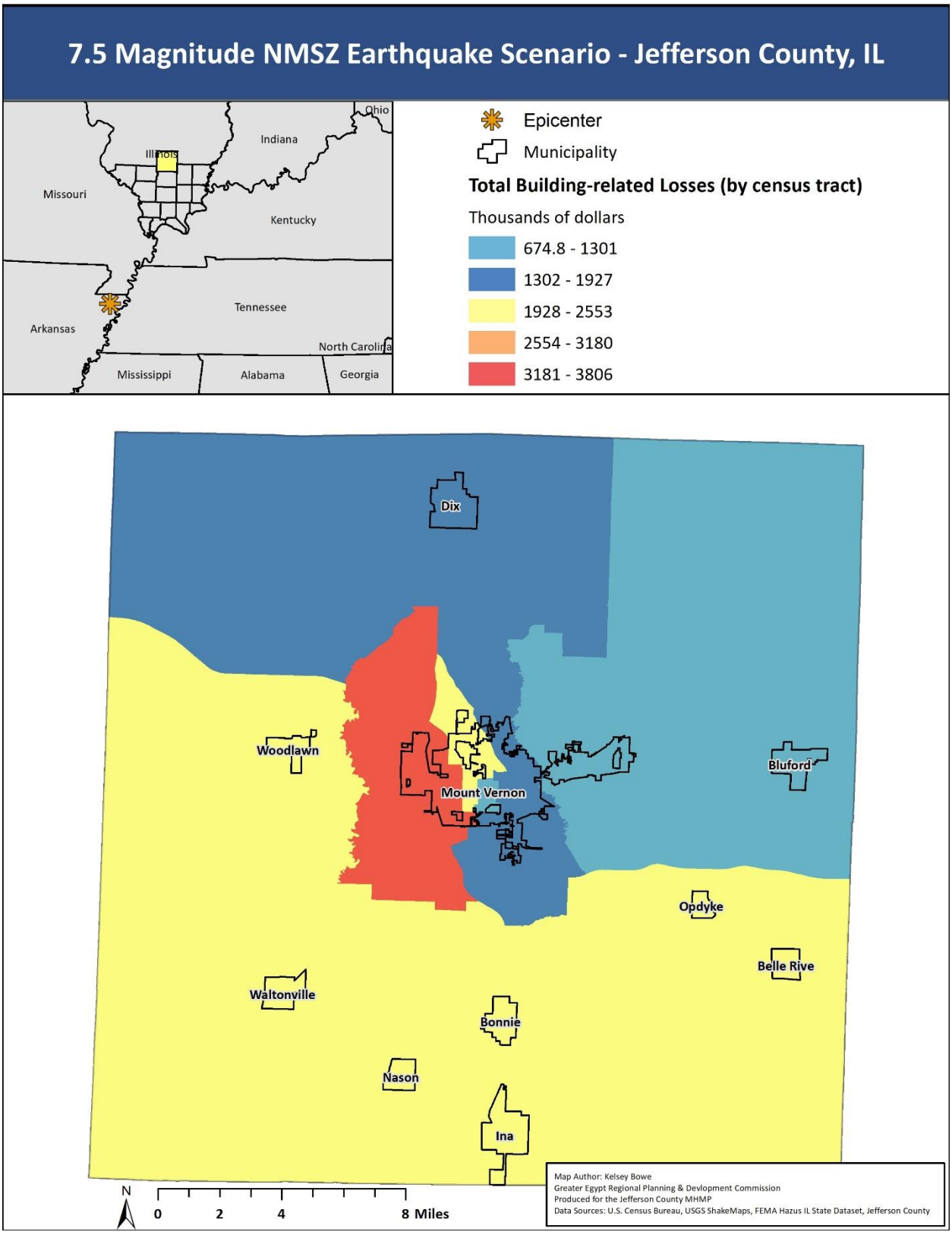
Seven households would be displaced as a result of the earthquake, and four of the households would be in need of temporary public shelter. This model estimates between six and eight level 1 injuries, one level 2 injury, and no severe injuries or deaths would occur from the earthquake, with the 2pm scenario 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	0.051	1.0033	0.0259	0.0821	1.1623
Capital-Related	0	0.0217	0.7337	0.0159	0.0271	0.7984
Rental	0.2949	0.2083	0.4503	0.0101	0.0365	1.0001
Relocation	1.0313	0.4493	0.7619	0.0571	0.3517	2.6513
Subtotal	**1.3262**	**0.7303**	**2.9492**	**0.109**	**0.4974**	**5.6121**
Capital Stock Losses						
Structural	1.8737	0.7064	0.9951	0.1635	0.4464	4.1851
Nonstructural	3.9164	1.4383	1.457	0.2556	0.6626	7.7299
Content	0.7435	0.1808	0.5908	0.1478	0.2512	1.9141
Inventory	0	0	0.0163	0.0268	0.0046	0.0477
Subtotal	**6.5336**	**2.3255**	**3.0592**	**0.5937**	**1.3648**	**13.8768**
Total	**7.86**	**3.06**	**6.01**	**0.7**	**1.86**	**19.49**

In addition to the building related losses, there is an estimated $330,000 economic loss to the transportation sector and $731,500 economic loss to utility systems. Total Economic losses are estimated to be $20.55 million.

Figure 4.10


7.5 Magnitude NMSZ Earthquake Scenario - Jefferson County, IL
Ohio
Indiana
Illinois
Missouri
Kentucky
Tennessee
Arkansas
North Carolina
Mississippi
Alabama
Georgia
Epicenter
Municipality
Total Building-related Losses (by census tract)
Thousands of dollars
674.8 - 1301
1302 - 1927
1928 - 2553
2554 - 3180
3181 - 3806
Dix
Woodlawn
Mount Vernon
Bluford
Opdyke
Belle Rive
Waltonville
Bonnie
Nason
Ina
N
0
2
4
8 Miles
Map Author: Kelsey Bowe
Greater Egypt Regional Planning & Devlopment Commission
Produced for the Jefferson County MHMP
Data Sources: U.S. Census Bureau, USGS ShakeMaps, FEMA Hazus IL State Dataset, Jefferson County

4.5. Severe Winter Weather

4.5.1. 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.

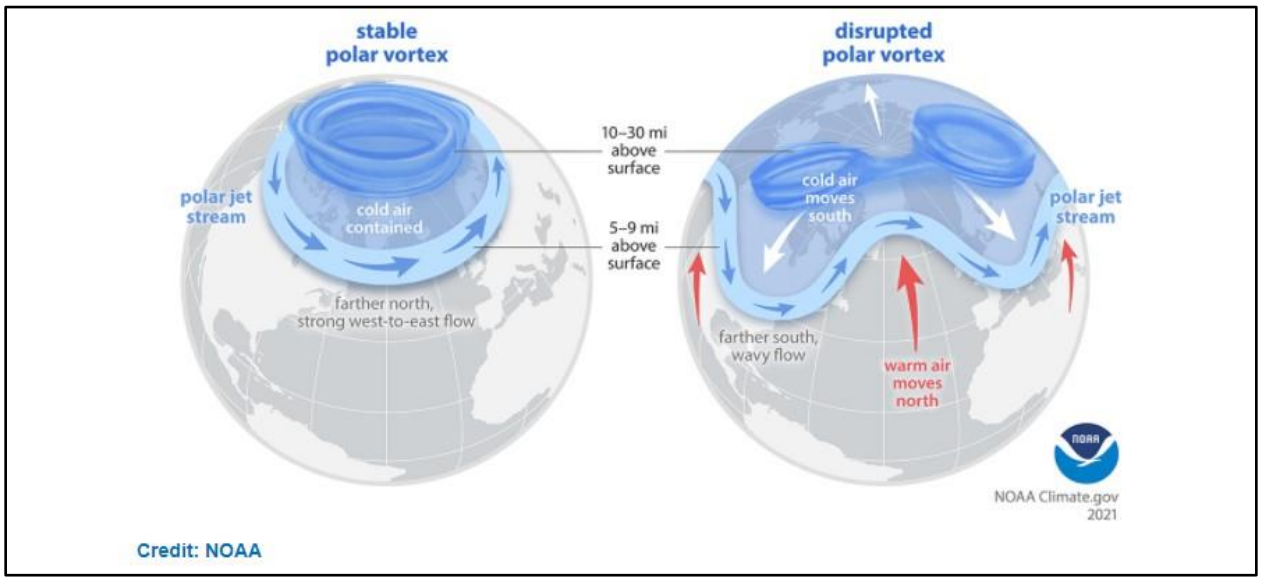
News and weather outlets have been using the term "Polar Vortex" more commonly in recent years. While some outlets are using the term loosely, this report will refer to the NOAA definitions:

- 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 4.11)[29]. Some but not all winter storms in southern Illinois are associated with this natural phenomenon.

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

Figure 4.11



4.5.2. Specific Impacts

4.5.2.1. 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.

4.5.2.2. 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.

4.5.2.3. 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.

4.5.2.4. 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.

4.5.3. 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[30].

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[31].

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

4.5.4. 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 4.25 - Severe winter weather and number of records for Jefferson County from 1996-2022.

Weather Type	Days
extreme cold	3
heavy snow	13
ice storm	4
winter storm	28

Table 4.26 - Severe winter weather events that caused property damage in Jefferson County

Date	Weather Event	Property Damage
3/3/2008	Winter Storm	50000
2/24/2016	Winter Storm	30000

4.5.5. 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 Jefferson County, the entire county has the same risk. Historical data is lacking for this weather event but based on available records Jefferson County experiences at least one winter storm each year and has a 15% probability of experiencing an ice storm each year.

4.6. Hazardous Materials Release

4.6.1. 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.

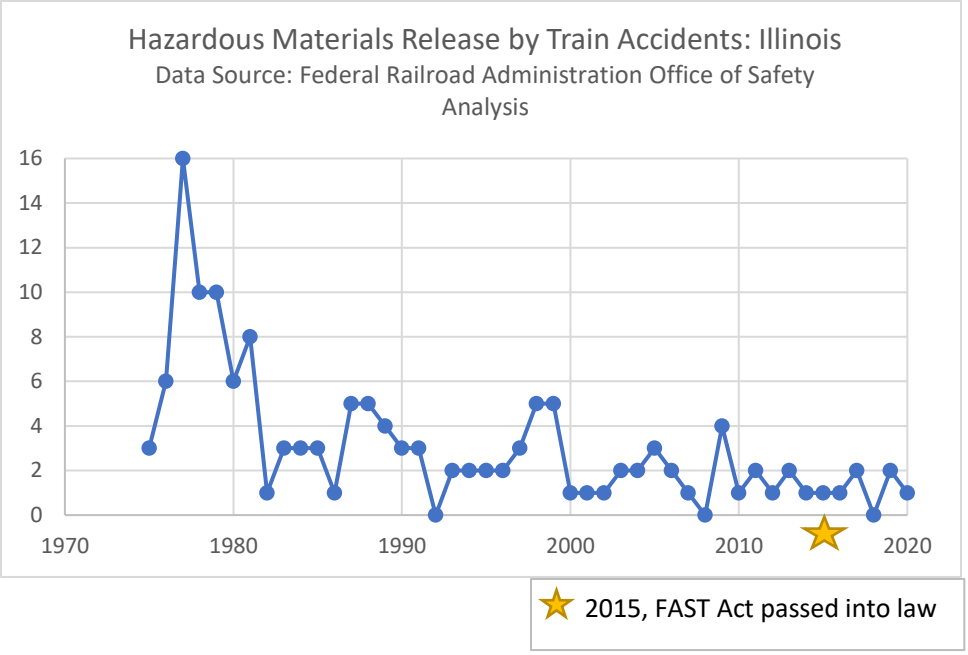
4.6.1.1. Train Derailments

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[32]. 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[33]. 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[34]. Figure 4.11 shows number of train accidents that caused HazMat release in Illinois from 1975-2020.

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

Figure 4.12



4.6.1.2. 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[35]. 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 4.7 for more details on coal mining)

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

4.6.2. 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 346 reported incidents for Jefferson County, with the vast majority being spills of gasoline, diesel fuel, or crude oil[36].

There has been one train derailment in Jefferson County since 1972. In December of 2012 a derailment near Mt. Vernon caused 6,000 gallons of ethanol to spill from a tank car. No injuries were reported from the incident[37].

4.6.3. Risk

Transportation routes with the highest risk of hazardous materials release include Interstates 57 and 64, state highways, 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.

It is not possible to calculate probability of HazMat release events for the county without a more detailed study. Transportation of HazMat materials varies daily, weather and age of equipment (vehicles/trains/pipelines) are also factors.

FEMA Hazus Comprehensive Data Management System (CDMS) currently lists five Hazardous Materials Storage Sites for Jefferson County, see below.

[36] Data.illinois.gov "IEMA Hazardous Materials Spills"
[37] Rickerel, S. "Train Derails, spills ethanol", The Southern Illinoisian, 12.31.2012.

Table 4.27 - Hazardous Materials Storage Sites, Jefferson County, IL.

Facility Name	Address	City	Contact Person	Chemical Name	Chemical Quality (lbs.)
CONTINENTAL GENERAL TIRE INC.	11525 N IL HWY. 142	MOUNT VERNON	HENRY EISENGA	ZINC COMPOUNDS	7
CONTINENTAL GENERAL TIRE INC.	11525 N IL HWY. 142	MOUNT VERNON	HENRY EISENGA	N-HEXANE	4
CONTINENTAL GENERAL TIRE INC.	11525 N IL HWY. 142	MOUNT VERNON	HENRY EISENGA	COBALT COMPOUNDS	4
GDB Paints & Coatings, LLC	1700 S. SHAWNEE ST.	MOUNT VERNON	W. RAY GRUBB	CERTAIN GLYCOL ETHER	4

Source: FEMA Hazus CDMS, Jefferson County EMA

4.7. Flooding

4.7.1. 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:

4.7.2. 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."[38] 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.

4.7.3. 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

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

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[39]. The total damages to human health, property, the economy, and the environment depend on the height, duration, and distribution of flood waters.

4.7.3.1. 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.

4.7.4. 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 [40]. 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[41]. 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[42]. 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[43].

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

4.7.5. Geographic Location and Historical Occurrences

The following table shows all flood records for the county from 1996-present.

Table 4.28 - Flood Events in Jefferson County from 1996-2022

Location	Date	Deaths	Property Damage
	3/1/1997	0	20000
MT VERNON	7/14/1997	0	5000
	1/21/1999	0	0
	4/4/1999	0	0
DIX	3/18/2008	2	58000
BAKERVILLE	4/24/2011	0	0
SPRING GARDEN	5/1/2011	0	30000
DIX	7/2/2013	0	10000
WALTONVILLE	8/15/2016	0	0
WALTONVILLE	5/21/2019	0	0
MT VERNON	5/29/2019	0	0
MT VERNON	7/16/2021	1	30000
WOODLAWN	9/04/2022	0	0

Source: NOAA Storm Events Database

There are 29 total records of flash floods in Jefferson County since 1996, the table below displays events that caused injury or property damage.

Table 4.29 - Flash Flood Events in Jefferson County that caused injuries or property damage from 1996-2022

Location	Date	Injuries	Property Damage
MT VERNON	4/28/1996	0	20000
COUNTYWIDE	3/12/2006	0	30000
SHIRLEY	4/19/2009	0	10000
DIX	9/8/2018	1	400000

Source: NOAA Storm Events Database

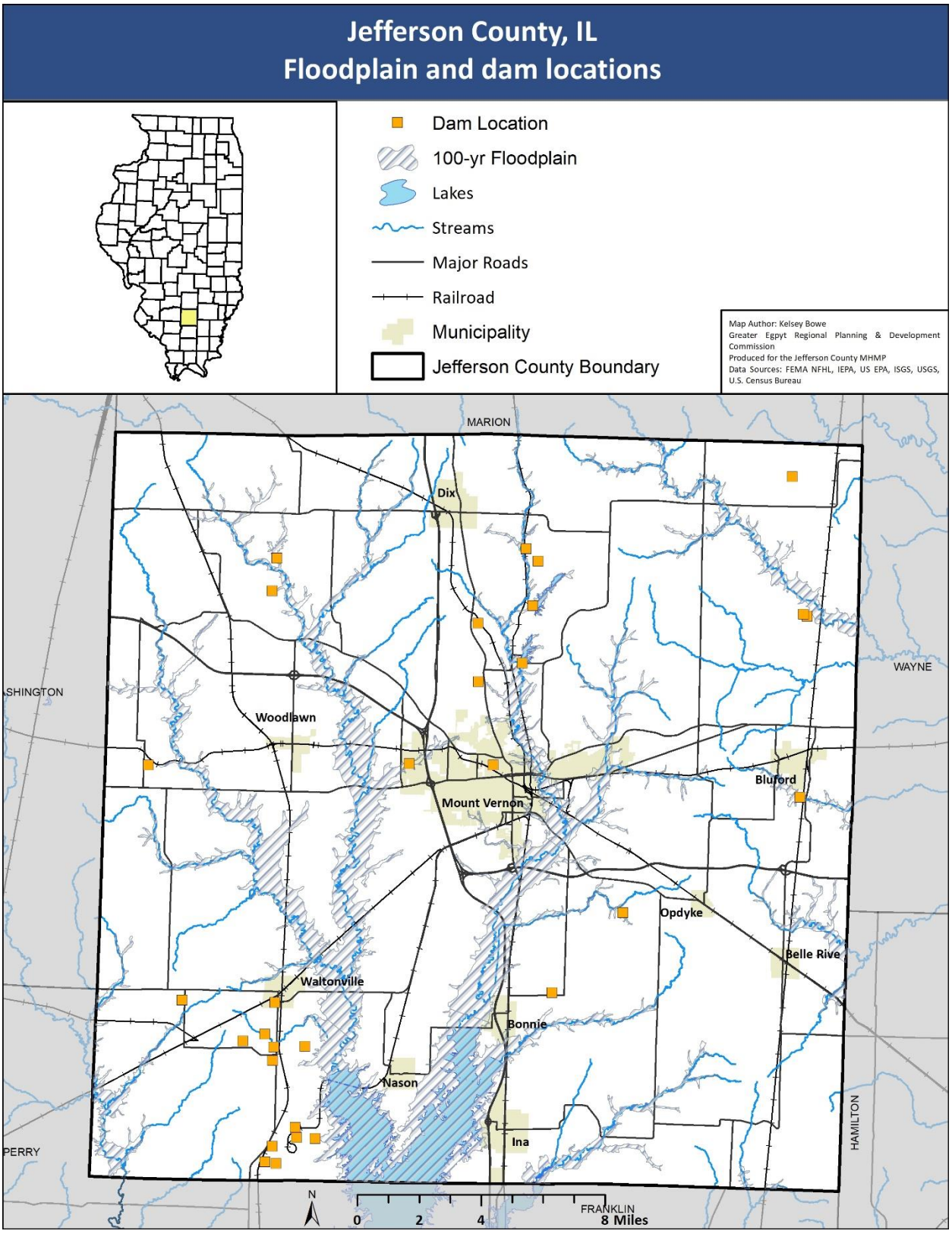
4.7.6. Risk

Flash floods may occur anywhere during heavy rainfall. Impacts are generally more severe in urban areas where there are impervious surfaces, and along low-lying roadways. Riverine flood risk is highest in the FEMA designated floodplain, especially near the Big Muddy River and its larger tributaries. Historical data is lacking for this hazard, but based on records available Jefferson County experiences at least one flash flood every year and has a 50% chance of flooding occurring. Both of these are expected to increase with climate change.

Figure 4.13 shows the 100-year floodplain, major water bodies, and dam locations for Jefferson County. The following essential and critical facilities are located within Jefferson County's floodplain:

- WMIX 90 Withers Broadcasting Co
- Air Evac Lifeteam
- Bonnie Wastewater Treatment Plant

Figure 4.13


Jefferson County, IL
Floodplain and dam locations
Dam Location
100-yr Floodplain
Lakes
Streams
Major Roads
Railroad
Municipality
Jefferson County Boundary
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Jefferson County MHMP
Data Sources: FEMA NFHL, IEPA, US EPA, ISGS, USGS, U.S. Census Bureau
MARION
Dix
WAYNE
SHINGTON
Woodlawn
Bluford
Mount Vernon
Opdyke
Belle Rive
Waltonville
Bonnie
Nason
Ina
HAMILTON
PERRY
FRANKLIN
N
0
2
4
8 Miles

4.8. Severe Thunderstorms

4.8.1. Hazard Description

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[44].

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 inures 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.

4.8.2. 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[45]. The Eastern U.S. is also expected to see an increase in days with favorable conditions for severe thunderstorms with the changing climate[46].

[44] "Severe Weather 101", NOAA National Severe Storms Laboratory.
[45] "Climate Change in Illinois" Illinois State Water Survey/Prairie Research Institute
[46] NASA - Global Climate Change, "Severe thunderstorms and climate change", April 7, 2013.

4.8.3. Geographic Location and Historical Occurrences

There are 86 total records of hail in Jefferson County, four of which caused property or crop damage, see table 4.30.

There are three records of lightning causing property damage, see table 4.31.

There are 127 total records of thunderstorm winds, see table 4.32 for records with death, injury, and damages over $15,000.

Table 4.30 – Hail records for Jefferson County that caused property or crop damage

Location	Date	Hail Diameter (In)	Property Damage	Crop Damage
MT VERNON	5/5/1999	3.5	50000	0
BOYD	4/10/2013	1.75	10000	0
DIX	4/10/2013	1	5000	0
OPDYKE	6/9/2008	1.75	0	10000

Source: NOAA Storm Events Database

Table 4.31 – Lightning Records for Jefferson County

Location	Date	Property Damage
MT VERNON	8/26/1996	5000
MT VERNON	10/7/2008	15000
TEXICO	6/18/2011	10000

Source: NOAA Storm Events Database

4.8.4. Risk

The county has equal risk of severe thunderstorms occurring. Based on NOAA records, the county experiences at least 2 thunderstorms each year.

Table 4.32 – Thunderstorm wind records for Jefferson County

Location	Date	Deaths	Injuries	Property Damage
	9/30/1994	0	0	50000
MT VERNON	10/22/1996	0	0	40000
MT VERNON	7/14/1997	0	0	15000
INA	1/17/1999	0	0	30000
WALTONVILLE	4/16/2000	0	0	40000
MT VERNON	8/17/2000	0	1	30000
WALTONVILLE	8/18/2001	0	0	25000
COUNTYWIDE	10/24/2001	0	0	20000
MT VERNON	5/9/2002	0	0	25000
BLUFORD	4/28/2003	0	0	100000
BELLE RIVE	5/25/2004	0	0	15000
BOYD	4/2/2006	0	0	100000
COUNTYWIDE	7/21/2006	0	5	13000000
MT VERNON	1/29/2008	0	0	40000
BELLE RIVE	2/5/2008	0	0	180000
INA	2/5/2008	0	0	20000
MT VERNON	7/8/2008	0	0	30000
WOODLAWN	6/15/2010	0	0	30000
OPDYKE	8/12/2010	0	0	40000
MT VERNON	4/19/2011	0	0	60000
BELLE RIVE	4/19/2011	0	0	50000
SCHELLER	4/19/2011	0	0	20000
DIX	4/19/2011	0	0	18000
INA	4/19/2011	0	0	15000
WOODLAWN	4/19/2011	0	0	15000
SPRING GARDEN	6/19/2011	0	0	20000
MT VERNON	7/12/2011	0	0	40000
(MVN)MT VERNON ARPT	6/26/2013	0	0	30000
MT VERNON	4/27/2014	0	0	20000
MT VERNON	5/10/2015	1	0	45000
BELLE RIVE	6/25/2015	0	0	40000
BONNIE	12/23/2015	0	0	15000
SCHELLER	7/13/2016	0	0	20000
MT VERNON	3/1/2017	0	0	25000
WOODLAWN	5/31/2018	0	0	20000
BONNIE	6/2/2018	0	0	15000
BONNIE	6/15/2018	0	0	18000
DIX	6/28/2018	0	0	25000
MT VERNON	7/17/2019	0	0	25000
DIX	6/17/2022	0	0	20000

Source: NOAA Storm Events Database

4.9. Drought and Excessive Heat

4.9.1. Hazard Description

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[47].

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.

4.9.2. Specific Impacts

4.9.2.1. 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[48].

4.9.2.2. 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[49]. 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.

[47] "Droughts: Things to Know" Water Science School, USGS
[48] 2015 plan
[49] U.S. Environmental Protection Agency. 2008. Reducing urban heat islands: Compendium of strategies. Draft. https://www.epa.gov/heat-islands/heat-island-compendium.

4.9.2.3. 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[50].

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 Southwest and Great Plains states[51] and some areas of Chicago suburbs[52], but is less of a concern for southern Illinois.

4.9.2.4. 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.

[50] Larson, Debra "Drought Impacts on the Cattle Industry" University of Illinois Animal Sciences
[51] "Groundwater depletion across the nation" USGS factsheet, 2003.
[52] Mannix et al., "Groundwater Depletion in Chicago's Southwestern Suburbs" Illinois State Water Survey

4.9.3. Climate change

Evidence suggests that the frequency and severity of droughts in the US will increase with climate change; in the Midwest specifically, droughts are expected to occur in late summer months.[53] Increases in temperature, precipitation, and evaporation will continue in Illinois, leading to frequent and more intense floods and droughts[54].

4.9.4. Geographic Location and Historical Occurrences

There are 10 records of excessive heat in Jefferson County from 2010-2019 and 19 records of drought from 1998-2012. 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[55].

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.

4.9.5. Risk

Jefferson County has equal risk for 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. There are not enough historical records to calculate an accurate probability for drought and extreme heat, but they are expected to increase with climate change. Increases in development without adequate mitigation efforts may lead to increased Urban Heat Island effects.

[53] 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.
[54] "Climate Change in Illinois" Illinois State Water Survey/Prairie Research Institute
[55] NOAA Storm Events Database

4.10. Ground Failure

4.10.1. Hazard Description

Ground failure may refer to any consequence of shaking that affects the stability of the ground[56]. In southern Illinois this is usually caused by subsidence of the land due to sinkholes from karst features or underground mines.

4.10.1.1. 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[57].

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.

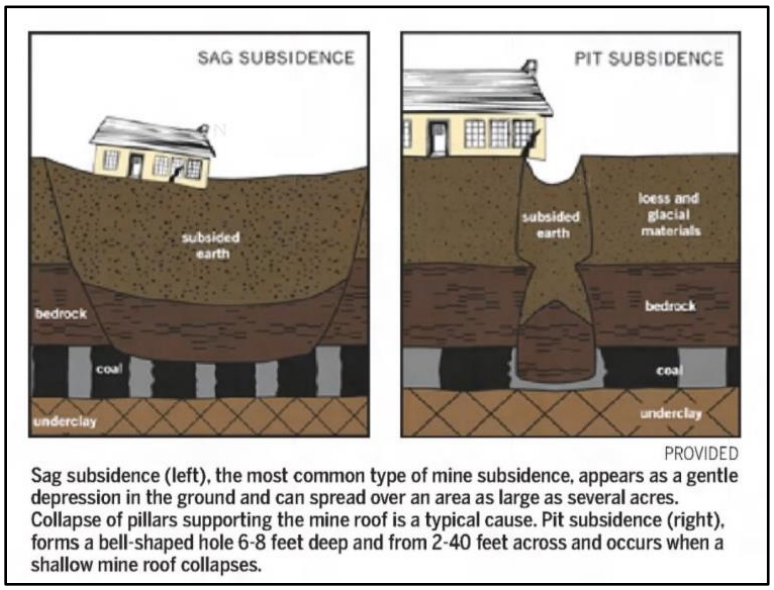
4.10.1.2. Underground Mining

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[58]. 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.

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

Figure 4.14 - Diagrams of mine subsidence



Source: Illinois Mine Subsidence Insurance Fund

4.10.2. 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[59] (see figures 4.14 and 4.15). 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.

Jefferson County rests over a geologic area with predominantly shale, sandstone and coal bearing bedrock. While some areas of limestone exist, karst sinkholes are not a major concern. Figure 4.15 shows karst bedrock types and known sinkhole areas for southern Illinois. Many developed areas of the county sit directly over underground coal mines, figures 4.16 and 4.17 show known and suspected coal mines for southern Illinois and Jefferson 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 4.33.

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

4.10.3. 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.

- Mount Vernon Wastewater Treatment Plant
- Waltonville Wastewater Treatment Plant
- Waltonville High School
- Waltonville Grade School

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 4.33 – 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 4.15

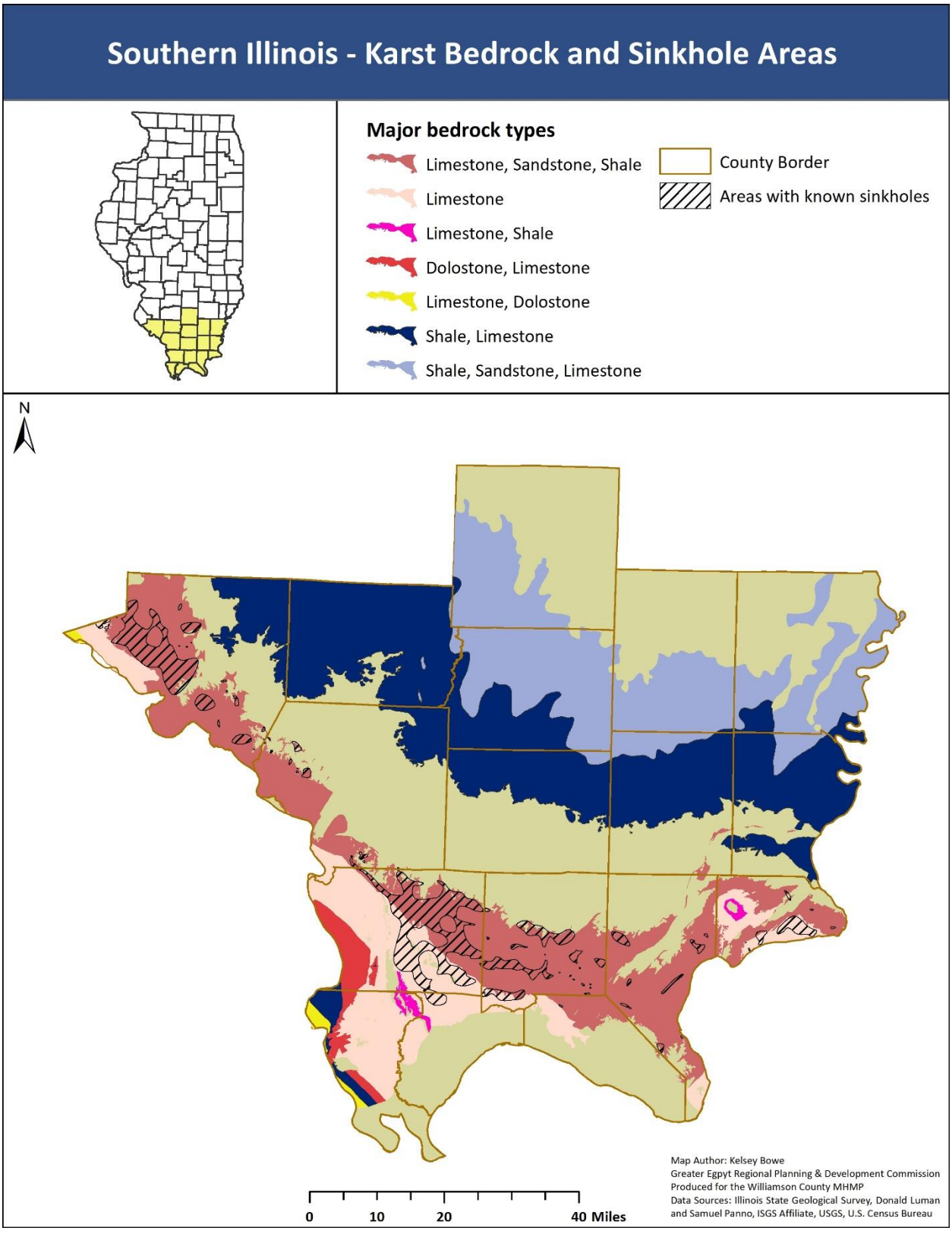

Southern Illinois - Karst Bedrock and Sinkhole Areas
Major bedrock types
Limestone, Sandstone, Shale
Limestone
Limestone, Shale
Dolostone, Limestone
Limestone, Dolostone
Shale, Limestone
Shale, Sandstone, Limestone
County Border
Areas with known sinkholes
N
0
10
20
40 Miles
Map Author: Kelsey Bowe
Greater 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 4.16

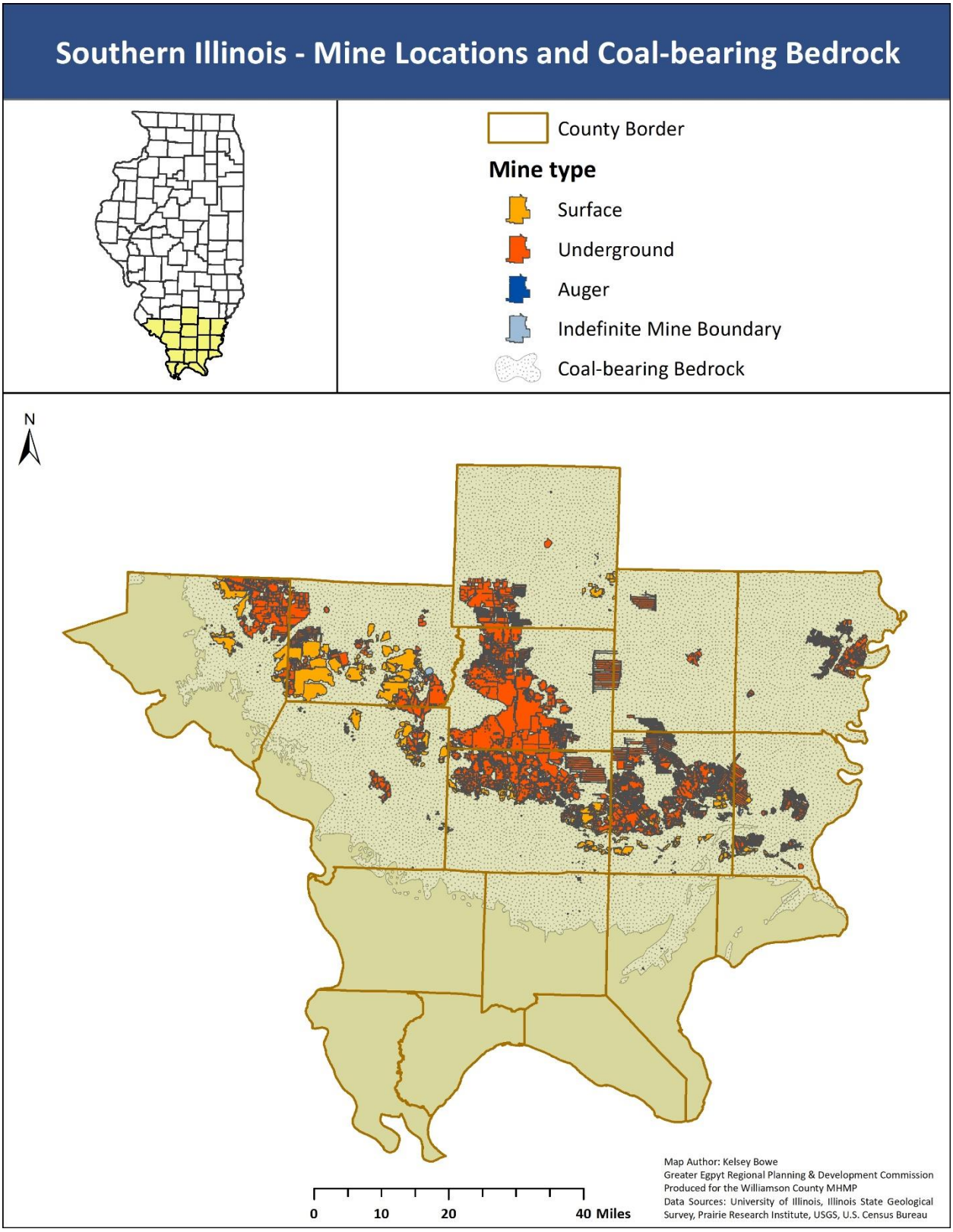
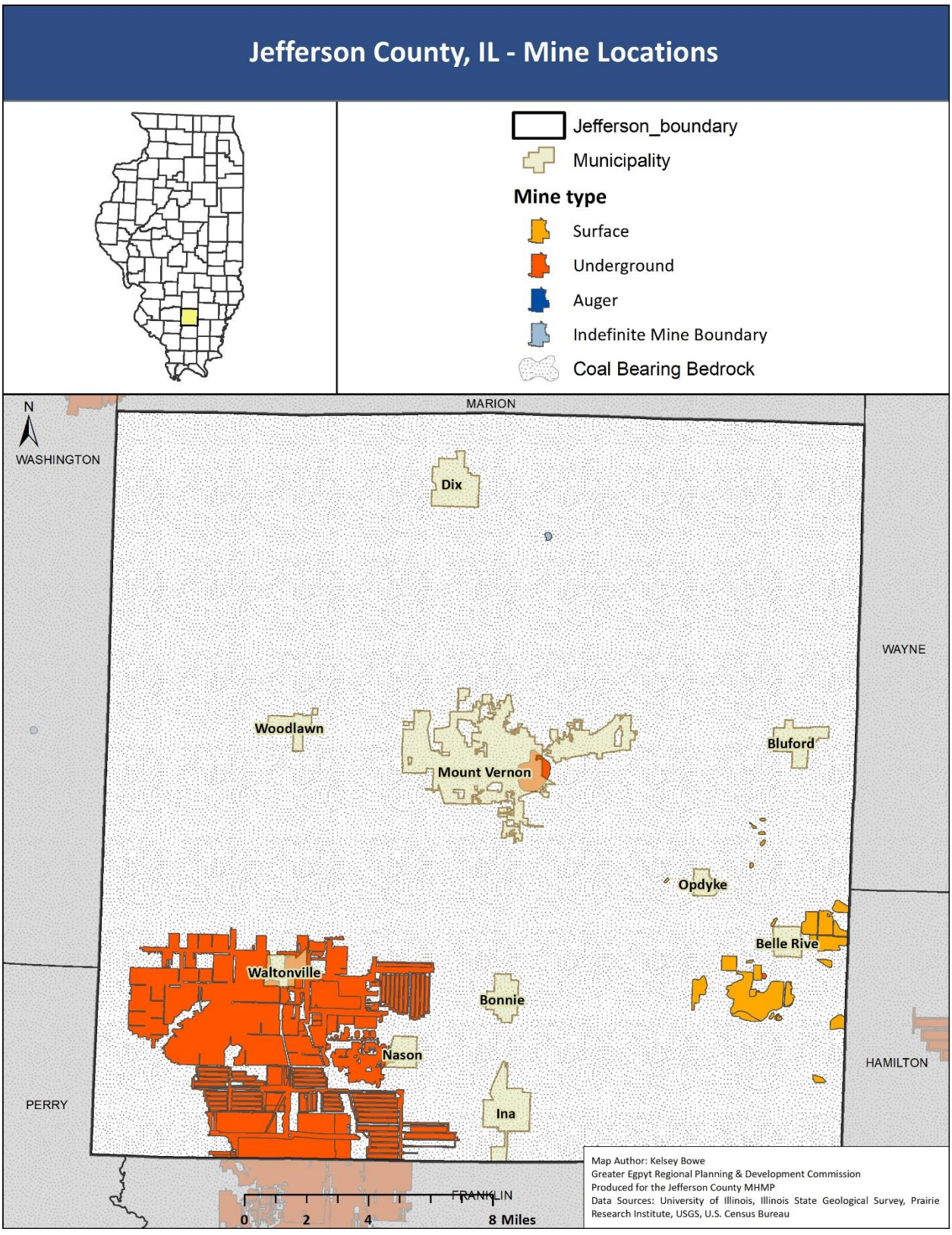

Southern Illinois - Mine Locations and Coal-bearing Bedrock
County Border
Mine type
Surface
Underground
Auger
Indefinite Mine Boundary
Coal-bearing Bedrock
N
0
10
20
40 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Williamson County MHMP
Data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

Figure 4.17


Jefferson County, IL - Mine Locations
Jefferson_boundary
Municipality
Mine type
Surface
Underground
Auger
Indefinite Mine Boundary
Coal Bearing Bedrock
N
MARION
WASHINGTON
Dix
WAYNE
Woodlawn
Mount Vernon
Bluford
Opdyke
Belle Rive
Waltonville
Bonnie
Nason
HAMILTON
PERRY
Ina
FRANKLIN
0
2
4
8 Miles
Map Author: Kelsey Bowe
Greater Egpyt Regional Planning & Development Commission
Produced for the Jefferson County MHMP
Data Sources: University of Illinois, Illinois State Geological Survey, Prairie Research Institute, USGS, U.S. Census Bureau

4.11. Terrorism

4.11.1. 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[60]:

4.11.1.1. Attacks in public places

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

4.11.1.2. 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

4.11.1.3. 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.

4.11.1.4. Explosions

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

4.11.1.5. Nuclear Explosions

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

4.11.1.6. Radiological dispersion device

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

4.11.1.7. Other

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

4.11.2. 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[61].

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

4.11.3. 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[62].

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/.

4.11.4. 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.

[62] Ready.gov "Disasters and Emergencies"

4.12. Dam and Levee Failure

4.12.1. 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[63] 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[64].

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.[65] This grade is mostly due to aging systems, increased usage, and inadequate funding to inspect, maintain, and repair infrastructures.

[63] Ferrante et al. "Uncertainty Analysis for Large Dam Failure Frequencies Based on Historic Data" nrc.gov
[64] "Overview of Levees" 2021 Report Card for America's Infrastructure
[65] 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.

4.12.2. 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.[66], 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.

4.12.3. Geographic Location and Historical Occurrences

There are no levees listed for Jefferson 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 Jefferson County.

The USACE National Dams inventory lists 30 dams for Jefferson County (table 4.34), four of which have a high hazard potential. They have an average age of 61 years. None of the dams in Franklin County are used for hydropower. All of the Dams are regulated and inspected by IDNR or USACE.

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[67].

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[68].

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 Franklin 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

[66] 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.
[67] FEMA, "Federal Guidelines for Dam Safety", April 2004.
[68] Illinois Dam Safety Report 2018

embankment to liquefy[69], leading to the failure. 10,000 people had to be evacuated, 2,000 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[70].

The reservoir size in Midland was 66,200 acre-feet. For comparison, Rend Lake 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. The USACE and Rend Lake Conservancy District participated in planning activities for this MHMP.

4.12.4. 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 Jefferson 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[71].

[69] House, K, "Report: Shoddy construction, ignored threats led to Edenville Dam collapse", Bridge Michigan, September 2021.
[70] Roth, C, "Timeline: The Edenville Dam saga, before, during and after the break" MLive.com, September 2020.
[71] "Risk Characteristics," Rend Dam, National Inventory of Dams

Table 4.34 - List of dams for Jefferson County, IL

Dam Name	River	Municipality	Year built	Hazard Potential	EAP
CONSOL/REND LAKE MINE/SLURRY CELL 2 DAM	TRIB REND LAKE	SESSER	1998	H	Y
CONSOL/REND LAKE MINE/SLURRY IMPOUNDMENT 1	TRIB REND LAKE	EWING	1993	H	Y
L & N RESERVOIR	TRIB CASEY FORK	MOUNT VERNON	1910	H	Y
MILLER LAKE DAM	TRIB CASEY FORK	MOUNT VERNON	1947	H	Y
FREEMAN/ /EAST LAKE DAM	TRIB BUCK CREEK	WALTONVILLE	1961	S	N
HAWTHORNE HILLS LAKE DAM	TRIB CASEY FORK	MT VERNON	1969	S	N
ILLINOIS CENTRAL RESERVOIR DAM	FOURMILE CREEK	MILL SHOATS	1926	S	N
LAKE JAYCEE DAM	TRIB CASEY FORK	MOUNT VERNON	1905	S	Y
RAW WATER RESERVOIR DAM	WARD BRANCH	SESSER	1966	S	N
SPRINGFIELD COAL/ORIENT 6 /SOUTH SLURRY CELL DAM	TRIB EAST HURRICANE CREEK	WALTONVILLE	1985	S	Y
BUSHONG POND DAM 1*	TR- BIG MUDDY RIVER	WOODLAWN	1977	L	NR
CONSOL/REND LAKE MINE/SEDIMENT POND 009 DAM	TRIB SILVER CREEK	SESSER	1999	L	Y
CONSOL/REND LAKE/SED POND 008 DAM	TRIB MOREDOCK LAKE	SESSER	1995	L	N
DONOHO POND DAM 1	TR- LICK BRANCH	WAYNE CITY	1979	L	NR
E POND TREATMENT		SESSER		L	N
FREEMAN UNITED/ /2 PORTAL LAKE	TRIB LITTLE MUDDY RIVER	WALTONVILLE	1974	L	N
LAGG LAKE 1 DAM	TRIB CASEY CREEK	IDLEWOOD	1976	L	N
LAGG LAKE 2	TRIB CASEY FORK	IDLEWOOD	1976	L	N
LAKE NORMANDY DAM	TRIB LIMESTONE CREEK	MOUNT VERNON	1969	L	N
LEWIS INDUSTRIAL PARK DETENTION DAM	TRIB WEST DITCH	MT VERNON	1999	L	N
MARTIN FAMILY DAM	TRIB ATCHISON CREEK	BONNIE		L	N
O'DANIEL LODGE LAKE 2 DAM*	TRIB HORSE CREEK	WAYNE CITY	1973	L	N
O'DANIEL LODGE LAKE DAM*	TRIB HORSE CREEK	WAYNE CITY	1973	L	N
SPRINGFIELD COAL/ORIENT 3/CLAR POND SADDLE DAM	TRIB BUCK CREEK	WALTONVILLE	1985	L	N
SPRINGFIELD COAL/ORIENT 3/FINE REFUSE IMPOUNDMENT	TRIB BIG MUDDY RIVER	WALTONVILLE	1981	L	N
SUPERIOR LAKE DAM	TRIB BIG MUDDY RIVER	MOUNT VERNON	1953	L	N
TEDRICK LAKE DAM	TRIB DODDS CREEK	ODPYKE	1999	L	N
WALTONVILLE MANUFACTURING LAKE DAM	TRIB BUCK CREEK	WALTONVILLE	1952	L	N

Source: USACE National Inventory of Dams, Jefferson County EMA

4.13. Cyberattacks

4.13.1. Hazard Description

Cyberattacks are any unauthorized attempt to access or damage a computer or network system[72] 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[73]. 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[74]

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[75]:

- 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

[72] Ready.gov Cybersecurity
[73] CISA "Ransomware Guidance and Resources"
[74] Bajak, Frank "Ransomware gangs get paid off as officials struggle for fix" Associated Press, June 21, 2021.
[75] 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.

4.13.2. 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[76]. 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[77]. 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[78].

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[79]
- 2021- SIU School of Medicine lost patient data in the cyber-attack on Accellion's File Transfer Appliance[80]
- April-May 2021- Ransomware attack on the IL Attorney General's office, loss of case files and court records[81]

4.13.3. 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.

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

4.14. Wildland Fires

4.14.1. 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[82]. 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.

4.14.2. 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.

4.14.3. Risk

Jefferson County has an 52% risk of wildfire to homes by the state ranking system, and 13% by the national rank. There is a 30% wildfire hazard potential by state rank and a 5% wildfire hazard potential by national rank[83].

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.

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

4.15. Utility Disruptions and Power Outages

4.15.1. 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[84]:

- 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.

4.15.2. 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.

4.15.3. 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.

[84] "10 common causes of power outages" Constellation, 2021.

4.16. Invasive Species and Infestations

4.16.1. 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[85]:

- 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.

4.16.1.1. 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[86]:

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.

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

Table 4.35 – 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

4.16.2. 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[87].

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[88].

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.

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

Table 4.36 - 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 4.37 -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 4.38 - 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

4.16.3. 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.

4.16.4. Risk

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

4.17. Landslides

4.17.1. 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[89]:

- **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.

4.17.2. Geographic Location and Historical Occurrences

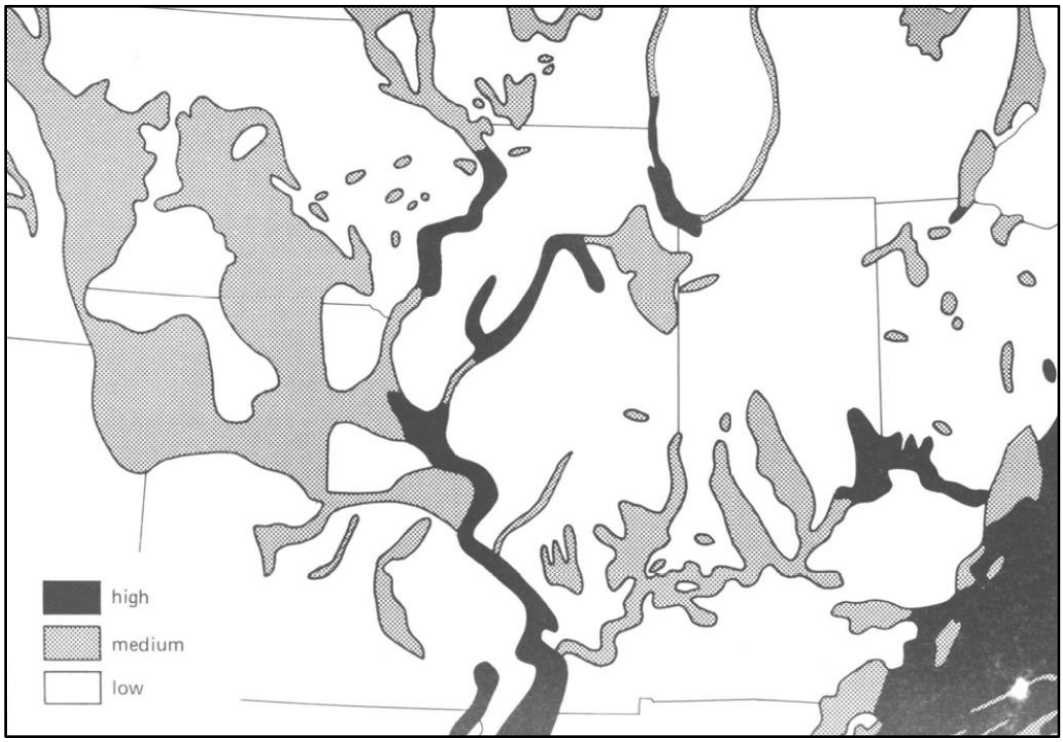
The most recent inventory of landslides in southern Illinois was competed in 1992. During this inventory, ISGS identified 221 landslides that occurred along the Mississippi and Ohio Rivers from Chester to Olmstead[90]. Most of the identified landslides were considered ancient landforms that had occurred 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.

4.17.3. 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; Jefferson County has a low to medium risk of landslides, see figure 4.18 for a map of landslide probability in the state.

[89] Killey, Hines, and DuMontelle "Landslide Inventory of Illinois" Illinois Department of Energy and Natural Resources, State Geological Survey Division, 1985.
[90] 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 4.18: Landslide potential in Illinois



Source: ISGS

4.18. Near Earth Object Impact

4.18.1. 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[91] (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.[92]" 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[93].

4.18.2. 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[94]. 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[95]. The most recent observed meteorite fall occurred in 2003.

4.18.3. Risk

NEO impact could occur anywhere, the county has equal risk. Table 4.39 below shows approximate impact probability (interval) and damage for different size classes of NEOs. MT

[91] NASA.gov "NASA on the Prowl for Near-Earth Objects" May 25, 2004.
[92] "Sentry: Earth Impact Monitoring", NASA Jet Propulsion Laboratory, Center for Near Earth Object Studies.
[93] NASA CNEOS "Discovery Statistics"
[94] "Meteorites from Illinois" Washington University in St Louis: Earth and Planetary Sciences
[95] 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 4.39 - 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. 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 Jefferson 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 Jefferson County.

Goal 2: Create new or revise existing plans/maps for Jefferson County	
Objective:	Support compliance with the NFIP for each jurisdiction in Jefferson 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 Jefferson County residents on the hazards	
Objective:	Raise public awareness on hazard mitigation.
Objective:	Improve education and training of emergency personnel and public officials.

5.1. 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. Table 5.1 shows the Jefferson County municipalities that are currently participating in the National Flood Insurance Program.

Table 5.1 – NFIP Participation

Municipality	NFIP Participation	Reason for Non-participation	Current FIRM Effective Date
Belle Rive	no	Not within SFHA	9/17/2010
Bluford	no	No business nor residential structures within SFHA	9/17/2010
Bonnie	yes		9/17/2010
Dix	no	Not within SFHA	9/17/2010
Ina	yes		9/17/2010
Mount Vernon	yes		9/17/2010
Nason	no	No business nor residential structures within SFHA	9/17/2010
Waltonville	no	No business nor residential structures within SFHA	9/17/2010
Woodlawn	no	Not within SFHA	9/17/2010

5.1.1. 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[96]:

- 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, Jefferson County does not have any jurisdictions with CRS status.

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

5.1.2. 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 5.2 shows the summary of repetitive loss structures in Jefferson County from 1983-2021.

Table 5.2 – Repetitive Loss Structures

Jurisdiction	Number of Properties	Occupancy Type	Number of Losses	Total paid
Jefferson County	1	Single Family	2	$ 67,925.65

Source: IEMA

5.2. 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 5.3 lists Jefferson 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 5.3 - Jurisdictional Ordinances

Community	Comprehensive Plan	Zoning	Subdivision Control	Erosion Control	Storm Water Management	Burning	Seismic	Building Standards
Jefferson County	5/1/1970	N/A	9/14/1982	N/A	9/14/1982	N/A	N/A	N/A
Belle Rive	N/A	4/20/1970	N/A	N/A	N/A	N/A	N/A	N/A
Bluford	N/A	N/A	N/A	N/A	N/A	5/2/1989	N/A	5/2/1989
Bonnie	N/A	11/1/1999	N/A	N/A	N/A	N/A	N/A	N/A
Dix	5/20/1969	N/A	5/16/1974	N/A	5/16/1974	N/A	N/A	N/A
Ina	N/A	5/18/1905	N/A	N/A	N/A	N/A	N/A	5/18/1905
Mount Vernon	9/1/1963	5/19/1905	5/19/1905	5/19/1905	5/19/1905	5/19/1905	N/A	4/1/2007
Nason	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Waltonville	5/1/1969	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Woodlawn	6/1/2002	N/A	5/4/2004	N/A	N/A	4/6/1999	N/A	N/A

5.3. Mitigation Strategies

The following tables display all hazard mitigation strategies proposed by the Jefferson County Planning Team. Strategies were created with county goals and FEMA STAPLEE criteria. Strategies from the 2015 Plan are noted in the tables. Planning Team members determined project priority based on the immediate need of the community, overall hazard reduction benefits to the community the strategy would provide, and cost-effectiveness of the project to other alternatives.

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 5.4 - 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

All Hazards						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
AH1	**Develop public outreach programs to instruct public on what to do during potential hazards:** The County EMA, schools, Red Cross, and other organizations have implemented various forms of this strategy. Local resources have been used to target and inform the resident population. Additional funding will be sought from the Pre-Disaster Mitigation program.	Ongoing	Local, state	High	Jefferson County EMA, Schools, Red Cross, other organizations	from 2015 MHMP
AH2	**Establish Local Emergency Planning Committee:** Funding has not been secured as of 2015. If funding is available, it is forecasted to be complete within approximately three years	Proposed	local	Medium	Sesser Fire Protection District	from 2015 MHMP
AH3	**Medical Reserve Corps is in place via Jefferson County Health Department:** The County Health Department, schools, and other organizations will participate in this project. Local resources will be used to target and inform the resident population. Additional funding will be sought from the Pre-Disaster Mitigations program	Ongoing	Local, state	High	Jefferson County Health Department, Sesser Fire Protection District	from 2015 MHMP
AH4	**Install new emergency radio system (Star COM radios) that is interoperable with different emergency agencies:** Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county. The County EMA, Sherriff Office, Rend Lake College, County Health Department, and Mt. Vernon Fire Department all now have Star COM radios. Local resources will be used to evaluate the cost benefits of the radios. Funding has not been secured as of 2015. If funding is available, it is forecasted to be complete within approximately three years	Ongoing	Local, state	Medium	Jefferson County EMA, K.C. Admin	from 2015 MHMP
AH5	**Establish Interoperability between utility companies and emergency responders:** County and Local Agencies continue to maintain contact with utility companies before during and after hazardous events. Funding has not been secured as of 2015, but Pre-Disaster Mitigation Program and Community Development grants are possible funding sources. If funding is available, implementation is forecasted to be completed within approximately five years.	Ongoing	Local	Medium	Jefferson County EMA	from 2015 MHMP
AH6	**Purchase NOAA Weather Radios for Schools:** Local resources will be used to evaluate the cost benefits of radios. Funding has not yet been secured as of 2015 If funding is available, is forecasted to be complete within approximately three years.	Ongoing	local	Medium	Jefferson County EMA	from 2015 MHMP

All Hazards						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
AH7	**Conduct response and communication disaster training for EMAs and deputies:** Improve education of emergency personnel and public officials. The County EMA will oversee the implementation of this project. Funding has not been secured, but additional funding will be sought from Department of Homeland Security and local resources. Implementation is forecasted to be complete within approximately three years.	Ongoing	Local	Medium	Jefferson County EMA	from 2015 MHMP
AH8	**Establish GIS database of emergency responders:** The Jefferson County Assessor's Office will oversee this project. The database is updated annually.	Ongoing	Local	High	Jefferson County EMA	from 2015 MHMP
AH9	**Develop a resource list to assist potential at-risk and/or special needs communities:** The County EMA will oversee the implementation of this project. Funding has not been secured, but additional funding will be sought from local resources. Implementation is forecasted to be complete within approximately five years.	Ongoing	Local	High	Jefferson County EMA	from 2015 MHMP
AH10	**Develop mutual aid agreements**: Tri-County Electric Company will oversee the implementation of this project. Funding has not been secured as of 2015. Implementation is forecasted to be initiated within approximately three years.	Ongoing	Local	Low	Tri-County Electric Company	from 2015 MHMP
AH11	**Construct a new Emergency Operations Center:** The Jefferson County EMA will oversee the implementation of this project. The project is approximately %50 completed. The pre-disaster mitigation program and community development grants are a possible funding source. Implementation, if funding is available, is forecasted to be initiated within approximately one year.	Ongoing	Local	High	Jefferson County EMA	from 2015 MHMP
AH12	**Harden existing community shelters and critical facilities:** The County EMA will oversee the implementation of this project. Local resources will be used to evaluate the cost benefit of the shelters and define specific locations. Funding has not been secured as of 2015. Implementation is forecasted to be initiated within approximately one year.	Proposed	Local, BRIC, USDA, Infrastructure Bill	High	Jefferson County EMA, Farrington School Board and Superintendent, Northeast Water Company, Tri-County Electric Company, Opdyke-Belle Rive CCDS #5,	from 2015 MHMP
AH13	**Identify and procure backup water supply:** Funding has not been secured as of 2015. Implementation is forecasted to be initiated within three to five years.	Proposed	USDA, IEPA	Medium	Northeast Water Company	from 2015 MHMP
AH14	**Construct additional community safe rooms:** Various jurisdictions interested in protecting citizens via construction and implementation of safe rooms. Local resources and additional grants will be used to procure the generators. If funding is available, is forecasted to be complete within three to five years	Proposed	Local, BRIC, USDA, Infrastructure Bill	Medium	Bethel BOE, ROE #13, Comprehensive Connections Strategies, Farrington School Board and Superintendent, Kaskaskia College, Opdyke-Belle Rive CCDS #5	from 2015 MHMP

All Hazards						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
AH15	**Purchase back-up generators for critical facilities:** IESMA Generator stockpiles in place in Effingham & Franklin Counties as of 2011. The County EMA will oversee the implementation of this project. Local resources and additional grants will be used to procure the generators. If funding is available, is forecasted to be complete within approximately one year.	Proposed	Local, BRIC	High	Jefferson County EMA, Northeast Water Company	from 2015 MHMP
AH16	**Improve/maintain access to public rights-of-way (Tree Management):** Tri-County Electric Company will oversee the implementation of this project. Local resources and additional grants will be used to maintain trees along roads and powerlines. If funding is available, is forecasted to be begin within one year.	Ongoing	Federal, private	Low	Tri-County Electric Company	from 2015 MHMP
AH17	**Acquire portable lighting for mass casualty preparation:** Kaskaskia College will oversee the implementation of this project. Local resources and additional grants will be used to procure the portable lighting. If funding is available, is forecasted to be complete within three to five years	Proposed	Local	Medium	Kaskaskia College	from 2015 MHMP
AH18	**Purchase Emergency response equipment for clean-up and removal, e.g. backhoe with clamp device, bobcat skid steer:** The County will oversee the implementation of this project. Funding has not been secured, but additional funding will be sought from IDOT and Local resources. Implementation is forecasted to be complete within approximately five years.	Proposed	Local, IDOT, USDA	High	Jefferson County EMA	from 2015 MHMP
AH19	**Acquire hazard event training trailer:** The County EMA will oversee the implementation of this project. Funding has not been secured, but additional funding will be sought from the Pre-Disaster Mitigation program. Implementation is forecasted to be initiated within approximately three years.	Proposed	Local, EMPG, BRIC	Medium	Jefferson County EMA	from 2015 MHMP
AH20	Construct or obtain a second water storage tower; We currently have only one water storage tower. Our water system is at full capacity. The loss of our tower would cause a major water supply interruption. There is not enough pressure from our supplier to keep adequate pressure	Proposed	Local; BRIC, CDBG,USDA, IEPA	High	Waltonville, FEMA/IEMA, Jefferson County	Ray Gilbert (Waltonville public works)
AH21	Secure connections to other nearby water providers to be used in emergency situations	Proposed	Local; BRIC, CDBG,USDA, IEPA	High	Waltonville, FEMA/IEMA, Jefferson County	Ray Gilbert (Waltonville public works)
AH22	TCEC will continue to deliver electricity and maintain lines in safe areas and conditions.	Ongoing	Private	Low	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
AH23	Local agencies to notify residents. Local police and fire	Proposed	Local	Low	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)
AH24	Prepare facilities with backup generators. Develop an available population list.	Proposed	Local; BRIC	Medium	Jefferson County EMA	Eric Helbig (Superintendent of Woodlawn CUSD #209)

All Hazards						
Code	**Mitigation Strategy**	**Status**	**Funding Source**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
AH25	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	Local, EMPG	High	IDOT, Road Commissions, Levee Commissions, Dam Personal, Water Plant managers, etc	IEMA Downstate Disaster workshop 2022
AH26	Forming & training local damage assessment teams and COADs (Community Organizations Active in Disaster)	Proposed	Local, EMPG, other Preparedness grant	High	IEMA, County EMA, Community Members	IEMA Downstate Disaster workshop 2022
AH27	Saving emergency funds at the county and municipal level to increase resiliency should a disaster occur.	Proposed/Ongoing	Local	High	County & Municipal Governments	IEMA Downstate Disaster workshop 2022
AH28	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	Animal control, non-profits	Low	County Animal Control & Sheriff's Office, Local Animal Rescue Groups	Jenny Richardson, Project Paws of Southern Illinois (PPSI)
AH29	Review and update county & municipality building & zoning codes/ordinances to improve disaster resiliency, community safety, and energy efficiency	Proposed	Local, EMPG	Medium	County Board, Municipalities	2022 National Initiative to Advance Building Codes

Flooding, Dam Failure						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
F1	**Implement a plan for voluntary buyouts for structures within Jefferson County:** The County EMA will oversee the implementation of this project. Local resources will be used to evaluate the applicable areas. Funding has not been secured, but additional funding will be sought from the Pre-Disaster Mitigation program. Implementation is forecasted to be initiated within approximately three years.	Proposed	Local, FMA	Medium	Jefferson County EMA	from 2015 MHMP
F2	**Evaluate Structures and Utilities in flood-prone areas:** Tri-County Electric Company will oversee the implementation of this project. Local resources and additional grants will be used to mitigate loss of utilities during flooding events. If funding is available, is forecasted to be begin in three to five years.	Ongoing	Federal, private	Low	Tri-County Electric Company	from 2015 MHMP
F3	**Flood-proof or elevate facilities:** Flood-proofing needed in flood prone residential and non-residential areas. Local resources and additional grants will be used to procure the generators. If funding is available, is forecasted to be complete within three to five years	Ongoing	Local, private, state, federal	High	Public Utilities, Comprehensive Connections Strategies	from 2015 MHMP
F4	**Install backflow valves and sump pumps in critical facilities:** Additional sump pumps needed in flood prone residential and non-residential areas. Local resources and additional grants will be used to procure the generators. If funding is available, is forecasted to be complete within three to five years	Proposed	Local, FMA, USDA, IEPA	High	Public Utilities, Comprehensive Connections Strategies	from 2015 MHMP
F5	**Implement stream maintenance to improve floodplain management:** The County EMA and DNR will oversee the implementation of this project. Funding has not been secured as of 2015. Community development grants are a possible funding source. Implementation, if funding is available, is forecasted to be complete within approximately three years.	Ongoing	State	Medium	Jefferson County EMA and IDNR	from 2015 MHMP
F6	**Culvert Replacement:** Public utilities will oversee the implementation of this project. Local resources and additional grants will be used to procure the generators. If funding is available, is forecasted to be complete within three to five years	Proposed	Local, FMA, USDA, IEPA	High	Public Utilities	from 2015 MHMP
F7	**Purchase permanent signage or flood gates for flood-prone areas:** The Jefferson County EMA will oversee the implementation of this project. Local resources and IDOT will be used to evaluate the areas for signage. Funding has not been secured, but IDOT and IDNR are possible sources. Implementation is forecasted to be complete within approximately three years.	Ongoing	Local, IDOT	Medium	Jefferson County EMA	from 2015 MHMP
F8	TCEC will continue to deliver electricity and maintain lines in safe areas and conditions. In the event of a large-scale outage as a result of damaged electrical infrastructure, Tri-County Electric Cooperative will contact the Association of Illinois Electric Cooperatives outage management response team to deploy all available electric cooperatives throughout the nation to assist.	Ongoing	Private	Low to Medium	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
F9	TCEC will continue to deliver electricity and maintain lines in safe areas and conditions.	Ongoing	Private	Low to Medium	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)

Flooding, Dam Failure						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
F10	Implement waterway maintenance to improve floodplain management. Purchase permanent signage for flood prone areas	Ongoing	Local, State, Federal	Medium	City of Mt.Vernon EMA and Jefferson County EMA, IDNR	Kevin Sargent (director) & Bryan Jennings (Deputy Director), Steve Leuker (Coordinator) and Keith Hertenstein (Assistant Coordinator), Janice Gahagan (Community Representative LEPC), Connie Simmons (County Clerk) and Marsha Leuker (County Recorder), Angie Litton (Litton Ambulance)
F11	Keeping ditches and culverts clean to prevent flooding on streets in Village.	Ongoing	Local	Medium	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)
F12	Implement waterway maintenance to improv on floodplain management. Purchase permanent signage for flood prone areas	Ongoing	State; Federal	Medium	Jefferson County EMA/ City of Mt. Vernon	Conan King (Jefferson County Fire Protection Chief), Angie Litton (Litton Ambulance)
F13	Provide training for drinking water bypass operations. Purchase emergency pumps for drinking water bypass operations.	Proposed	Local; FMA, BRIC, USDA, IEPA	Medium	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager at Rend Lake Conservancy District)
F14	In the event of a dam failure; Build a second water treatment plants on a separate lake. Install cross connects between other water suppliers and the RLCD distribution system.	Proposed	Local; BRIC, USDA, Infrastructure Bill	Medium	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager at Rend Lake Conservancy District)
F15	Review bus routes for flooding situations. Share information to community about roads that are dangerous under heavy rain events.	Proposed	Local	Medium	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)

Tornados, Severe T-Storms						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
T1	Construct new utility lines to withstand high winds	Proposed	Local, private, USDA, BRIC, Infrastructure Bill	low	Tri-County Electric Cooperative	from 2015 MHMP
T2	In the event of a tornado; mitigation efforts will be in place to limit the vulnerability of electrical infrastructure to tornadoes are addressed by an aggressive forestry trim and pole inspection cycle. In the event of a large-scale outage as a result of damaged electrical infrastructure, Tri-County Electric Cooperative will contact the Association of Illinois Electric Cooperatives outage management response team to deploy all available electric cooperatives throughout the nation to assist.	Ongoing	Private	High	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
T3	Mitigation efforts to limit the vulnerability of electrical infrastructure to severe thunderstorms are addressed by an aggressive forestry trim and pole inspection cycle. In the event of a large-scale outage as a result of damaged electrical infrastructure, Tri-County Electric Cooperative will contact the Association of Illinois Electric Cooperatives outage management response team to deploy all available electric cooperatives throughout the nation to assist.	Ongoing	Private	Medium	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
T4	Hardened laminate window and door film to prevent damage from windblown storm debris	Proposed	Local, Private	Medium	Northeast Water Mt. Vernon	Jim Hertenstein (Board Secretary)
T5	Enhance any available warning systems in the county. Encourage construction of safe rooms in new public buildings.	Ongoing	Local, State	High	City of Mt. Vernon EMA and Jefferson County EMA	Kevin Sargent (director) & Bryan Jennings (Deputy Director), Steve Leuker (Coordinator) and Keith Hertenstein (Assistant Coordinator), Janice Gahagan (Community Representative LEPC), Connie Simmons (County Clerk) and Marsha Leuker (County Recorder), Angie Litton (Litton Ambulance)
T6	Work with local churches to secure safe structures for community to go to for shelter. We have checked no churches in area have safe secure areas to house residents.	Ongoing	local	High	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)
T7	Informing area residents on how to be ready for severe storms in the event. Would have to work with local agencies for clean-up.	Ongoing	Local	High	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)

Tornados, Severe T-Storms						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
T8	Enhance any available warning systems in the county. Encourage construction of safe rooms in new public buildings.	Proposed	Local; FEMA preparedness grant, BRIC, USDA	High	Jefferson County EMA/ City of Mt. Vernon	Conan King (Jefferson County Fire Protection- Chief)
T9	Enhance any available warning systems for severe thunderstorms within the county.	Proposed	Local; Local; FEMA preparedness grant, BRIC, USDA	High	Jefferson County EMA/ City of Mt. Vernon	Conan King (Jefferson County Fire Protection- Chief)
T10	In the event of a tornado; provide training for employees for safety and operations if communication towers are destroyed. Provide training to staff to isolate water supply lines to damaged buildings and restore water service to the area.	Ongoing	Local	Medium	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager at Rend Lake Conservancy District)
T11	During the event of a severe thunderstorm; provide training for employees for safety and operations if communication towers are destroyed. Provide training to staff to isolate water supply lines to damaged buildings and restore water service to the area.	Ongoing	Local	Medium	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager at Rend Lake Conservancy District)
T12	Retro fit existing buildings to withstand high winds in a tornado event. Ballistic film installed on exterior windows to help resist breakage. Install emergency generators in case of a long power outage. Review and revise emergency plan for shelter and place.	Ongoing	Local; State; Federal	High	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)
T13	In the event of a severe thunderstorm; ballistic film may be installed on windows to resist possible breakage. Retrofit buildings and upgrade emergency plans for severe weather.	Ongoing	Local; State; Federal	High	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)
T14	Review plans annually, staff education & exercises	Ongoing	Private	High	SSM Health Illinois	Robin Jones. SSM Emergency Preparedness Coordinator

Earthquakes						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
EQ1	**Retrofit existing bridges to withstand potential hazards:** The Jefferson County EMA and IDOT will oversee the implementation of this project. Local resources and additional grants will be used to procure the system. If funding is available, is forecasted to be complete within approximately three years.	Ongoing	l,s,f,p	Medium	Jefferson County and IDOT	from 2015 MHMP
EQ2	**Retrofit/harden critical structures, Replace and improve pump stations:** The County EMA and public utilities will oversee the implementation of this project. Funding has not been secured as of 2009, but the pre-disaster mitigation program is a possible funding source. Implementation, if funding is available, is forecasted to be complete within approximately five years.	Proposed	BRIC, FMA, Infrastructure Bill, USDA	High	Jefferson County EMA, Public Utilities	from 2015 MHMP
EQ3	**Conduct earthquake drills and training:** The Jefferson County EMA and IEMA will continue to oversee this project. It started in February 2009.	Ongoing	l,s,f,p	High	Jefferson County EMA and IEMA	from 2015 MHMP
EQ4	**Adopt 2009 International Building Code:** Adjust ordinance to use updated code	Proposed	local	High	City Administrator	from 2015 MHMP
EQ5	**Stockpile building materials, such as rock and piping, for building temporary bridges:** The County EMA and IDOT will oversee the implementation of this project. Funding has not been secured, but additional funding will be sought from IDOT. Implementation is forecasted to be complete within approximately five years.	Ongoing	l,s,f,p	High	Jefferson County and IDOT	from 2015 MHMP
EQ6	In the case of an earthquake; mitigation efforts to limit the vulnerability of electrical infrastructure to earthquakes are addressed by an aggressive forestry trim and pole inspection cycle. In the event of a large scale outage as a result of damaged electrical infrastructure, Tri-County Electric Cooperative will contact the Association of Illinois Electric Cooperatives outage management response team to deploy all available electric cooperatives throughout the nation to assist.	Ongoing	Private	Medium	Jefferson County EMA //Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
EQ7	Making residents aware of local and state agencies that would help in the event of a earthquake. Agencies that could work with residents and making them aware of the help.	Ongoing	Local	Low	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)
EQ8	Install at least two water supply lines to each community. Install cross connects with other utilities	Proposed	Local; BRIC, FMA, Infrastructure Bill	High	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager at Rend Lake Conservancy District)
EQ9	Install emergency Shut Off valves; Develop an earthquake emergency action plan.	Proposed	Local; FEMA preparedness grant	Medium	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)
EQ10	Secure connections to other nearby water providers to be used in emergency situations, there is only one 6-inch water main running from Mt. Vernon to the village of Waltonville. An earthquake could rupture the line in several locations causing water supply shortage.	Proposed	Local; BRIC, FMA, Infrastructure Bill	High	Waltonville, FEMA/IEMA, Jefferson County	Ray Gilbert (Waltonville public works)
EQ11	Review/revise plans annually, staff education & exercises	Ongoing	Private	High	SSM Health Illinois	Robin Jones. SSM Emergency Preparedness Coordinator

HazMat Release						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
HM1	TCEC will continue to deliver electricity and maintain lines in safe areas and conditions.	Ongoing	Private	Medium	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
HM2	Conduct Hazardous Materials Commodity flow study	Proposed	Local, EMPG	Medium	Jefferson County EMA	Kevin Sargent (director) & Bryan Jennings (Deputy Director), Steve Leuker (Coordinator) and Keith Hertenstein (Assistant Coordinator), Janice Gahagan (Community Representative LEPC), Connie Simmons (County Clerk) and Marsha Leuker (County Recorder)
HM3	Work with local fire and police to set up necessary cleanup of hazardous materials spilled in the area. We do not have a local fire we are under jurisdiction of Jefferson Rural Fire.	Proposed	Local	Medium	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)
HM4	Conduct hazardous materials commodity flow study	Proposed	Local; EMPG	Medium	Jefferson County EMA/ City of Mt. Vernon	Conan King (Jefferson County Fire Protection- Chief) Angie Litton (Litton Ambulance)
HM5	Test water supply lake. Test water in distribution system.	Ongoing	Local	High	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager at Rend Lake Conservancy District)
HM6	Develop and update hazmat emergency plans. Acquire protective gear for first responders.	Proposed	Local	Low	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)
HM7	Review/revise plans annually, staff education & exercises	Ongoing	Private	Medium	SSM Health Illinois	Robin Jones. SSM Emergency Preparedness Coordinator

Drought, Extreme Heat						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
D1	Retrofit Water Supply Systems: Enhance water supply to the campus in case of fire and extreme heat.	Proposed	Local, BRIC, FMA, Infrastructure Bill		Kaskaskia College	from 2015 MHMP
D2	In drought/extreme heat conditions, equipment is monitored to limit the vulnerability of electrical infrastructure failure. TCEC will continue to deliver electricity and maintain lines in safe areas and conditions.	Ongoing	Private	Low	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
D3	Cooling areas to open at local church would be available	Proposed	Local	Medium	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)
D4	Develop a water conservation plan and implementation procedures. Build a second water treatment plant on a separate lake.	Proposed	Local; BRIC	Medium	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager of the Rend Lake Conservancy District)
D5	Ensure al students have access to appropriate AC during the school day. Retro-fit buildings with heat reflective materials.	Proposed	Local; Infrastructure Bill, USDA, CDBG	Low	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)

Ground Failure						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
GF1	TCEC will continue to deliver electricity and maintain lines in safe areas and conditions.	Ongoing	Private	Medium to Low	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
GF2	Install 2 water supply lines to each community. Develop a large warehouse of emergency parts.	Proposed	Local; BRIC, FMA, USDA, Infrastructure Bill	Medium	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager at Rend Lake Conservancy District)
GF3	Maintain a list of buildings that are constructed over underground mines. Create brochures regarding mine subsidence insurance for residents.	Proposed	Local	Low	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)

Winter Storms						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
W1	Mitigation efforts to limit the vulnerability of electrical infrastructure to severe winter weather are addressed by an aggressive forestry trim and pole inspection cycle. In the event of a large scale outage as a result of damaged electrical infrastructure, Tri-County Electric Cooperative will contact the Association of Illinois Electric Cooperatives outage management response team to deploy all available electric cooperatives throughout the nation to assist.	Ongoing	Private	High	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
W2	Establish warming centers throughout the county. Enhance any available warning systems in the county.	Proposed	Local, IEMA, BRIC	Medium	City of Mt.Vernon EMA and Jefferson County EMA	Kevin Sargent (director) & Bryan Jennings (Deputy Director), Steve Leuker (Coordinator) and Keith Hertenstein (Assistant Coordinator), Janice Gahagan (Community Representative LEPC), Connie Simmons (County Clerk) and Marsha Leuker (County Recorder)
W3	Informing residents on severe winter weather. Radio, internet and television for information . Help from local highway and state to clean roads along with village to clean streets in the village. Having truck ready and salt available to clean village roads.	Proposed	Local	High	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)
W4	Establish warming centers throughout the county. Enhance any available warning systems in the county.	Proposed	CDBG, USDA, BRIC	Medium	Jefferson County EMA/ City of Mt. Vernon	Conan King (Jefferson County Fire Protection - Cheif)
W5	Provide training for extreme cold weather repairs. Provide alternative lake raw water pumping capabilities for the water treatment plant.	Ongoing	Local; State	High	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager at rend Lake Conservancy District)
W6	Regular inspections of heating systems/ roofing to ensure they can keep up/ hold up in a large amount of snowfall. Invest in engine block heaters for buses.	Ongoing	Local; State	Medium	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)
W7	Review/revise plans annually, plans for staff to remain on campus	Ongoing	Private	Medium	SSM Health Illinois	Robin Jones. SSM Emergency Preparedness Coordinator

Pandemic/Disease Outbreak						
Code	**Mitigation Strategy**	**Status**	**Funding Source**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
DEP1	**Start non-pharmaceutical intervention program:** County Health Department and Hospitals will oversee implementation of this project. Will seek local, state, and federal funding for project.	Proposed	Local, IDPH, CDC	High	Jefferson County Health Department and Hospitals	from 2015 MHMP
DEP2	**Develop plan for local healthcare mass care situations:** County Health Department and Hospitals will oversee implementation of this project. Will seek local and state for project.	Proposed	Local, IDPH, CDC	High	Jefferson County EMA, Health Department, and Hospitals	from 2015 MHMP
DEP3	**Portable morgue and mutual aid agreement and response plan:** County Coroner has a portable morgue and access to trailer in the event of mass casualties. Mutual aid agreements with surrounding counties and internal departments. Coroner has a 7-year-old response plan but it has been updated twice.	Ongoing	Local	High	Jefferson County Coroner	from 2015 MHMP
DEP4	Secure a permanent warehouse facility for PPE in case of future outbreak(s).	Ongoing	Local, State	High	Jefferson County EMA, City of Mt. Vernon EMA	Kevin Sargent (director) & Bryan Jennings (Deputy Director), Steve Leuker (Coordinator) and Keith Hertenstein (Assistant Coordinator), Janice Gahagan (Community Representative LEPC), Connie Simmons (County Clerk) and Marsha Leuker (County Recorder)
DEP5	Local health departments help to the community in the need of epidemic to the residents. Guidance in testing of a epidemic to the community. Set up test sites.	Ongoing	Local	Medium	Village of Belle Rive EMA/ Jefferson County Health Department	Kim McCormick (Village President of Belle Rive)
DEP6	Secure a permanent warehouse facility for PPE in case of a future outbreak.	Proposed	Local; IDPH	High	Jefferson County EMA/ City of Mt. Vernon	Conan King (Jefferson County Fire Protection- Cheif)
DEP7	Implement safety procedures and purchase masks. Develop alternate work stations.	Proposed	Local; State; Federal	High	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager at Rend Lake Conservancy District)
DEP8	Enhance reporting and contact tracing program/ protocols. Stockpile PPE for usage.	Ongoing	Local; State; federal	High	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)
DEP9	Conduct a full-scale exercise every 5 years to address pandemic response. Update plans for contact tracing protocols with lessons learned from COVID-19 and train staff on these protocols.	Ongoing	Local	High	Jefferson County EMA	Amy Harrion (Administrator at the Jefferson County Health Department)
DEP10	Inventory PPE, use of IEMA staffing, communication or needs process	Ongoing	private, state	High	SSM Health Illinois	Robin Jones. SSM Emergency Preparedness Coordinator

Terrorism						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
TR1	In the event of a large scale outage as a result of damaged electrical infrastructure, Tri-County Electric Cooperative will contact the Association of Illinois Electric Cooperatives outage management response team to deploy all available electric cooperatives throughout the nation to assist.	Proposed	Private	Low	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
TR2	Working with local agencies to notify village residents in the event.	Ongoing	Local	Medium	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)
TR3	Implement Risk and Resiliency Plan items; Eliminate single points of failure.	Proposed	Local; IEMA	High	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager of the Rend Lake Conservancy District)
TR4	Ballistic film to place on exterior windows to help resist breakage. Partner with Jefferson County Police to assess threats.	Proposed	Local; BRIC, IEMA, CDBG, USDA	Medium	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)

Cyberattack						
Code	**Mitigation Strategy**	**Status**	**Funding Source**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
C1	TCEC's IT team works diligently to prevent cyberattacks by testing the system and working with the National Rural Electric Cooperative Association on best practices.	Ongoing	Private	High	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
C2	Notify residents of local agencies within the state to help with this event of a cyberattack	Proposed	Local	Medium	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)
C3	Perform study to identify cyber weaknesses at the water treatment plant and pumping stations. Install manual operation controls not dependent on the computerized system.	Proposed	Local; Infrastructure Bill	High	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager of the Rend Lake Conservancy District)
C4	Insurance coverage for lost resources/ lawsuits for a possible data breach. Update the firewalls to the strictest ones.	Ongoing	Local; State	High	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)
C5	Work with IT dept to develop plan	Ongoing	Private	High	SSM Health Illinois	Robin Jones. SSM Emergency Preparedness Coordinator

Power outage/ utility disruption						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
O1	Mitigation efforts to limit the vulnerability of electrical infrastructure to tornadoes are addressed by an aggressive forestry trim and pole inspection cycle. In the event of a large-scale outage as a result of damaged electrical infrastructure, Tri-County Electric Cooperative will contact the Association of Illinois Electric Cooperatives outage management response team to deploy all available electric cooperatives throughout the nation to assist.	Ongoing	Private	High	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
O2	Enhance private/public utility services maintenance capabilities and try to provide for any known deficiencies	Proposed	Local, IEPA, CDBG, BRIC, Infrastructure Bill	Medium	City of Mt. Vernon EMA and Jefferson County EMA	Kevin Sargent (director) & Bryan Jennings (Deputy Director), Steve Leuker (Coordinator) and Keith Hertenstein (Assistant Coordinator), Janice Gahagan (Community Representative LEPC), Connie Simmons (County Clerk) and Marsha Leuker (County Recorder)
O3	Inform residents of how to notify local utility companies in the event of power outages.	Proposed	Local	Medium	Village of Belle Rive EMA	Kim McCormick (Village President of Belle Rive)
O4	Enhance private/public utility service maintenance capabilities and try to provide for any known deficiencies.	Proposed	Local, IEPA, CDBG, BRIC, Infrastructure Bill	Medium	Jefferson County EMA/ City of Mt. Vernon	Conan King (Jefferson County Fire Protection- Chief), Angie Litton (Litton Ambulance)
O5	Refurbish or replace 50-year-old emergency engines for drinking water pumping. Install emergency generators and/or hookup panels at each pump station and lift station.	Proposed	Local, IEPA, CDBG, BRIC, Infrastructure Bill	High	Rend Lake Conservancy District/ Jefferson County EMA	Keith Thomason (General Manager of the Rend Lake Conservancy District)
O6	Install emergency generators. Install solar panels to be more self-sufficient.	Proposed	Local, IEPA, CDBG, BRIC, Infrastructure Bill	Medium	Jefferson County EMA	Eric Helbig (Woodlawn CUSD #209 Superintendent)
O7	Plant Operations reviews plan annually. Staff education and preventative maintenance programs	Ongoing	Private	High	SSM Health Illinois	Robin Jones. SSM Emergency Preparedness Coordinator

Other Potential Hazards						
Code	**Mitigation Strategy**	**Status**	**Funding Source/ Potential Grants**	**Priority**	**Responsible Organization/ Agency**	**Strategy Proposed by**
OH1	Invasive Species: Create and date a list of possible emergency equipment. Develop a vulnerable populations list.	Proposed	Local	Low	Jefferson County EMA	Eric Helbig (Superintendent of Woodlawn CUSD #209)
OH2	Wildfire: TCEC will continue to deliver electricity and maintain lines in safe areas and conditions. In the event of a large-scale outage as a result of damaged electrical infrastructure, Tri-County Electric Cooperative will contact the Association of Illinois Electric Cooperatives outage management response team to deploy all available electric cooperatives throughout the nation to assist.	Ongoing	Private	low	Tri-County Electric Cooperative	Lynn Hutchison (Director of Member Services)
OH3	Wildfire: Write a Community Wildfire Protection Plan for Jefferson County	Proposed	Local, USDA CWDG	High	WCFPD, County EMA, All other Fire Depts	US Forest Service, Greater Egypt

6. Plan Implementation

6.1. Implementation through Existing Programs

Throughout the planning process, the Jefferson 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. The ultimate goal of this plan is to incorporate the mitigation strategies proposed into ongoing planning efforts within the County. The Jefferson County Emergency Management Agency will be the local champion for the mitigation actions. The Jefferson 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 Jefferson County EMA and forwarded to the Planning Team for discussion. Education efforts for hazard mitigation will be an ongoing effort of Jefferson 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 Jefferson County Emergency Management Agency.

6.2. Monitoring, Evaluation, and Updating the MHMP

Throughout the five-year planning cycle, the Jefferson 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 Jefferson County Board.

Appendix 1: Planning Team List

Name of Municipality/Organization	Participation Type	Name(Last,First)	Title
County EMA			
		Lueker, Steve	EMA Coordinator
		Hertenstein, Keith	Chairman, LEPC
		Gahagan, Janice	Secretary, LEPC
County			
		Simmons, Connie	County Clerk
		Lueker, Marsha	Clerk
		Hayse, Roger	Coroner
		Hefner, Brittney	Administrative Assistant
County Sheriff's Office			
		Bullard, Jeff	Sheriff
		Uhls, Blaine	Chief Deputy
Cities/villages			
Belle Rive	Jurisdiction	McCormick, Kim	Village President
Bluford	Jurisdiction	Buttram, Robert	Natural Gas manager
Bonnie	Jurisdiction	Lefforge, Terry	Mayor
		Fulkerson, Angela	Secretary/treasurer
Centralia	Jurisdiction	Lynch, John	Fire Chief
Dix	Jurisdiction	Karcher, Kurt	Mayor
Ina	Jurisdiction	Joy, Jo Ann	Mayor
		Fowler, Jordana	Office Administrator
Mt Vernon	Jurisdiction	Sargent, Kevin	Fire Chief and EMA Coordinator
		Brands, Robert	Assistant Police Chief
		Bechtel, Mary Ellen	City Manager
		Jennings, Bryan	Deputy EMA Coordinator
		Page, Trent	Chief of Police
Nason	Jurisdiction	Vancil, Donna	City Clerk
Waltonville	Jurisdiction	Dees, Randy	Mayor
		Schmitt, Betty	Village clerk
		Gilbert, Ray	Water Superintendent
Woodlawn	Jurisdiction	Airington, Rodney	Mayor

Name of Municipality/Organization	Participation Type	Name(Last,First)	Title
Schools			
Woodlawn CUSD #209	Jurisdiction	Kabat, Sandra	Principal, Grade School
		Helbig, Eric	Superintendent
Rome Grade School	Jurisdiction	Phillips, Steve	Superintendent
Mt Vernon City Schools District #80	Stakeholder	Swan, Ryan	Superintendent
		Williams, Scott	Principal, Casey Middle School
Mt Vernon High School #201	Stakeholder	Andrews, Melanie	Superintendent
Regional Office of Education #13	Stakeholder	Renaud, Matt	Regional Superintendent
Health/ emergency jurisdictions			
Regional Hospital Coordinating Center	Jurisdiction	Herrmann, Arien	Region V manager
		Caffrey-Bey, Tamara	Regional Emergency Planning Coordinator
Jefferson County Health Department	Jurisdiction	Harrison, Amy	Administrator
Litton ambulance service	Jurisdiction	Litton, Angie	Administrator
Jefferson County Fire Protection District	Jurisdiction	King, Conan	Fire Chief
Good Samaritan Hospital	Jurisdiction	Jones, Robin	EMS Coordinator
Other			
Tri-County Electric Cooperative	Jurisdiction	Lynn Hutchinson	Director of member Services
C.E. Brehm Memorial Public Library District	Jurisdiction	Pixley, Bill	Library Director
		Hall, Clyde	President
Midland Area Agency on Aging	Stakeholder	Cummins, Lori	Program Coordinator
Comprehensive Connections	Stakeholder	Holsapple, Debbie	Ex Director
		Pearson, Donna	Director of Senior Services
Rend Lake Conservancy District	Jurisdiction	Thomason, Keith	General Manager
		Sanders, Larry	General Counsel
Northeast Water District	Jurisdiction	Hertenstein, Jim	Representative
Franklin County EMA	Neighboring Jurisdiction	Buckingham, Ryan	Director
Jackson County EMA	Neighboring Jurisdiction	Burns, Robert	Sheriff, EMA Coordinator
		Rowe, Orval	Deputy EMA Coordinator
Perry County EMA	Neighboring Jurisdiction	Genesio, Charles	Director
Williamson County EMA	Neighboring Jurisdiction	Burgess, Brian	Director
		Creek, Pat	Deputy Director

Appendix 2: Jefferson County Essential Facilities

Following is the list of essential facilities as determined by the Jefferson 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.

Medical Rescue

Name	Address	City	Zip	Yr Built	Backup Power	Kitchen	Shelter Capacity	Equipment	Sq Ft	Replacement Value (x1000)
Litton Ambulance	808 South 17th Street	Mt. Vernon	62864	1990	Yes	Yes		3 ambulances	6200	2796.53
United Medical Response Division 5	3000 Veterans Memorial Drive	Mt. Vernon	62864	2020	Yes	Yes		4 ambulances	12225	2796.53
Air Evac Lifeteam	600 Aviation Dr	Mt Vernon	62864	Currently being updated				3 medical helicopters	11000	2796.53

Fire Stations

Name	Address	City	Zip	Yr Built	Backup Power	Kitchen	Shelter Capacity	Equipment	Sq Ft	Replacement Value (x1000)
Jefferson Fire Protection District Station 1	1600 South 10th Street	Mt Vernon	62864	1962	Yes	Yes			11000	2796.53
Jefferson Fire Protection District Station 2	303 West Third	Ina	62846	1974	Yes	No			11000	2796.53
Jefferson Fire Protection District Station 3	298 North Main	Dix	62830	1981	Yes	No			11000	2796.53
Jefferson Fire Protection District Station 4	9083 North Hottenson	Opdyke	62872	1974	No	No			11000	2796.53
Mt Vernon Fire Department Station 1	1100 South Main Street	Mt. Vernon	62864	1954	Yes	Yes			11000	2796.53
Mt Vernon Fire Department Station 3	1111 Airport Road	Mt. Vernon	62864	1979	Yes	Yes			11000	2796.53
Mt Vernon Fire Department Station 4	714 South 42nd Street	Mt. Vernon	62864	1979	Yes	Yes			11000	2796.53
Waltonville Fire Protection District	214 West Main Street	Waltonville	62894	1980	Yes	No			11000	2796.53
Webber Fire Department	504 Parker Street	Bluford	62814	1979	Yes	No			11000	2796.53
Woodlawn Fire Protection District	102 South Central Street	Woodlawn	62898	1980	Yes	No			11000	2796.53

Emergency Operations Centers

Name	Address	City	Zip	Yr Built	Backup Power	Kitchen	Sq Ft	Replacement Value (x1000)
Jefferson County Emergency Operations Center	100 South Tenth Street	Mt Vernon	62864	1983	Yes	Yes	2000	2796.53
City of Mt. Vernon Emergency Operations Center	211 North 10th Street	Mt Vernon	62864	1954	Yes	Yes	11000	2796.53

Medical Care Facilities

Name	Address	City	Zip	Yr Built	# Beds	Backup Power	Kitchen	Shelter Capacity	Sq Ft	Replacement Value (x1000)
Crossroads Community Hospital	8 Doctors Park Rd	Mt Vernon	62864	1979	47					5578.35
SSM Health Good Samaritan Hospital	1 Good Samaritan Way	Mt Vernon	62864	2000	115					16629.25
Jefferson County Health Department	4102 S Water Tower Place	Mt. Vernon	62864	new	NA				9824	879
DaVita Dialysis Center	4102 N Water Tower Place	Mt. Vernon	62864	new	NA				18800	2796.53

Police Stations

Name	Address	City	Zip	Yr Built	Backup Power	Kitchen	Shelter Capacity	Equipment	Sq Ft	Replacement Value(x1000)
Rend Lake College Police Department	468 North Ken Gray Parkway	Ina	62848	1974	Yes	Yes			11000	2796.53
Mt. Vernon Police Department	211 North 10th Street	Mt Vernon	62864	1954	Yes	No			11000	2796.53
Jefferson County Sheriff's Office	911 Casey Avenue	Mt Vernon	62864	1954	Yes	Yes			11000	2796.53
Ina Police Department	306 S Elm Street	Ina	62846		No	No			11000	2796.53

Schools

District/Type	Name	Grades	# Students	Address	City	Zip Code	Year Built	Backup Power	Kitchen	Shelter Capacity	Sq Ft	Replacement Value (x1000)
Bethel Grade School District #82	Bethel Grade School	K-8	154	1201 Bethel Road	Mt Vernon	62864	1962				13500	2722.00
Bluford Unit School District 318	Bluford Grade School	prek-8	256	901 6th St.	Bluford	62814	1979				20714.29	4176.62
Bluford Unit School District 318	Webber High School	9-12	113	805 W 6th St	Bluford	62815	2019				130000	7000
College	Rend Lake College	2 year		468 North Ken Gray Parkway	Ina	62846	1974				225333.3	38543.27
District 201	Mt Vernon Township High School	9-12	1107	11101 North Wells Bypass	Mt Vernon	62864	2016				338487	7434
Farrington Community District 99	Farrington Elementary School	K-8	52	20941 East Divide Rd	Bluford	62815	1979				5714.286	1152.17
Field CCSD # 3	Field Elementary School	prek-8	257	21075 North Hails Lane	Texico	62889	1981				22071.43	4450.26
Grand Prairie #6	Grand Prairie Grade School	K-8	88	21462 North Richview Lane	Centralia	62801	1981				6571.429	1325.00
McClellan CCSD #12	McClellan Elementary School	K-8	62	9475 North Illinois Highway 148	Mt Vernon	62864	1979				5214.286	1051.36
Mt Vernon District 80	Dr. Andy Hall Early Childhood Center	preK	244	301 South 17th Street	Mt Vernon	62864	1959				22857.14	4608.69
Mt Vernon District 80	Dr. Nick Osborne Primary Center	K-3	627	401 North 30th Street	Mt Vernon	62864	1967				53428.57	10772.80
Mt Vernon District 80	J.L. Buford Intermediate Education Center	4-5	255	623 South 34th Street	Mt Vernon	62864	1979				22642.86	4565.48
Mt Vernon District 80	Zadok Casey Middle School	6-8	425	1829 Broadway	Mt Vernon	62864	1954				30357.14	6120.91
Opdyke-Belle Rive CCSD #5	Opdyke-Belle Rive CCSD #5	K-8	140	19380 East 4th Street	Opdyke	62872	1974				14071.43	2837.22
Private	Coram Deo Classical School			1600 Salem Road	Mt Vernon	62864					1714.286	345.65
Private	St. Mary's Catholic School	K-8		1416 Main Street	Mt Vernon	62864					1714.286	345.65
Private	Victory Christian Academy	K-12		1719 Broadway Street	Mt Vernon	62864	1954				1714.286	345.65
Regional Office of Education #13	Alternative Learning Center	6-12		2300 Benton Rd	Mt Vernon	62864					5714.286	1152.17
Regional Office of Education #13	Alternative Learning Center Building B	6-12		2300 Benton Road, Building B	Mt Vernon	62864					5714.286	1152.17
Rome School District #3	Rome Grade School	K-8	361	233 West South Street	Dix	62830	1981				27642.86	5573.63
Spring Garden CCSD #178	Spring Garden Elementary	K-4	140	14975 East Bakerville	Mt Vernon	62864	1962				9142.857	1843.47
Spring Garden CCSD #178	Spring Garden Middle School	5-8	98	511 South. Elm Street	Ina	62846	1974				9714.286	1958.69

Schools cont'd.

District/Type	Name	Grades	# Students	Address	City	Zip Code	Year Built	Backup Power	Kitchen	Shelter Capacity	Sq Ft	Replacement Value (x1000)
Summersville School District #79	Summersville Grade School	prek-8	274	1118 Fairfield Road	Mt Vernon	62864	1979				22071.43	4450.26
Waltonville Community Unit School District No. 1	Waltonville High School	9-12	93	805 West Knob St	Waltonville	62894	1980				8928.571	1800.27
Waltonville Community Unit School District No. 1	Waltonville Grade School	P-8	215	802 W Knob St	Waltonville	62894					36913.1	
Woodlawn Unit School District #209	Woodlawn Grade School	K-8	324	301 South Central Street	Woodlawn	62898	1980				27071.43	5458.41
Woodlawn Unit School District #209	Woodlawn High School	9-12	172	300 North Central Lane	Woodlawn	62898	1980				13357.14	2693.20

Appendix 3: Risk Indices

Hazard	Avg risk index	# lists included	total # lists	% importance	weighted risk index
tornado	15.00	21	21	1.00	15.00
epidemic	7.45	20	21	0.95	7.10
earthquake	7.83	19	21	0.90	7.09
winter storm	7.56	19	21	0.90	6.84
hazmat release	8.44	16	21	0.76	6.43
flooding	6.47	17	21	0.81	5.24
thunderstorm	7.14	15	21	0.71	5.10
extreme heat	4.33	12	21	0.57	2.48
ground failure	3.08	14	21	0.67	2.05
terrorism	3.80	10	21	0.48	1.81
dam failure	3.67	9	21	0.43	1.57
cyber attack	12.00	1	21	0.05	0.57
wildfire	1.43	7	21	0.33	0.48
utility disruption	6.00	1	21	0.05	0.29
infestation	2.50	2	21	0.10	0.24
invasive spp	1.33	3	21	0.14	0.19
landslide	2.00	1	21	0.05	0.10
meteor	1.00	1	21	0.05	0.05

Jefferson County	
Hazard	Risk Index
tornado	20.0
hazmat release	7.6
earthquake	7.1
epidemic	6.9
winter storm	6.8
dam failure	4.0
terrorism	4.0
flooding	3.6
thunderstorm	3.0
ground failure	2.7
extreme heat	2.0
infestation	1.0
invasive spp	1.0
meteor	1.0
wildfire	1.0

Jefferson fire prot. Dist.	
Hazard	Risk Index
pandemic	8
hazmat	8
tornado	6
thunderstorm	4
winter storm	3
earthquake	2
terrorism	2
ground failure	1

Belle Rive	
Hazard	Risk Index
extreme heat	6
hazmat	6
thunderstorm	6
tornado	6
winter storm	6
pandemic	4

Bonnie	
Hazard	Risk Index
tornado	32
winter storm	8
thunderstorm	8
ground failure	8
earthquake	6
pandemic	6
flooding	4
extreme heat	2
dam failure	1

Nason	
Hazard	Risk Index
earthquake	16
tornado	16
winter storm	16
pandemic	8
thunderstorm	8
flooding	6
extreme heat	4
ground failure	4
hazmat	4
terrorism	4
invasives	2

Mt Vernon	
Hazard	Risk Index
hazmat	13.3
winter storm	13.3
earthquake	10.7
flooding	9.3
tornado	9.3
extreme heat	8
thunderstorm	6.7
pandemic	4.7
dam failure	4
terrorism	4
ground failure	3

Waltonville	
Hazard	Risk Index
flooding	32
thunderstorm	27
pandemic	16
earthquake	12
extreme heat	4
hazmat	4
tornado	4
winter storm	3

Woodlawn	
Hazard	Risk Index
pandemic	4
extreme heat	4
thunderstorm	4
tornado	4
winter storm	4
flooding	3

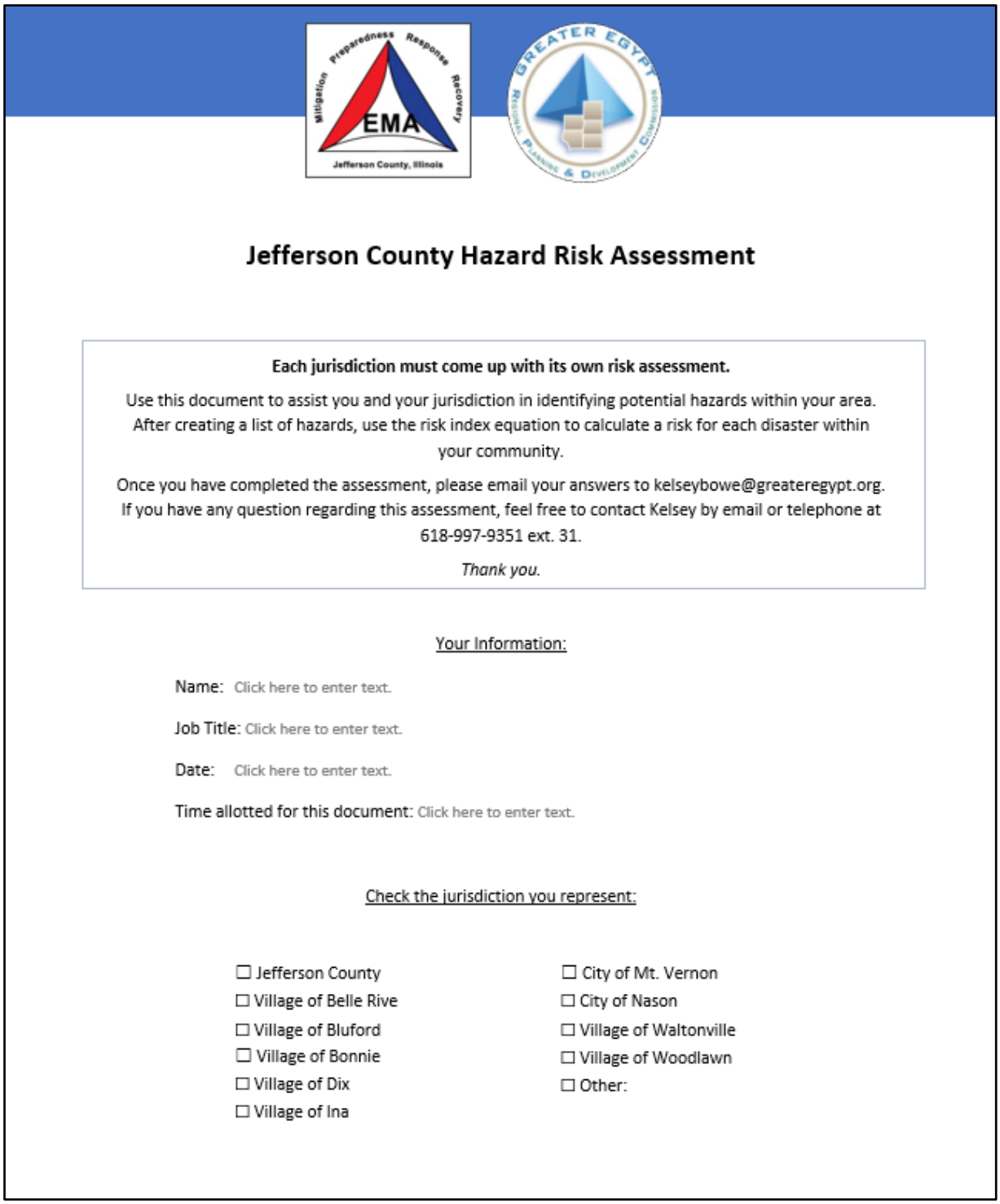
Woodlawn CUSD	
Hazard	Risk Index
tornado	12
thunderstorm	8
pandemic	6
earthquake	4
extreme heat	2

Brehm memorial library district	
Hazard	Risk Index
tornado	16
pandemic	16
thunderstorm	6
earthquake	4
ground failure	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
meteor	4
terrorism	4
wildfire	4

Risk Assessment Worksheets

Below is the example worksheet for the Jefferson County Hazard Risk Assessment and responses from Planning team Members.



Jefferson County Hazard Risk Assessment

Each jurisdiction must come up with its 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, please email your answers to kelseybowe@greateregypt.org. If you have any question regarding this assessment, feel free to contact Kelsey by email or telephone at 618-997-9351 ext. 31.

Thank you.

Your Information:

Name: Click here to enter text.

Job Title: Click here to enter text.

Date: Click here to enter text.

Time allotted for this document: Click here to enter text.

Check the jurisdiction you represent:

- ☐ Jefferson County
- ☐ Village of Belle Rive
- ☐ Village of Bluford
- ☐ Village of Bonnie
- ☐ Village of Dix
- ☐ Village of Ina
- ☐ City of Mt. Vernon
- ☐ City of Nason
- ☐ Village of Waltonville
- ☐ Village of Woodlawn
- ☐ 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

Jefferson County EMA, Steve Lueker

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

Keith Hertenstein, Jefferson County LEPC

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

Jefferson County, Amy Harrison

Hazard	**Probability** *(1-4)*	**Severity** *(1,2,4, or 8)*	**Risk Index** *(P*I)*	**Rank**
Earthquake	2	4	8	2
Epidemic	3	2	6	3
Extreme Heat	2	2	4	4
Flooding	3	1	3	5
Hazardous Materials Event	3	4	12	1
Thunderstorm	4	1	4	4
Tornado	3	2	6	3
Winter Storm	4	1	4	4

Jefferson County, Angie Litton

Hazard	**Probability** *(1-4)*	**Severity** *{1,2,4, or 8}*	**Risk Index** *(P*I}*	**Rank**
Earthquake	1	1	1	1
Epidemic	1	1	1	1
Extreme Heat	1	1	1	1
Flooding	2	1	2	2
Ground Failure	1	1	1	1
Hazardous Materials Events	1	1	1	1
Thunderstorm	3	1	2	2
Tornado	3	2	2	3
Winter Storm/Ice Storm	3	2	2	3

RHCC Region V, Arien Herrmann

Hazard	**Probability** *(1-4)*	**Severity** *(1,2,4, or 8)*	**Risk Index** *(P*I)*	**Rank**
Dam/ Levee Failure	1	4	4	4
Earthquake	1	8	8	2
Epidemic	3	4	12	1
Extreme Heat	4	2	8	2
Flooding	3	2	6	3
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	8	8	2
Wildfire	1	4	4	4
Draught	2	1	2	6
Cyber Attack	3	4	12	1
Utility Disruption	3	2	6	3
Chemical, Biological, Radiological, Nuclear	2	2	4	4
Civil Disruption	2	4	8	2
Transportation Incident	4	1	4	4
Winter Storm	2	1	2	6

Village of Belle Rive, Kim McCormick

Hazard	Probability (1-4)	Severity (1,2,4, or 8)	Risk Index (P*I)	Rank
Epidemic	2	2	8	1
Extreme Heat	2	3	8	3
Winter Storm	2	3	8	3
Hazardous Material	2	3	8	2
Thunderstorm	2	3	8	3
Tornado	2	3	8	3
Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

Village of Bluford, Robert Buttram

Hazard	Probability (1-4)	Severity (1,2,4, or 8)	Risk Index (P*I)	Rank
Earthquake	1	1		1
Ground Failure (wash out)	1	1		5
Thunderstorm	1	1		2
Tornado	1	1		4
Winter Storm Ice	1	1		3

Village of Bonnie, Angela Fulkerson

Hazard	Probability *{1-4)*	Severity *{1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Dam Failure	1	1		8
Earthquake	3	2		5
Epidemic	3	2		9
Extreme Heat	2	1		4
Flooding	1	4		6
Ground Failure (mine subsidence/karst/sinkhole)	2	4		7
Thunderstorm	4	2		1
Tornado	4	8		2
Winter storm/Ice storm	4	2		3

Jefferson County, Connie Simmons

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

Comprehensive Connections, Debra H

Hazard	Probability (1-4)	Severity (1,2,4, or 8)	Risk Index (P*I)
Epidemic	4	8	32
Tornado	4	8	32
Winter Storm / Ice Storm	4	8	32
Earthquake	3	8	24
Terrorism	4	4	16
Thunderstorm	4	4	16
Utility Failure (Water, Electric, Internet)	4	4	16
Dam Failure	2	4	8
Severe Heat	4	2	8
Flooding	4	2	8
Hazardous Materials Event	4	2	8
Wildfire	4	2	8
Ground Failure	2	2	4
Infestation	2	2	4
Invasive Species	2	2	4
Meteor Impact	2	2	4
Landslide	1	1	1
Levee Failure	1	1	1
Volcanic Eruption	1	1	1

Woodlawn CUSD #209, Eric Helbig

Hazard	**Probability** *(1-4)*	**Severity** *(1,2,4, or 8)*	**Risk Index** *(P*I)*	**Rank**
Tornado	3	4	12	1
Thunderstorm	4	2	8	2
Extreme Heat	2	1	2	5
Earthquake	1	4	4	4
Epidemic	2	3	6	3

Jefferson County Fire Protection District, Conan King

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
EARTHQUAKE	2	1	2	5
EPIDEMIC	2	4	8	1
FLOODING	2	1	2	5
GROUND FAILURE	1	1	1	6
HAZMAT	4	2	8	1
TERRORISM	1	2	2	5
THUNDERSTORM	4	1	4	3
TORNADO	3	2	6	2
WINTER STORM / ICE STORM	3	1	3	4

Northeast Water, Jim Hertenstein

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

City of Mt. Vernon, Kevin Sargent

Hazard	**Probability** *(1-4)*	**Severity** *(1,2,4, or 8)*	**Risk Index** *(P*I)*	**Rank**
Dam Failure	2	2	4	8
Earthquake	2	4	8	5
Epidemic / Pandemic	3	2	6	6
Flooding	4	3	12	2
Ground Failure	3	1	3	10
Hazardous Materials Event	4	2	8	3
Terrorism	2	2	4	7
Tornado	4	4	16	1
Winter Storm / Ice Storm	4	2	8	4
Thunderstorm	4	1	4	9

Jefferson County, Marsha Lueker

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Dam Failure	2	2	4	6
Earthquake	2	4	8	9
Epidemic / Pandemic	4	2	8	4
Flooding	4	1	4	5
Ground Failure	3	1	3	8
Hazardous Materials Event	4	2	8	2
Terrorism	2	2	4	7
Tornado	4	8	12	1
Winter Storm / Ice Storm	4	2	8	3
Wildfire	1	1	2	10
Invasive Species	1	1	2	11
Extreme Heat	1	1	2	12
Meteor Impact	1	1	2	13
Infestation	1	1	2	14

City of Nason, Donna Vancil

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Earthquake	2	8	16	3
Epidemic	4	2	8	5
Extreme Heat	4	1	4	7
Flooding	3	2	6	6
Ground Failure	2	2	4	8
Hazardous Materials	2	2	4	9
Invasive Species	2	1	2	11
Terrorism	2	2	4	10
Thunderstorm	4	2	8	4
Tornado	4	4	16	1
Winter Storm/Ice	4	4	16	2

City of Mt. Vernon, Robert Brands

Hazard	**Probability** *(1-4)*	**Severity** *(1,2,4, or 8)*	**Risk Index** *(P*I)*	**Rank**
Earthquake	3	4	12	3
Epidemic	2	2	4	8
Extreme Heat	4	2	8	4
Flooding	4	2	8	6
Hazardous Materials Event	4	4	16	1
Thunderstorm	4	2	8	5
Tornado	3	2	6	7
Winter Storm / Ice Storm	4	4	16	2

Jefferson County, Suzy Tate

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

Village of Waltonville, Ray Gilbert

Earthquake	XXX	Probability 2	Severity 2	Risk Index 4
Extreme Heat	XXX	Probability 4	Severity 1	Risk Index 4
Tornado	XXX	Probability 3	Severity 4	Risk Index 12

Village of Waltonville, Jerry Newell

Hazard	**Probability** *(1-4)*	**Severity** *(1,2,4, or 8)*	**Risk Index** *(P*I)*	**Rank**
Earthquake	3	4	7	8
Epidemic	4	4	8	5
Flooding	4	8	1/2	3
Extreme heat	2	2	4	6
Hazardous material	2	2	4	7
Thunderstorm	4	7	5	1
Tornado	4	1	5	2
Winter storm	3	1	4	4

C.E. Brehm Memorial Public Library District, William Pixley

Hazard	**Probability** *(1-4)*	**Severity** *(1,2,4, or 8)*	**Risk Index** *(P*I)*	**Rank**
Tornado	2	8	16	1
Thunderstorm	3	2	6	3
Earthquake	1	4	4	4
Epidemic	2	8	16	2
Ground failure	1	1	1	5

Village of Woodlawn, Rodney Airington

Hazard	Probability *(1-4)*	Severity *(1,2,4, or 8)*	Risk Index *(P*I)*	Rank
Epidemic	4	1	4	6
Extreme Heat	4	1	4	4
Flooding	3	1	3	5
Thunderstorm	4	1	4	3
Tornado	2	2	4	1
Winter Storm/Ice Storm	4	1	4	2

Appendix 4: Meeting Announcements

The following notice was published in The Southern Illinoisian and the Mount Vernon Sentinel on October 1, 2021

PUBLIC MEETING NOTICE

Jefferson County EMA and Greater Egypt will host a public meeting Tuesday, October 5 at 10:00 AM to provide information and receive public input on the update to the Jefferson 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.

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Appendix 5: Meeting Minute & Attendance

Jefferson County Multi-Hazard Mitigation Plan
Meeting 1 Minutes

June 22, 2021 - 10:00 AM
County EMA Coordinator: Steve Lueker
Deputy Coordinator: Keith Hertenstein
Zoom (Virtual) Meeting
Planning Team Attendance: 35

Tyler Carpenter (Greater Egypt) opened the meeting and introduced Keith Hertenstein, EMA Deputy Coordinator of Jefferson 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 Jefferson County. She also identified hazards that have been included in previous plans for Jefferson 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 22, 2021 10:00 AM
Name
Andrews, Melanie
Ruble, Brad
Baltzell, Dennis
Bechtel, Mary Ellen
Brands, Robert
King, Conan
Gahagan, janice
Harrison, Amy
Helbig, Eric
Hermann, Arien
Hertenstein, Jim
Hertenstein, Keith
Holsapple, Debbie
Jones, Robin
Kabat, Sandra
Litton, Angie
Lueker, Marsha
Lueker, Steve
Pearson, Donna
Jennings, Bryan
Phillips, Steve
Pixley, Bill
Renaud, Matt
Sargent, Kevin
Simmons, Connie
Swan, Ryan
Tate, Suzy
Williams, Scott
Carpenter, Tyler
Bowe, Kelsey
Nixon, Ciara

Jefferson County Multi-Hazard Mitigation Plan

Meeting 2 Minutes

October 5, 2021 - 10:00 AM
County EMA Director: Steve Lueker
EMA Deputy Director: Keith Hertenstein
Zoom (virtual) Meeting
Planning Team Attendance: 22

Tyler Carpenter (Greater Egypt) opened the meeting and gave introductory remarks. Meeting attendees were encouraged to introduce themselves through the chat feature.

Mr. Carpenter reviewed the Planning Updates and the timeline of the MHMP. He 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. He also discussed what to expect leading up to the next MHMP meeting (match survey and strategies exercises).

Kelsey Bowe (Greater Egypt) presented requirements for Jefferson County MHMP plans. She also identified hazards that have been included in previous plans for Jefferson County. Different hazards and their damages were discussed for Jefferson County. Ms. Bowe introduced the initial hazard models and the areas of impact within the Mount Vernon area. She also discussed the different cost of damages within a range of a modeled earthquake's 'epicenter' and the overall severity of earthquakes causing injury or death within surrounding areas. Possible mitigation strategies were discussed for the county. The Hazus model was discussed as a means to understand the development of the data for hazards.

Ms. Bowe explained the process to assess risk of hazards through the hazard ranking exercises and the mitigation strategies exercises. The Planning Team will be required to complete the Mitigations Strategies exercise for their jurisdiction. 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/.

The meeting was adjourned.

Meeting Attendance
Meeting 2: October 5, 2021 10:00 AM
Name
Tyler Carpenter
Kelsey Bowe
Gabrielle Reed
Amy Harrison
Trent Page
Clyde Hall
Conan King
Connie Simmons
Eric Helbig
Steve Lueker
Keith Hertenstein
Jim Hertenstein
Jessica Hagen
John Lynch
Kevin Sargent
Lynn Hutchison
Mary Ellen Bechtel
Robert Brands
Sandra Kabat
Steve Damron
Tamara Caffey-Bey
Mike Bullard

Jefferson County Multi-Hazard Mitigation Plan

Meeting 3 Minutes

March 1, 2022 - 10:00 AM
County EMA Director: Steve Lueker
EMA Deputy Director: Keith Hertenstein
Zoom (virtual) Meeting
Planning Team Attendance: 8

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.

Kelsey Bowe (Greater Egypt) reviewed the ranking for each hazard for Jefferson 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 was also discussed and explained further by Ms. Bowe.

Ms. Bowe explained what to expect in the future for Jefferson 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.

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/.

The meeting adjourned.

Meeting Attendance
Meeting 3: March 1, 2022 10:00AM
Name
Kelsey Bowe
Gabrielle Reed
Amy Harrison
Tamara Caffey-Bey
Robin Jones
Ray Gilbert
Keith Hertenstein
Steve Lueker
Jim Hertenstein
Keith Thomason

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 # 2023-03-02

ADOPTING THE JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, Jefferson 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, Jefferson 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 Jefferson County, Illinois hereby adopts the updated Jefferson County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Jefferson 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.

Jefferson County Board Chairman

Attested by: County Clerk & Recorder

Resolution # MHM 2023

ADOPTING THE JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Belle Rive, 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 Belle Rive 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 Belle Rive, Illinois hereby adopts the updated Jefferson County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Jefferson 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 9th Day of May, 2023.

Kim McInnes
Village President

Cathy D. Pelson
Attested by: Village Clerk

Resolution # 06-05-23

ADOPTING THE JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Bluford, 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 Bluford 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 Bluford, Illinois hereby adopts the updated Jefferson County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Jefferson 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 6th Day of June, 2023.

Village President

Attested by: Village Clerk

Resolution # 2023-01

ADOPTING THE JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Bonnie, 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 Bonnieparticipated 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 Bonnie, Illinoishereby adopts the updated Jefferson County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Jefferson 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 10 Day of April, 2023.

Village Mayor Wesley Meyer Pro-tem

Attested by: Village Clerk Carolyn Overturf

Resolution # 2023-03

ADOPTING THE JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Dix, 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 Dix 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 Dix, Illinois hereby adopts the updated Jefferson County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Jefferson 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 9th Day of May, 2023.

Village President

Attested by: Village Clerk

Resolution # 23-1

ADOPTING THE JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Ina, 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 Ina 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 Ina, Illinois hereby adopts the updated Jefferson County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Jefferson 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 1st Day of May, 2023.

Village Mayor

Attested By: Village Clerk

Resolution #_____

ADOPTING THE JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the City of Mount Vernon, 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 Mount Vernon 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 Mount Vernon, Illinois hereby adopts the updated Jefferson County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Jefferson 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 15th Day of May, 2023.

Mayor

Attested by: City Clerk Deputy

Resolution # 2023-1

ADOPTING THE JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the City of Nason, 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 Nason 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 Nason, Illinois hereby adopts the updated Jefferson County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Jefferson 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 11th Day of April, 2023.

Mayor

Donna Vancil

Attested by: City Clerk

Resolution # 04-03-2023

ADOPTING THE JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Waltonville, 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 Waltonville 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 Waltonville, Illinois hereby adopts the updated Jefferson County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Jefferson 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 review and approval.

ADOPTED THIS 3 Day of April, 2023.

Village President

Attested by: Village Clerk

Resolution #____2023-01_

ADOPTING THE JEFFERSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Village of Woodlawn, 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 Woodlawn 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 Woodlawn, Illinois hereby adopts the updated Jefferson County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED that the Jefferson 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 review and approval.

ADOPTED THIS _____18th_____ Day of _____April_____, 2023.

Village Mayor

Attested by: Village Clerk