CASS COUNTY, ILLINOIS

HAZARD MITIGATION PLAN

February 2024

PARTICIPATING JURISDICTIONS

Cass County

Arenzville, Village of

Ashland, Village of

Beardstown, City of

Chandlerville, Village of

Virginia, City of

ACRONYMS

APA	Approval Pending Adoption
B/C	Benefit Cost
BRIC	Building Resilient Infrastructure and Communities
CDBG	Community Development Block Grant
CFM	Certified Floodplain Manager
CTP	Cooperating Technical Partners
DCEO	Department of Commerce and Economic Opportunity (Illinois)
DHS	Department of Homeland Security (federal)
DMA2k	Disaster Mitigation Act of 2000
EOP	Emergency Operations Plan
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HUD	U.S. Department of Housing and Urban Development
IAFSM	Illinois Association of Floodplain and Stormwater Managers
IDNR	Illinois Department of Natural Resources
IDNR-OWR	Illinois Department of Natural Resources - Office of Water Resources
IDOA	Illinois Department of Agriculture
IDOT	Illinois Department of Transportation
IDPH	Illinois Department of Public Health
IEA	Illinois Education Association
IEMA-OHS	Illinois Emergency Management Agency and Office of Homeland Security
IEPA	Illinois Environmental Protection Agency
ISBE	Illinois State Board of Education
ISGS	Illinois State Geological Survey
ISWS	Illinois State Water Survey
LSAC	Levee Safety Action Classification
MRCC	Midwest Regional Climate Center
NCEI	National Centers for Environmental Information (former NCDC)

NFIP	National Flood Insurance Program
NLD	National Levee Database
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
PDSI	Palmer Drought Severity Index
SBA	Small Business Administration, U.S. Department of Commerce
SBE	State Board of Education
SCO	State Coordinating Officer
SCS	Soil Conservation Service (now NRCS)
SHMO	State Hazard Mitigation Officer
UIUC	University of Illinois, Urbana-Champaign
USACE	U. S. Army Corps of Engineers
USEPA	U. S. Environmental Protection Agency
USGS	U. S. Geological Survey

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SECTION 1

INTRODUCTION

EXECUTIVE SUMMARY

Goals and Objectives

Communities strive to protect the well-being and safety of their citizens. Hazard mitigation plans begin by identifying natural hazard risks and physical and social vulnerabilities in order to understand disaster risk within a community. Mitigation plans are then developed by the community to lessen the impacts of these recognized hazards to its citizens and infrastructure.

The *Cass County Hazard Mitigation Plan* identifies risks to Cass County and its jurisdictions from natural hazards and presents hazard mitigation goals and actions that will reduce the risk for loss of life and property damage in the short and long-term future. This plan is an update to the hazard mitigation plan developed for Cass County, Illinois in 2012.

Jurisdictions must approve and adopt a hazard mitigation plan to be eligible to receive mitigation grant funding from the Federal Emergency Management Administration (FEMA). With funding from the federal government, communities have the opportunity to implement mitigation projects that may otherwise be financially difficult. The Cass County Hazard Mitigation Plan enables all participating communities to be eligible for hazard mitigation grant programs administered by FEMA: Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) Program, and Building Resilient Infrastructure & Communities (BRIC).

Community Participation

Community input is essential for creating a successful mitigation plan. The criteria that would constitute satisfactory jurisdictional participation in the planning process:

1. Attend a minimum of 1 meeting
2. Submit a relevant community documents
3. Confirm hazards that directly affect the community
4. Confirm the list of critical facilities submitted by HAZUS
5. Develop goals for the community
6. Develop and prioritize mitigation actions for the community
7. Host opportunities for public involvement
8. Review and comment on draft plan

Table 1 shows the jurisdictions participating in the Cass County Hazard Mitigation Plan.

Table 1. Participation by community in Cass County's Hazard Mitigation Plan.

Jurisdiction	Attend 1 meeting	Risk Assessment	Mitigation Projects	Capability Assessment	Review Plan
Cass County	Y	Y	Y	Y	Y
Arenzville, Village of	Y	Y	Y	Y	N
Ashland, Village of	Y	Y	Y	Y	N
Beardstown, City of	Y	Y	Y	Y	Y
Chandlerville, Village of	Y	Y	Y	Y	N
Virginia, City of	Y	Y	Y	Y	Y

Risk Assessment

Risk assessments help jurisdictions identify hazards that could adversely affect their community. Representatives from Cass County's communities were asked to assess the risk of sixteen hazards – drought, earthquake, extreme temperatures (cold wave, heat wave), floods (dam failure, flash flooding, riverine flooding), HazMat spill, pandemic, severe storms (hail, lightning, wind), severe winter storms (ice storms, winter weather), tornado, and wildfire – affecting their community using hazard profiles (**Section 4:Risk Assessment**) and their personal experiences. Completed Risk Assessments can be found in **Appendix A: Risk Assessment**.

The overall risk of the hazards was measured by taking into account their probability and severity.

Risk (R) = Probability (P) x Severity (S)

The top five hazards identified by Cass County were HazMat Spill, Tornadoes, Hail, Severe Storms, and Severe Winter Storms (Table 2).

Table 2. Risk of natural hazards identified by jurisdictions in Cass County.

Hazard	Average risk	Risk rank
HazMat Spill	13.6	1
Tornado	9.6	2
Hail	9.2	3
Severe Storms	9.2	4
Severe Winter Storms	8.4	5
Wind	8.4	6
Flash Flooding	8	7
Ice Storms	8	8
Earthquake	6.8	9
Extreme Heat	6	10
Extreme Cold	6	11
Riverine Flooding	5.2	12
Pandemic	4.2	13
Drought	3.8	14
Dam Failure	3.5	15
Wildfire	2	16
*Rolling Blackout	*6	*n/a

*The City of Virginia added rolling blackout as potential hazard for concern. Though not discussed in detail in this report, it is noted that it is a priority concern for the City of Virginia.

Mitigation Projects

Mitigation projects help jurisdictions reduce the risk of their community being adversely affected by natural hazards. Representatives from Cass County's communities defined mitigation projects based on their risk assessment and knowledge of their community's needs. More information can be found in **Mitigation Actions**.

Capability Assessment

Capability assessments evaluate the capabilities and resources that a community already has at their disposal to reduce hazard risks. More information can be found in **Capability Assessment**.

Plan Implementation

Each participating jurisdiction was required to pass a resolution to adopt the plan. More information can be found in **Plan Adoption**.

SECTION 2

PLANNING PROCESS

INTRODUCTION

The Prairie Research Institute – Illinois State Water Survey (PRI-ISWS) has collaborated with Cass County and University of Illinois - Extension to create the *Cass County Hazard Mitigation Plan*. Preparing the plan requires the engagement of local governments, stakeholders, and residents in a planning process that meets the requirements in 44 CFR Part 201 Mitigation Planning as described herein.

Mitigation plans are the foundation for effective hazard mitigation and are a required component to secure funding for FEMA mitigation project grants. A mitigation plan is a demonstration of the commitment to reduce risks from natural hazards and serves as a strategic guide for decision-makers as they commit resources.

Developing hazard mitigation plans enables local governments to:

- Identify actions for risk reduction that are agreed upon by stakeholders and the public
- Focus resources on the greatest risks and vulnerabilities
- Build partnerships by involving citizens, organizations, and businesses
- Increase education and awareness around threats and hazards, as well as their risks
- Communicate priorities to State and Federal officials
- Align risk reduction with other state or community objectives

These three guiding principles serve to ensure that the plan is designed to effectively assist Cass County to achieve its resilience goals:

- ***Focus on the mitigation strategy.*** *The mitigation strategy is the plan's main purpose. All other sections contribute to and inform the mitigation strategy and specific hazard mitigation activities.*
- ***Process is as important as the plan itself.*** *The plan is only as good as the process and people involved in its development. The plan also serves as the written record of the planning process.*
- ***This is your community's plan.*** *To have value, the plan must represent the current needs and values of the community and be useful for local officials and stakeholders. The plan shall be developed in a way that best serves your community's purpose and people.*

The primary purpose of the plan is to provide the community with a mitigation strategy and all the other sections of the plan contribute to and inform the mitigation strategy and specific hazard mitigation activities. All procedural details are documented in the plan itself which serves as a written record of the plan-making process. The plan must represent the current needs and values of the community and be useful for local officials and stakeholders. The plan shall be developed in a way that best serves your community's purpose and people.

The planning process involved coordination between ISWS, Cass County EMA, and University of Illinois - Extension. University of Illinois - Extension coordinated with ISWS to undertake the organization of resources and the building of the planning team and created the strategy for community outreach.

This is an update to the hazard mitigation plan developed for Cass County, Illinois in 2012. Once adopted, participating jurisdictions can choose mitigations projects in the plan for which they can apply for federal mitigation funding.

PLAN FINANCING AND PREPARATION

The Cass County Emergency Management Agency, University of Illinois - Extension, and the Prairie Research Institute – Illinois State Water Survey (PRI-ISWS) partnered together to prepare this mitigation planning update. The PRI-ISWS was responsible for managing the planning process, developing the risk assessment, facilitating the mitigation action and strategy development, and preparing the final plan document. University of Illinois - Extension assisted in the process by providing local planning information, outreach to local municipalities, organizing and facilitating meetings, tracking the grant match, and assisting with other grant administration tasks.

Through participation of these agencies as well as participation, input and assistance from Planning Committee members and the citizens of Cass County, the 2024 Multi-Hazard Mitigation Planning process for Cass County was successful.

This plan was prepared using funding from FEMA's Pre-Disaster Mitigation Grant program. The funding consisted of a 75% Federal Share with a 25% cost share. The cost share was provided through participation and time of those on the Cass County Mitigation Planning Committee, the Cass County Emergency Management Agency (EMA), as well as in-kind services provided by PRI-ISWS.

TIMELINE AND MEETINGS

Timeline

The internal plan-making process started with team building and the organization of resources within the Illinois State Water Survey. This was followed by the conception of a community outreach strategy aimed at identifying community goals, capabilities, and local resources. The risk assessment process takes up five months of the project timeline and is the most time-intensive task. The development of the action plan is followed by the identification of a maintenance strategy to create a feedback loop after the plan has been implemented. The final steps involve reviews by the State and FEMA before it is adopted and submitted to Illinois Emergency Management Agency (IEMA). The adoption of the plan occurred in February 2024.

Table 3. Timeline of tasks, actions, deliverables, and meetings.

DESCRIPTION OF TASK	START DATE	END DATE	ACTIONS
Organize resources and build planning team	5/25/2022	7/24/2022	Identify planning team member agencies, roles, collect community plans and documents
Create outreach strategy	6/15/2022	8/14/2022	Consult with local champions on best strategy
Assess community capabilities	6/15/2022	8/14/2022	Final call for local plans, review of content of local plans
Conduct risk and capability assessments	8/15/2022	2/16/2023	Finalize hazard inventory data collection, historic weather data, hold meeting 2
Identify mitigation goals and actions	2/16/2023	7/15/2023	Create a list of potential mitigation strategies, hold meeting 3
Develop action plan for implementation	7/15/2023	10/14/2023	Engage with local champions on how to integrate plan in other planning efforts
Identify plan maintenance strategy	7/15/2023	10/14/2023	Hold discussion with steering committee on plan maintenance
Review final draft	9/14/2023	10/31/2023	Post plan to website, share with Cass County jurisdictions, hold meeting 4
Submit plan to State and FEMA	11/1/2023	1/15/2024	ISWS submits plan and makes revisions as needed
Local adoption of plan	1/15/2024	3/15/2024	Local jurisdictions adopt plan

The final plan identifies community risks and needs specific to each community. For the planning process to accurately represent a community's priorities a local representative would be required to participate throughout the process. For a jurisdiction to be considered a participating community, as per FEMA's requirements, a designated representative would need to participate in at least one of the scheduled committee meetings and complete three forms: a risk assessment, mitigation project grid, and capability assessment. Each jurisdiction must formally adopt the plan once completed.

During the planning process, public meetings were held to encourage public involvement in the creation and review of the plan. The planning committee considered public involvement to be vital to the process.

Meetings

Planning committee members were identified and invited to attend planning committee meetings held on June 10, 2022, June 30, 2022, and July 27, 2022. These meetings were designed to prepare for the four steering committee meetings and to tackle administrative tasks. Brief summaries of the steering committee meetings are provided below. Agendas, minutes, and community participation are documented in **Appendix C: Meeting Documents.** These stakeholder meetings provided critical information about the vulnerability and the current resiliency of the jurisdiction. All meetings were open to the public and available via Zoom.

Coordination with local jurisdictions and communities was an important part of the hazard mitigation process. ISWS scheduled one-on-one meetings with each of the participating communities of Cass County in order to understand their current disaster preparedness and to document each community's specific needs. All 5 communities were contacted via email or telephone and invited to participate in the process by filling out Risk and Capability Assessment spreadsheets.

A website (https://www.illinoisfloodmaps.org/hazard-mit-plans-cass.aspx) was created for this project which housed all the relevant documents of the Cass County Hazard Mitigation Project for ease of access and a brief explanation of the process.

Meeting 1: Hazard Mitigation Planning Kick-off – August 18, 2022

Meeting Summary: The planning committee went over the purpose of a hazard mitigation plan, what hazard mitigation is, the requirements for communities to participate and the benefits of participating in the plan.

Meeting 2: Hazard Profiles and Risk Assessment – December 15, 2022

Meeting Summary: The planning committee reviewed natural hazards that may impact the communities, identified community vulnerabilities that might affect risk, discussed the history of hazards in the area, introduced the community web map, and participated in a risk assessment activity.

Meeting 3: Mitigation Strategies – February 16, 2023

Meeting Summary: The planning committee reviewed hazard mitigation goals from the 2012 Cass County Multi-Hazard Mitigation Plan. The steering committee presented ideas for hazard mitigation projects and began scheduling one-on-one meetings with individual jurisdictions to develop hazard mitigation projects.

Following the third meeting, ISWS scheduled one-on-one meetings in person with representatives from each participating jurisdiction in Cass County to discuss active mitigation projects and develop new mitigation projects to enhance disaster preparedness. Each jurisdiction was given the opportunity to rank hazards in order of highest perceive risk to their community. Jurisdictions also shared information about their current mitigation capabilities and proposed projects in the Jurisdictional Project Grid that they felt were central to their community's needs (see **Mitigation Actions**).

Meeting 4: Review of Hazard Mitigation Plan – September 14, 2023

Meeting Summary: ISWS invited the committee and the public to review the Draft *2024 Cass County Hazard Mitigation Plan* and provide comments at a public meeting. ISWS emphasized the importance of plan maintenance and developed a strategy with the county EMA to check-in with communities every year when grant opportunities from IEMA become available. ISWS agreed to draft the plan adoption documents and send them to communities once the HMP was approved.

PLANNING COMMITTEE INFORMATION

The Cass County Planning Committee consists of representatives from PRI-ISWS, University of Illinois - Extension, and the Cass County EMA (Table 4). The planning committee has experts in the domains of urban planning, spatial analysis, hazard mitigation, and floodplain management. Planning Committee members attended every Planning Committee and Steering Committee meeting.

Table 4. Cass County Planning Committee

Planning Team	Organization	Title
Roger Lauder	Cass County Emergency Services & Disaster Agency	Director
Jennifer Russell	University of Illinois Extension	Extension Educator, Community and Economic Development
Carrie McKillip	University of Illinois Extension	Community Development Educator
Dustin Fritsche	University of Illinois Extension	Extension Program Coordinator, Community and Economic Development
Lisa Graff	Illinois State Water Survey	Program Manager
Brad McVay	Illinois State Water Survey	GIS Specialist
Camden Arnold	Illinois State Water Survey	Hazard Mitigation Planner
Meirah Williamson	Illinois State Water Survey	Scientific Specialist
Zoe Zaloudek	Illinois State Water Survey	Geospatial Application Developer

The plan-making process was designed to be inclusive and tailored to individual communities in Cass County. Local and county officials, fire and police departments, hospital representatives, among others, were invited to be a part of the Steering Committee (Table 5). Members of the Steering Committee were invited to attend every Steering Committee meeting.

Table 5. Cass County Steering Committee.

NAME	COMMUNITY/AGENCY REPRESENTED	TITLE
Roger Lauder	Cass County	Emergency Service and Disaster Agency (ESDA)
Tim Icenogle	Cass County	Highway Dept, GIS
Wells Petersen	Cass County	Beardstown Flood Prevention District
Stan Hoffman	Cass County	Beardstown Flood Prevention District
Brock Rohn	Cass County	Valley Levee & Drainage
Tim Harris	City of Beardstown	City of Beardstown
Gary Hamilton	City of Beardstown	Public Works
Dustin Looker	City of Beardstown	Public Works
Clint Brewer	City of Beardstown	Public Works
Gus Vermillion	City of Beardstown	Public Works
Randy McClure	City of Virginia	City of Virginia
David McMillan	City of Virginia	Public Works
Tommy Knous	City of Virginia	Virginia Board
Kitty Mau	Village of Ashland	Village of Ashland
Will Harris	Village of Ashland	Public Works
Pamela Clark	Village of Ashland	Village of Ashland
Ron Kershaw	Village of Arenzville	Village of Arenzville
Don Howell	Village of Arenzville	Public Works
Jason Beck	Village of Arenzville	Public Works
Tim Richard	Village of Chandlerville	Village of Chandlerville
Ted Flinn	Village of Chandlerville	Chandlerville Board
Ross Cloniger	Village of Chandlerville	Chandlerville Board
Jim Meinhart	City of Virginia	FS
Zach Witherell	City of Virginia	FS
Elizabeth Bruns	City of Beardstown/Cass County	US Army Corps of Engineers
JT Hopkins	City of Beardstown	JBS
Don Lunsford	City of Beardstown	JBS
Nicole Porter	City of Beardstown	JBS
Mekelle Neathery	City of Virginia	Virginia CUSD #64
Brent O'Daniell	City of Beardstown	Beardstown CUSD #15
Candy Shaver	Villages of Ashland & Chandlerville	A-C Central CUSD #262
Adam Dean	Village of Arenzville	Triopia CUSD #27
Marty Turner	Hager Slough and Lost Creek Drainage	
Dena Turner	Hager Slough and Lost Creek Drainage	
Charles Taylor	Clear Lake, South Sangamon	
Mike Barnett	Cass County	
Martin Coad	City of Beardstown	Beardstown PD
Jordyn Hughes	Sunrise FS	

PUBLIC INVOLVEMENT

Public participation is a welcomed and integral part of the hazard mitigation planning process. Unfortunately, due to the COVID-19 pandemic declared by the World Health Organization in March 2020, and weather challenges in the Fall and Winter 2022, robust engagement in public meetings was a challenge. All meetings were available via Zoom as well as in person and were advertised in local papers and on information boards.

A web map was created for the collection of comments from community officials and residents of the county. Users were encouraged to mark the locations of critical facilities, roads or areas that frequently flood, places of community or historical significance, mitigation ideas or successes, or any other place that felt important to the mitigation planning process. Between December 15, 2022, and August 31, 2023, comments were left on the topics of critical facilities, flooded roads/areas, and places that are important to the community.

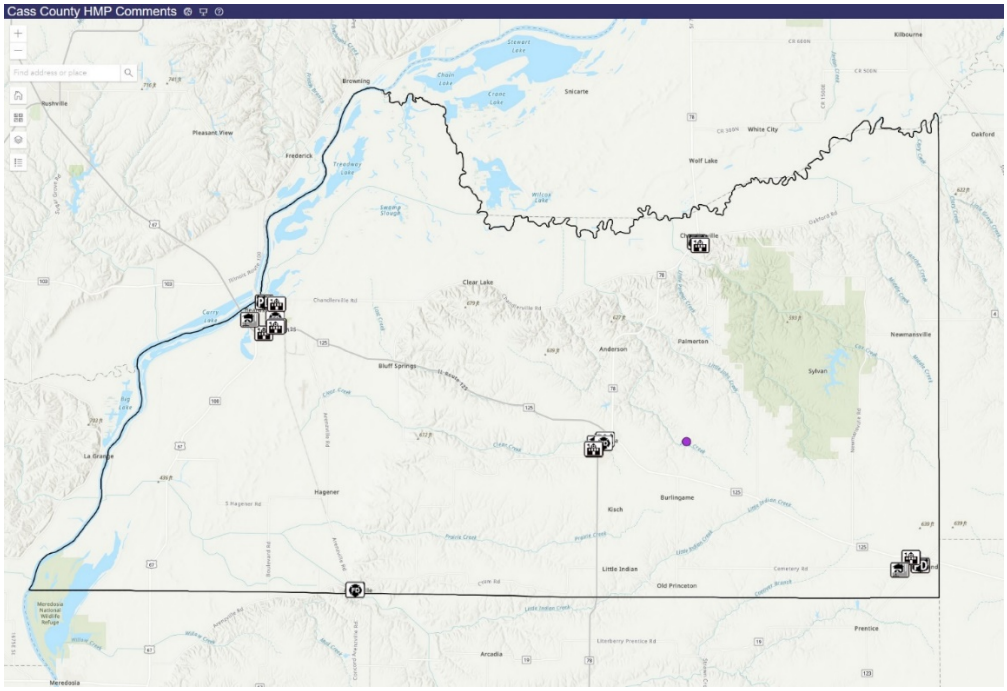

Figure 1. Cass County Comment Web Map.

A public meeting was held on September 14, 2023, to review and allow the public to comment on the Cass County's draft HMP. A comment period for anyone in the communities to provide feedback and input ran from September 15, 2023, until October 31, 2023. Public notifications were distributed by members of the planning committee and local community leaders to share with members of their community that the plan was available for review. **Appendix D: Public Input Summary** provides a collection of comments received during the comment period.

Elected officials and representatives from fire and police departments, hospitals, local businesses, and government agencies were invited to represent the communities they serve throughout the process, and act as a voice for their communities when members of the general public were not present. **Appendix C: Meeting Documents** contains the minutes from this public meeting. **Appendix E: Public Notifications** contains articles published by the local newspaper throughout the public input process.

CAPABILITY ASSESSMENT

Each participating jurisdiction has a unique set of capabilities and resources available to accomplish hazard mitigation and reduce long-term vulnerabilities to hazard events. In order to identify these existing capabilities and resources, a Capability Assessment was conducted. The Capability Assessment helps determine the ability of the participating jurisdictions to implement the Mitigation Strategy and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects. It is important to try and establish which goals and actions are feasible based on an understanding of the organizational capacity of those entities tasked with their implementation. This assessment is designed to provide a general overview of the key capabilities in place for each participating jurisdiction along with their potential effect of loss reduction.

To record the existing capabilities of each participant, Capability Assessment Worksheets were distributed to each of the participating jurisdictions following the first Planning Committee meeting on March 3, 2021. The worksheets requested information on four primary types of capabilities described below:

- **Planning & Regulatory Capabilities:** Planning and regulatory capabilities are based on the implementation of existing plans, policies, codes, ordinances, resolutions, local laws, and programs that prevent or reduce the impacts of hazards and guide and manage growth and development.
- **Administrative & Technical Capabilities:** Administrative and technical capabilities are based on the availability of staff, personnel resources, and their related skills and tools that can be used to develop and implement mitigation actions, policies, and programs.
- **Fiscal Capabilities:** Fiscal capabilities include the resources a jurisdiction has access to or is eligible to apply for and use to implement mitigation actions, polices, and programs.
- **Education & Outreach Capabilities:** Education and outreach capabilities include programs and methods already in place that could support the implementation of mitigation actions and communicate hazard-related information.

Many of the participating jurisdictions have limited resources and abilities to expand on and improve the existing policies and programs identified. The lack of legal authority and policies/programs currently in place, especially with regards to building codes and zoning ordinances, which limits the participating jurisdiction's abilities to expand and strengthen existing policies and programs. Often, the participating jurisdiction's fiscal and staffing abilities are also extremely limited; many local community officials are part-time, and communities lack the funds to expand or implement new programs and policies.

Overcoming these limitations will require time and a range of actions including, improved general awareness of natural hazards and the potential benefits that may come from the development of new standards in terms of hazard loss prevention and the identification of resources available to expand and improve existing policies and programs should the opportunity arise.

Table 6 summarizes the results of the Capability Assessment for each participating jurisdiction. A capability level of Limited, Moderate or High was assigned by capability type to each participating jurisdiction based on the number of available capabilities and resources as well as the jurisdiction's size/area served.

Table 6. Cass County Capability Assessments.

Capability Type	Cass County	Arenzville	Ashland	Beardstown	Chandlerville	Virginia
Comprehensive Plan	X	X	X		X	X
Capital Improvements Plan						
Economic Development Plan	X			X		X
Emergency Operational Plan	X	X	X	X	X	X
Floodplain Management Plan	X	X	X	X	X	X
Storm Water Management Plan	X	X	X	X		X
Zoning Ordinance	X	X	X	X	X	X
Subdivision Regulation/Ordinance	X	X	X	X		X
Floodplain Ordinance	X	X	X	X	X	X
Building Codes	X	X	X	X	X	X
National Flood Insurance Program	X	X	X	X	X	X
Community Rating System						
Level of Capability (Limited, Moderate, High)	**H**	**M**	**M**	**H**	**M**	**H**
Planning Commission	X	X		X	X	X
Floodplain Administration	X	X	X	X	X	X
GIS Capabilities	X	X	X	X	X	X
Chief Building Official	X		X	X	X	X
Civil Engineering	X	X		X	X	X
Local Staff Who Can Assess Community's Vulnerability to Hazards	X	X	X	X	X	X
Grant Manager						X
Mutual Aid Agreement	X	X	X	X	X	X
Level of Capability (Limited, Moderate, High)	**H**	**M**	**M**	**H**	**H**	**H**
Applied for Grants in the Past	X	X	X	X	X	X
Awarded a Grant in the Past	X	X	X	X	X	X
Authority to Levy Taxes for Specific Purposes	X		X	X		X
Gas/Electric Service Fees			X			
Storm Water Service Fees	X		X			
Water/Sewer Service Fees	X	X	X	X	X	X
Development Impact Fees						
General Obligation Revenue or Special Tax Bonds	X			X		
Level of Capability (Limited, Moderate, High)	**M**	**L**	**M**	**M**	**L**	**L**
Local groups/non-profit organizations focused on environmental protection, emergency preparedness, accessibility and functional needs populations. (Ex. CERT Teams, Red Cross, etc.)	X	X	X	X	X	X
Ongoing public education or information program (Ex. responsible water use, fire safety, household preparedness, etc.)	X					
Disaster or Safety Related School Programs	X	X	X	X	X	X
Storm Ready Certification						

Capability Type	Cass County	Arenzville	Ashland	Beardstown	Chandlerville	Virginia
Firewise Communities Certification						
Tree City USA						
Level of Capability (Limited, Moderate, High)	**M**	**L**	**L**	**L**	**L**	**L**
Does the community have the financial resources needed to implement mitigation projects?	N	N	N	N	N	N
Does the community have the staff/expertise to implement projects?	Y	Y	Y	Y	Y	Y
Is there community support to implement projects?	Y	Y	Y	Y	Y	Y
Does the community staff have time to devote to hazard mitigation?	Y	Y	Y	Y	Y	Y
Overall Capability (Limited, Moderate, High)	**H**	**L**	**M**	**H**	**L**	**M**

Capability assessments for jurisdictions across Cass County can be found in **Appendix B: Capability Assessment.**

NEIGHBORING COMMUNITIES AND SPECIAL DISTRICTS

Cass County is located in southwestern Illinois and is bordered by six Illinois counties:

- **Brown County:** Situated to the west of Cass County, Brown County has a population of 6,244 and its county seat is Mount Sterling.
- **Schuyler County:** This county located to the northwest of Cass County is home to 6,902 people and the county seat is Rushville.
- **Mason County:** Bordering Cass County to the northeast, Mason County has a resident population of 13,086, as of 2020. The county seat is Havana.
- **Menard County:** Menard County is an Illinois county sharing the eastern border of Cass County. According to the 2020 census, it had a population of 12,297. Its county seat is Petersburg. Menard County is part of the Springfield, IL Micropolitan Statistical Area.
- **Sangamon County:** Home to the capital of Illinois, Springfield, Sangamon County is located to the southeast of Cass County. As of the 2020 Census, it has a population of 196,343.
- **Morgan County:** Morgan County is located south of Cass County. The county seat is Jacksonville and as of 2020, has a population of 32,915. Morgan County is part of the Jacksonville, IL Micropolitan Statistical Area, which is also included in the Springfield–Jacksonville–Lincoln, IL Combined Statistical Area.

Cass County is served by five school districts:

- A C Central Community Unit School District #262
- Beardstown Community Unit School District #15
- PORTA Community Unit School District #202
- Triopia Community Unit School District #27
- Virginia Community Unit School District #64

Cass County is served by eight fire protection districts, which respond to emergencies across the county.

ISO fire ratings, also referred to as fire scores, rate fire protection districts on a scale of 1 to 10 to indicate how a fire department is able to protect its community. A score of 1 is the best score a fire protection district can receive while a score of 10 is the worst score. Table 7 shows city and rural ISO fire ratings for districts that serve Cass County. City ISO scores refer to the ability of a fire protection district to serve an area with fire hydrants, while rural ISO scores refer to areas without fire hydrants.

Table 7. Fire protection districts and ISO scores

Fire Protection District	City ISO	Rural ISO
Arenzville	-	6
Ashland	-	6
Beardstown	5	8
Chandlerville	-	-
Virginia	-	7
Meredosia	-	5
Oakford	-	3
Petersburg	3	6

REVIEW OF TECHNICAL DOCUMENTS

The literature review that was undertaken to prepare this plan document involved a study of several "best practice" plans. These best practice plans have been analyzed to borrow elements that have been drafted with the utmost care and consideration. Reviewing these plans helps to synthesize a comprehensive, all-encompassing hazard mitigation plan that covers every possible detail about natural hazard risk mitigation by providing robust and strategic mitigation mechanisms tailored to specific communities and their capabilities.

Table 8. Review of technical documents

Document	Element
Cass County 2012 Pre-Disaster Mitigation Plan	
Cass County Zoning Ordinance	Review of building codes, zoning, and fire prevention and protection
Flood Risk Preparedness - Sid Simpson Levee Breach Analysis (2020)	Flood history and potential impacts in the event of a levee breach
Beardstown Municipal Code	Building regulations, planning and development, floods, fire prevention and protection, and zoning
Virginia, IL Code of Ordinances	Review of building codes, zoning, and fire prevention and protection
Cass County 2022 IPlan	Community background information and stakeholder engagement
Cass County Flood Insurance Study (2019)	Post-disaster redevelopment strategy
Cass County GIS Database	
2023 Illinois Natural Hazard Mitigation Plan	Guidance on hazards and mitigation measures and historical disasters in Illinois
IEMA - Repetitive Loss Data	Repetitive loss structures and mitigation status
Local Mitigation Planning Handbook (2023)	Best practices and planning guidance
NOAA / National Water Service Storm Prediction Center	Severe weather data and narratives of historical events
US Census Bureau	2020 census data and 2021 ACS 5-year estimates
USGS Earthquake Catalog	Earthquake data

PLAN ADOPTION

FEMA outlines adoption mechanisms for both single-jurisdictional plans as well as multi-jurisdictional plans. The plan shall include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County commissioner, Tribal Council).

Adoption by the local governing body demonstrates the community's commitment to implementing the mitigation strategy and authorizes responsible agencies to execute their actions. For final approval, the community must adopt the plan and send the documentation required for formal adoption to IEMA, which is responsible for forwarding this documentation on to FEMA Region 5. See **Appendix G: Adoption Resolutions.**

The Cass County Hazard Mitigation Plan for 2024-2029 was adopted by the Village of Arenzville on February 5, 2024. All other communities adopted the plan in the month of February 2024. The plan received approval on March 5, 2024. The plan is active for five years following the approval date. The plan will expire on March 5, 2029. A full update must be completed within five years to maintain Hazard Mitigation Assistance funding eligibility.

PLAN MAINTENANCE

The plan maintenance process is designed to provide:

- A description of the method and schedule for monitoring, evaluating, and updating the mitigation plan within a five-year cycle:
    - **Plan monitoring**: A method and schedule for regular monitoring would ideally include reports or other deliverables and expectations for meeting attendance. Monitoring, therefore, becomes part of the regular administrative function of the offices or positions to which it is assigned.
    - **Plan evaluation**: Evaluation of the plan may not occur as frequently as plan monitoring, but it is a critical step to ensure that the plan continues to serve its purpose effectively. At a minimum, communities are required to convene the planning team annually to evaluate the plan's effectiveness and to prepare a report for their governing bodies that demonstrates progress to date.
- A description of how local jurisdictions can incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate.
- A discussion on how the community will continue public participation in the plan maintenance process.

Monitoring, Evaluating, and Updating the Plan

Throughout the five-year planning cycle, the Cass County EMA will reconvene the HMP Planning Committee to monitor, evaluate, and update the plan on an annual basis. An additional meeting will be held in late 2027 to address the five-year update of this plan. Members of the planning committee are readily available to engage in email correspondence between annual meetings. If the need for a special meeting, due to new developments or a declared disaster occurs in the county, the team will meet to update mitigation strategies. Depending on grant opportunities and fiscal resources, mitigation projects may be implemented independently by individual communities or through local partnerships.

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

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

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

Implementation through Existing Programs

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

Based on conversations with Steering Committee members, none of the jurisdictions who participated in the original Plan have incorporated it into other planning mechanisms within their jurisdictions. This is due in part to the size, fiscal and staffing situations, and technical capacity of the participants. Ongoing planning efforts will have the updated *2024 Cass County Hazard Mitigation Plan* available to better align goals and projects with existing programs throughout the communities.

Adoption of this Plan update will trigger each participating jurisdiction to review and, where appropriate, integrate the Plan into other available planning mechanisms. The HMP planning committee's annual review will help maintain awareness of the Plan among the participating jurisdictions and encourage active integration of the Plan into their day-to-day operations and other planning mechanisms. There is no indication that the County or any of the participating jurisdictions will be adopting, reviewing, or strengthening current policies or programs in the near future.

Most of the participating jurisdictions have limited capabilities, as seen in the Capability Assessment section, to integrate the mitigation strategy and other information contained in the Plan update into existing planning mechanisms. These jurisdictions are small in size and do not have the financial resources or trained personnel to develop planning mechanisms such as comprehensive plans or building and zoning ordinances.

Continued Public Involvement

Continued public involvement is critical to the successful implementation of the HMP. Comments from the public on the HMP will be received by the EMA director and forwarded to the HMP planning committee for discussion. Education efforts for hazard mitigation will be ongoing through the EMA. The public will be notified of periodic planning meetings through notices in the local newspaper. Once adopted, a copy of this plan will be maintained in each jurisdiction and in the County EMA Office.

The next Plan update will continue to prioritize public involvement and opportunities will be made available for the community to comment on proposed revisions.

REVIEW PROCESS

Once the state is satisfied that the plan meets the requirements, the State Hazard Mitigation Officer (SHMO) will forward the plan to the FEMA Regional Office for review and approval. FEMA will conduct its review within 45 days and provide a completed Local Mitigation Plan Review Tool to the state.

Approvable Pending Adoption

To fast-track the approval process, FEMA encourages communities to submit the final draft of the mitigation plan to the State and FEMA for review before formal adoption by the elected officials or other authorized governing bodies. This will allow for revisions to be made to the plan in case FEMA requires it.

Plan Approval

Upon receiving the record of adoption from the State, FEMA will issue an official approval letter deeming communities eligible for FEMA Hazard Mitigation Assistance programs. FEMA also sends a final *Local Mitigation Plan Review Tool* that provides feedback on the strengths of the plan, recommendations for plan improvements during future updates, and suggestions to the plan for implementing mitigation strategies.

SECTION 3

COUNTY PROFILE

GEOGRAPHIC PROFILE

Cass County is a rural county located in west central Illinois. Founded in 1837, is named after Lewis Cass, a general in the War of 1812, Governor of the Michigan Territory, and United States Secretary of State in 1860.[1] The county is approximately 384 square miles and contains five municipalities and nine townships (Figure 2). Virginia was selected as the county seat when Cass County was founded in 1837 due to its location in the center of the county. Established in 1836 by pioneer Henry H. Hall, M.D., it got its name from Hall's adopted home state of Virginia.

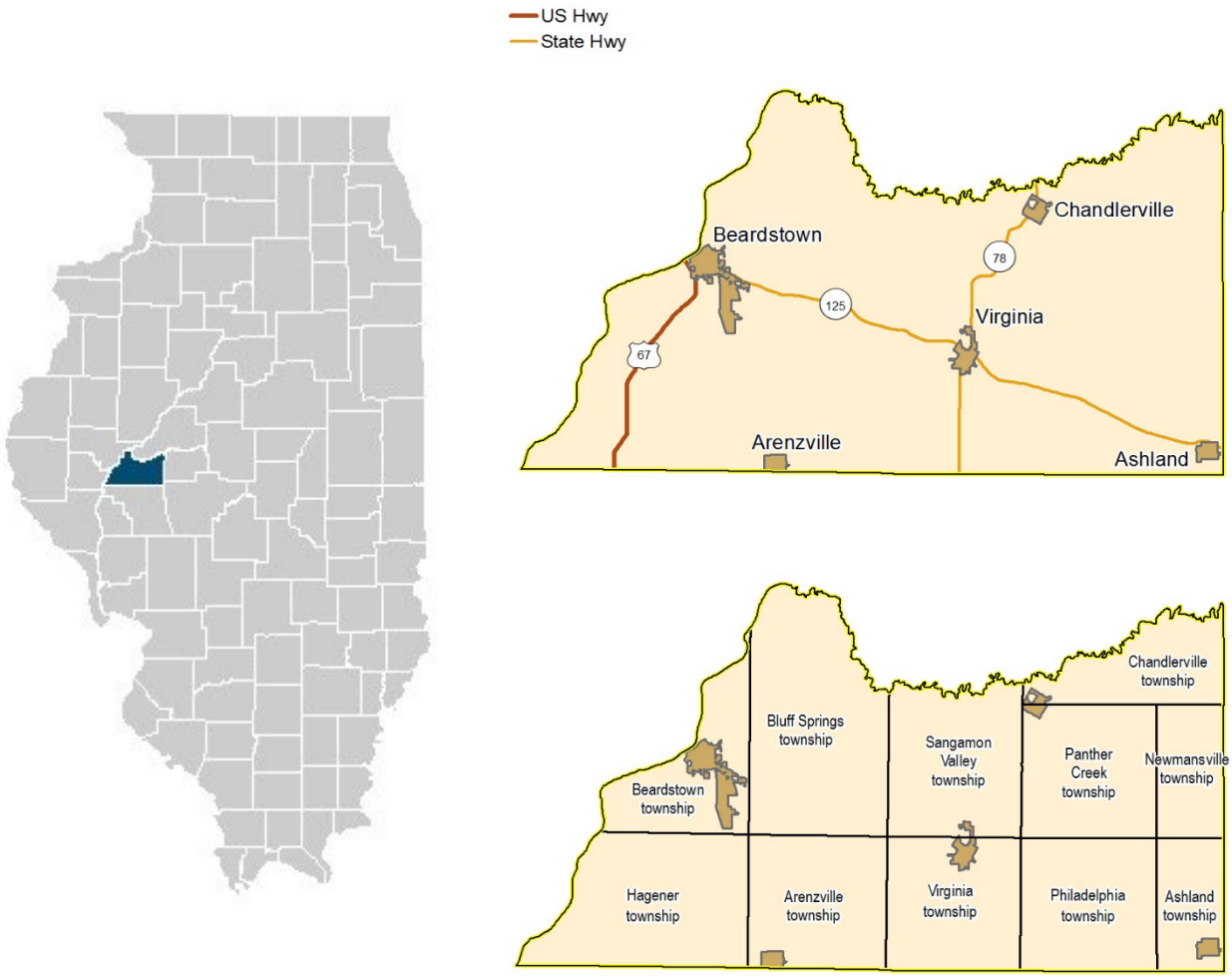

Figure 2. Cass County, jurisdictions, and townships.

[1] Cass County—Illinois. (n.d.). *Tourism Cass County*. Retrieved from http://www.seecass.com/

Landscape

Located primarily in the River Hills biome, which is characterized by forested hills, bluffs, cliffs, and ravines it is characteristically underlain by limestone and sandstone, and is deeply covered by loess. The Western Forest-Prairie Division and the Illinois River Sand Areas are characterized by wetlands with a large diversity of trees depicted below (Figure 3).[2] Sugar maple, basswood, and red oak are common on mesic sites, whereas black and white oaks occur on drier sites, and post oak is found near ridge tops. Floodplain forests grow on bottomlands, and are dominated by silver maple, cottonwood, hickories, and sycamore.

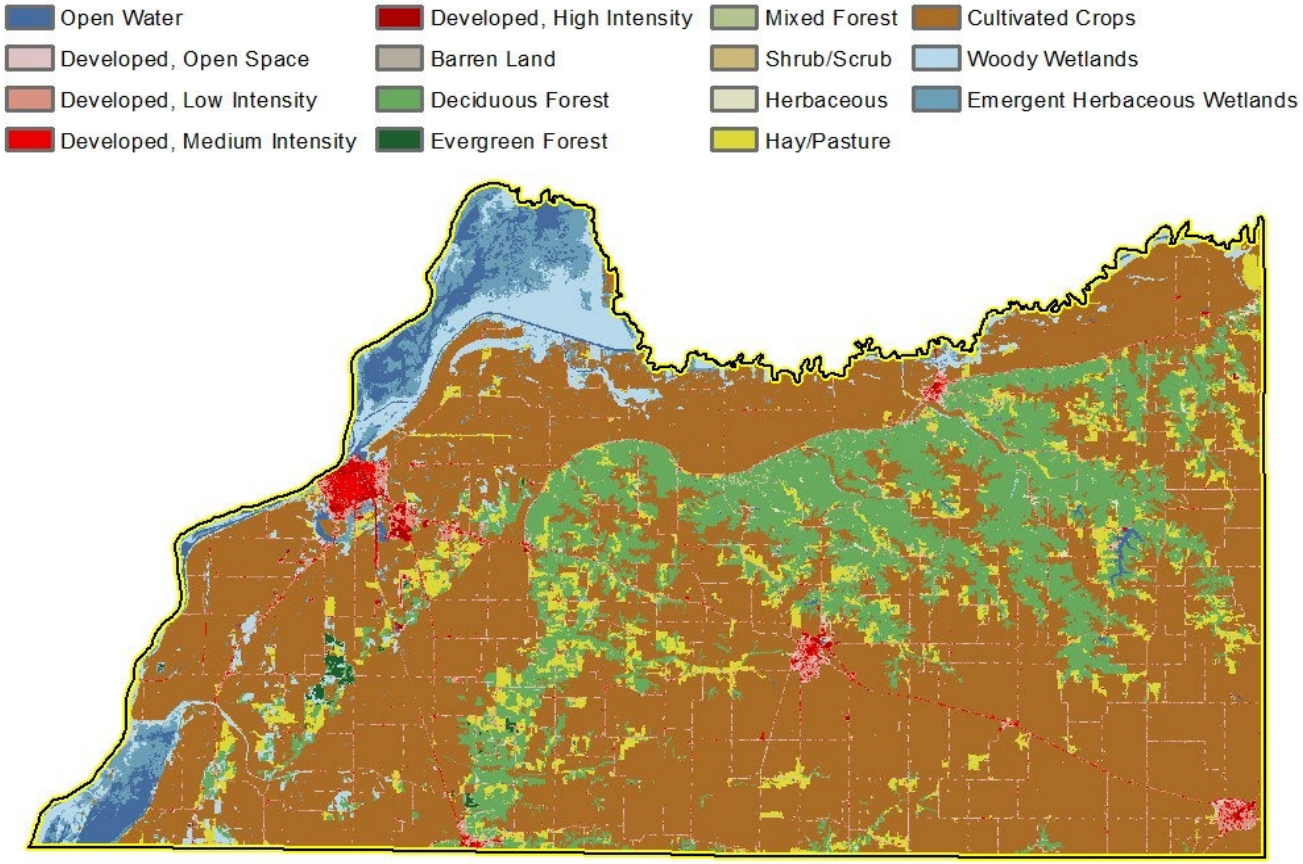

Figure 3. Land cover in Cass County.
Source: Multi-Resolution Land Characteristics (MRLC) Consortium, National Land cover Database (NLCD)

Cass County is on the Springfield Plain of the Central Lowland Province. Loess is the main soil of the uplands, whereas sandy and loamy materials form the soils of the river terraces. Major areas of bottomland exist along the Illinois and Sangamon Rivers. Elevation in the county ranges from more than 680 feet above sea level southwest of Chandlerville to less than 420 feet above sea level on the Illinois River floodplain in the western part of the county (Figure 4).

[2] Illinois Natural History Survey, "Natural Divisions", accessed February 1, 2023. https://publish.illinois.edu/inhseducation/biodiversity/natural-divisions/

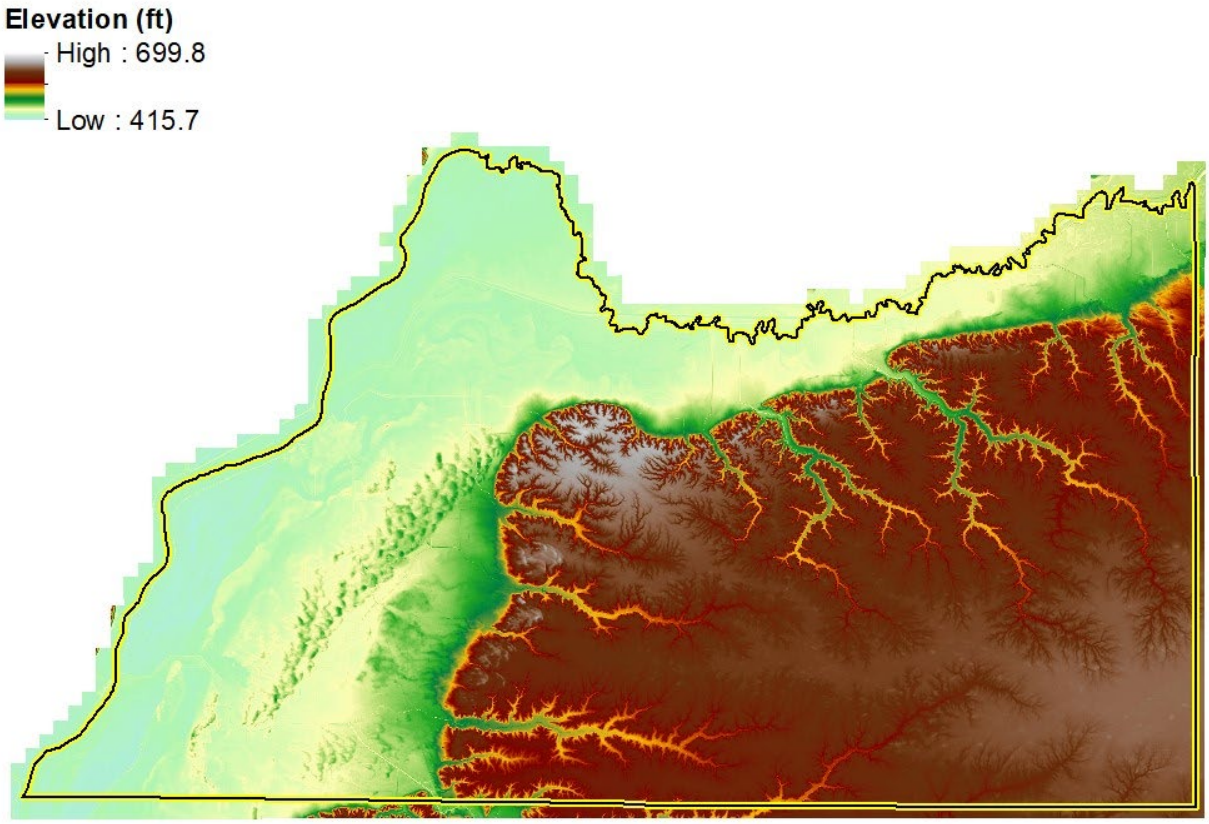

Figure 4.Topography of Cass County. Source: Illinois State Geological Survey (ISGS)

Cass county contains part of 3 watersheds. A watershed, or drainage basin, is the land area that drains directly to a common stream, river, or lake. Cass County falls within the Lower Illinois – Lake Chautauqua Watershed, the Lower Illinois Watershed, and the Lower Sangamon Watershed (Figure 5). The Illinois River and the Sangamon River flow through Cass County. Approximately twenty-three miles of the Illinois River form the western boundary of Cass County. The northern and eastern parts of the county are drained by Cox, Jobs, Middle, and Panther Creeks, which flow into the Sangamon River. Clear, Indian, and Lost Creeks drain the southern and western parts of the county. These creeks all flow into the Illinois River. The Illinois River is a principal tributary of the Mississippi River.

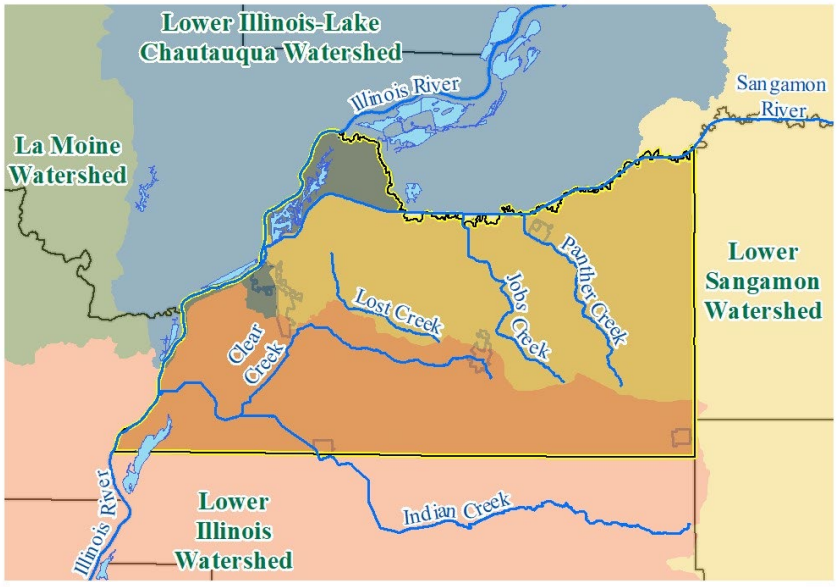

Figure 5. Hydrologic features in Cass County.

Natural Resources

Cass County is home to part of the Meredosia National Wildlife Refuge, a 5,255-acre national wildlife refuge located along the Illinois River. The refuge is also located within neighboring Morgan County. State managed natural areas in Cass County include the 16,500 acre Jim Edgar Panther Creek State Fish and Wildlife Area and the 10,360 acre Sanganois State Fish and Wildlife Area. In addition to hunting and fishing, recreational opportunities at these fish and wildlife areas include boating, picnicking, biking, horse back riding, hiking, and camping.

Cass County is home to a variety of lakes including Meredosia Lake, Crane Lake, Virginia Lake, Gridely Lake, Prairie Lake, Drake Lake, Clear Lake, Meyers Pond, Big Lake, Wood Duck Slough, Eagle Lake, Mound Laken and Leaper Lake. The many natural areas in Cass County are home to a variety of wildlife. As of April 2023, Cass County is home to 34 threatened or endangered species (Table 9).[3]

Table 9. Threatened and endangered species. Source: IDNR.

Scientific Name	Common Name	State Status
Acipenser fulvescens	Lake Sturgeon	Endangered
Agalinis skinneriana	Pale False Foxglove	Threatened
Antrostomus carolinensis	Chuck-will's-widow	Threatened
Apalone mutica	Smooth Softshell	Threatened
Astragalus distortus	Bent Milk Vetch	Endangered
Boltonia decurrens	Decurrent False Aster	Threatened
Botaurus lentiginosus	American Bittern	Endangered
Buchnera americana	Blue Hearts	Threatened
Circus hudsonius	Northern Harrier	Endangered
Cyperus grayoides	Umbrella Sedge	Threatened
Echinodorus tenellus	Small Burhead	Endangered
Emydoidea blandingii	Blanding's Turtle	Endangered
Fimbristylis vahlii	Vahl's Fimbry	Endangered
Gallinula galeata	Common Gallinule	Endangered
Hesperia ottoe	Ottoe Skipper	Endangered
Heterodon nasicus	Plains Hog-nosed Snake	Threatened
Hypericum adpressum	Shore St. John's Wort	Endangered
Ixobrychus exilis	Least Bittern	Threatened
Kinosternon flavescens	Yellow Mud Turtle	Endangered
Lanius ludovicianus	Loggerhead Shrike	Endangered
Lepomis miniatus	Redspotted Sunfish	Threatened
Moxostoma carinatum	River Redhorse	Threatened
Myotis septentrionalis	Northern Long-eared Myotis	Threatened
Myotis sodalis	Indiana Bat	Endangered
Necturus maculosus	Mudpuppy	Threatened
Polygala incarnata	Pink Milkwort	Endangered
Pseudacris illinoensis	Illinois Chorus Frog	Threatened
Sanguisorba canadensis	American Burnet	Endangered

[3] Illinois Department of Natural Resources. (2023, April). Illinois Natural Heritage Database – Illinois Threatened and Endangered Species by County. https://dnr.illinois.gov/content/dam/soi/en/web/dnr/espb/documents/ETCountyList_Apr2023.pdf

Schoenoplectus hallii	Hall's Bulrush	Threatened
Silene regia	Royal Catchfly	Endangered
Speyeria idalia	Regal Fritillary	Threatened
Stylisma pickeringii	Patterson's Bindweed	Endangered
Terrapene ornata	Ornate Box Turtle	Threatened
Xanthocephalus xanthocephalus	Yellow-headed Blackbird	Endangered

Cass County's many natural areas are an important part of its history and are enjoyed by many of the inhabitants in and around the county. In the event of a natural hazard, natural areas can become inaccessible for days to months. Flood waters may need to fall, trees may need to be removed from roads or trails, or buildings may need repairs to make natural areas accessible after a disaster. This can negatively impact tourism and the quality of life for local residents.

Climate

The climate of Illinois is continental with cold winters, warm and humid summers, and moderate spring and fall temperatures. Changes in temperature, humidity, cloudiness, and wind direction occur frequently. Located in the Southern Illinois Climate region, Cass County averages nearly 40 days above 90°F and 80 days below 32°F per year. Measurable precipitation occurs on nearly 100 days of the year, with and 13 days with more than 1 inch of precipitation.[4]

Cass County on average experiences its warmest temperatures in July and coldest temperatures in January. The area receives the most rainfall in late spring and early summer (Table 10).

Table 10. Temperature and precipitation 30-year normals for station JACKSONVILLE 2 (USC00114447) and VIRGINAI (USC00118870).
Source: NCEI, 1991-2020

Month	**Temperature Normals (Jacksonville)**			**Precipitation Normals (Virginia)**	
	Maximum (°F)	*Minimum (°F)*	*Average (°F)*	*Precipitation (in)*	*Snowfall (in)*
Jan	35.3	17.6	26.4	2.15	6.6
Feb	40.5	20.9	30.7	2.16	6.0
Mar	52.1	30.3	41.2	2.63	2.4
Apr	65.0	40.5	52.7	4.01	0.1
May	75.0	52.6	63.8	4.89	0.0
Jun	83.4	61.9	72.7	4.52	0.0
Jul	86.9	65.4	76.1	4.15	0.0
Aug	85.7	63.2	74.5	3.75	0.0
Sep	79.9	54.7	67.3	3.54	0.0
Oct	67.0	42.9	54.9	3.20	0.0
Nov	52.3	31.8	42.0	2.97	0.4
Dec	39.9	22.9	31.4	2.41	3.8
Annual	63.6	42.1	52.8	40.38	19.3

[4] Illinois State Climatologist. "Climate of Illinois". Retrieved May 18, 2022, from https://stateclimatologist.web.illinois.edu/climate-of-illinois/

Built Environment

Building Inventory

A structure-based asset inventory, or building inventory, was compiled for Cass County. The building inventory was created using GIS parcel data containing 2020 county assessor's data provided by Cass County, and building footprints developed by Microsoft Corporation[5].

Exposure consists of an estimation of the total replacement cost of all buildings in Cass County represented in 2022 US dollars. Values were taken from the Hazus General Building Stock (GBS) database which is aggregated to the census block level. Table 11 shows the exposure based on the occupancy class, or use class, of the buildings. Table 12 contains the building exposure for each incorporated community and unincorporated Cass County. This does not include the potential content exposure of what is within the building.

Table 11. Building Exposure by Occupancy

Occupancy Class	Total Exposure (2022 USD)	Percent of Total
Residential	$1,271,424,000	87.37
Commercial	$70,048,000	4.81
Industrial	$4,888,000	0.34
Agriculture	$1,603,000	0.11
Religious	$1,329,000	0.09
Government	$2,750,000	0.19
Education	$103,111,000	7.09
Total	**$1,455,692,000**	**100**

Table 12. Building Exposure by Community

Community	Total Exposure (2022 USD)	Percent of Total
Arenzville, Village of	$77,176,000	5.3
Ashland, Village of	$162,053,000	11.14
Beardstown, City of	$676,069,000	46.46
Chandlerville, Village of	$89,279,000	6.14
Virginia, City of	$236,829,000	16.28
Unincorporated Areas	$213,747,000	14.69
Total	**$1,455,692,000**	**100**

Transportation Network

State and national highways 67, 78, 100 and 125 connects the communities of Cass County (Figure 6).

[5] Microsoft Building Footprints. Downloaded 2018.
https://www.microsoft.com/en-us/maps/building-footprints

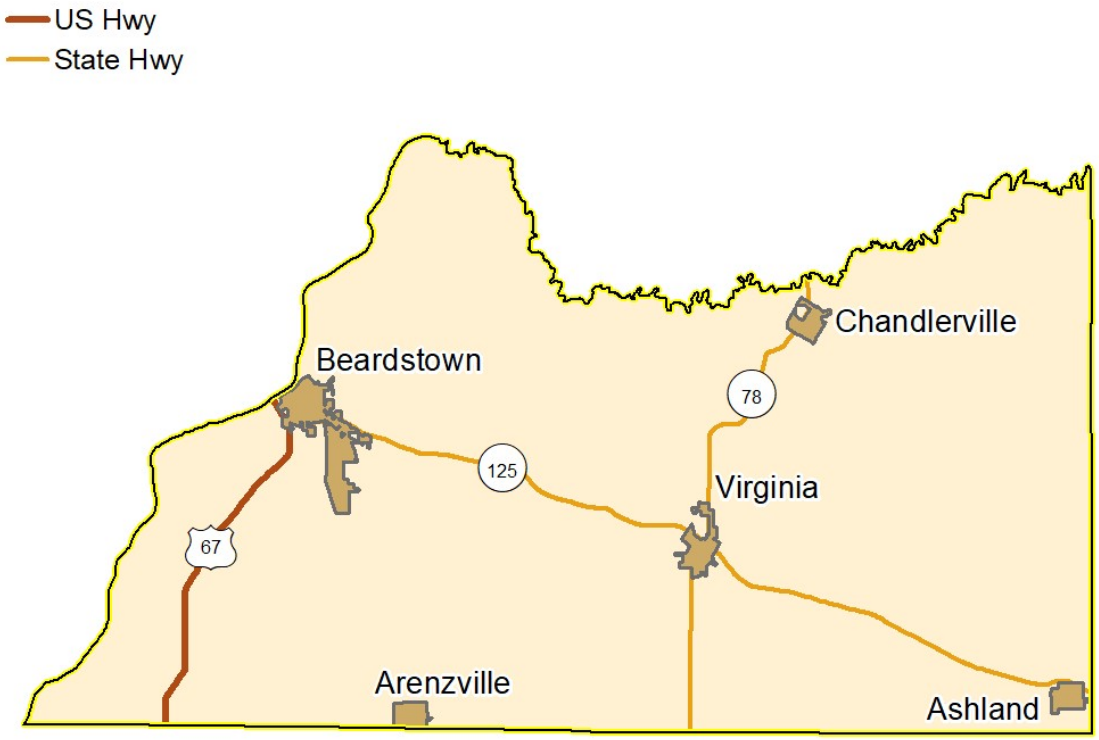

Figure 6. Cass County Highways and Roads. Source: IDOT, US Census.

Ashland is located in Eastern Cass County along Route 125 and serves as one of the two main gateways to Jim Edgar Panther Creek State Fish and Wildlife Area. Chandlerville is located in the northeast and serves as the other gateway to Jim Edgar Panther Creek State Fish and Wildlife Area. Virginia is located in the center of Cass County and serves as the county seat and is connected to other communities by highway 125. Beardstown connects to many important transportation corridors, including the Illinois River, and highways 67, 100, and 125.

Historic Places

Historic properties and cultural resources contribute to the identity and uniqueness of a community and can cause harm to a community's sense of place if they are damaged or destroyed during a disaster. Damage to historic properties and cultural resources can also cause economic fallout, particularly to the tourism sector. Mitigation actions, such as property improvement and regulatory actions, can be taken to lessen the risk of damage.

There are numerous historic properties and cultural resources across Cass County. The Old Lincoln Courtroom and Museum in Beardstown is one of the sights on the Looking for Lincoln Heritage Trail. The courtroom is where Abraham Lincoln defended Duff Armstrong in the famous Almanac Trial in 1858.[6] Beardstown is also home to the River Museum which features items related to the Illinois River and the river's importance in the development of the city and surrounding area.

Two structures are listed on the National Register of Historic Places: the Beardstown Grand Opera House and the Andrew Cunningham Farm located outside of Virginia, Illinois.

[6] Ferguson, D. (1922). True Story of the Almanac Used by Abraham Lincoln in the Famous Trial of Duff Armstrong. *Journal of the Illinois State Historical Society (1908-1984)*, *15*(3/4), 688–691. http://www.jstor.org/stable/40186950

DEMOGRAPHICS

Population

Cass County has a current population of 13,042 according to the 2020 U.S. Census and has observed a 5% decrease in its population since the 2010 census (Table 13). Arenzville and Ashland have observed the most significant decrease in population. Overall, Cass County has seen about 600 people move out over the last two decades. The county has a density of 34 inhabitants per square mile.

Table 13. Cass County and community population trends. Source: U.S. Census

Community	2000	2010	2020	Population Change 2010-2020 Census (%)
Cass County	13,695	13,642	13,042	-5%
Arenzville	423	409	367	-11%
Ashland	1,363	1,333	1,218	-9%
Beardstown	5,773	6,123	5,951	-3%
Chandlerville	713	553	527	-5%
Virginia	1,721	1,611	1,514	-6%

Although Beardstown's overall population has decreased, the population identifying as Hispanic or Latino has increased by 500 people since 2010. The foreign-born population has also increased in Beardstown. In 2021, 25% of the population over 5 years old was born outside of the US. This represents an increase from 20.2% in 2010.

The historic population estimate shows how population grew exponentially during 1840-1880 with the onset of the Industrial Revolution that brought jobs and consequently people into the county (Figure 7). The county's population experienced its peak population of 17,896 in 1920 and has declined since then.

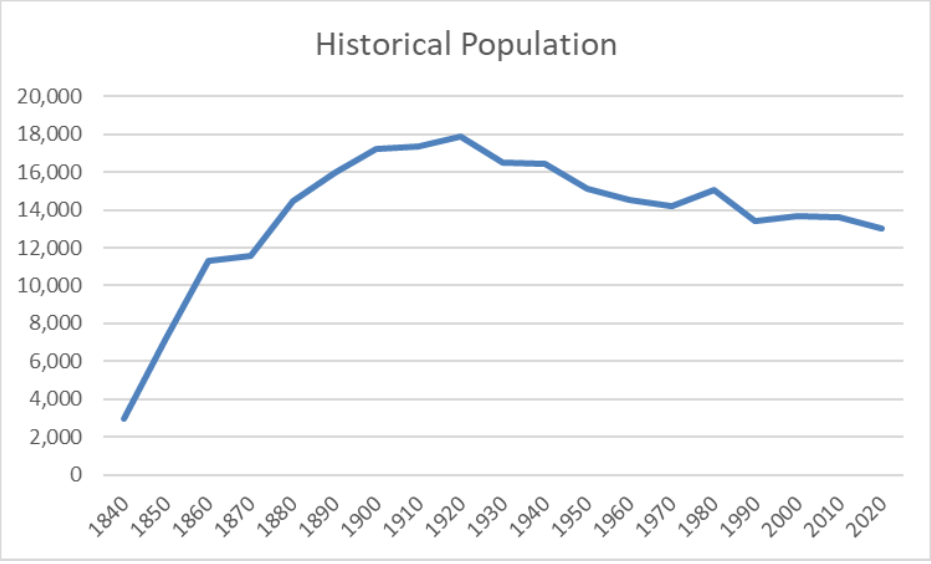

Figure 7. Historic population estimates of Cass County (1840-2020). Source: U.S. Census.

Age & Sex

The age and sex pyramid reveals information about the county's residents (Figure 8). The bulge in the pyramid suggests a large portion of the population between the ages of 25-39 years and 45-49 years. The average age of the county is 38.3 years. Youth comprise a large portion of the county's populace, with those aged 10 to 14 predominantly being boys. The middle-aged portion of the county's populace tend to be equally distributed across both sexes. However, the county's senior population is largely female.

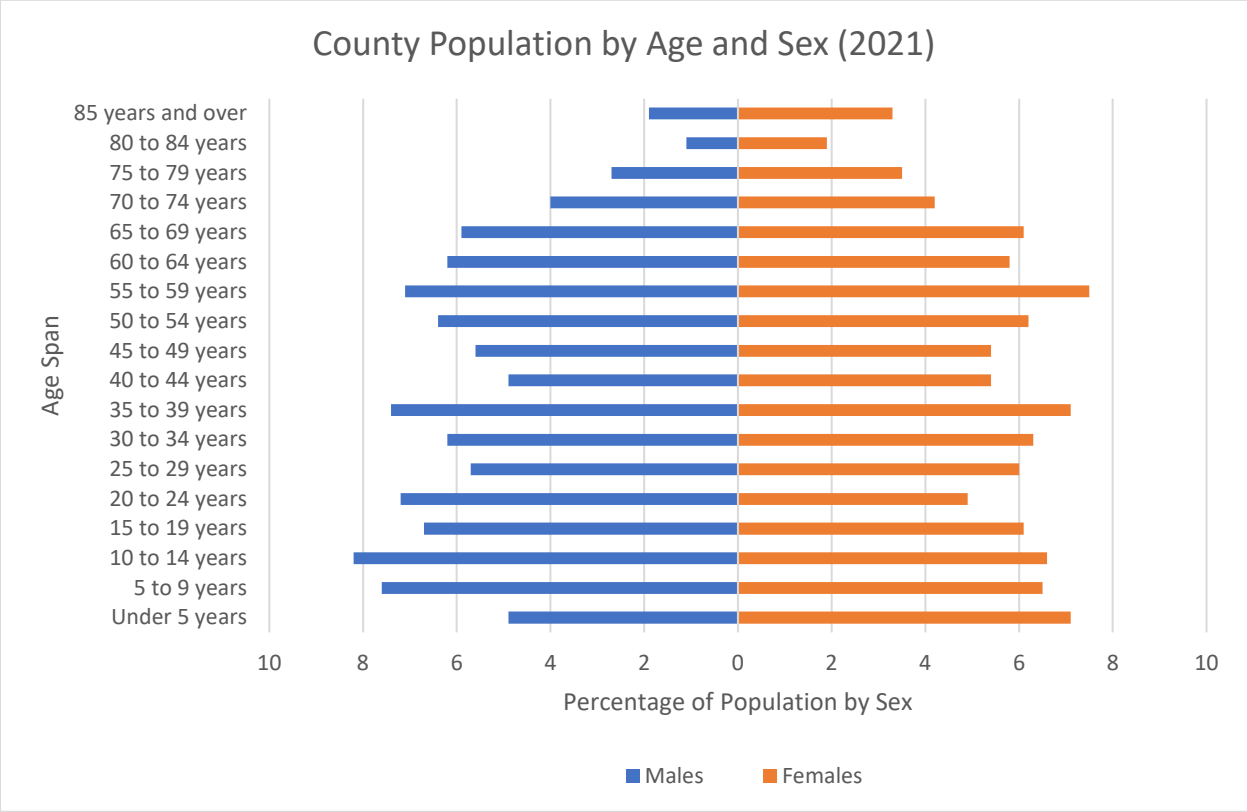

Figure 8. Community population by age and sex (2021). Source: U.S. Census.

Race and Ethnicity

Cass County's racial composition is predominantly white while more than twenty percent of the county's population identifies ethnically as Hispanic/Latino (Table 14).

Table 14. Community population by race & ethnicity (2020). Source: U.S. Census.

Race	**Cass County (2020)**	
White	9,528	73.1%
Black or African American	725	5.6%
American Indian and Alaska Native	129	1.0%
Asian	117	0.9%
Native Hawaiian and Other Pacific Islander	41	0.3%
Some other race	1,594	12.2%
Two or more races	908	7.0%
Ethnicity		
Hispanic/Latino	2,789	21.4%

Education Levels

The number of high school graduates is uniformly distributed across all the communities led by Virginia (Figure 9). The county has a relatively low proportion of people without complete schooling. Arenzville and Ashland account for a significant portion of the region's population with a bachelor's degree or higher. A majority of the county populace has attained at least a high school graduate level education.

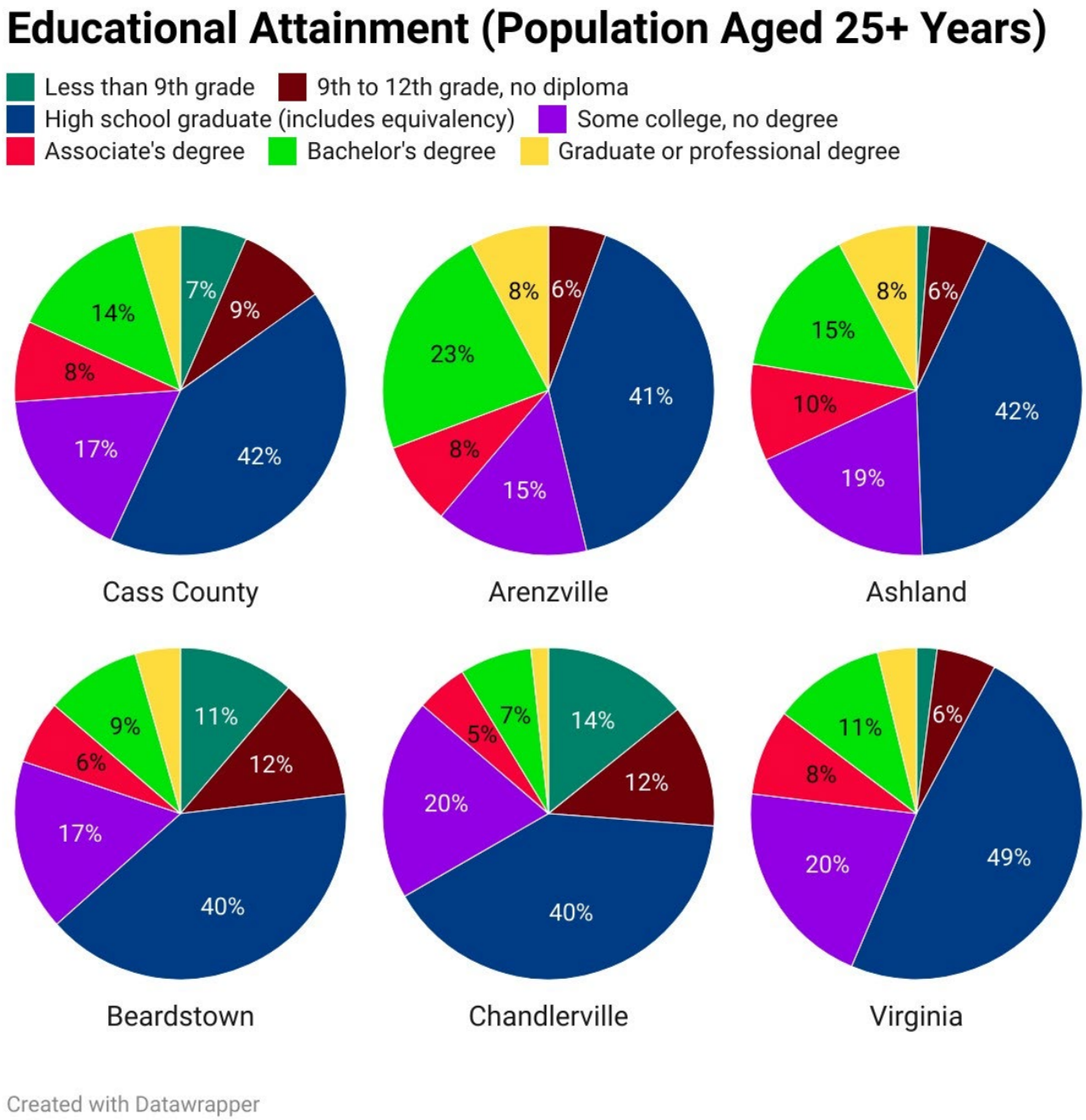

Figure 9. Educational attainment in Cass County (population aged 25+), 2020.

Income

The median household income in Cass is $58,364, with an unemployment rate of 6.8%, as of the 2020 U.S. Census (Table 15).[7] Arenzville has the highest median household income and the lowest unemployment rate, while Chandlerville has the lowest median household income and the highest unemployment rate. About 13.3% of the county lives below the poverty line.

Table 15. Community unemployment, income, and poverty (2021). Sources: American Community Survey

Community	Unemployment Rate (%)	Median Household Income ($)	Population Below Poverty Line (%)
Cass County	6.8%	58,364	13.3%
Arenzville	1.1%	85,938	3.3%
Ashland	4.9%	63,571	7.1%
Beardstown	9.7%	49,643	18.8%
Chandlerville	16.2%	36,250	16.1%
Virginia	1.9%	49,868	15.4%

Housing

Beardstown accounts for the highest proportion of housing units in the county (Table 16). There is relatively low homeowner vacancy rates throughout the county, while rental vacancy rates are quite high in Ashland and Beardstown. The highest payable median rent is found to be for rental properties in Chandlerville. The average rent in Cass County is $630.

Table 16. Community Housing Occupancy & Rental Market.

Community	Total Housing Units	Homeowner Vacancy Rate (%)	Rental Vacancy Rate (%)	Occupied Units Paying Rent	Median Gross Rent ($)
Cass County	5,702	1.2	10.3	994	630
Arenzville	164	8.8	0	6	825
Ashland	592	0	11.2	78	814
Beardstown	2,397	1.2	15.4	568	636
Chandlerville	274	2.3	2.6	27	830
Virginia	621	0.2	0	149	589

[7] Economic Census Bureau

ECONOMY AND INDUSTRY

The industry mix in Cass County is dominated by manufacturing, followed by educational services, healthcare, and social assistance and then by retail trade sectors (Figure 10). The county is also involved in agriculture, mining, forestry, and public administration, among other sectors.

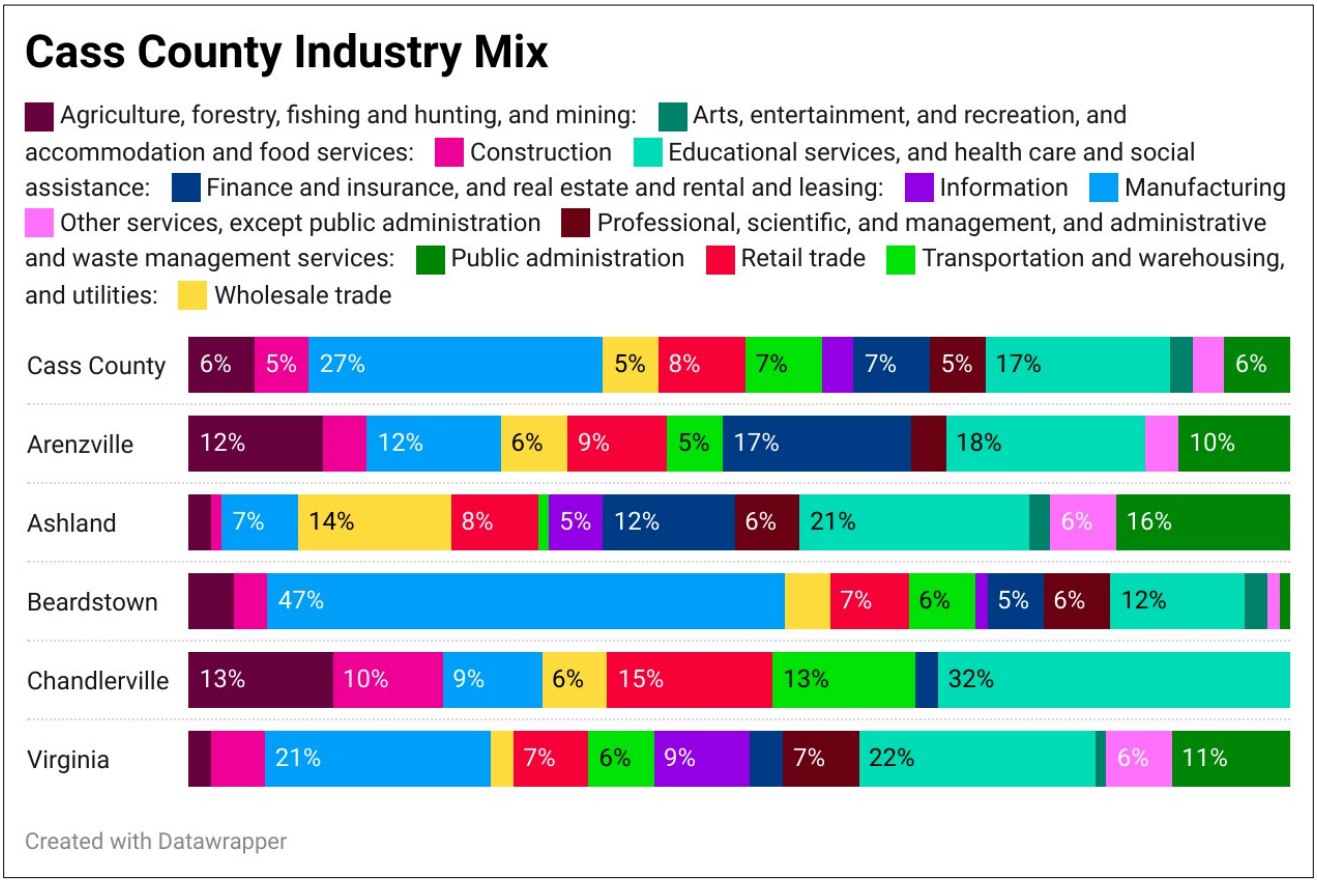

Figure 10. Community Occupational Statistics by Industry (2021). Source: US Census.

Major employers in the county include JBS Pork, Cass Communications, Beard Implement Company, Sunrise FS and Burus Seed.

Beardstown has many advantages as a site for industry, due to frontage on the Illinois River waterway, railroad access and highways in all directions, and a bridge that crosses the Illinois River.

Agriculture

Cass County lies in the corn belt region and corn and soybeans dominate most of its land area (Figure 11). 86% of the farmed lands are used for cropland, 3% for pastureland, 7% for woodland, and 4% for other.[8]

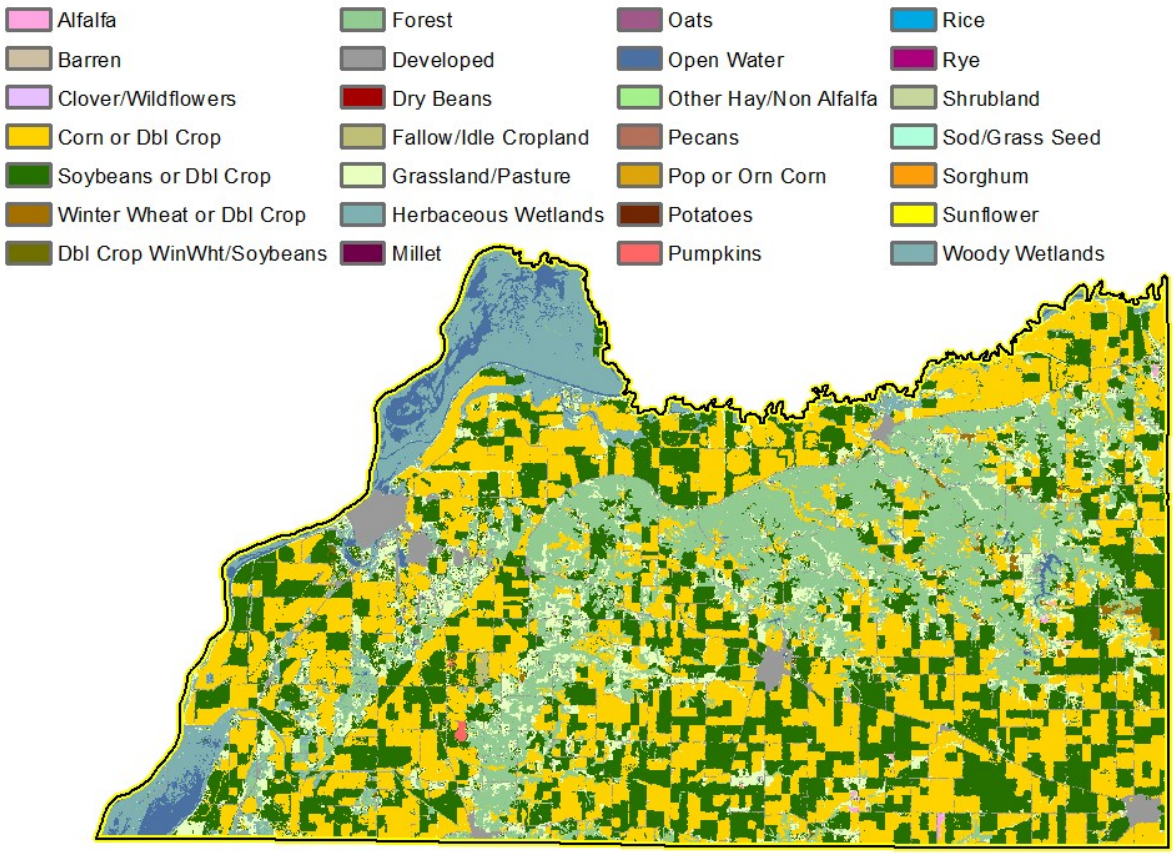

Figure 11. Cass County crop cover.

The average number of farms decreased in this region by 4% since 2012 while the average sizes increased by 8% (Table 17). Overall farmed lands have increased slightly, and now make up over 80% of Cass County's land cover.

Table 17. Farm and crop overview (2012-2017).

Commodity	**2017**	**Change since 2012**
Number of Farms	429	-4%
Area of Farmland (acres)	197,561	+8%
Average Size of Farm (acres)	461	+12%
Top crops in Acres	**Crop area (acres)**	
Corn	86,133	
Soybeans	65,038	
Forage	2,953	

[8] USDA. 2017. National Agricultural Statistics Service. Census of Agriculture. https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Illinois/cp17017.pdf .

NATIONAL FLOOD INSURANCE PROGRAM

The National Flood Insurance Program (NFIP) is a federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses. A jurisdiction's eligibility to participate is premised on their adoption and enforcement of state and community floodplain management regulations intended to prevent unsafe development in the floodplain, reducing future flood damages.[9] If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses (Table 18). To ensure compliance with the program, communities must continue to enforce their local floodplain management ordinances. In Illinois, most communities have adopted the State of Illinois Model Ordinance that goes above and beyond NFIP minimum standards and are much more restrictive than NFIP minimums.

Table 18. Community participation in the NFIP

Jurisdiction	Participating	Date Joined	Current Effective FIRM Date	SFHA Present
Cass County	Y	1/30/1981	5/16/2019	Y
Village of Arenzville	Y	9/29/2010	9/29/2010	Y
Village of Ashland	Y	9/29/2010	9/29/2010	Y
City of Beardstown	Y	3/15/1974	5/16/2019	Y
Village of Chandlerville	Y	11/23/1973	9/29/2010	Y
City of Virginia	Y	4/5/1974	9/29/2010	Y

Flood maps generated by FEMA to support the NFIP are the primary source of information on the location of special flood hazard areas (SFHA) in the state. Flood Insurance Studies (FIS) and Flood Insurance Rate Maps (FIRM) are issued by FEMA following a detailed engineering analysis of flood hazard areas in participating communities. The FIS and FIRM identify 1%-annual-chance flood elevations and boundaries for selected stream reaches in the community. The FIRM contains flood elevation information for various flood frequencies and may also delineate floodway boundaries. Cass County's FIS and FIRMs can be viewed on https://msc.fema.gov/portal/home.

Repetitive loss properties are defined as any insurable building for which the NFIP paid two or more claims of at least $1,000 over a ten-year period. There are 16 repetitive loss properties in Cass County. One of which is has a 'Severe Repetitive Loss' designation, which is four or more separate claim payments where each payment is greater than $5,000; or two or more separate claim payments where the total payments exceed the current value of the property. In either case, two of the claim payments must have occurred within 10 years of each other. At the time of publication for this plan, 11 properties had been mitigated.

FEMA Guidance specifies that NFIP flood insurance claim information is subject to The Privacy Act of 1974, as amended. The Act prohibits public release of policy holder names, or names of financial assistance recipients and the amount of the claim payment or assistance.

After flooding events, local officials are responsible for inspecting flood damaged structures in the special flood hazard area (SFHA) to determine if they are substantially damaged (50% or more damaged). If so, the property owner is required to bring a non-conforming structure into compliance with the local floodplain ordinance. The

[9] Federal Emergency Management Agency. "Flood Insurance". https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book

Illinois Department of Natural Resources (IDNR) created a tool for communities to use with steps to take following a flood.[10] Communities can also contact Illinois Association for Floodplain and Stormwater Management (IAFSM) for additional support following a flood.

In Cass County, local floodplain management is the responsibility of the Cass County Floodplain Administrator. At the time of this publication, County Engineer, Tim Icenogle, is the Cass County Floodplain Administrator. Cass County will continue to educate these jurisdictions on the benefits of the program.

[10] Illinois Department of Natural Resources, "State of Illinois Flood Damage Packet", 2021. https://www2.illinois.gov/dnr/WaterResources/Documents/IL_Damage_Assess_Packet_March_2020.pdf

SECTION 4

RISK ASSESSMENT

DATA AND METHODOLOGY

Hazard Identification

The list of hazards that affect Cass County was created through consultation of resources including the 2023 Illinois Natural Hazard Mitigation Plan and various hazard mitigation plans for other jurisdictions in Illinois. Hazards included in this plan are cold wave, dam failure, drought, earthquake, flooding (flash flooding and riverine flooding), hail, HazMat spill, heat wave, ice storm, lightning, pandemic, tornado, wildfire, wind, and winter weather. Coastal flooding, cyber-terrorism, landslide, and mine subsidence were excluded.

Data sources for historic occurrences of hazards include the National Centers for Environmental Information (NCEI) Storm Events Database and Severe Weather Data Inventory (SWDI), the Association of State Dam Safety Officials (ASDSO) Dam Incident Database, the United States Geological Survey (USGS) Earthquake Catalog, the United States Department of Agriculture (USDA) Forest Service (FS) Wildfire Occurrence Database, the Illinois Emergency Management Agency (IEMA), and the Illinois Department of Public Health (IDPH). Locations of dams and levees come from the United States Army Corps of Engineers (USACE) National Inventory of Dams (NID) and National Levee Database (NLD).

The table below gives a summary of reports/cases, damage, and casualties for each hazard found in the data sources listed above. Each data source has its caveats, so while this table is as complete as possible, there may be under- and over-reporting for any variable. Fatalities from IDPH for the coronavirus pandemic are as of April 2023.

Table 19: Summary of Hazard Reports/Occurrences/Claims/Cases in Cass County, IL

Hazard	Reports	Start Year	End Year	Property Damage	Injuries	Fatalities	Source
Drought	5	1996	2022	$28,600,00[1]	0	0	NCEI Storm Data
Earthquake	0	1970	2022	*	*	*	USGS Earthquake Catalog
Cold Wave	6	1996	2022	$0	0	1	NCEI Storm Data
Heat Wave	12	1996	2022	$0	0	0	NCEI Storm Data
Dam Failure	0	2010	2022	*	*	*	ASDSO Dam Incident Data
Flash Flooding	23	1996	2022	$2,180,000	0	0	NCEI Storm Data
Riverine Flooding	11	1996	2022	$0	0	0	NCEI Storm Data
HazMat Spill	128	1988	2022	*	*	*	IEMA
Pandemic	5,396	2020	2023	*	*	37	ILDPH
Hail	54	1996	2022	$110,000	0	0	NCEI Storm Data
Lightning strikes	218,465	1987	2022	*	*	*	NCEI SWDI
Wind	107	1955	2022	$11,108,800	0	0	NCEI Storm Data
Ice Storms	4	1996	2022	$50,000	0	1	NCEI Storm Data
Winter Weather	41	1996	2022	$0	0	0	NCEI Storm Data
Tornadoes	16	1996	2022	$2,260,000	7	1	NCEI Storm Data
Wildfire	5	1992	2018	*	*	*	USDA FS Wildfire

** Not Applicable / Not Available from data source*

[1] Crop Damage

Hazus

Hazus[11] is a geographic information system (GIS)-based natural hazard risk analysis tool developed and freely distributed by the Federal Emergency Management Agency (FEMA). It is a loss and risk assessment software package built on GIS technology. The information generated can be used for planning emergency response actions and prioritizing mitigation efforts to reduce risk. Hazus output will provide a baseline for evaluating success in reducing natural hazard risk exposure when conducting future assessments.

The Hazus assessment is highly data-dependent. The accuracy of the analyses depends on several important datasets including essential facilities, building structure information, and general building stock inventories. Cass County's Hazus analyses included the creation of a building inventory using the Cass County assessor's data and an update of the essential facilities database. Risks and losses due to flood hazards were modeled using the Hazus methodology of a Level 2, or advanced, analysis. The earthquake hazard was modeled using Hazus Level 1 methodology. Losses due to a simulated tornado scenario were modeled by a separate methodology using the asset information prepared for Hazus.

[11] FEMA Hazus 5.0 Software. Released May 24, 2021.
https://www.fema.gov/flood-maps/products-tools/hazus

HISTORIC DISASTERS

Historical Disaster Declarations

Disaster declarations in the State of Illinois can be made at the city, county, state, or federal government level. City or county officials may declare a local disaster to activate emergency operation plans within their jurisdiction. If a disaster overwhelms local response capabilities, local officials may request assistance from the Illinois Emergency Management Agency (IEMA). The Governor of Illinois may request a Presidential Disaster Declaration from the federal government if local and state response capabilities are overwhelmed. Disasters can also be declared by the Farm Service Agency (FSA) and the Small Business Administration (SBA).

Presidential Disaster Declarations

Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act), a governor of an affected state or territory, or a tribal government, can request that the President of the United States make a disaster declaration. There are two types of presidential disaster declarations: major disaster declarations and emergency declarations.

A major disaster declaration covers any natural hazard, including hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought, and any fire, flood, or explosion, regardless of the cause. Federal assistance for recovery and future hazard mitigation can be made available to affected counties. An emergency declaration is more broadly defined – one is declared when federal assistance is needed to protect lives, property, public health, and safety, or to lessen the threat of catastrophe – but provides less federal assistance.

Cass County has received 21 presidential disaster declarations since 1973 (Table 20).

Table 20. Presidential and emergency disaster declarations (1973 – 2023). Source: FEMA

Declaration No.	Date Declared	Hazard(s) covered by declaration
3577	12/13/2021	Severe Storms, Straight-Line Winds, Tornadoes
4489	3/26/2020	Covid-19 Pandemic
3435	3/13/2020	Covid-19
4461	9/19/2019	Severe Storms, Flooding
4116	5/10/2013	Severe Storms, Straight-Line Winds, Flooding
1960	3/17/2011	Severe Winter Storm, Snowstorm
1800	10/3/2008	Severe Storms, Flooding
3230	9/7/2005	Hurricane Katrina Evacuation
1416	5/21/2002	Severe Storms, Tornadoes, Flooding
3134	1/8/1999	Winter Weather
1112	5/6/1996	Severe Storms, Flooding
1053	5/30/1995	Severe Storms, Flooding
1025	4/26/1994	Severe Storms, Flooding
997	7/9/1993	Severe Storms, Flooding
871	6/22/1990	Severe Storms, Tornadoes, Flooding
735	3/29/1985	Severe Storms, Flooding
684	6/6/1983	Severe Storms, Tornadoes, Flooding

Declaration No.	Date Declared	Hazard(s) covered by declaration
674	12/13/1982	Severe Storms, Tornadoes, Flooding
583	4/30/1979	Severe Storms & Flooding
438	6/10/1974	Severe Storms & Flooding
373	4/26/1973	Severe Storms & Flooding

Gubernatorial Disaster Proclamations

Between 2010 and 2022, there were 30 gubernatorial disaster proclamations across the State of Illinois (Table 21). Cass County received 13 gubernatorial disaster proclamations. This equates to a disaster declaration every year. In 2013, structures southwest of Beardstown and in other parts of rural Cass County were damaged by record flooding on the Illinois River. Agricultural land and roads near the river also incurred damage. Beardstown's floodwall saved the city from significant damage.

Table 21. Gubernatorial disaster proclamations (2010-2023).

Date Declared	Hazard(s) covered by declaration
8/1/2022*	Monkeypox
2/1/2022	Winter Storms
2/16/2021	Winter Storms
3/12/2020*	COVID-19
5/3/2019	Flooding
1/29/2019	Winter Storms
1/5/2016	Severe Storms, Heavy Rainfall, Flooding
7/31/2015	Severe Storms, Tornadoes, Flooding, Straight-line Winds
6/30/2015	Severe Storms, Heavy Rainfall
1/6/2014	Heavy Snowfall, Cold Temperatures
4/18/2013	Severe Storms, Heavy Rainfall, Flooding, Straight-line Winds
4/25/2011	High Wind, Tornadoes, Heavy Rain
1/31/2011	Winter Weather

*reissued monthly

Farm Service Agency

The Farm Service Agency (FSA) is an agency in the US Department of Agriculture (USDA) that provides low-interest emergency loans to producers in counties affected by a disaster. Applications for emergency loans must be received within 8 months of the declaration date.

Each county in the State of Illinois has a local FSA office that provides USDA services to producers, including obtaining federal disaster relief. The Cass County FSA office is in the City of Virginia. Cass County has received six FSA-administered disaster declarations since 2012 (Table 22).

Table 22. FSA disaster declarations, (2012-2023).

Declaration No.	Date Declared	Hazard(s) covered by the declaration
S5434	7/10/2023	Tornado, High Winds
S5448	7/5/2023	Drought
S5097	10/18/2021	Excessive Moisture, Flash Flooding
S4508	8/7/2019	Excessive Moisture, Flooding, Flash Flooding
S3865	8/12/2015	Excessive Rainfall, Flooding
S3311	8/1/2012	Drought

Small Business Administration

The Small Business Administration (SBA) is a government agency that provides low-interest loans to businesses, private nonprofits, homeowners, and renters after a disaster is declared.

SBA disasters are automatically declared when a presidential disaster or agricultural disaster is declared. SBA disasters can also be declared at the request of the Governor of Illinois.

There were no disaster loans distributed by the SBA to Cass County between 2000-2023.

FUTURE CHANGES

Climate Change

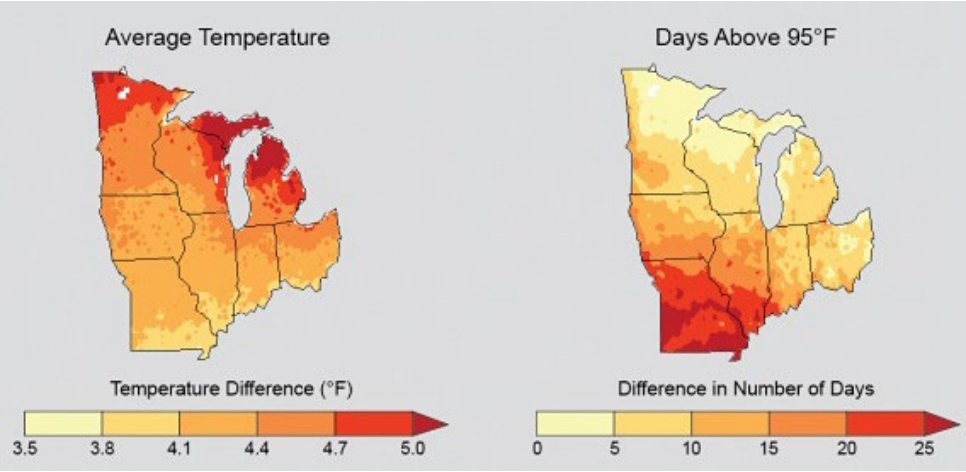

Figure 12. Projected 2050 temperatures changes. Source: US Global Change Research Program (2014).

Human-induced climate change is expected to increase the intensity and frequency of natural hazards in Illinois, including extreme heat, drought, and flash and riverine flooding. As a result, human health, ecosystems, infrastructure, and agriculture are expected to be negatively impacted. Average temperatures are expected to rise by nearly 4°F and there are projected to be over 15 more days above 95°F per year in western Illinois by 2050 (Figure 12).Increasing temperatures will negatively impact human health by increasing the risk of heat-related illnesses, such as heat stroke or heat exhaustion. Livestock may similarly suffer heat stress. Warming temperatures may make conditions less suitable for native plants and animals across Illinois and invasive, non-native species could move into Illinois, harming native ecosystems. Projected increases in flooding may also affect habitat availability for native species.

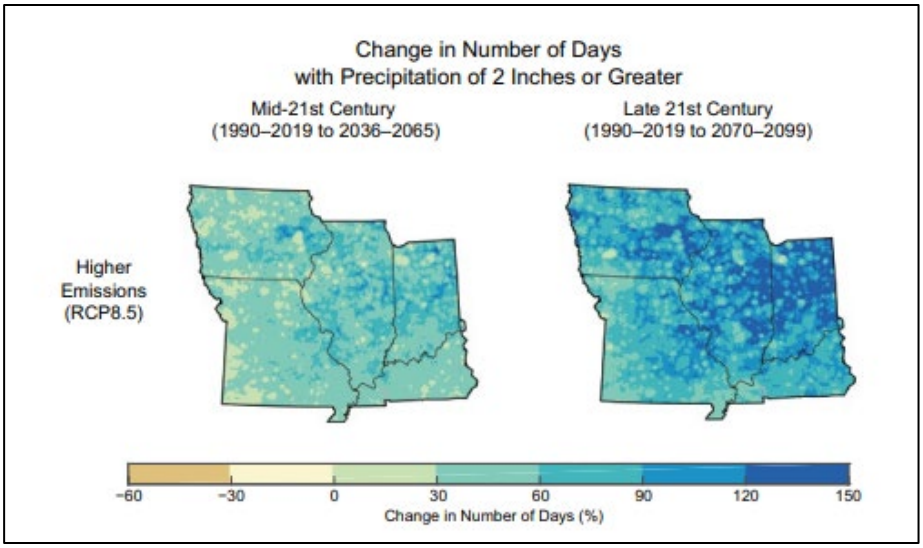

Figure 13. Changes in extreme precipitation by 2100. Source: The Nature Conservancy.

While climate change is expected to increase precipitation in Illinois, the distribution is expected to become more extreme. Rainfall events of more than 2" are expected to increase, causing more riverine and flash flooding (Figure 13). Rivers across Illinois are already flooding more frequently, and this trend is expected to continue. Flash flooding in urban

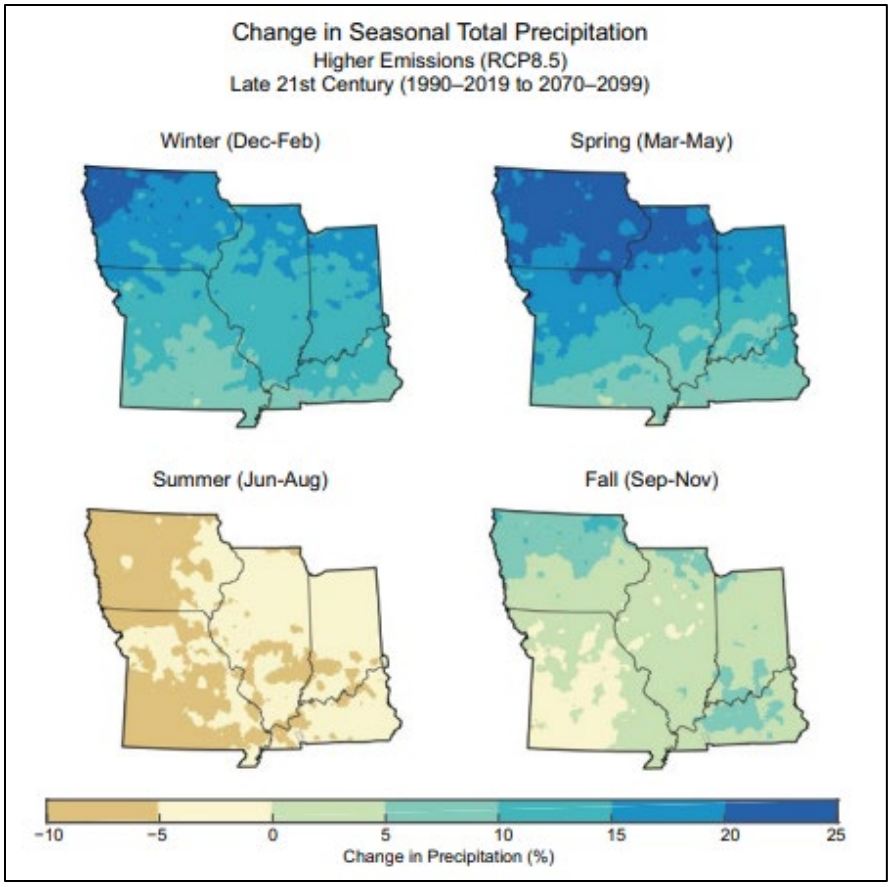

Figure 14. Changes in seasonal total precipitation by 2100 (left). Source: The Nature Conservancy.

areas is expected to increase, as many stormwater systems are not built to handle extreme rainfall events and land-use change from urban sprawl reduces water drainage capabilities. Increased flooding can affect human health by increasing the risk of water-borne diseases and flood-related injuries. In rural Illinois, extreme precipitation has caused runoff from agricultural fertilizer to enter groundwater wells, harming the safety of drinking water.

By the end of the 21st century, dry periods between rainfall events are expected to lengthen, and summer precipitation is expected to decrease, increasing the likelihood of severe summer drought (Figure 14). Soybean and corn yields are expected to decrease due to a combination of rising temperatures, increasing drought, and more water-borne diseases from increased flooding.

Land Use and Development Trends

There has been minimal development and land use change since 2001 (Figure 15). Expanding factories have caused urban expansion in Beardstown. Increased urbanization can be tied to extreme heat events. Urban heat islands occur when natural land cover is replaced with surfaces that absorb and retain heat, such as concrete, asphalt, and buildings. Although large urban areas experience a greater urban heat island effect, small towns and villages can likewise experience warming caused by built-up areas.[12] Increasing development in Beardstown could have impacts on future extreme heat events.

[12] Oke, T.R. (1973). City size and the urban heat island. Atmospheric Environment Volume 7, Issue 8, 769-779. https://doi.org/10.1016/0004-6981(73(90140-6

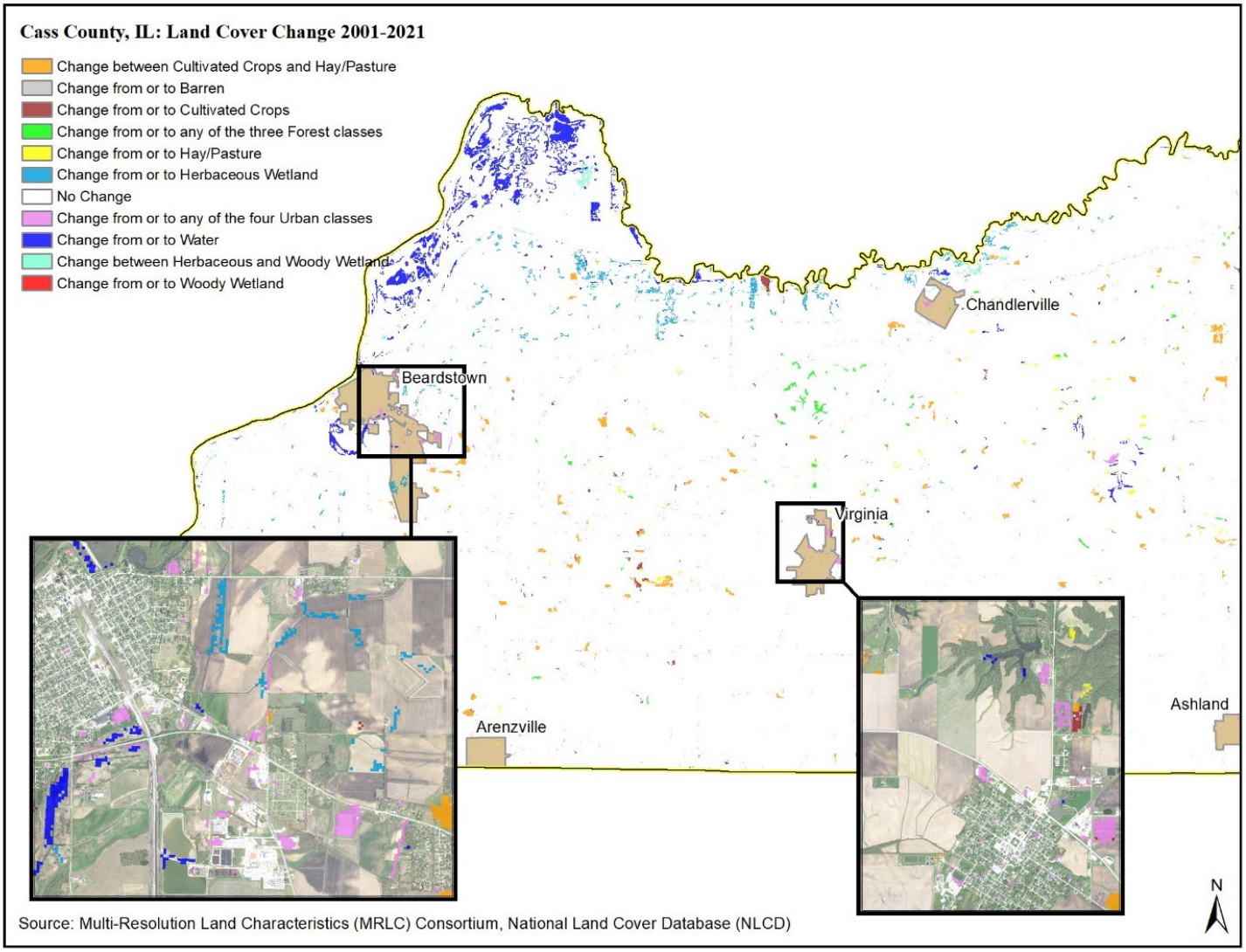

Figure 15. Land cover change in Cass County, 2001-2021.

An increase in water and wetlands land cover can be seen throughout the county. Due to the proximity to the Illinois River, the Sangamon River and a relatively constant elevation throughout the county, the area is susceptible to increased future flooding.

The area of farmland has increased by more than 8% since 2012. Most of the land was converted from grassland or pasture to cropland. This switch could have an impact on future flooding in the county. Flash and riverine floods can destroy large swaths of agricultural land, temporarily or permanently changing the land cover. Wildfires can burn forests and cropland; recovery may precipitate land use changes.

Cass County is home to part of the Meredosia National Wildlife Refuge, the Jim Edgar Panther Creek State Fish and Wildlife Area, and the Sanganois State Fish and Wildlife Area. Protecting and maintaining these natural areas is a priority throughout the county. These areas may be susceptible to wildfires which can have long term impacts on land cover in the county.

Brownfields are abandoned or under-utilized industrial or commercial properties that may be contaminated but have the potential for redevelopment.[13] While Cass County has experienced a steady decline in population since the mid-1900s, should businesses depart the county, brownfield redevelopment will play a major role in future land use. Local governments can receive grants to clean up sites in their area, turning them into safe, toxin-free spaces in their community. Brownfield redevelopment is particularly important for environmental justice, as brownfield sites tend to be located in underserved, socially vulnerable communities.

Currently in Cass County, there are no substantial developments taking place and no substantial growth is expected within the next five years.

[13] Illinois Environmental Protection Agency. (n.d.). Brownfields. Retrieved August 11, 2023, from https://epa.illinois.gov/topics/cleanup-programs/brownfields.html#:~:text=The%20Illinois%20Brownfields%20Redevelopment%20Loan,EPA%20voluntary%20Site%20Remediation%20Program

ESSENTIAL FACILITIES

Essential facilities are buildings and infrastructure that provide necessary services to the public and would cause harm if they were destroyed or damaged. Examples of essential facilities include hospitals, emergency operation centers (such as police and fire departments), schools, nursing homes, cell towers, and utility centers (such as for electricity or water). There are 27 identified essential facilities in Cass County.

FEMA stipulates those essential facilities should not be located in a floodplain when possible. If an essential facility must be located in a floodplain, it should be designed with higher flood protection standards and have a flood evacuation plan. For Cass County, one essential facility was identified as being located in an approximate Zone A 1% annual chance floodplain represented on the FEMA Flood Insurance Rate Map (FIRM) for the City of Virginia[14]. This facility is the Cass County Health Clinic located at 331 S Main St. in Virginia.

Essential facility data are an example of site-specific information used in Hazus for analysis. This data was first compiled from the Hazus statewide database for Illinois and included schools, medical care facilities, emergency operation centers, police stations, fire stations, and potable/wastewater facilities. This data was used as a starting point with the intent for it to be updated for the 2024 Cass County Multi-Jurisdictional Natural Hazards Mitigation Plan.

The planning team was asked to help with updating the essential facilities at the December 15th, 2022, risk assessment meeting held at St. Luke's Hall in Virginia, Illinois. Locations of essential facilities were confirmed using community feedback and internet mapping services such as Google Maps and Google Street View. The updated Hazus inventory contributed to the Level 2 analysis, which improved the accuracy of the risk assessment.

Table 23 identifies the essential facilities that were used for the analysis. A complete list of the essential facilities and community maps displaying the essential facilities are included in **Appendix F: Essential Facilities.**

Table 23. Essential facilities.

Facility	Number of Facilities
Emergency Operation Centers	1
Fire Stations	5
Medical Care Facilities	3
Police Stations	5
Schools	10
Waste Water Facilities	3
Potable Water Facilities	8

[14] FEMA Flood Insurance Rate Map #17017C0204C. City of Virginia, IL. Effective Date September 29, 2010. https://msc.fema.gov/portal/home

SOCIAL VULNERABILITY

Social vulnerability is defined as the susceptibility of a community to adverse impacts caused by natural hazards. The Center for Disease Control's (CDC) Social Vulnerability Index (SVI) uses 16 socioeconomic variables grouped under four categories (Figure 16) to identify factors that affect a community's ability to prepare for, respond to, and recover from natural hazards.[15]By including social vulnerability in a risk analysis, hazard mitigation projects can be better tailored to the needs of individual communities.

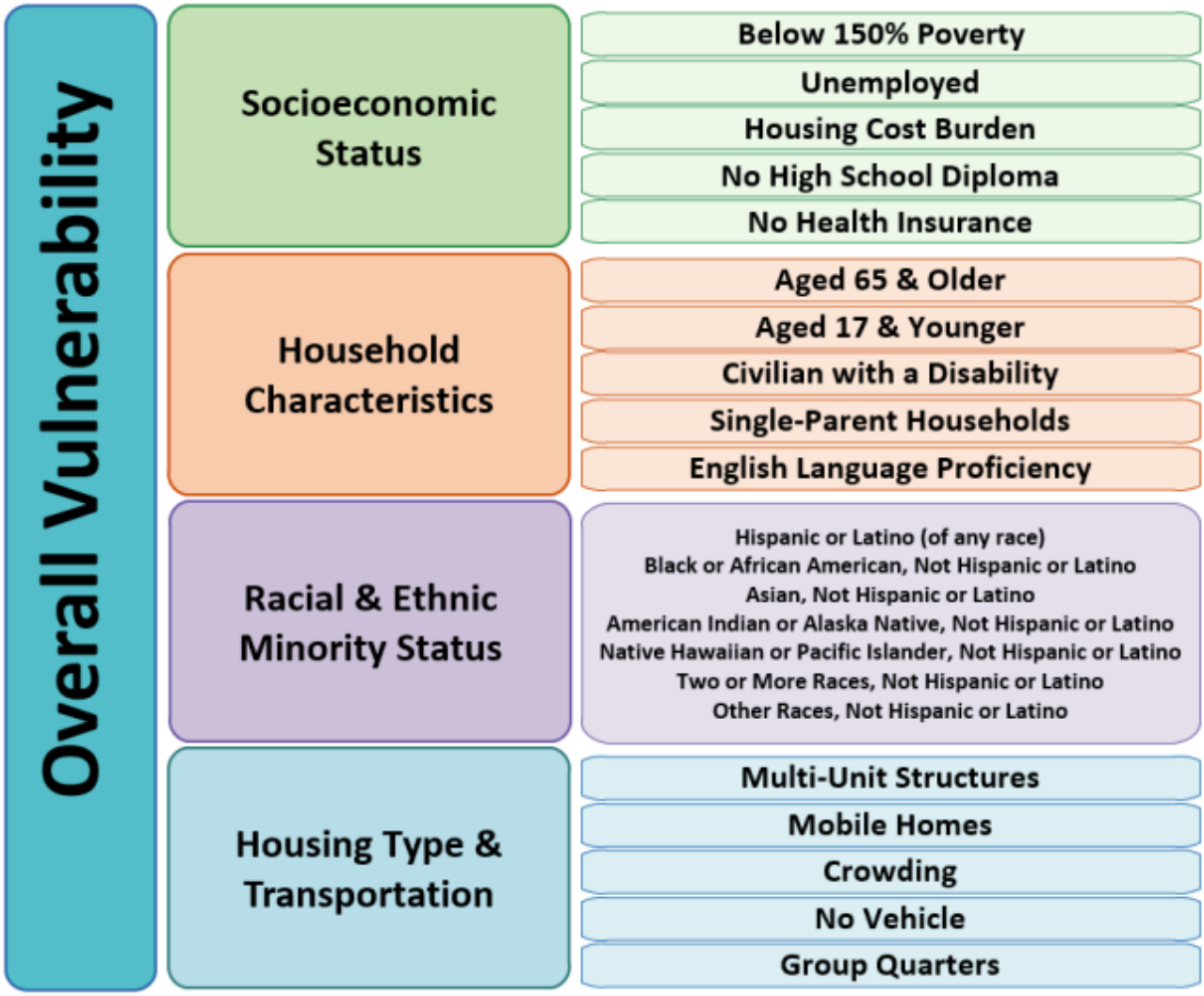

Figure 16. CDC/ASTDR SVI factors. Source: CDC

[15] CDC. (2022). "CDC/ATSDR SVI 2020 Documentation". https://www.atsdr.cdc.gov/placeandhealth/svi/documentation/pdf/SVI2020Documentation_08.05.22.pdf

Socioeconomic status can affect natural hazard risk within communities. Individuals and families may not be able to afford hazard insurance (e.g., flood, earthquake), and may not seek medical assistance if injured during a disaster due to a lack of health insurance. Stocking up on provisions before a severe weather event or dipping into savings to replace items lost during hazard event may be out of financial reach for communities with lower socioeconomic status.[16] Infrastructure and facilities in low-income communities are frequently of lower quality, exacerbating the impacts of disasters.

Household characteristics may impact the ability to respond to a hazard. Elderly people, young children, and people with disabilities may need extra assistance when a disaster occurs. Children frequently don't have the experience or resources necessary to protect themselves from hazards, and elderly people may require extra medical care or other physical assistance during or after a disaster. People with disabilities may need additional resources or assistance post-disaster. People who are not proficient in English may have difficulty understanding hazard alerts or seeking assistance post-disaster.

Racial and ethnic minority status – namely, communities that are non-white, including Hispanic communities – have wide ranging impacts on hazard risk. Social, political, and economic marginalization makes people of color more vulnerable to natural hazards and can prevent people of color from receiving disaster assistance. Historically redlined neighborhoods, where many people of color reside today, are in areas that are more vulnerable to natural hazards, such as floodplains.

Housing type and transportation likewise impact hazard risk. People who live in mobile homes, because mobile homes are not anchored to the ground, are much more susceptible to natural hazards such as tornadoes, severe wind, floods, and earthquakes. People without a vehicle may be unable to evacuate before a disaster occurs, or get supplies needed to prepare for a disaster. People living in group quarters, such as nursing homes or prisons, do not have autonomy to prepare for a disaster, and must rely on facility operators to have a disaster plan in place.

[16] Fothergill, A., & Peek, L. A. (2004). Poverty and Disasters in the United States: A Review of Recent Sociological Findings. Natural Hazards, 32(1), 89–110. https://doi.org/10.1023/B:NHAZ.0000026792.76181.d9

HAZARD PROFILES AND RISK ANALYSIS

Drought

Drought is a complex physical and social phenomenon that can cause widespread damaging impacts to individuals, industries, and municipalities. Although drought originates from low precipitation, drought is best identified by examining crop losses, low water levels in bodies of water, and water shortages.[17] It can be difficult to tell exactly when a dry period becomes a drought since the effects of drought tend to appear slowly. The Palmer Drought Severity Index (PDSI) shows that Cass County has experienced several extreme droughts since 2000 (Figure 17).

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
0.19	5	26

SOURCE: NCEI STORM EVENTS DATABASE (1996-2022)

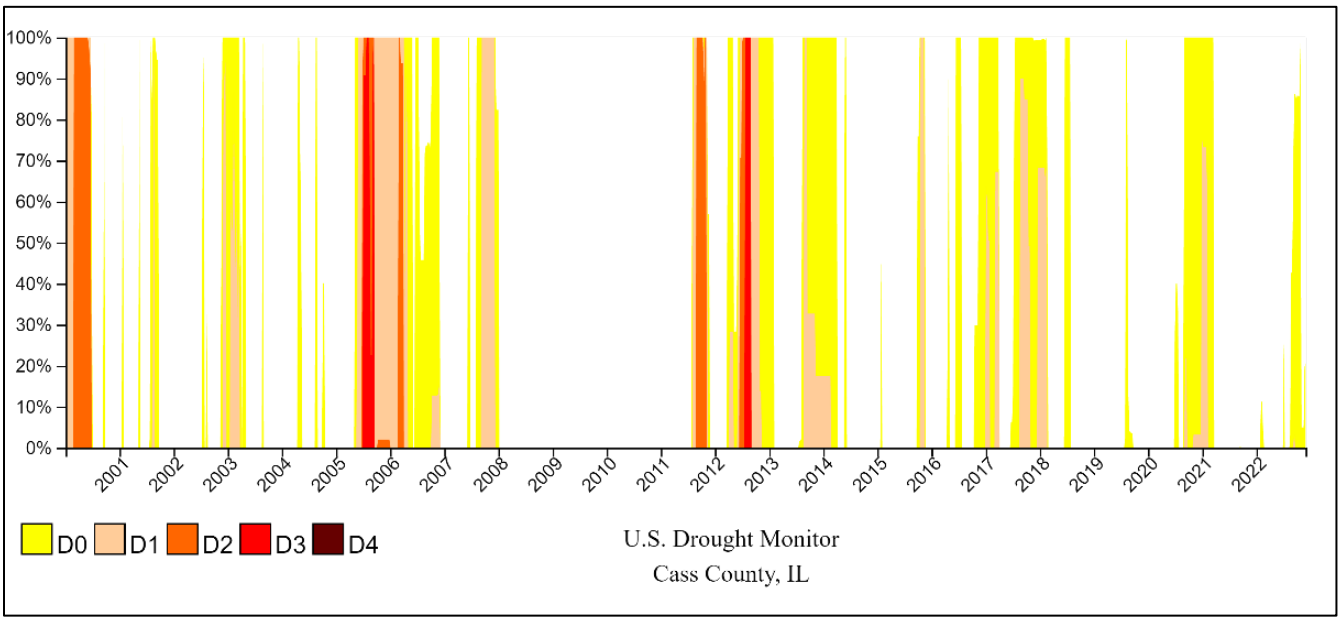

Figure 17. Percentage of Cass County area in PSDI categories over time (2000-2022).

[17] Illinois State Climatologist. "Drought in Illinois". University of Illinois. Retrieved July 5, 2023, from https://stateclimatologist.web.illinois.edu/drought-in-illinois/

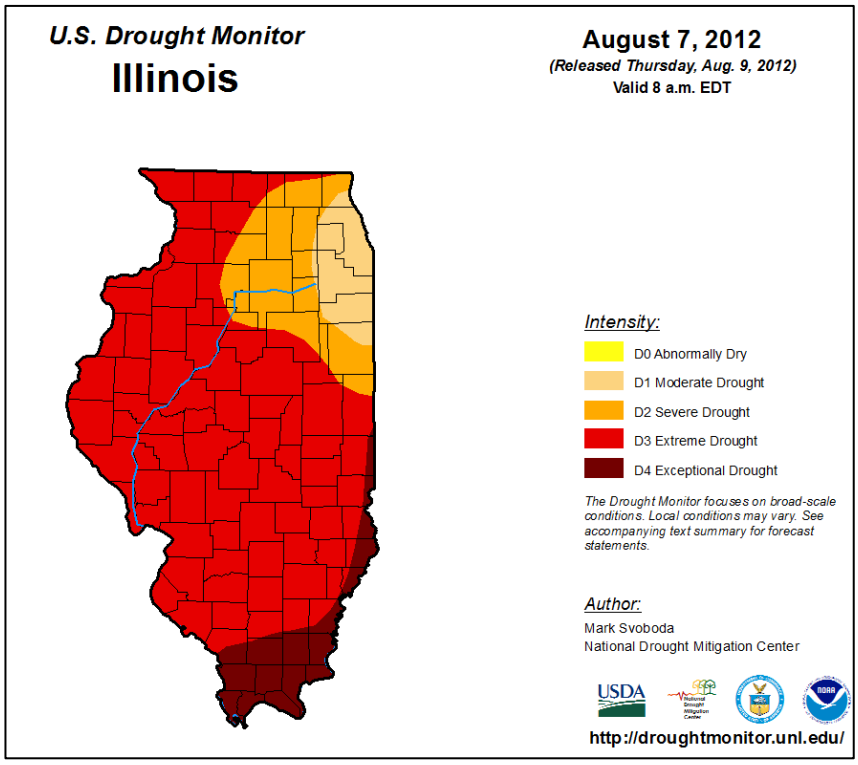

Figure 18. US Drought Monitor map for Illinois on 8/7/2012.

Illinois was one of several states stricken by the historic US drought of 2012 (Figure 18). After a dry, record warm March and an abnormally dry May, conditions deteriorated rapidly throughout the summer. The average corn yield in Illinois was about 40% below normal, and average soybean yields were about 10% below normal. Illinois counties situated along major rivers frequently require supplemental irrigation because their sandy soils do not retain moisture. In 2012, Cass County was ranked fifth in the state among all counties for center pivot irrigation. Irrigation increases during abnormally dry years, which can decrease overall water supply, interrupt private well service, and even lower the water level in already low streams. The turning point of the drought occurred in August, due to the rainfall remnants from Hurricane Isaac and other August-September precipitation events.[18]

When a drought occurs, the height of under groundwater levels can drop, impacting the water level in an aquifer. Public water systems in Cass County are primarily supplied by aquifers. Chandlerville's public water system was deemed potentially vulnerable to drought by the Illinois State Water Survey (ISWS) in 2006.[19] In 2008, after firefighters battled a house fire, Chandlerville's water storage tank ran critically low. Chandlerville's residents received a low domestic water flow, with traces of sediment and discoloration.[20] Although low water storage tank levels were not due to a drought, similar impacts may be felt by the community. Private groundwater from shallow aquifers and in areas where no aquifer exist are also susceptible to drought.

The risk of drought occurring applies the same to the entire county. There are no known factors that make one area more prone to these events than another. However, drought can adversely impact individuals employed in agriculture and natural resources more than other industries. In Cass County, over 5% of the employed population works in agriculture or natural resources. Drought can also negatively impact households that rely on aquifers for drinking water, which is the majority of the county.

[18] Knapp, H. Vernon; Angel, James R.; Atkins, Jennie R.; Bard, Luke; Getahun, Elias; Hlinka, Kenneth J.; Keefer, Laura L.; Kelly, Walton R.; Roadcap, George S., (2017): The 2012 Drought in Illinois. Illinois State Water Survey. http://hdl.handle.net/2142/96286

[19] IDNR, "The Drought of 2012: A report of the governor's drought response task force", accessed Dec 2022. https://dnr.illinois.gov/content/dam/soi/en/web/dnr/waterresources/documents/thedroughtof2012.pdf

[20] My Star Journal, "Chandlerville's new water tank", accessed Dec 2022. https://www.sj-r.com/story/news/2008/07/15/chandlerville-s-new-water-tank/43250720007/

Social Vulnerability

Droughts can have significant impacts for vulnerable populations who rely on agriculture and natural resources for their livelihoods. This can include reduced income, loss of employment opportunities, and increased poverty. Droughts can lead to water shortages and reduced access to clean potable water, which can have negative impacts on health and wellbeing.

Climate Change

Mean precipitation has increased by 5-20% over the last 120 years across Illinois. One result of this is that extreme droughts have become less common. Illinois will likely see an overall increase in precipitation over the next few decades, including an increase in the number of days with 2 or more inches of rain. However, rising temperatures and evapotranspiration also play an important role in future drought occurrences, and the risk for short-term droughts may increase due to these factors.[21]

[21] Wuebbles, D., et al. (2021). An Assessment of the Impacts of Climate Change in Illinois. University of Illinois at Urbana-Champaign. https://doi.org/10.13012/B2IDB-1260194_V1

Earthquake

Illinois is located within two seismic zones: the New Madrid Seismic Zone and the Wabash Valley Seismic Zone. There is usually at least one measurable earthquake in Illinois per year, typically in the southern region of the state. Damaging earthquakes in Illinois are much less frequent compared to other regions, with minor damage from earthquakes reported about once every 20 years, and serious damage from earthquakes occurring once every 70-90 years.[22]

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
0	0	228

SOURCE: USGS EARTHQUAKE CATALOG (1795-2022)

The highest earthquake hazard area in Illinois is in the southernmost counties due to the New Madrid Seismic Zone. Cass County is shown in light blue, a lower-middle hazard category (Figure 19).[23] The United States Geological Survey (USGS) estimates that a seismic hazard has an 8-10% chance of occurring in Cass County by 2064. There have been 593 earthquakes with a magnitude of 2.0 or greater between 1795 and 2022 in Illinois, producing an average of 2.6 earthquakes per year.[24]

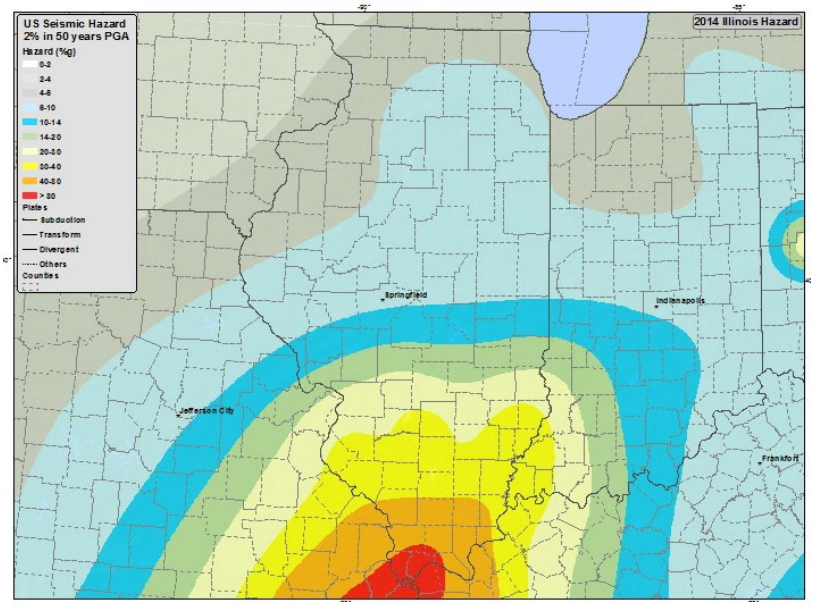

Figure 19. 2014 Illinois Seismic Hazard Map. Source: USGS

There have been no reports of earthquakes in Cass County, although earthquakes centered hundreds of miles away have the potential to be felt in the county. On April 18th, 2008, a 5.2 magnitude earthquake struck near Mt. Carmel in southeastern Illinois. This was the largest-magnitude earthquake with an epicenter in Illinois since 1968. Several buildings close to the epicenter incurred damage, and roads cracked near the City of Cairo in southern Illinois. While there were no damages or injuries reported in Cass County, residents felt the initial shock

[22] Illinois State Geological Survey, "Damaging Earthquakes in Illinois", 1995. https://files.isgs.illinois.edu/sites/default/files/files/qk-fct-damag.pdf

[23] United States Geological Survey (USGS), "2014 Seismic Hazard Map for Illinois", accessed Dec 2022. https://www.usgs.gov/media/images/2014-seismic-hazard-map-illinois

[24] United States Geological Survey (USGS), Earthquake Catalog, accessed Dec 2022. https://earthquake.usgs.gov/earthquakes/search

and subsequent aftershocks.[25] In 1909, a 4.8 magnitude earthquake struck several miles north of Cass County near the Village of Kilbourne, Mason County.[26]

Social Vulnerability

Illinois does not have statewide building codes, although units of local government can adopt building codes of their choice.[27] In Cass County, all municipalities have building codes and all municipalities, excluding Arenzville, have a chief building official. Ashland and Virginia have adopted specific building codes from the International Code Council (ICC) 2006 edition and 2015 edition, respectively. Beardstown has adopted building codes from the Building Officials and Code Administrators (BOCA) National Building Code 1996 edition.

Limited or outdated building codes may make a community more vulnerable to earthquakes. Additionally, lower income neighborhoods and people of color tend to live in areas with more buildings in disrepair. Buildings that are already structurally unsound are more prone to collapsing during an earthquake, putting people at greater risk.

Hazus Earthquake Analysis

For planning purposes, a Hazus Level 1 analysis was run on two earthquake scenarios that could impact Cass County. Both scenarios use the Hazus general building stock database to estimate the impact of these events had they occurred in 2022. The magnitude of the earthquakes is measured using the Moment Magnitude (M) scale.

The two scenarios include:

- Scenario #1: New Madrid Historical Event
    - Replication of the 7.4M event that occurred February 7th, 1812
- Scenario #2: Cass County Hypothetical Event
    - 5M event with an epicenter at the approximate center of Cass County

A scenario using the Village of Kilbourne, Mason County, 1909 earthquake was analyzed but Hazus did not report any damages. This is not to say that there would be no damages or impacts of a repeat event, it may just be that Hazus is not sensitive enough to report them.

Building Damage

Scenario #1: New Madrid Historical Event

- Hazus estimates that only 7 buildings will be at least moderately damaged in this scenario with 0 buildings damaged beyond repair.

Scenario #2: Cass County Hypothetical Event

- An estimated 1,139 buildings will be at least moderately damaged in this scenario. This is over 19% of the total number of buildings in the region. It's estimated that 64 buildings will be damaged beyond repair.

Economic Loss

Scenario #1: New Madrid Historical Event

- The total economic loss estimated for the earthquake is $370,000, which includes building and lifeline-related losses based on the region's available inventory.

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[25] Cass County Star-Gazette, "Shake, Rattle, and Roll", accessed Dec 2022. https://beardstown.advantage-preservation.com/

[26] USGS, Earthquake Catalog, accessed Dec 2022. https://earthquake.usgs.gov/earthquakes/search/

[27] Building Codes and Regulations. (n.d.). State of Illinois. Retrieved August 23, 2023, from https://cdb.illinois.gov/business/codes/buildingcodesregulations.html

Scenario #2: Cass County Hypothetical Event

- The total economic loss estimated for the earthquake is $263.98 million, which includes building and lifeline-related losses based on the region's available inventory.

The following sections provide more detailed information about these losses.

Building-Related Losses

Building losses are broken into two categories: direct building losses and business interruption losses. Direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. Business interruption losses are those associated with the inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include temporary living expenses for those people displaced from their homes because of the earthquake.

Scenario #1: New Madrid Historical Event

- The estimated total building-related losses were $302,100; 27% of the estimated losses were related to the business interruption of the region. The largest loss was sustained by the residential occupancies which made up over 76% of the total loss.

Scenario #2: Cass County Hypothetical Event

- Total building-related losses were $126.11 million; 15% of the estimated losses were related to the business interruption of the region. The largest loss was sustained by the residential occupancies which made up over 61% of the total loss.

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages.

Scenario #1: New Madrid Historical Event

- Economic losses to transportation infrastructure were estimated to be $24,400. This represents loss incurred by physical damage to highways and railways.
- Utility System losses were estimated to be $47,200. This includes damages to pipelines, facilities, and distribution lines for utilities including potable water, waste water, natural gas, electrical power, and communication.

Scenario #2: Cass County Hypothetical Event

- Economic losses to transportation infrastructure was estimated to be $4.70 million. This represents losses incurred by physical damage to highways and railways.
- Utility System losses were estimated to be $133.18 million. This includes damages to pipelines, facilities, and distribution lines for utilities including potable water, waste water, natural gas, electrical power, and communication.

Summary of Scenario Losses

Selected results of the two earthquake scenarios are shown in Table 24 below. Both scenarios would potentially have an impact in Cass County in terms of building damage and damage to the infrastructure of the county. Of the two, the Cass County hypothetical 5M Scenario 2 event would have a significantly higher impact. Though the magnitude is less than New Madrid Scenario 1, Cass County's distance, approximately 230 miles, from the epicenter of the New Madrid event significantly reduces the impact.

Table 24. Earthquake Scenario Results (Estimated Losses in Millions of 2022 USD)

	Category	Scenario #1 New Madrid 7.4M	Scenario #2 Cass County 5M
Buildings Damaged (Count)	Moderate	6	803
	Extensive	1	271
	Complete	0	65
	Subtotal	**7**	**1,139**
Building Related Economic Loss Estimate	Income Losses	$0.0809	$18.8087
	Capital Stock Losses	$0.2212	$107.3002
	Subtotal	**$0.3021**	**$126.1089**
Transportation System Economic Loss Estimate	Highway	$0.0071	$1.2451
	Airport	$0.0057	$1.2785
	Port	$0.0116	2.1487
	Railway	$0	$.0228
	Subtotal	**$0.0244**	**$4.6951**
Utility System Economic Loss Estimate	Potable Water	$0.0209	$1.0283
	Waste Water	$0.0227	$131.9232
	Natural Gas	$0.0036	$0.1770
	Electrical Power	$0	$0.0000
	Communication	$0	$0.0472
	Subtotal	**$0.0472**	**$133.1757**
	Loss Totals	**$0.3737**	**$263.9797**

Extreme Temperatures: Cold Wave

A cold wave is a weather phenomenon that occurs when a cold air mass moves into an area and brings unusually cold temperatures for an extended period of time. Typically, a cold wave is defined as a rapid and significant drop in temperature over a 24-hour period, with the resulting temperatures significantly lower than the average for the time of year. Abnormally low temperatures, especially when combined with blowing wind, can become uncomfortable, dangerous, or deadly to humans and animals. The wind chill temperature (Figure 20), which combines temperature and wind speed, describes how cold air feels on your skin is commonly used to provide a value taking wind speeds into account.[28] Very cold wind chill temperatures can cause frostbite or hypothermia.

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
0.23	6	26

SOURCE: NCEI STORM EVENTS DATABASE (1996-2022)

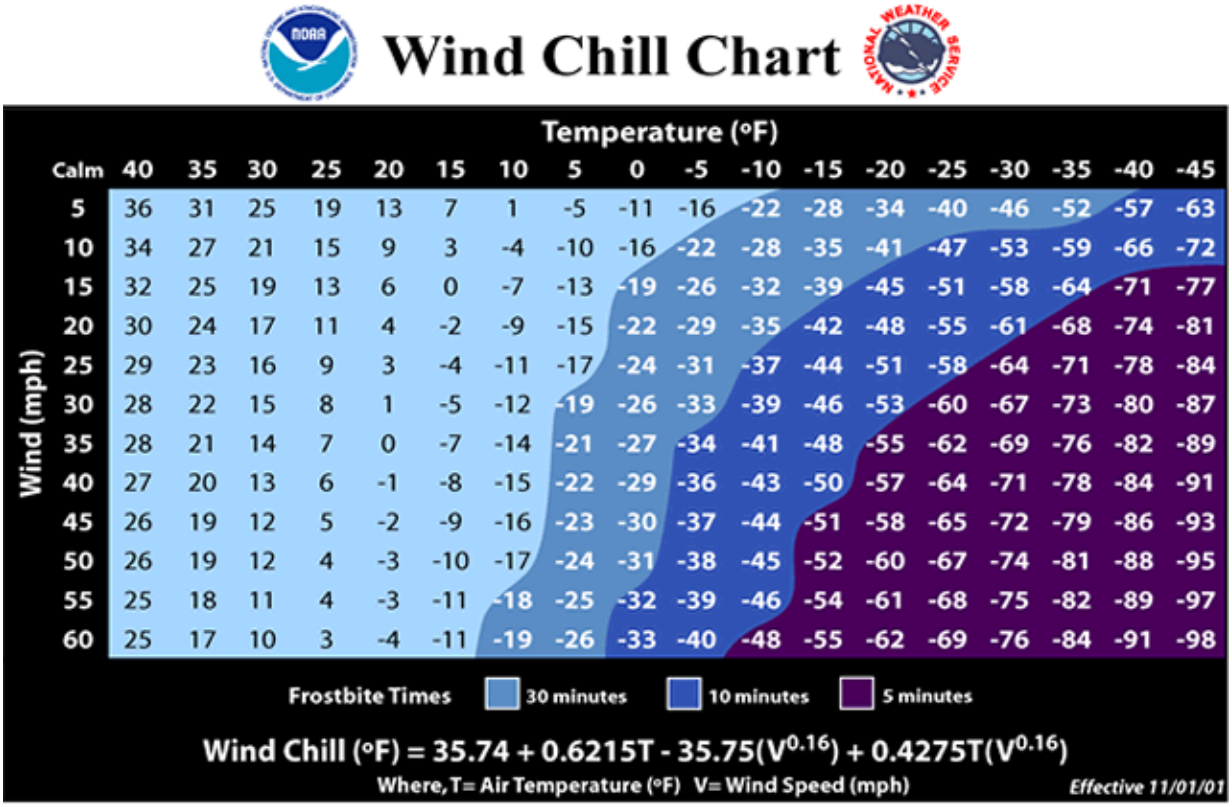

Figure 20. Wind chill temperatures. Source: NWS

[28] NWS. "Wind Chill Chart". Retrieved August 24, 2023, from https://www.weather.gov/safety/cold-wind-chill-chart

Wind Chill Climatology: Average Number of Days with ≥ 1 hr

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Wind Chill ≤	30°F	25°F	20°F	15°F	10°F	5°F	0°F	-5°F	-10°F	-15	-20°F	-25°F	-30°F	-35°F	-40°F
Snow Year	135.7	108.3	77.9	55.5	41.7	30.1	21.3	14.9	9.8	5.7	3.4	1.8	0.9	0.4	0.1
July	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
August	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
September	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October	5.1	1.8	0.2	0	0	0	0	0	0	0	0	0	0	0	0
November	17.8	12.5	6.9	3.6	2.1	0.8	0.3	0.2	0.1	0	0	0	0	0	0
December	28	24.2	18.3	13.5	10.2	7.4	4.9	3.3	2.2	1.3	0.9	0.4	0.3	0.1	0
January	30	27.8	23.5	18.8	15.5	12.3	9.5	6.8	4.8	3	1.8	1.1	0.5	0.3	0.1
February	26.7	23.4	18.2	13.8	10.6	8	5.9	4.2	2.4	1.3	0.7	0.3	0.1	0	0
March	20.5	15.3	9.4	5.4	3.2	1.6	0.7	0.4	0.3	0.1	0	0	0	0	0
April	7.1	3.3	1.4	0.4	0.1	0	0	0	0	0	0	0	0	0	0
May	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: Annual averages may not match the sum of monthly averages due to rounding.

Data Time Period: Snow Years 1973/74 to 2018/19

Figure 21. Average number of days with at least 1 hour of selected wind chill temperatures in Springfield, IL (1973/74 - 2018/19). Source: MRCC

The National Weather Service (NWS) office in Lincoln, IL (ILX) is Cass County's weather forecasting office. ILX issues a wind chill advisory when the wind chill is expected to be between -15°F and -24°F. The NWS advises caution when going outside and to cover exposed skin. A wind chill warning is issued when the wind chill is expected to be -25°F or below. The NWS advises people to stay inside, as frostbite or hypothermia could occur in minutes.

The Midwestern Regional Climate Center (MRCC) has calculated wind chill climatologies for select stations across the US. Springfield, IL is the station nearest to Cass County. The area can expect an average of 12.3 days per year with at least one hour of a wind chill below -15°F (Figure 21).[29] In February 2021, wind chill readings reached -30°F in Cass County. One death was reported northeast of Peoria in the Village of Germantown Hills.[30]

Social Vulnerability

The entire county is at risk of a cold wave. However, the severity of a cold wave may be mitigated by the urban heat island effect. Urban heat islands are densely built-up areas that have the ability to trap heat, warming the surrounding air. Beardstown is the most densely built-up region in Cass County, meaning it may be less susceptible to cold waves. However, Beardstown also has a large immigrant community with many immigrants coming from Mexico, the Democratic Republic of Congo, and other regions that are typically warm throughout the year. Beardstown's immigrant population may be more susceptible to cold waves than the rest of the city's population.

Other vulnerable populations include elderly adults and young children as the human body's ability to thermoregulate is least effective at young and old ages. Nearly 25% of Arenzville's population is over 65, the largest percentage in the county. Beardstown has the largest percentage of children under 5 years old at 8%.

Climate Change

Average daily temperatures in Illinois have increased by 1-2°F over the last 120 years. In addition to rising daytime maximum temperatures, overnight minimum temperatures are also increasing. The number of freezing winter nights has decreased, and in the future, Illinois will likely see a significant decrease in days with extremely cold temperatures.[31]

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[29] MRCC, "Wind Chill Climatology", accessed Dec 2022. https://mrcc.illinois.edu/clim/windChill/index.jsp

[30] NCEI, Storm Events Database, accessed Dec 2022. https://www.ncdc.noaa.gov/stormevents

[31] Wuebbles, D., Angel, J., Petersen, K., and Lemke, A.M. (2021). An Assessment of the Impacts of Climate Change in Illinois. *The Nature Conservancy, Illinois*. https://doi.org/10.13012/B2IDB-1260194_V1

Extreme Temperatures: Heat Wave

A heat wave is a period of two or more days of abnormally and uncomfortably hot and humid weather. Extremely high temperatures, especially when combined with humidity, can be dangerous or deadly to humans and animals. The heat index, which combines temperature and relative humidity, describes how hot it really feels to your body (Figure 22). High heat indices can cause dehydration, heat exhaustion, or heat stroke. Heat stroke is particularly dangerous and can result in death.

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
0.46	12	26

SOURCE: NCEI STORM EVENTS DATABASE (1996-2022)

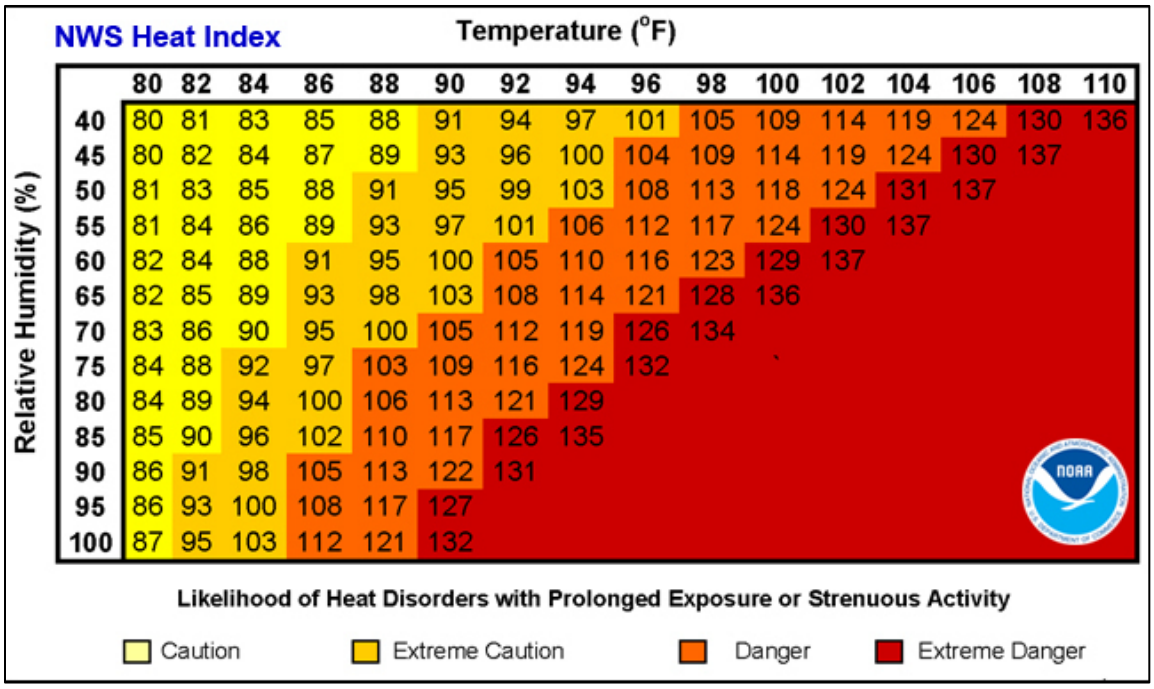

Figure 22. Heat Index Chart. Source: National Weather Service

The NWS office in Lincoln, IL (ILX) is Cass County's weather forecasting office. ILX issues a heat advisory when heat index temperatures need to be forecast for 105°F or higher. A heat warning is issued when maximum heat index temperatures are to be at least 110°F and minimum heat index temperatures are forecast to be 75°F for 48 consecutive hours.

The MRCC has calculated heat index climatologies for select stations across the US. Springfield, IL is the station nearest to Cass County. The area can expect an average of 7 days per year with at least one hour of a heat index above 105°F (Figure 23).[32]

Heat Index Climatology: Average Number of Days with ≥ 1 hr for

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Heat Index ≥	80°F	85°F	90°F	95°F	100°F	105°F	110°F	115°F
Calendar Year	102	68.5	42.7	24.2	12.6	5.1	1.5	0.3
January	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0
March	0.3	0	0	0	0	0	0	0
April	2.6	0.4	0	0	0	0	0	0
May	9.8	4.8	1.8	0.5	0	0	0	0
June	21	14.4	9	4.7	1.7	0.4	0.1	0
July	26.9	21.6	15.6	10.1	6.4	3.1	1	0.3
August	24.3	18.1	11.7	7	3.8	1.7	0.5	0
September	14	8	4.3	2	0.6	0	0	0
October	3.1	1.2	0.2	0	0	0	0	0
November	0.1	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0

Note: Annual averages may not match the sum of monthly averages due to rounding.

Data Time Period: 1973 to 2018

Figure 23. Average number of days with at least 1 hour of selected Heat Index temperatures for Springfield, IL (1973-2018). Source: MRCC

In 2012, during the historic drought, a heat wave occurred across the Midwest during the last four days of June and continued into July. A large area of high pressure over this part of the US suppressed rainfall and kept skies cloud-free, allowing abundant solar energy to heat the surface.[33] In nearby Jacksonville, IL an air temperature of 103°F and a heat index of 117°F was recorded on July 7th. Although there were no deaths in Cass County, three heat-related deaths were reported in nearby Madison and St. Clair counties. Across Illinois, 32 people perished during this heat event.[34] One year later in June 2021, a stifling heatwave settled over Cass County for several weeks. People were encouraged to stay in their air-conditioned homes, as the county did not have a cooling center.[35]

Social Vulnerability

The entire county is at risk of a heat wave. However, the severity of a heat wave may be worsened by the urban heat island effect. Urban heat islands are densely built-up areas that have the ability to trap heat, warming the surrounding air. Beardstown is the most densely built-up region in Cass County, meaning it may be more susceptible to heat waves.

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[32] MRCC, "Heat Index Climatology", accessed Dec 2022. https://mrcc.illinois.edu/clim/heatIndex/index.jsp
[33] NWS St. Louis office, "Historic Heat Wave 2012", accessed Dec 2022. https://www.weather.gov/media/lsx/Events/07_07_2012.pdf
[34] NCEI, Storm Events Database, accessed Dec 2022. https://www.ncdc.noaa.gov/stormevents
[35] Cass County Star Gazette, "Heatwave to continue cooking Cass County", accessed Dec 2022. https://www.beardstownnewspapers.com/news/heatwave-continue-cooking-cass-county

Elderly adults are the most vulnerable demographic to heat waves as the body's ability to thermoregulate deteriorates with age. Since 1999, people over 65 years old have been several times more likely to die from heat-related cardiovascular disease than the rest of the US population. [36] Nearly 25% of Arenzville's population is over 65 years old, making the village especially susceptible to heat waves.

Air conditioning and cooling centers are important tools for fighting heat-related illness. Lower-income households may not be able to afford air-conditioning, making them more susceptible to heat waves. Smaller towns may not have a cooling center or the capacity to keep one staffed during the hottest parts of the day.

Climate Change

Average daily temperatures in Illinois have increased by 1-2°F over the last 120 years. In addition to rising daytime maximum temperatures, overnight minimum temperatures are also increasing, markedly higher than the maximums. In the future, Illinois will likely see increases in extreme high temperatures. Projections to the end of the 21st century predict temperature increases in ranges of 4-9°F to 8-14°F. They are also showing an increase in the number of days with a high temperature of 95°F. [37] Many aspects of urban and rural development and economic stability can increase or decrease the risk of heat wave health impacts, including loss of life. For example, sprawl-based urban development increases the intensity of the urban heat island effect, which increases the exposure risk of residents to extreme heat. This type of development also tends to favor car-based transit and car-dependent communities, which increases the risk of social isolation, one of the best predictors of heat health outcomes.

[36] Climate Change Indicators: Heat-Related Deaths. (2021). EPA. https://www.epa.gov/climate-indicators/climate-change-indicators-heat-related-deaths#ref18

[37] Wuebbles, D; Angel, J; Petersen, K; Lemke, A.M. (2021): An Assessment of the Impacts of Climate Change in Illinois. University of Illinois at Urbana-Champaign. https://doi.org/10.13012/B2IDB-1260194_V1

Floods: Dam/Levee Failure

The United States Army Corps of Engineers (USACE) keeps a database of dams called the National Inventory of Dams (NID). Among the many attributes recorded is downstream hazard potential. Ratings of high, significant, or low are given depending on the potential hazard to the downstream area resulting from failure or misoperation of a dam. A probable loss of any human life automatically puts a dam in the high category. Probable economic, environmental, or lifeline losses place a dam in the significant category. If these losses are low and generally limited to the dam owner, a dam will be categorized as low.[38] The USACE also keeps a database of levees called the National Levee Database (NLD).[39] Levees are designed to reduce flood risk from flood events, but do not eliminate the hazard entirely. Levee systems can be accredited by FEMA provided they meet specific design, data, and documentation requirements.[40]

HIGH HAZARD POTENTIAL DAMS	SIGNIFICANT HAZARD POTENTIAL DAMS	LOW POTENTIAL AND UNDETERMINED DAMS	TOTAL DAMS
2	2	9	13

SOURCE: USACE NATIONAL INVENTORY OF DAMS (2018)

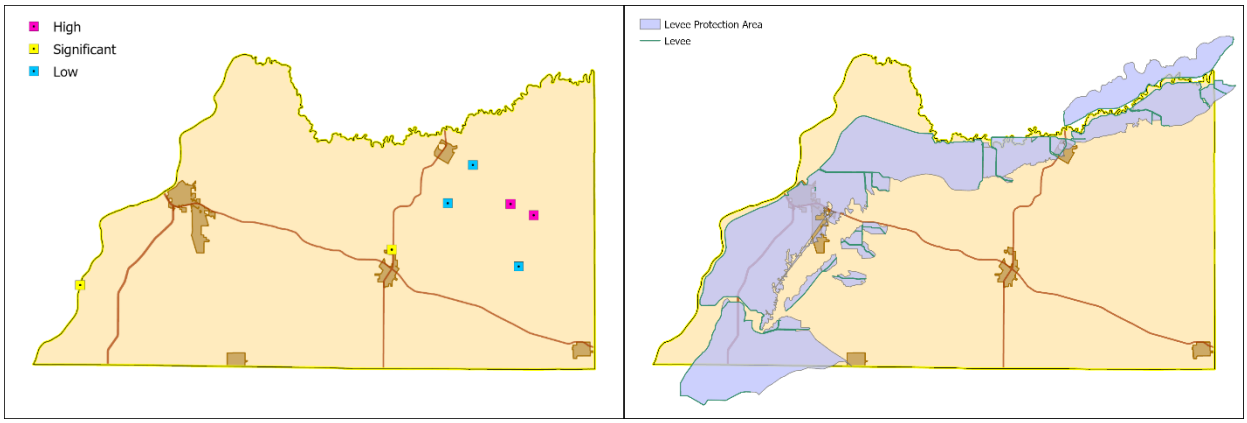

Figure 24. Dams (L) and levees (R) in Cass County (2018). Source: USACE NID, NLD

There are 6 dams located in Cass County. An additional dam is located on the Illinois River in neighboring Brown County. Two of these, Drake Lake Dam and Prairie Lake Dam, are ranked with high downstream hazard potential. Two others, LaGrange Lock and Dam and Virginia Lake Dam, are listed with significant downstream hazard potential. The other 3 dams have low downstream hazard potential (Figure 24). There have been no reported dam failures in Cass County.

[38] USACE, National Inventory of Dams, accessed Dec 2022. https://nid.sec.usace.army.mil
[39] USACE, National Levee Database, accessed Dec 2022. https://levees.sec.usace.army.mil/
[40] FEMA, "Meeting the Criteria for Accrediting Levee Systems on Flood Insurance Rate Maps", accessed Dec 2022. https://www.fema.gov/sites/default/files/documents/fema_meeting-criteria-accrediting.pdf

Although there have not been any dam failures reported in Cass County, levee failures along the Illinois and Sangamon Rivers have caused city, road, and farmland flooding. In 1922, one of the most destructive floods in Beardstown occurred after a levee failure on the Illinois River (Figure 25). A 30-foot wall of water demolished parts of Beardstown, causing $5 million – or $88 million in today's dollars – worth of damage.[41]

There are 33 levees in Cass County, many of which are operated by local drainage and levee districts across the county (Figure 24).[42] There is one accredited levee system – Sid Simpson Levee System – on the Illinois River at Beardstown, which is operated by the Rock Island District USACE.

In 2020, the USACE performed a breach analysis on the Sid Simpson Levee using the 2013 historic flooding event and the 1% annual event probability, also known as the 100-year flood. Five breach scenarios at different points along the levee showed that there could be little evacuation time in the event of a levee failure during the crest of a record flood event.[43]

Figure 25. A breach in a levee on the Illinois River at Beardstown in 1922, washing out a railroad (L). Flood waters were so high that residents travelled by canoe (R). Source: My Journal Courier

Climate Change

As climate changes and heavy rainfall is predicted to increase in Illinois, more stress may be placed on dams and levees. Dams and levees in Cass County are on average 46 and 81 years old, respectively. Many of these structures were built using less rigorous engineering standards that may not stand up to extreme precipitation and faster streamflow.[44]

Illinois does not currently have a funding program to assist dam owners with dam rehabilitation, although the state is removing aging low head dams.[45] Levees also need frequent maintenance and strengthening, which falls to the owner of the levee. As climate changes while dams and levees do not improve to catch up with changing precipitation and streamflow conditions, high-hazard dam failure has the potential to be catastrophic for areas

[41] My Journal Courier, "Nature's fury: As much of the East Coast cleans up after Hurricane Ian, the devastation carries a cautionary note for Illinois", accessed Dec 2022. https://www.myjournalcourier.com/news/article/natures-fury-17476025.php

[42] KFVS News, "It did what it was supposed to": Secondary dam breaches at Nashville, Ill. Reservoir", accessed July 2022. https://www.kfvs12.com/2022/07/26/it-did-what-it-was-supposed-secondary-dam-breaches-nashville-ill-reservoir/

[43] Sid Simpson Levee Breach Analysis. (2020). USACE. https://www.iwr.usace.army.mil/Silver-Jackets/State-Teams/Illinois/

[44] Masters, J. (2021, March 3). New report: U.S. dams, levees get D grades, need $115 billion in upgrades. Yale Climate Connections. https://yaleclimateconnections.org/2021/03/new-report-u-s-dams-levees-get-d-grades-need-115-billion-in-upgrades/

[45] Illinois Section of the American Society of Civil Engineers. (2022). 2022 Report Card for Illinois Infrastructure. ASCE. https://infrastructurereportcard.org/wp-content/uploads/2016/10/Illinois_Report_Card_Report_2022.pdf

downstream such as Virgnia. Levee failures could flood Beardstown and Chandlerville which are protected by levees from floods on the Illinois and Sangamon rivers, respectively.

Social Vulnerability

Certain characteristics of dams and levees may put people more at risk. High-hazard potential dams and dams without emergency action plans (EAP) may leave downstream areas more at risk of catastrophic flooding. Both of Cass County's high-hazard potential dams are owned by the Illinois Department of Natural Resources (IDNR) and have EAPs. Three other dams in the county are privately owned and do not have EAPs. Viriginia Lake Dam is classified as a significant hazard and is north of Virginia, making the city potentially susceptible to a failure.

Communities with levees may also be at greater risk of flooding due to the perception that flood risk has been eliminated once a levee is constructed. Residents may decrease their flood preparedness activities, and communities may build structures in high-risk areas. The Sid Simpson Levee provides protection to Beardstown on their Flood Insurance Rate Maps (FIRM). In Illinois, fewer than 3% of people living behind levees carry flood insurance. Although Beardstown participates in the National Flood Insurance Program (NFIP), few residents may have flood insurance despite its availability. The availability of insurance and the potential danger of a levee breach may not be well communicated to residents who speak languages other than English at home, which constitutes over one-third of Beardstown's population.

[46] Martindale, B and Osman, P. (n.d.). Why the Concerns with Levees? They're Safe, Right?. IAFSM. Retrieved June 7, 2023, from https://www.illinoisfloods.org/news-file/download/6

Floods: Flash Flooding

Flooding is a natural part of the hydrologic cycle. It rains, water collects on the ground, it evaporates, and it rains again. Flooding becomes a problem when water collects on the ground in locations where it normally does not, for example outside of riverbanks, on top of roads, or in homes. Flash flooding is most commonly caused by heavy rainfall, and it typically begins and subsides quickly.[47] It does not have to occur near an existing stream, and often happens in developed areas, flooding streets and basements, and overwhelming stormwater and combined sewer systems.[48] Due to its fast-developing nature, flash flooding can be extra dangerous because it is difficult to predict.

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
0.85	22	26

SOURCE: NCEI STORM EVENTS DATABASE (1996-2022)

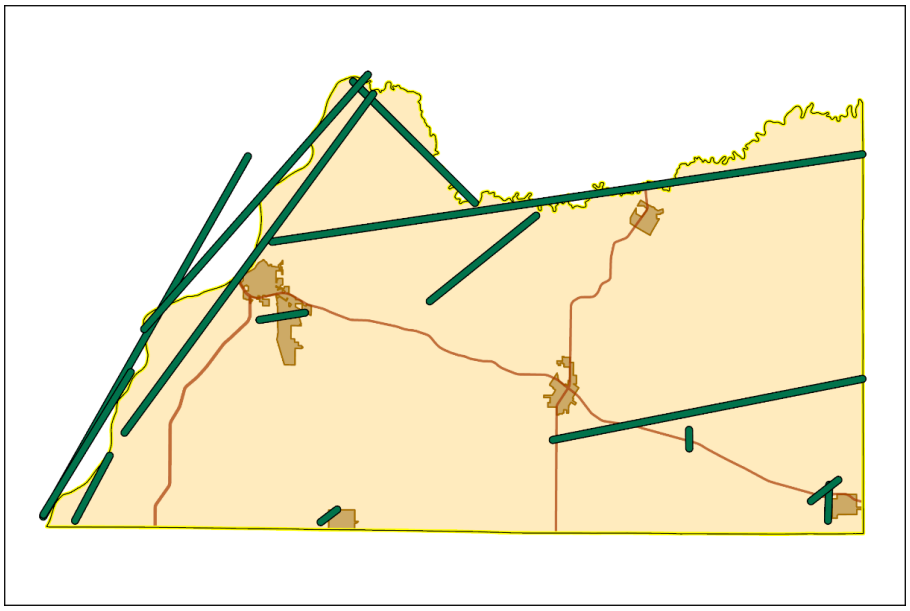

Figure 26. Flash flood reports (1955-2022). Source: NCEI

Flash floods can occur anywhere in Cass County (Figure 26). Frequently, roads and transportation are affected. In the last 15 years, law enforcement and emergency responders have reported rural road and major highway closures due to flash floods. Events occurred in September 2009, June 2011, May 2013, June 2015, April 2017, and October 2021. Road closures within cities and villages around Cass County were also reported.[49] On July 28th, 2010, slow moving thunderstorms produced up to 5 inches of rain in Beardstown, causing urban flooding of nearly two feet and stranding numerous cars on the roads.[50]

[47] National Weather Service, "Flood Related Hazards", accessed Dec 2022. https://www.weather.gov/safety/flood-hazards

[48] Midwestern Regional Climate Center, "Living with Weather: Floods", accessed Dec 2022. https://mrcc.illinois.edu/living_wx/floods/index.html

[49] NCEI, Storm Events Database, accessed Dec 2022. https://www.ncdc.noaa.gov/stormevents

[50] Ibid

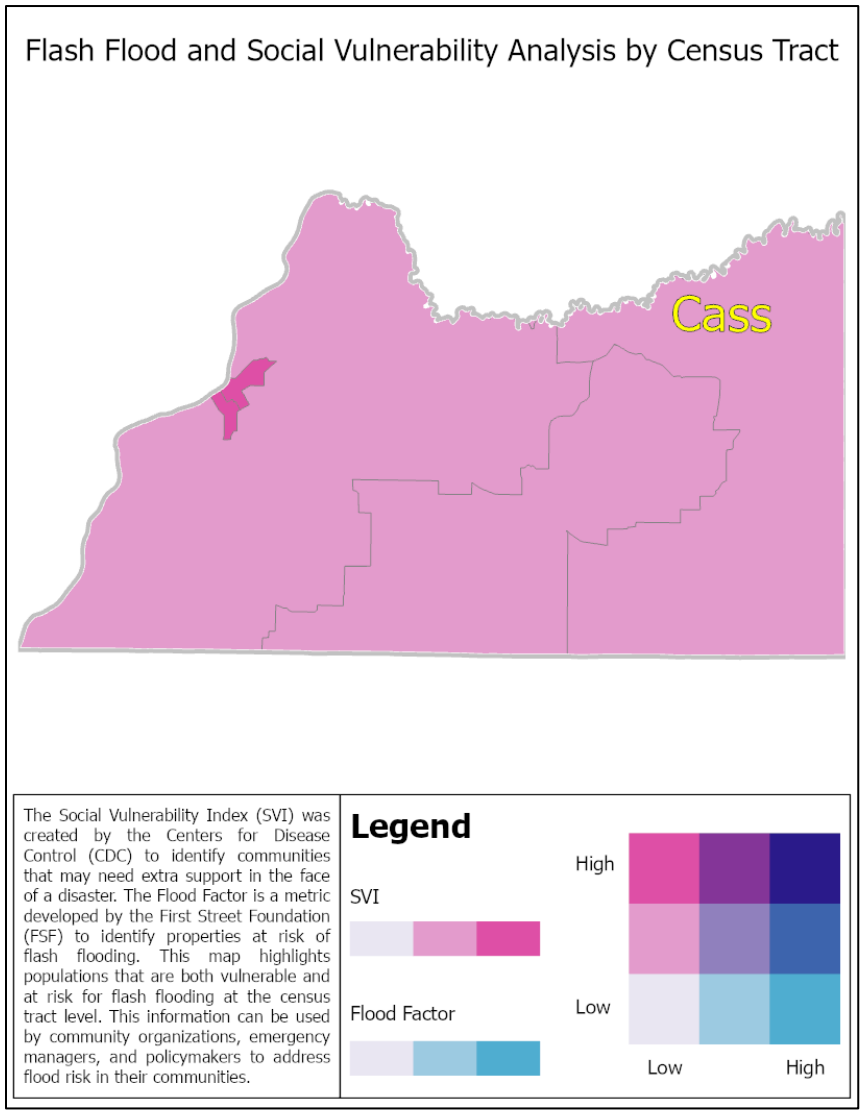

Figure 27. Flash flood and social vulnerability.

The risk of a flash flood event occurring at a location varies depending on many factors. These include environmental variables such as topography ("hilliness" or "flatness" of an area) and soil type/permeability. Additionally, developed areas with impervious surfaces and aging stormwater systems tend to have higher chances for flash flooding. [51] Although rates and amounts of a rain event play the largest factor in whether a location sees a flash flood, the risk for heavy rainfall is the same across the county.

Social Vulnerability

Flooding has been well documented as having a disproportionate impact on socially vulnerable populations. Low-income populations and people of color are more likely to live in floodplains. However, floodplains are not the only places where flooding occurs. In fact, nearly 40% of NFIP claims come from outside SFHAs. Homeowners living outside SFHAs are not required to purchase flood insurance, meaning that they are at risk of incurring high out-of-pocket expenses if their home is flooded. Renters may not be aware that flood insurance is available.

Compared to the rest of Illinois, Cass County has low vulnerability to flash floods, although social vulnerability is high in Beardstown (Figure 27). Limited or non-English speaking households in Beardstown and throughout the county may not be aware of the availability of flood insurance. Low-income households across the county may also not be able to afford insurance or extra expenses incurred from flash flood damage.

Climate Change

Mean precipitation has increased by 5-20% over the last 120 years. The number of days with 2 inches of rain has also increased by about 40%. In the future, Illinois will likely see an overall increase in precipitation over the next few decades, including an increase in the number of days with 2 or more inches of rain. Increases in intense rainfall events are expected to worsen flash flooding in developed areas.[52]

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[51] Illinois Department of Natural Resources, "Report for the Urban Flooding Awareness Act", June 2015. https://www.dnr.illinois.gov/WaterResources/Documents/Final_UFAA_Report.pdf

[52] Wuebbles, D; Angel, J; Petersen, K; Lemke, A.M. (2021): An Assessment of the Impacts of Climate Change in Illinois. University of Illinois at Urbana-Champaign. https://doi.org/10.13012/B2IDB-1260194_V1

Floods: Riverine Flooding

Flooding is a natural part of the hydrologic cycle. It rains, water collects on the ground, it evaporates, and it rains again. Flooding becomes a problem when water collects on the ground in locations where it normally does not, for example outside of riverbanks, on top of roads, or in homes. Riverine flooding can occur due to an excess of rain, melting snow, or an ice jam. Floods on larger rivers can take days, weeks, or months to crest and subside.[53]

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
0.42	22	26

SOURCE: NCEI STORM EVENTS DATABASE (1996-2022)

In addition to the Unincorporated Areas of Cass County, all five incorporated communities – Arenzville, Ashland, Beardstown, Chandlerville, and Virginia – have FEMA Flood Insurance Rate Maps (FIRM) showing Special Flood Hazard Areas (SFHA) (Figure 28).[54]

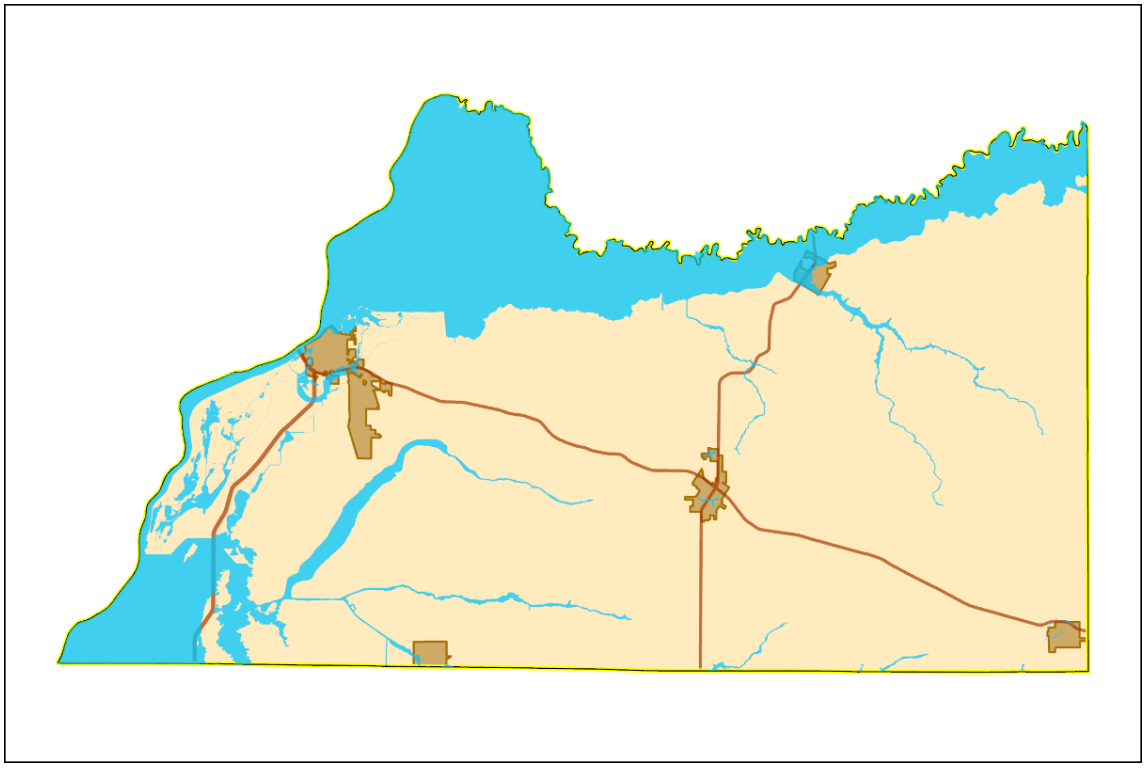

Figure 28. SFHAs on FEMA FIRMs for Cass County. Sources: FEMA, Map Service Center (MSC)

[53] Midwestern Regional Climate Center, "Living with Weather: Floods", accessed Dec 2022. https://mrcc.illinois.edu/living_wx/floods/index.html

[54] Federal Emergency Management Agency, Flood Map Service Center, accessed Dec 2022. https://msc.fema.gov

Figure 29. A sinkhole caused by the April 2013 floods at the intersection of E Main St and Monroe St in Beardstown, which connects the two grain elevators in town. Farmers were delayed by this road closure. Credit: Peoria Journal Star

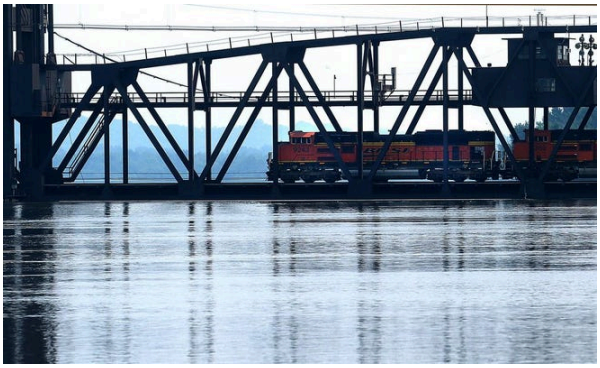

Figure 30. The BNSF railroad bridge over the Illinois River at Beardstown on July 2nd, 2015, barely above water. Credit: Peoria Journal Star

Cass County is bounded by the Illinois River on its western border and the Sangamon River on its northern border. The threat of riverine flooding is ever-present in the county, although dams, levees, and flood walls have prevented severe flooding in recent years.

On April 27th, 2013, heavy rains that began in mid-April caused the Illinois River at Beardstown reached major flood stage and a record river crest of 29.81 feet.[55] Major flood stage on the Illinois River at Beardstown is 28 feet and indicates the potential for severe threat to life and property. Although agricultural land and roads near the river were damaged, levees and the 35-foot floodwall in Beardstown prevented loss of life and major damage to property. [56] Although no mandatory evacuation was issued, several families chose to leave the area temporarily until the river level receded.[57] The city was still dealing with nine sinkholes and nearly $2.3 million in damages from the April 2013 flood when the Illinois River reached its second highest river crest value of 29.75 feet on July 2nd, 2015.

Figure 31. Logjam on the Sangamon River near Chandlerville, February 6th, 2016. Credit: Peoria Journal Star

Chandlerville, which lies on the Sangamon River in the northern part of the county, nearly experienced catastrophic flooding due to a logjam on the river in early 2016. The logjam began developing several years prior and continued to grow, threatening the Hager Slough Drainage District levee. A levee breach would inundate farmland and cause irreparable ecological changes to the Sanganois State Fish and Wildlife Area Site which is home to a variety of waterfowl. Fortunately, unlike the Chandlerville City Levee breach in 2002 which flood parts of the village[58], this levee did not fail.

The risk of a riverine flood event occurring at a location varies on its proximity to a river, lake, or other surface water feature. The closer a structure is to a water feature, the greater its chances of getting flooded.

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[55] NWS, Advanced Hydrologic Prediction Service, accessed Dec 2022. https://water.weather.gov/ahps2/hydrograph.php?gage=beai2&wfo=ilx

[56] NCEI, Storm Events Database, accessed Dec 2022. https://www.ncdc.noaa.gov/stormevents

[57] KHQA, "Some people moving out of Beardstown at least temporarily", accessed Dec 2022. https://khqa.com/news/flood/some-people-moving-out-of-beardstown-at-least-temporarily

[58] The Washington Post, "Nation in Brief", accessed Dec 2022. https://www.washingtonpost.com/archive/politics/2002/05/18/nation-in-brief/d55ff9d3-9610-4736-b5da-251735b44431/

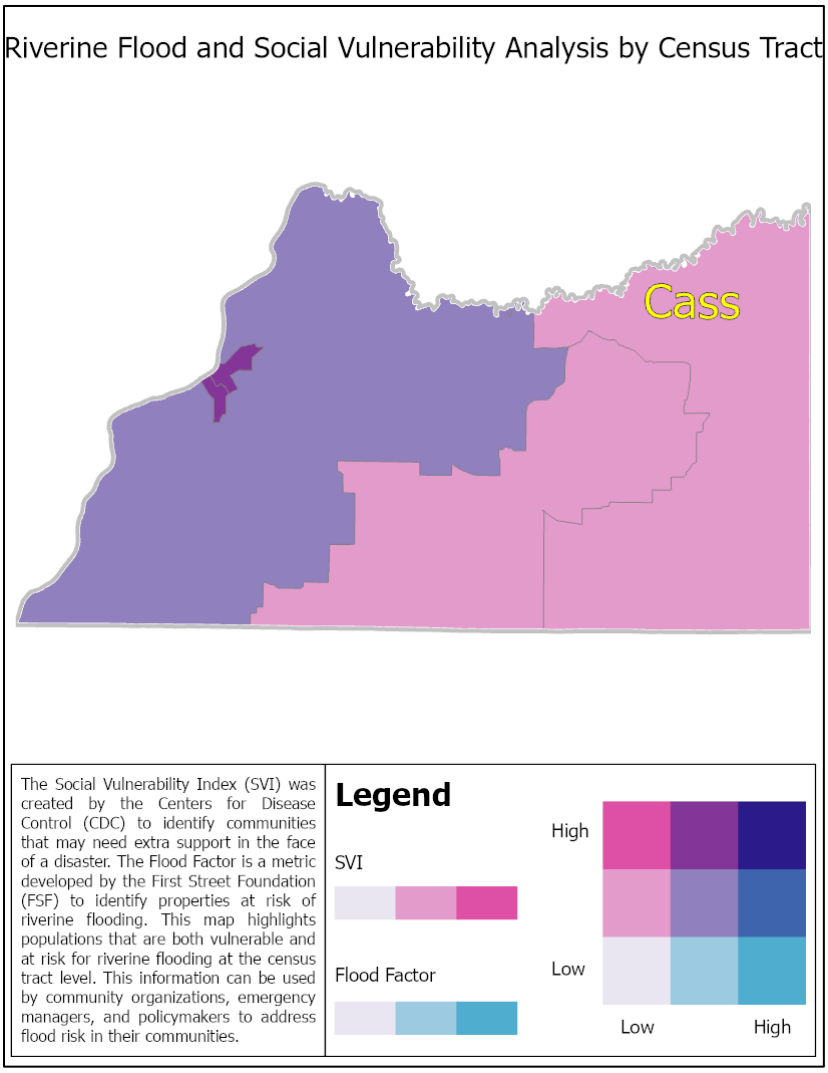

Figure 32. Riverine flooding and social vulnerability.

Social Vulnerability

Flooding has been well documented as having a disproportionate impact on socially vulnerable populations. Low-income populations and people of color in particular are more likely to live in floodplains. However, floodplains are not the only places where flooding occurs. In fact, nearly 40% of NFIP claims come from outside SFHAs. Homeowners living outside SFHAs are not required to purchase flood insurance, meaning that they are at risk of incurring high out-of-pocket expenses if their home is flooded. Renters may not be aware that flood insurance is available.

Compared to the rest of Illinois, western Cass County has low vulnerability to riverine floods (Figure 32. Riverine flooding and social vulnerability.). Limited or non-English speaking households in Beardstown may not be aware of the availability of flood insurance, and the low-income households in Beardstown, Chandlerville, and rural Cass County may not be able to afford insurance or extra expenses incurred from flash flood damage.

Climate Change

Climate change has a less clear impact on riverine floods compared to flash floods. Unlike flash floods, runoff and streamflow heavily impact riverine floods. Snowmelt runoff may decrease due to decreasing snowpack as the climate warms, decreasing streamflow. However, heavy precipitation is increasing, which increases stream volume. In Illinois, riverine floods have broadly increased between 1965 and 2015.[59] If riverine floods continue this trend, Illinois' river-adjacent communities, including Beardstown, Chandlerville, and farmers along the Illinois and Sangamon rivers, will become more at risk.

Hazus Flood Analysis

The flood risk assessment conducted for Cass County combines the GIS-based technology of Hazus with the updated structure asset inventory, essential facilities, and flood hazards to provide a solid, consistent framework to quantify the county's risk.

[59] Mallakpour, I. and Villarini, G. (2015). The changing nature of flooding across the central United States. Nature Clim Change 5, 250–254 (2015). https://doi.org/10.1038/nclimate2516

The impact of five separate flood events was analyzed including the 10%, 4%, 2%, 1%, and 0.2% annual chance floods. An average annualized loss (AAL) value is then calculated using the values from the five flood events listed above. AAL represents the estimated long-term value of losses averaged on an annual basis. This value can be useful for estimating the potential flood losses over a defined period of time.

Depth Grids

To represent the flood hazard, flood depth grids were created for each of the five flood events in Cass County. Depth grids consist of a grid of equal-sized cells that cover the spatial extent of a given flood event. Each one of these cells has a flood depth value associated with it for the annual chance event being represented. Depth grids are calculated by subtracting ground elevations from flood elevation grids. Ground elevations take the form of a GIS raster Digital Elevation Model (DEM) or Digital Terrain Model (DTM). The Water Surface Elevation (WSE) grids are created by using flood elevations at cross-sections along the studied river or stream. A more detailed description of the source for each of these grids is included in the paragraphs below.

The Illinois River along the western border of Cass County presents the county's greatest flood hazard. Depth grids for the Illinois River were provided by the U.S. Army Corps of Engineers – Rock Island District (USACE-RI). The WSE grids were created from cross sections based largely on the 2004 Upper Mississippi River System Flow Frequency Study (UMRSFFS) UNET hydraulic models (USACE, 2004) which also includes the Illinois River. CWMS terrain combined USACE Upper Mississippi River Restoration Program (UMRR) LiDAR Digital Elevation Models (developed 2008 – 2012)[60]. National Levee Database (NLD) top of levee elevations were compared by USACE-RI to 2004 UMRSFFS water surface profiles to determine overtopping frequency of each levee[61].

Depth grids for the remainder of the county were created by running a hydrologic analysis in Hazus. The ground elevations were derived using the United States Geological Survey (USGS) 1/3 ArcSecond seamless DEM. The USGS 1/3 ArcSecond, or 10 meters, DEM is kept up to date with current topographic data through the USGS 3DEP[61] program. This includes LiDAR data made available in 2017.

Building Exposure

210 structures were identified to be at a high risk of flooding in Cass County. For this risk assessment, "high risk" structures are those that are located within the 0.2% annual chance (500-year) floodplain. Estimates of the structure counts and fair market value of the structures are detailed in Table 25 below.

Table 25. High-risk building exposure (building and content cost) (2022 USD)

	1% Annual Chance Flood (100yr)		***0.2% Annual Chance Flood (500yr)***	
Community Name	**Count**	**Total Exposure**	**Count**	**Total Exposure**
Village of Arenzville	4	$6,527,486	4	$6,527,486
Village of Ashland	18	$8,182,655	24	$10,168,345
Village of Chandlerville	35	$15,939,414	50	$19,932,526
City of Virginia	33	$18,250,311	36	$18,998,862
Cass County Unincorporated Areas	85	$39,031,200	96	$45,136,783
Total	**175**	**$87,931,066**	**210**	**$100,764,002**

[60] Hawes, C. Karon, A. and Scott, K. (February 2023) Illinois River Structural Flood Risk Assessment – Cass County, IL. US Army Corps of Engineers, Rock Island District.
[61] U.S. Geological Survey 3D Elevation Program (3DEP). Accessed 2021. USGS NED 1/3 arc-second DEM. https://apps.nationalmap.gov/downloader Reston, VA

Economic Loss Due to Flooding

A Hazus flood loss analysis was performed using the structure-based asset inventory to investigate the impact of the five analyzed flood events. The results are listed by community and by occupancy class in Table 26 and Table 27.

Flooding events can be extreme and devastating, leading to millions of dollars of losses during a flood event. Looking at the flood risk faced on an annual basis by using the average annualized losses shows on average how much it costs per year to keep properties unprotected from floods or in the floodplain.

Structure counts include buildings within the floodplain that did not return flood losses. Examples could include structures that are elevated above the flood water elevation of the event being analyzed.

Table 26. Total Flood Losses by Community (2022 USD)

		Community Name					
		Village of Arenzville	Village of Ashland	Village of Chandlerville	City of Virginia	Cass County Unincorporated Areas	**Total**
10% Annual Chance Flood (10yr)	Count	0	15	11	23	32	81
	Total Losses	$0	$330,500	$894,400	$1,913,700	$4,618,800	$7,757,400
4% Annual Chance Flood (25yr)	Count	4	15	25	29	39	112
	Total Losses	$1,597,500	$334,400	$2,399,700	$2,410,400	$7,203,300	$13,945,300
2% Annual Chance Flood (50yr)	Count	4	16	30	30	78	158
	Total Losses	$2,372,800	$367,200	$2,987,000	$2,732,800	$11,867,600	$20,327,400
1% Annual Chance Flood (100yr)	Count	4	18	35	33	85	175
	Total Losses	$2,750,300	$438,200	$3,645,100	$3,103,800	$13,077,000	$23,014,400
0.2% Annual Chance Flood (500yr)	Count	4	24	50	36	96	210
	Total Losses	$5,366,500	$634,200	$5,564,200	$3,731,200	$21,549,600	$36,845,700
Average Annualized Loss	Count	4	24	50	36	96	210
	Total Losses	$156,450	$36,540	$233,810	$245,120	$851,660	$1,523,580

Table 27. Total Flood Losses by Occupancy (2022 USD)

		Community Name					
		Agricultural	Commercial	Government	Industrial	Residential	**Total**
10% Annual Chance Flood (10yr)	Count	19	9	1	2	50	81
	Total Losses	$2,760,400	$2,521,100	$287,700	$119,400	$2,068,800	$7,757,400
4% Annual Chance Flood (25yr)	Count	29	10	1	3	69	112
	Total Losses	$6,450,500	$3,671,100	$326,900	$455,700	$3,041,100	$13,945,300
2% Annual Chance Flood (50yr)	Count	48	11	1	3	95	158
	Total Losses	$10,152,600	$4,338,600	$341,700	$540,100	$4,954,400	$20,327,400
1% Annual Chance Flood (100yr)	Count	53	11	1	3	107	175
	Total Losses	$11,291,400	$4,749,200	$353,300	$605,600	$6,014,900	$23,014,400
0.2% Annual Chance Flood (500yr)	Count	56	11	1	3	139	210
	Total Losses	$21,386,700	$5,459,000	$370,200	$709,900	$8,919,900	$36,845,700
Average Annualized Loss	Count	56	11	1	3	139	210
	Total Losses	$723,050	$363,070	$32,230	$39,620	$365,610	$1,523,580

HazMat Spill

Hazardous materials (HazMat) exist everywhere. Typically, these materials are transported, stored, and used according to guidance that prevents exposure to harmful chemicals. However, regardless of reason or intent, the release of hazardous materials has the potential to cause harm to humans, animals, and the natural and built environment.[62]

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
1.41	45	32

SOURCE: US COAST GUARD NATIONAL RESPONSE CENTER (1990-2022)

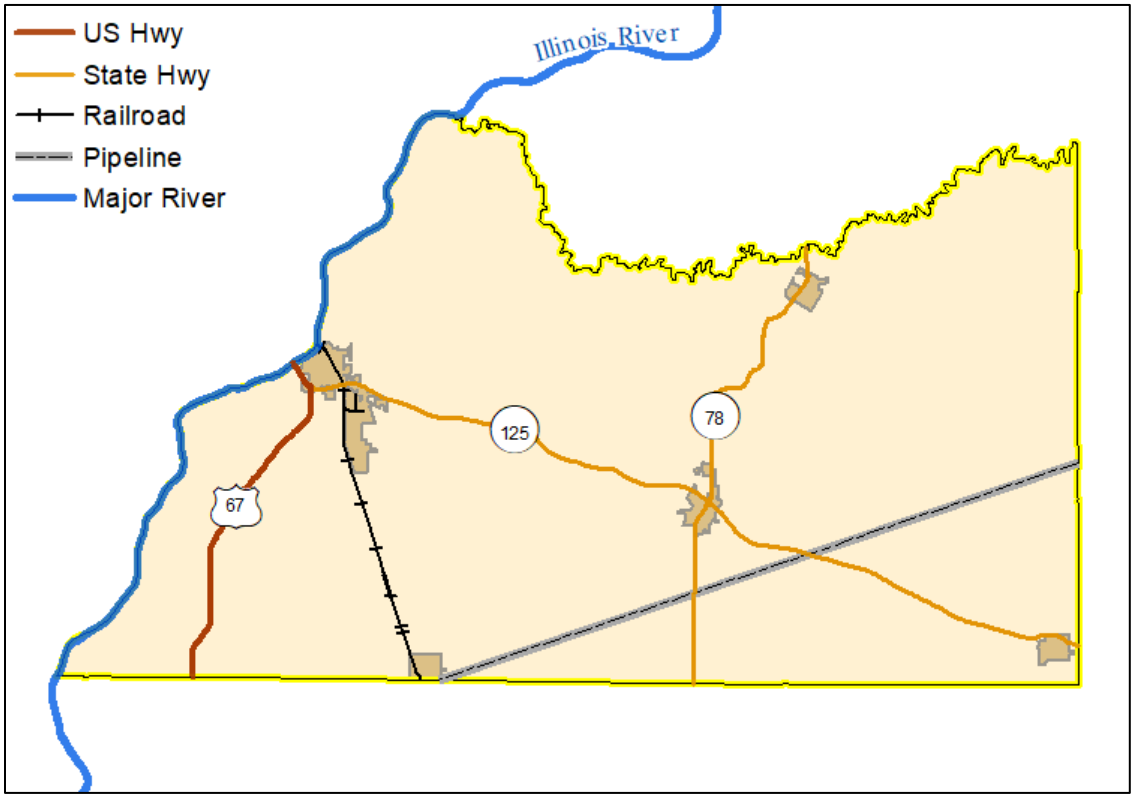

Figure 33. Major transportation features and pipelines. Source: IDOT

Several U.S. Highways, State Highways, and railroads run through Cass County's incorporated and unincorporated areas. An abandoned pipeline also cuts across the southeastern part of the county. The Illinois River, which borders Cass County on the west, is an important shipping throughfare (Figure 33, Table 28).

[62] Federal Emergency Management Agency, "Hazardous Materials Incidents", August 2019. https://www.fema.gov/sites/default/files/2020-07/hazardous-materials-incidents.pdf

Table 28. Length of major transportation features. Source: IDOT

Transportation Type	Miles
US Highway	14.4
State Highway	52.8
Railroad	18.2
Pipeline	26.9
Illinois River	30.4

The U.S. Coast Guard's National Response Center serves as an emergency call center for pollution and railroad incidents. Initial reports are tracked in spreadsheets that are downloadable from its website. Of the 45 HazMat reports, 23 of them came from JBS, an American pork processing plant.

The risk of a HazMat spill occurring at a location is primarily tied to its proximity to either a transportation route or a potential fixed-point source. Many HazMat reports in the county come from JBS, a pork manufacturing plant on the outskirts of Beardstown. HazMat incidents at the plant include improper animal waste disposal and anhydrous ammonia leaks. Anhydrous ammonia is a gas (or liquid under high pressure) widely used in nitrogen fertilizers. Inhalation of the substance can lead to lung and eye irritation, blindness, severe respiratory problems, or even death.[63]

Anhydrous ammonia is also a danger in Arenzville. Sunrise FS, an agricultural services and products plant in Arenzville, is only accessible to semi-trucks using a road with a dangerous intersection. Although there have been no incidents, a crash or rollover of truck transporting anhydrous ammonia could be catastrophic, especially considering the proximity of a private elementary school. Across the rest of the county, HazMat incidents involving oil and other liquid spills have occurred on highways and cargo ships on the Illinois river.

Social Vulnerability

People with existing health conditions are more vulnerable to HazMat incidents. Anhydrous ammonia leaks may affect people with preexisting conditions, such as asthma. Lack of health insurance is also a vulnerability, as people exposed to hazardous materials may be less likely to seek treatment. Uninsured numbers are especially high in Chandlerville (12.9% of the population) and among Beardstown's foreign-born residents without citizenship (21.1%).

There are over 26 languages spoken at JBS. Workers who do not speak English may be less able to advocate for safe working conditions, disproportionately exposing them to hazardous materials. Nearly 37% of Beardstown's residents speak a language other than English at home, and 21% speak English less than "very well".[64] Safety materials that explain how to respond to a hazardous incident may not be available in the preferred language of a limited- or non-English speaking worker.

[63] CDC. (n.d.). Ammonia Solution, Ammonia, Anhydrous: Lung Damaging Agent. Retrieved August 25, 2023, from https://www.cdc.gov/niosh/ershdb/emergencyresponsecard_29750013.html

[64] ACS. (n.d.). S0601 | Selected Characteristics of the Total and Native Populations in the United States. US Census Bureau. Retrieved September 13, 2023, from https://data.census.gov

Pandemic

According to Ready.gov, "A pandemic is a disease outbreak that spans several countries and affects a large number of people." Pandemics are typically caused by new viruses that are easily transmitted from person to person.[65] Viruses causing pandemics can potentially affect people in all age groups. In addition to illness and death caused by pandemics, societal impacts may include economic disruption.[66]

Table 29: Pandemics since 1918. Sources: CDC, WHO

Pandemic Declared	Cause	US Deaths (est.)	Global Deaths (est.)
1918	Influenza A (H1N1) virus	675,000	50,000,000
1957	Influenza A (H2N2) virus	116,000	1,100,000
1968	Influenza A (H3N2) virus	100,000	1,000,000
2009	Novel influenza A (H1N1)pdm09 virus	8,868 – 18,306	151,700 – 575,400
2020	Coronavirus SARS-CoV-2	1,074,367*	6,634,816*
*As of April 2023			

According to the Centers for Disease Control and Prevention (CDC), there have been five pandemics in the US since 1918. The first four pandemics were caused by influenza viruses, each starting in 1918, 1957, 1968, and 2009 (Table 29). Of these, the influenza pandemic of 1918 by far caused the most deaths in the United States and around the world.[67] The most recent pandemic, declared by the World Health Organization in 2020[68], was caused by a coronavirus, SARS-CoV-2.[69]

COVID-19 DEATHS (PERCENTAGE)	
CASS COUNTY	STATE OF ILLINOIS
37 (0.28%)	35,494 (0.28%)

SOURCE: ILLINOIS DEPARTMENT OF PUBLIC HEALTH (DEC 2022)

[65] Ready.gov, "Pandemics", accessed Jul 2021. https://www.ready.gov/pandemic
[66] State of California, "2018 California State Hazard Mitigation Plan", accessed Jul 2021. https://www.caloes.ca.gov/cal-oes-divisions/hazard-mitigation/hazard-mitigation-planning/state-hazard-mitigation-plan
[67] Centers for Disease Control and Prevention, "Past Pandemics", accessed Jul 2021. https://www.cdc.gov/flu/pandemic-resources/basics/past-pandemics.html
[68] World Health Organization, "WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020", accessed Jul 2021. https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020
[69] World Health Organization, "Coronavirus disease 2019 Q&As", accessed Jul 2021. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19

By definition, a pandemic is an international event, covering an area much larger than any one county, so in general, the risk of a pandemic occurring applies the same to the entire county. However, populations with certain social determinants of health may have a higher risk of exposure to pandemic-causing viruses. [70]

Social Vulnerability

Race, income, education and employment status can impact exposure to infectious diseases. People living in poverty often must work through illness to afford necessities such as food and housing, making recovery take longer and exposing others to illness. Lack of health insurance is also a vulnerability, as people exposed to illness materials may be less likely to seek treatment. Uninsured numbers are especially high in Chandlerville (12.9% of the population) and among Beardstown's foreign-born residents without citizenship (21.1% of the population).

Climate Change

As the climate warms, average winter temperatures decrease and bring about shorter winters. Shorter and milder winters bring on earlier spring seasons which can result in an increasingly hospitable environment for carriers of vector-borne diseases and increase the likelihood of new pests and transmission of diseases. Climatic factors such as temperature, humidity and precipitation strongly influence the survival of ticks and the bacterium that causes Lyme disease. Pathogens like Zika, Dengue and West Nile virus, which are commonly found in tropical or temperate climates, may become more prevalent in Illinois.[71]

[70] Centers for Disease Control and Prevention, "Risk of Exposure to COVID-19", accessed Jul 2021. https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/racial-ethnic-disparities/increased-risk-exposure.html

[71] CDC. (2021, February 25). Regional Health Effects – Midwest. https://www.cdc.gov/climateandhealth/effects/midwest.htm

Severe Storms: Hail

Hail is precipitation in the form of balls of irregular lumps of ice, typically from a thunderstorm.[72] Hail can be the size of a pea or smaller, however, larger hailstones can cause severe damage to buildings, vehicles and plants.[73] Hailstones less than one inch in diameter are not considered severe by the NWS because the likelihood of these causing damage is lower. However, once a hailstone reaches the size of one inch in diameter, it has the potential to cause significant damage.[74]

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
0.81	54	68

SOURCE: NCEI STORM EVENTS DATABASE (1955-2022)

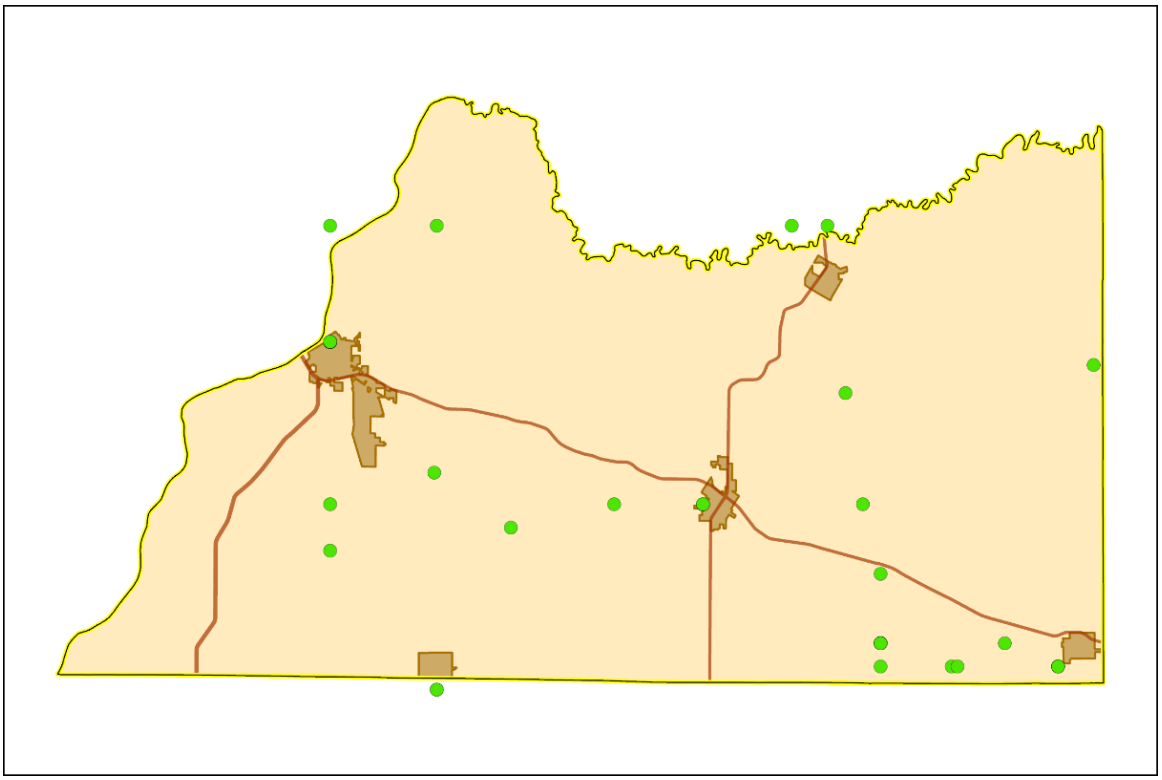

Figure 34. Hail reports in Cass County (1955-2022). Source: NCEI

[72] AMS Glossary, "Hail", accessed Dec 2022. https://glossary.ametsoc.org/wiki/Hail
[73] NWS, "Severe Thunderstorm Safety", accessed Dec 2022. https://www.weather.gov/safety/thunderstorm
[74] NWS, "National Implementation of the Use of 1-inch Diameter Hail Criterion for Severe Thunderstorm Warnings in the NWS", accessed Dec 2022. https://nws.weather.gov/products/PDD/OneInchHail_Oper_PDD.pdf

Hail can occur anywhere in Cass County (Figure 34). On June 10, 2012, severe storms formed over the Illinois River Valley and traveled through Cass County and central Illinois.[75] Tennis ball-sized hail (2.7 inches in diameter) was reported southeast of Beardstown in Bluff Springs, causing $100,000 in damage to roofs and vehicles.[76]

The risk of a hail event occurring applies the same to the entire county. There are no known factors that make one area or community more prone to these events than another.

Social Vulnerability

Among the most vulnerable to hail are people who have outdoor occupations, such as construction workers, agricultural workers, utility repair workers, and landscapers. Nearly 11% of employment in Cass County is in the agricultural and construction sectors.

Although specific statistics are not available for Cass County, nearly 24% of people employed in the construction sector in Illinois are foreign-born.[77] Illinois' foreign-born agricultural workers are rising too. In 2020, nearly 3,000 agricultural workers had H-2A visas, which allow nonimmigrants to work in the US. This represents an increase of over 250% since 2015.[78] People who are in the US without immigrant status and those who do not speak English may be less able to advocate for safe working conditions in the event of a severe storm, disproportionately exposing them to hail. Safety materials that explain what to do during a severe storm may also not be available in the preferred language of a limited- or non-English speaking worker. In Beardstown, 21% of the population is estimated to speak English less than "very well".

Climate Change

The impact of climate change on severe weather, such as hail, is not well known. Warmer and more humid climates in Illinois may be contributing to the increasing frequency in severe storm environments. Although hail frequency is not necessarily predicted to increase, large hail (greater than 5cm) events may increase while small hail events decrease.[79]

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[75] NWS Lincoln, "June 10th Severe Storms/Champaign Tornado", accessed Dec 2022. https://www.weather.gov/ilx/SevereStorms061018

[76] NCEI. (n.d.). Storm Events Database. accessed Dec 2022. https://www.ncdc.noaa.gov/stormevents

[77] Siniavskaia, N. (2020). Immigrant Workers in the Construction Labor Force. NAHB Economics and Housing Policy. https://www.nahb.org/-/media/NAHB/news-and-economics/docs/housing-economics-plus/special-studies/2020/special-study-immigrant-workers-in-the-construction-labor-force-march-2020.pdf

[78] Pintado, A. P. (2021, September 9). As labor pool shrinks, Illinois farmers turn to foreign workers. Investigate Midwest. Retrieved May 18, 2023, from https://investigatemidwest.org/2021/09/09/as-labor-pool-shrinks-illinois-farmers-turn-to-foreign-workers/

[79] Tang, B.H., Gensini, V.A. & Homeyer, C.R. (2019). Trends in United States large hail environments and observations. npj Clim Atmos Sci 2, 45. https://doi.org/10.1038/s41612-019-0103-7

Severe Storms: Lightning

Lightning is a transient, high-current electric discharge most commonly produced by thunderstorms. Lightning discharges can happen within and between thunderstorm clouds. Cloud-to-ground lightning strikes are the most studied, and this type of lightning can severely injure or kill people, in addition to doing damage to structures, disrupting power/communications infrastructure, and starting fires.[80] Summer is the most common time of year for lightning to occur, however, thunderstorms can happen at any time of year.[81]

AVG CG STRIKES/YEAR	TOTAL CG STRIKES	YEARS IN RECORD
6,425	218,465	30

SOURCE: NCEI SEVERE WEATHER DATA INVENTORY (1988-2017)

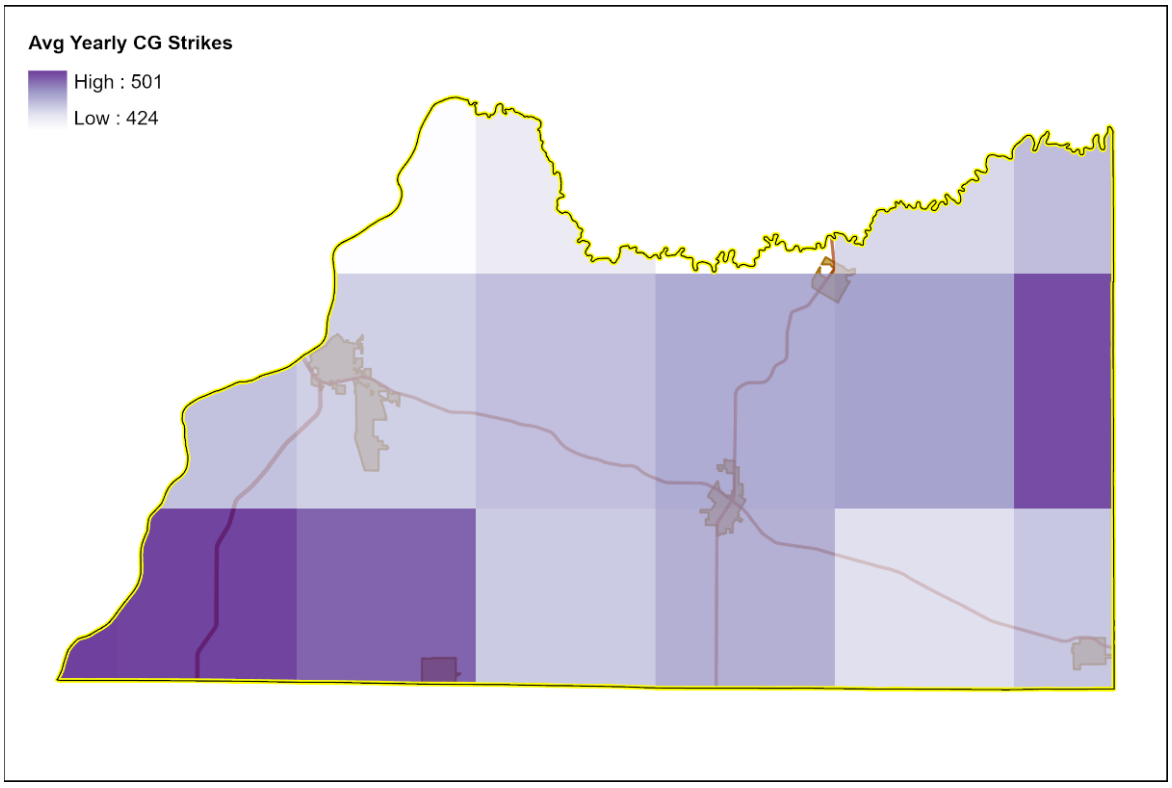

Figure 35. Average Yearly Cloud-to-Ground Lightning Strikes (1987-2017).Source: NCEI SWDI

[80] American Meteorological Society Glossary, "Lightning", accessed Dec 2022. https://glossary.ametsoc.org/wiki/Lightning

[81] National Weather Service, "Lightning Safety Tips and Resources", accessed Dec 2022. https://www.weather.gov/safety/lightning

The number of average yearly strikes varies by tile. The number of average yearly strikes for 0.1-degree tiles covering Cass County ranges from 433 to 534 (Figure 35). Overall, there are a total of 5,395 average cloud-to-ground lightning strikes per year.[82] Lightning in Cass County is most likely to occur during afternoons and evenings during summer months (Figure 36).[83]

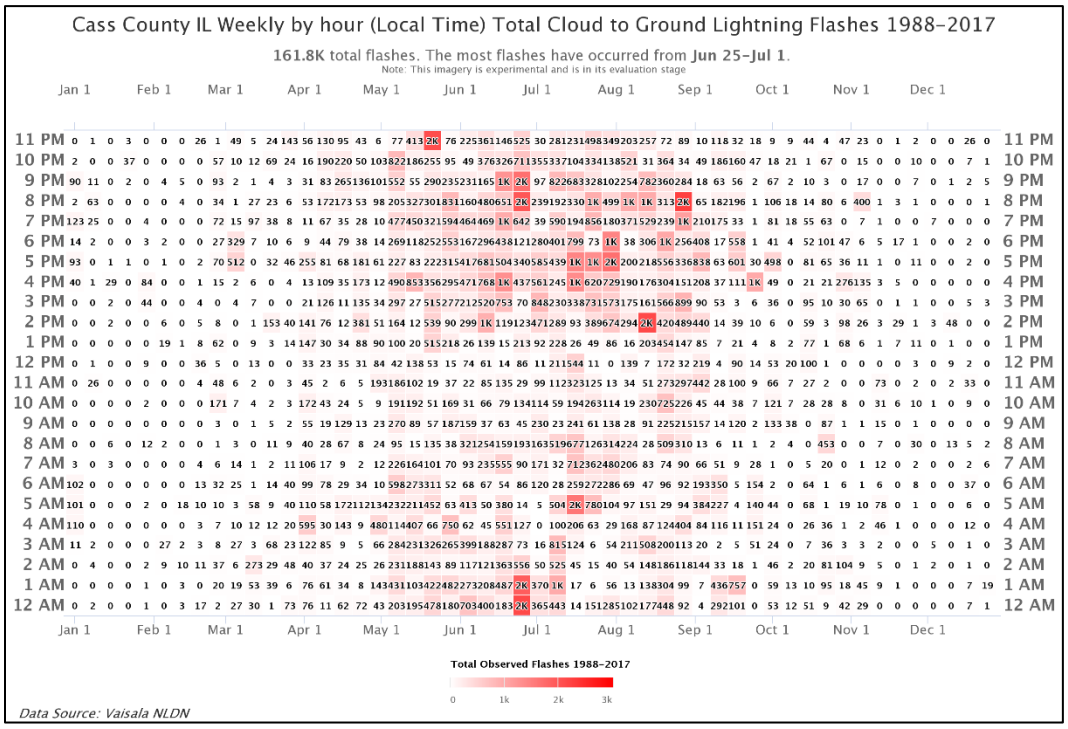

Figure 36. Average Yearly Cloud-to-Ground Lightning Strikes (1987-2017).Source: NCEI SWDI

The risk of a lightning event occurring applies the same to the entire county. Lightning tends to strike the tallest object in an area, meaning tall buildings and trees in farmland may be more vulnerable to lightning. There are no known factors that make one community more prone to these events than another.

Social Vulnerability

Among the most vulnerable to lightning are people who have outdoor occupations, such as construction workers, agricultural workers, utility repair workers, and landscapers. Lightning is an especially dangerous hazard for workers who use metal, due to metal's conductivity properties. Nearly 11% of employment in Cass County is in the agricultural and construction sectors.

Although specific statistics are not available for Cass County, nearly 24% of people employed in the construction sector in Illinois are foreign-born.[84] Illinois' foreign-born agricultural workers are rising too. In 2020, nearly 3,000 agricultural workers had H-2A visas, which allow nonimmigrants to work in the US. This represents an increase of

[82] NCEI, "Lightning Products and Services", accessed Dec 2022. https://www.ncei.noaa.gov/products/lightning-products

[83] National Weather Service Medford Office, "Hourly Lightning Climatology for Continental United States", accessed Dec 2022. https://www.weather.gov/mfr/lightning_climatology

[84] Siniavskaia, N. (2020). Immigrant Workers in the Construction Labor Force. NAHB Economics and Housing Policy. https://www.nahb.org/-/media/NAHB/news-and-economics/docs/housing-economics-plus/special-studies/2020/special-study-immigrant-workers-in-the-construction-labor-force-march-2020.pdf

over 250% since 2015.[85] People who are in the US without immigrant status and those who do not speak English may be less able to advocate for safe working conditions in the event of a severe storm, disproportionately exposing them to hail. Safety materials that explain what to do during a severe storm may also not be available in the preferred language of a limited- or non-English speaking worker.

Climate Change

The impact of climate change on lightning is less well known. Warmer and more humid climate in Illinois may contribute to increasing frequency and severity of thunderstorms. Lightning frequency and intensity may likewise increase.[86] Dry lightning is one of the primary drivers of wildfires worldwide, which could cause an increase in cropland fires in Cass County.[87]

[85] Pintado, A. P. (2021, September 9). As labor pool shrinks, Illinois farmers turn to foreign workers. Investigate Midwest. Retrieved May 18, 2023, from https://investigatemidwest.org/2021/09/09/as-labor-pool-shrinks-illinois-farmers-turn-to-foreign-workers/

[86] Price, C. (2009). Will a drier climate result in more lightning?. *Atmospheric Research*, *91*(2-4), 479-484. https://doi.org/10.1016/j.atmosres.2008.05.016

[87] Pérez-Invernón, F.J., Gordillo-Vázquez, F.J., Huntrieser, H. et al. (2023). Variation of lightning-ignited wildfire patterns under climate change. Nat Commun 14, 739. https://doi.org/10.1038/s41467-023-36500-5

Severe Storms: Wind

High winds can occur during severe thunderstorms or strong weather systems. Isolated damage is possible when winds are sustained at 40-50 mph, as high winds can blow objects around.[88] Wind speeds over 58 miles per hour are considered severe. Straight-line winds in severe thunderstorms can exceed speeds of 100 mph.[89] Winds this strong can damage, or in extreme cases demolish, trees and structures.

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
1.60	107	67

SOURCE: NCEI STORM EVENTS DATABASE (1955-2022)

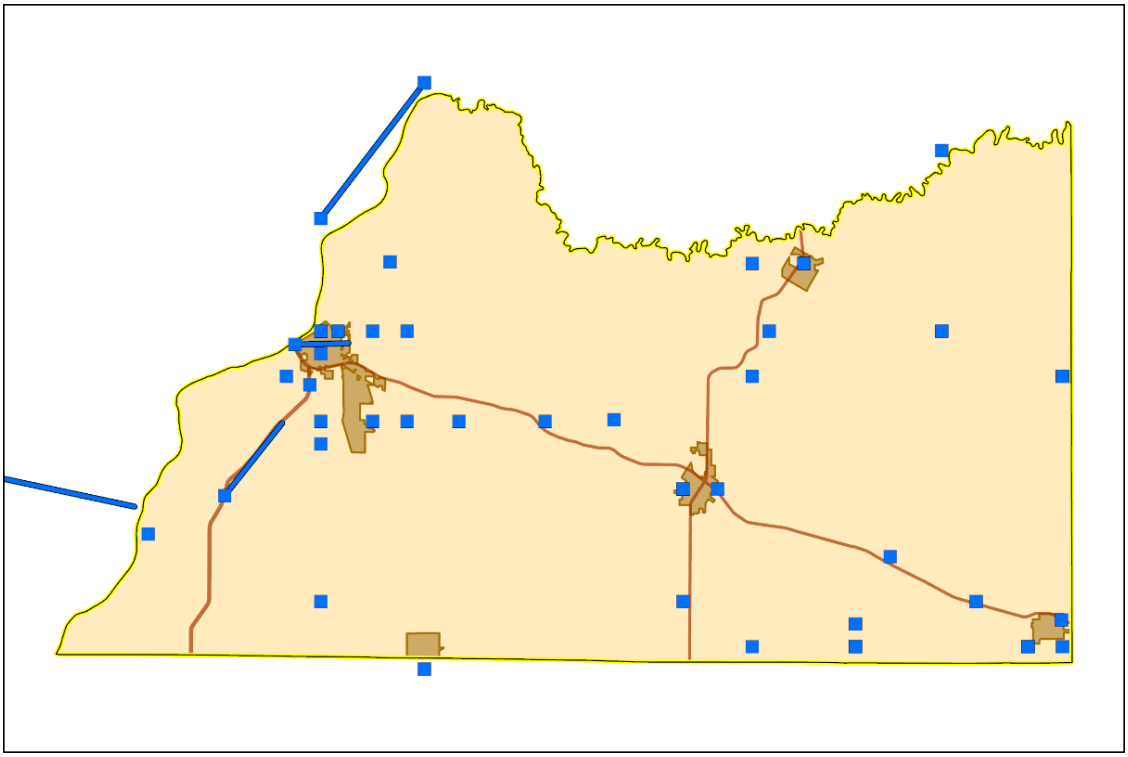

Figure 37. Severe wind reports in Cass County (1955-2021). Source: NCEI

Severe wind can occur anywhere in Cass County (Figure 37). On June 22, 2010, thunderstorm complexes appeared over central Illinois, bringing damaging straight-line winds. In Beardstown, large trees were uprooted and many power lines were downed by wind gusts of up to 89mph.[90]

[88] National Weather Service, "Wind Safety", accessed Dec 2022. https://www.weather.gov/safety/wind
[89] National Weather Service, "Severe Thunderstorm Safety", accessed Dec 2022. https://www.weather.gov/safety/thunderstorm
[90] NCEI, Storm Events Database, accessed Dec 2022. https://www.ncdc.noaa.gov/stormevents

The roof of an apartment building was blown off, rendering the building uninhabitable. Overall, thirty-nine structures in the city, including single and multi-family homes, mobile homes, and businesses, required repairs to become habitable again. An emergency shelter was set up by the Red Cross at Beardstown High School for individuals without a place to stay.[91] Although there were $3.5 million in damages reported, there were no reported injuries or deaths.[92]

Another severe wind event on August 22, 2019 caused numerous downed trees and powerlines on US Route 67 between Beardstown and Arenzville Road. The highway was closed the following day while powerlines were restored.[93]

Figure 38. Beardstown Junior High/High School. Source: Beardstown CUSD 15

Figure 39. Downed powerlines on US Route 67 (August 22, 2019). Source: Cass County Sheriff's Office.

The risk of a severe wind event occurring applies the same to the entire county. There are no known factors that make one area or community more prone to these events than another.

Social Vulnerability

Manufactured or mobile homes are at risk due to many not being built to withstand strong winds. In addition to the physical vulnerability of living in these types of homes, these residents tend to be lower-income and have a higher prevalence of disabilities, making recovery or evacuation more difficult. In Cass County, 12.2% of residents are estimated to live in manufactured or mobile homes. The highest percentages of manufactured home residents are in Ashland, Beardstown, and Chandlerville. Mobile homes in Cass County and its jurisdictions are required to be anchored "at each corner of the structure to gain maximum

[91] The State Journal-Register, "Storm hits Beardstown hard, causes problems elsewhere", accessed Dec 2022. https://www.sj-r.com/story/news/2010/06/23/storm-hits-beardstown-hard-causes/41776805007/
[92] NCEI, Storm Events Database, accessed Dec 2022. https://www.ncdc.noaa.gov/stormevents
[93] My Journal Courier, "Super-cell storm causes scattered damage with 60 mph winds, accessed Dec 2022. https://www.myjournalcourier.com/news/article/Super-cell-storm-causes-scattered-damage-with-60-16409983.php

protection against high velocity winds. In addition, all mobile home units shall be installed with approved skirting."[94]

Illinois does not have statewide building codes, although units of local government can adopt building codes of their choice.[95] In Cass County, all municipalities have building codes and all municipalities excluding Arenzville have a chief building official. Ashland and Virginia have adopted specific building codes from the International Code Council (ICC) 2006 edition and 2015 edition, respectively. Beardstown has adopted building codes from the Building Officials and Code Administrators (BOCA) National Building Code 1996 edition.

Climate Change

Overall, the frequency of storm environments conducive to producing severe weather, such as strong winds or tornadoes, has increased across much of the Midwest over the past 40-50 years. Climate models project continued increases in severe convective environments that bring wind gusts and tornadoes. Projections also show a potential shift in the seasonality of supercells, one of the most powerful types of severe storms experienced in Illinois.[96]

[94] Cass County Zoning Ordinance. (2023). Cass County, Illinois. https://casscountyil.gov/application/files/6416/8919/3647/Zoning_Ordinance.pdf

[95] Building Codes and Regulations. (n.d.). State of Illinois. Retrieved August 23, 2023, from https://cdb.illinois.gov/business/codes/buildingcodesregulations.html

[96] Ashley, W. S., Haberlie, A. M., and Gensini, V. A.. (2023). The Future of Supercells in the United States. Bull. Amer. Meteor. Soc., 104, E1–E21, https://doi.org/10.1175/BAMS-D-22-0027.1

Severe Winter Storms: Ice Storms

Winter storms in which freezing rain is the precipitation type are called ice storms. This special precipitation is supercooled liquid water while falling near the surface, however, upon contact with any object, it freezes, forming a layer of solid ice.[97] Even a thin glaze of ice from freezing rain can make any kind of travel hazardous. Heavier accumulations can bring down trees, power lines, and other built structures.[98]

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
0.15	4	26

SOURCE: NCEI STORM EVENTS DATABASE (1996-2022)

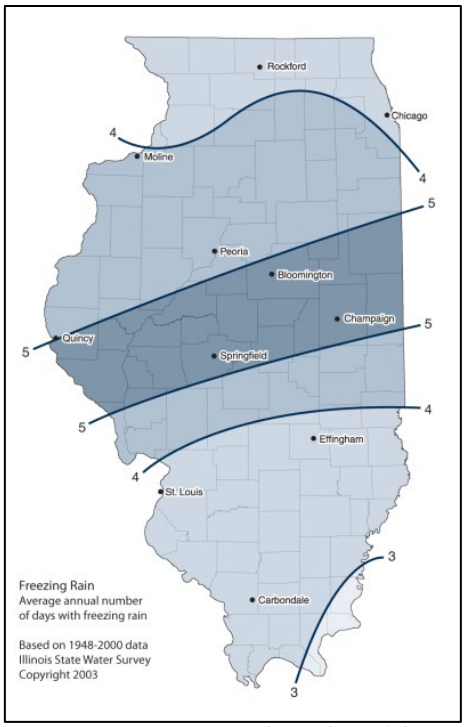

Figure 40. Average Annual number of days with freezing rain (1948-2000). Source: Illinois State Climatologist

According to data collected by the Illinois State Water Survey from 1948 to 2000, Cass County can expect an average of 5 days of freezing rain per year (Figure 40).[99]

In early February 2007, between five- and seven-tenths of an inch of ice was reported on roadways throughout Cass County. A man near Virginia was killed when his car slid off the icy roads. [100] Less than a year later, in December 2007, a winter storm brought freezing rain to central Illinois. Seven-tenths of an inch of ice was reported near Philadelphia. Roughly 2,000 homes and businesses lost power and ice froze over tree branches, causing cracks and breaks in numerous trees.[101] A New Year's Day winter storm in 2021 brought snow and ice to the county. Trees and limbs were downed, driving conditions were dangerous, and there were power outages across the county.[102]

[97] Midwestern Regional Climate Center, "Living with Weather: Ice Storms", accessed Dec 2022. https://mrcc.illinois.edu/living_wx/icestorms/index.html
[98] National Weather Service, "Ice Storm Safety", accessed Dec 2022. https://www.weather.gov/safety/winter-ice-frost
[99] Illinois State Climatologist, "Ice Storms in Illinois", accessed Dec 2022. https://stateclimatologist.web.illinois.edu/climate-of-illinois/ice-storms-in-illinois
[100] NCEI, Storm Events Database, accessed Dec 2022. https://www.ncdc.noaa.gov/stormevents
[101] Ibid.
[102] Cass County Star Gazette, "When it comes to ice, Illinois isn't nice", accessed Dec 2022. https://www.beardstownnewspapers.com/leigh-morris/when-it-comes-ice-illinois-isnt-nice

Figure 41: Ice covers powerlines over State Street in Beardstown (L) and a tree at the Beardstown Marina (R) on January 1st, 2021.
Credit: David V. Miller, Cass County Star Gazette

The risk of an ice storm occurring applies the same to the entire county. There are no known factors that make one area or community more prone to these events than another.

Social Vulnerability

Ice storms bring the possibility of power outages, which can lead to the inability to heat homes safely. This can lead people to resort to unsafe practices such as running a generator, gas stove, or using a barbecue or fire inside their house, resulting in house fires or carbon monoxide poisoning. Beardstown's large immigrant population, primarily from warmer regions, may be unprepared for the severity of ice storms and not know the best practices for staying warm during a power outage.

The elderly population in Cass County could be disproportionately affected by ice storms, too. Power outages caused by ice storms could prevent life-saving oxygen and dialysis machines from operating at home. Ice storms create slick, hazardous driving conditions and road closures, meaning emergency vehicles may take longer to reach people in crisis, resulting in preventable deaths. Arenzville is one of the more vulnerable communities in the county, as nearly 25% of their population is over 65.

Climate Change

Climate change does not account for any meaningful trends seen in the occurrence of ice storms in Cass County. Models are not currently able to capture the fine scale processes that cause ice and storms. Observations for ice are also incomplete, making analyses of trends difficult.

Severe Winter Storms: Winter Weather

As the seasons in the Midwest change from Summer to Fall and Winter, cold Arctic air pushes farther south into the region. Winter storms can form as large low-pressure systems and bring sub-freezing temperatures, snow, and wind.[103] The term "blizzard" requires sustained winds or frequent gusts of 35 mph or more, with falling or blowing snow frequently reducing visibility to less than a quarter-mile for 3 hours or more. These storms can last for several hours to over a day, disrupting transportation of goods and hindering mobility for daily life. Humans and animals caught outside in these conditions can suffer injury or death due to hypothermia. Power outages can interrupt daily life, preventing residents from being able to cook, turn on lights, and use life-saving devices, such as oxygen tanks. Snow removal and damage repair can be costly for communities and individuals. [104]

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
1.50	39	26

SOURCE: NCEI STORM EVENTS DATABASE (1996-2022)

Snow Climatology: Average number of 3-Day Snow Totals for

JACKSONVILLE 2E

	≥ 0.1"	≥ 1.0"	≥ 2.0"	≥ 3.0"	≥ 4.0"	≥ 6.0"	≥ 8.0"	≥ 12.0"	≥ 18.0"	≥ 24.0"
All Months	27.3	19.1	11.8	7.5	4.7	2.3	0.9	0.2	0	0
January	8.2	5.7	3.8	2.4	1.3	0.7	0.3	0.1	0	0
February	7	4.9	3.3	2.1	1.5	0.7	0.3	0.1	0	0
March	3.5	2.6	1.5	1.1	0.7	0.4	0.1	0	0	0
April	0.6	0.6	0.3	0.1	0	0	0	0	0	0
May	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0	0	0	0
August	0	0	0	0	0	0	0	0	0	0
September	0	0	0	0	0	0	0	0	0	0
October	0	0	0	0	0	0	0	0	0	0
November	1.2	0.8	0.5	0.3	0.2	0.1	0.1	0	0	0
December	6.8	4.6	2.5	1.5	0.9	0.5	0.2	0	0	0

Period of Record used: Snow Years 1960-61 to 2017-18

Figure 42. Average number of 3-day snow totals for Jacksonville, IL (1960/61 - 2017/8). Source: MRCC

The MRCC has calculated snow climatology for select stations across the US. Jacksonville, IL is the station nearest to Cass County, where an average of 2.3 events per year with at least 6 inches of snow over 3 days can be expected (Figure 42).[105]

Beginning January 11th, 2019, a slow-moving winter storm system brought snow to the Illinois River Valley. Snow continued to fall through the morning of January 13th, bringing up to 15" of snow across Cass County. [106] Bluff Springs incurred the highest

[103] Midwestern Regional Climate Center, "Living with Weather: Winter Storms", accessed Dec 2022. https://mrcc.illinois.edu/living_wx/winterstorms/index.html

[104] National Weather Service, "Snow Storm Safety", accessed Dec 2022. https://www.weather.gov/safety/winter-snow

[105] Midwestern Regional Climate Center, Snow Climatology Tool, accessed Dec 2022. https://mrcc.illinois.edu/gismaps/snowclimatology.htm

[106] National Weather Service St. Louis office, "Winter Storm January 26th-28th, 2009", accessed Dec 2022. https://www.weather.gov/media/lsx/Events/01_31_2008.pdf

snow total of 14.6 inches in the county, followed by 13.0 inches in Philadelphia, and 12.4 inches in Arenzville. Plowing roads was difficult because the snow was heavy and wet, leading to multiple traffic accidents across the county. Luckily, no injuries or fatalities were reported, and there were no reported power outages.[107]

The risk of a winter storm occurring applies the same to the entire county.

Social Vulnerability

Like ice storms, winter storms bring the possibility of power outages, which can lead to the inability to heat homes safely. This can lead people to resort to unsafe practices such as running a generator, gas stove, or using a barbecue or fire inside their house, resulting in house fires or carbon monoxide poisoning. Beardstown's large immigrant population, primarily from warmer regions, may be unprepared for the severity of winter storms and not know the best practices for staying warm during a power outage.

The elderly population in Cass County could be disproportionately affected by snowstorms. Power outages caused by ice storms could prevent life-saving oxygen and dialysis machines from operating at home. Snowstorms create low visibility leading to hazardous driving conditions. Emergency vehicles may take longer to reach people in crisis, resulting in preventable deaths. Arenzville is one of the more vulnerable communities in the county, as nearly 25% of their population is over 65.

Climate Change

It is predicted that Illinois will likely see fewer snow days leading to decreases in total seasonal snowfall as climate changes, although large year-to-year variability makes predicting snowfall changes difficult. The snow season is also predicted to decrease, reducing the risk of early- or late-season snowfall events. Overall, winter climate in central Illinois will become milder with decreasing snowfall and winter storm frequency, severity, and extent.[108]

[107] NCEI, Storm Events Database, accessed Dec 2022. https://www.ncdc.noaa.gov/stormevents
[108] Wuebbles, D; Angel, J; Petersen, K; Lemke, A.M. (2021): An Assessment of the Impacts of Climate Change in Illinois. University of Illinois at Urbana-Champaign. https://doi.org/10.13012/B2IDB-1260194_V1

Tornado

A tornado is a violently rotating column of air that extends from the base of a thunderstorm and touches the ground. Tornadoes vary in strength from weak to devastating. Some can be strong enough to uproot large trees and destroy well-made buildings.[109] Although in Illinois they are more likely to occur in the Spring during late afternoon hours,[110] tornadoes can form during any day of the year and during any time of day.

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
0.22	16	72

SOURCE: NCEI STORM EVENTS DATABASE (1950-2022)

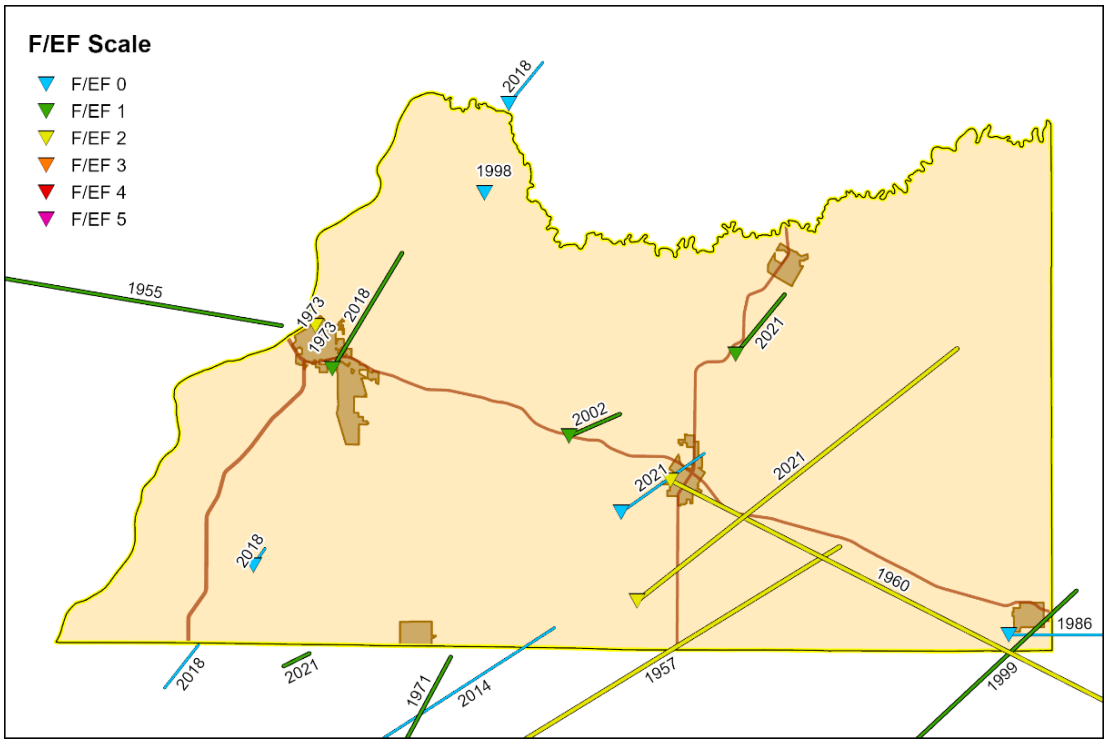

Figure 43. Tornado reports and tracks in Cass County (1950-2021). Source: NWS Storm Prediction Center

Tornadoes can occur anywhere in Cass County (Figure 43). The strongest tornado in Cass County since 1973 touched down 4 miles southwest of Virginia on December 10th, 2021. Severe thunderstorms across Missouri and Illinois produced 65 other tornadoes on December 10th and 11th, including an EF-3 tornado that killed six people in an Amazon warehouse in Edwardsville, IL. The EF-2 tornado in Cass County did not cause any injuries or

[109] National Weather Service, "Tornado Safety", accessed Dec 2022. https://www.weather.gov/safety/tornado
[110] Illinois State Climatologist, "Tornadoes in Illinois", accessed Dec 2022. https://stateclimatologist.web.illinois.edu/climate-of-illinois/tornadoes-in-illinois

fatalities but damaged a house and destroyed several barns outside of Virginia. As the tornado moved northeast for 12.8 miles, it toppled power poles, trees, and storage tanks in the county.[111]

Figure 44. A destroyed barn on Parlier Road, south of Virginia. Source: NWS Lincoln

On April 8th, 1999, an F-1 tornado touched down in Morgan County to the south of Cass County, and traveled northeast through the South Mobile Home Park Community in Ashland.[112] Seventeen mobile homes were destroyed and 20 were damaged, and six people were injured. A woman was pinned under her trailer for several hours, perishing before rescuers were able to pull her out. Multiple buildings downtown were damaged, including brick buildings, a church, a laundromat, a city garage, and over a dozen homes. Damages to the town were estimated to be $1.75 million.[113]

Social Vulnerability

Among the most socially vulnerable people to tornadoes are those who live in manufactured or mobile homes.[114] Although Cass County's zoning ordinance requires manufactured homes to be anchored "at each corner of the structure to gain maximum protection against high velocity winds… [and] installed with approved skirting", they can be thrown from the ground by an F/EF-0 tornado and are thus not safe structures in which to shelter [115,116] In Illinois, 35% of mobile home fatalities occurred in mobile homes. Only 22% of mobile home parks had aboveground wind-resistant shelters in the state in 2007; only 8% had belowground shelters. In addition to the physical vulnerability of living in a mobile home, these residents tend to be lower-income and have a higher prevalence of disabilities, making recovery or evacuation more difficult.

In Cass County, 12.2% of residents are estimated to live in manufactured or mobile homes. The highest percentages of manufactured home residents are in Ashland, Beardstown, and Chandlerville. An Ashland woman was pinned underneath her trailer after her mobile home park was hit by an F-1 tornado; she perished a few hours later. Immigrants, who primarily reside in Beardstown, may be more at risk for tornadoes, particularly if they are unfamiliar with the warning signs and sirens. Tornado safety literature may not be available in their preferred language.

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[111] NWS Lincoln, "Missouri and Illinois: A region in the Crosshairs", accessed Dec 2022. https://storymaps.arcgis.com/stories/9f473b0d253344c4b5c8ffd1d06ac876

[112] The Chicago Tribune, "1 dead, 4 injured as tornadoes rake Southern, Central Illinois", accessed Dec 2022. https://www.chicagotribune.com/news/ct-xpm-1999-04-09-9904090330-story.html

[113] NWS Lincoln, "Cass County Tornadoes Since 1950", accessed Dec 2022. https://www.weather.gov/ilx/cass-tor

[114] NWS. (n.d.). Severe Weather Preparedness Week. Jackson, MS Weather Forecast Office. https://www.weather.gov/jan/swpw_mhsafety

[115] NWS. (n.d.). Severe Weather Preparedness Week. Jackson, MS Weather Forecast Office. https://www.weather.gov/jan/swpw_mhsafety

[116] Cass County Zoning Ordinance. (2023). Cass County, Illinois. https://casscountyil.gov/application/files/6416/8919/3647/Zoning_Ordinance.pdf

Climate Change

Climate models project continued increases in severe convective environments that can result in tornadoes. Additionally, projections show a potential shift in the seasonality of supercells, one of the most powerful types of severe storms we experience in Illinois. Supercells generate many, if not most, tornadoes in the Midwest. Model projections show a potential shift toward higher frequency of supercell storms in the late winter and early spring, with fewer in the fall. Most severe storms in Illinois occur between 3 pm and 8 pm, and therefore a potentially increasing number of storms in late winter and early spring mean more nighttime storms, which increases risk of life-threatening impacts. Recent research has found that while fatalities from daytime tornado events have decreased by 20% over the past century, fatalities from nighttime tornadoes have increased by 20% over the same time.

Hazus Tornado Analysis

GIS-overlay modeling was used to estimate the potential impacts of an F3 tornado moving through Cass County. A hypothetical tornado track was created that begins just west of the City of Beardstown and travels approximately 2 miles northwest crossing through the city and terminates approximately 1,850 feet east of Beardstown.

Description of Analysis

As stated above, the scenario for this analysis is a Fujita Scale F3 tornado moving through Cass County. See Figure 45 below for a map of this scenario. Hazus software was not used for this analysis. A GIS-based methodology was used to estimate potential damages based on current structure values located in the path of the simulated tornado track.

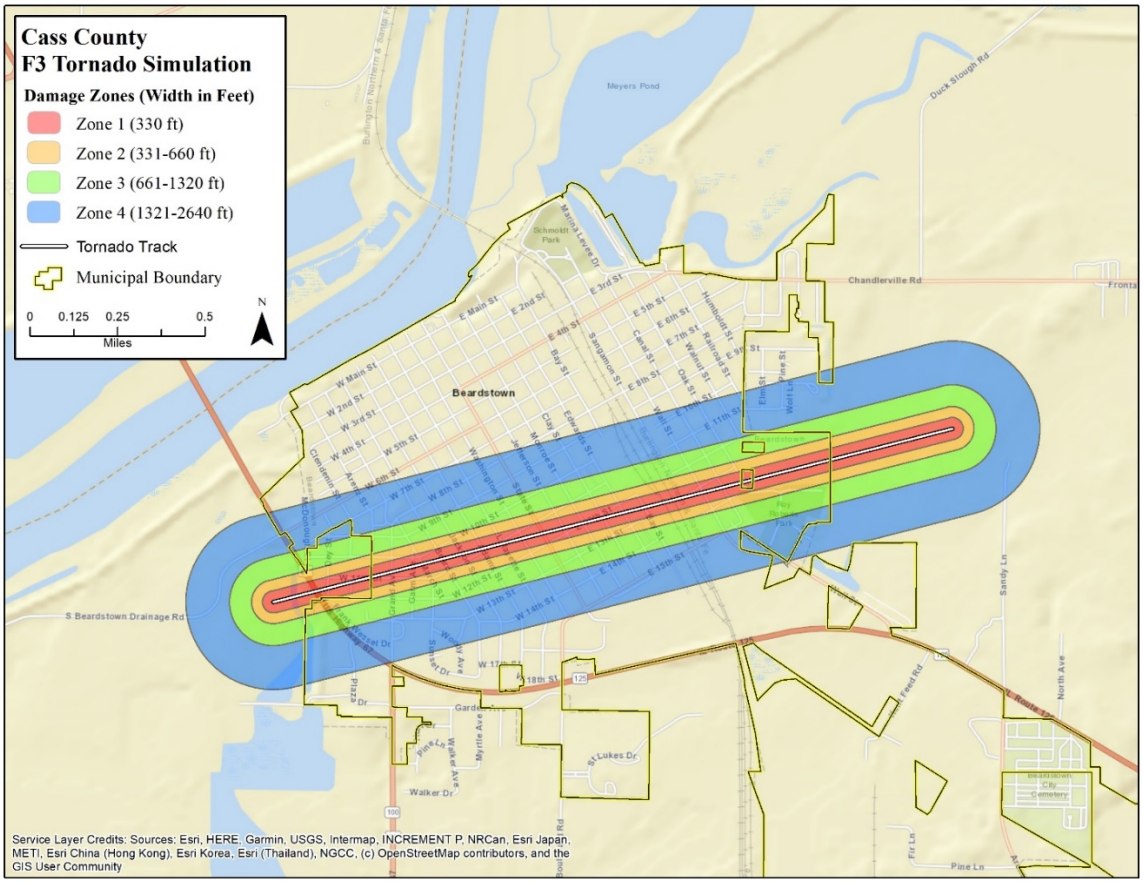


Figure 45. Tornado Damage Zones

Estimates of dollar losses for structures located in the tornado's path were determined through this analysis. Estimates for injuries/loss of life, shelter needs, and damage to infrastructure are not included. To estimate the potential damages, GIS was used to create four different damage zones around the tornado track (Figure 45). Each zone represents a different Fujita Scale wind intensity from F3 to F0 based on its proximity to the center of the track. A damage percentage is assigned to each zone, with the most intense damage occurring within the center of the tornado path and decreasing amounts of damage away from the center. These percentages are listed in Table 30. This methodology of creating buffers was based on the publication titled "A Study of the GIS Tools Available During Tornado Events and Their Effectiveness for Meteorologists, First Responders and Emergency Managers" presented at the American Meteorological Society Cloud Physics Conference in 2006[117].

Once these zones were created, they were overlaid on top of points taken from the building inventory derived from the Cass County Assessor's database and building footprints developed by Microsoft Corporation[14]. Each point represents an existing structure and is attributed with an estimate of the replacement cost of the structure as calculated from RSMeans square footage values. For more information on this see Section 8.2 Hazus Occupancy Classes . The number of structures that fell in each tornado damage zone is listed in Table 31. Depending on which damage zone each of these points was located in, the fair market value of the structure was multiplied by the percentage listed in Table 30 to give an estimate of the dollar losses that may result in such an event. These loss estimates are listed in Table 33.

Table 30. Tornado Damage Zones

Damage Zone	Distance from Tornado Centerline (Feet)	Damage Percentage
1 (F3)	0-165	0.8
2 (F2)	166-330	0.5
3 (F1)	331-660	0.1
4 (F0)	661-1320	0

Table 31. Structure Count in Each Tornado Damage Zone

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	158	142	280	476
Commercial	5	3	9	25
Industrial	0	0	1	2
Agriculture	0	0	0	0
Government	0	3	3	7
Religion	0	0	4	0
Education	0	0	2	3
Total	**163**	**148**	**299**	**513**

A total of 610 structures located in Zones 1-3 were damaged in this scenario. One of these structures was an essential facility. Three essential facilities fell within Zone 4. These facilities are listed in Table 32.

[117] Hubbard, S.A. and MacLaughlin, K. A Study of the GIS Tools Available During Tornado Events and Their Effectiveness for Meteorologists, First Responders and Emergency Managers. Conference publication, American Meteorological Society Cloud Physics Conference. 2006.

Table 32. Essential Facilities Located in Tornado Path

Essential Facilities	Damage Zone	City
Beardstown Fire Department and Ambulance	Zone 2	Beardstown
Gard Elementary School	Zone 4	Beardstown
Beardstown JR/SR High School	Zone 4	Beardstown
Beardstown Sewage Treatment Plant	Zone 4	Beardstown

Damage to, or loss of, these essential facilities can result in a large negative impact on the community during a disaster. The loss of a fire station and associated ambulance service can reduce the capacity for first responders to treat those injured during an event.

Economic Losses

The total loss estimate for this event is $87,033,300. As detailed in Table 33 below, residential losses are the largest contributor to loss estimates, comprising approximately 85% of the total losses. This is due to volume as 95% of the damaged structures were residential.

Table 33. Total Loss Estimates by Occupancy

Occupancy	Zone 1	Zone 2	Zone 3	Zone 4
Residential	$39,681,600	$23,678,600	$10,842,600	$0
Commercial	$4,270,200	$2,723,900	$1,173,700	$0
Industrial	$0	$0	$94,700	$0
Agriculture	$0	$0	$0	$0
Governmental	$0	$2,776,700	$469,500	$0
Religion	$0	$0	$742,300	$0
Education	$0	$0	$579,500	$0
Total	$43,951,800	$29,179,200	$13,902,300	$0
Total Losses	**$87,033,300**			

Wildfire

Even in the Midwest, wildfires (or wildland fires) are a natural component of the earth-atmosphere system. However, it appears that human activity – whether the result of a person's action or the failure of infrastructure – is the cause of the majority of wildfires in the Midwest today.[118]

AVG REPORTS/YEAR	TOTAL REPORTS	YEARS IN RECORD
0.19	5	27

SOURCE: USDA FOREST SERVICE WILDFIRE DATABASE (1992-2018)

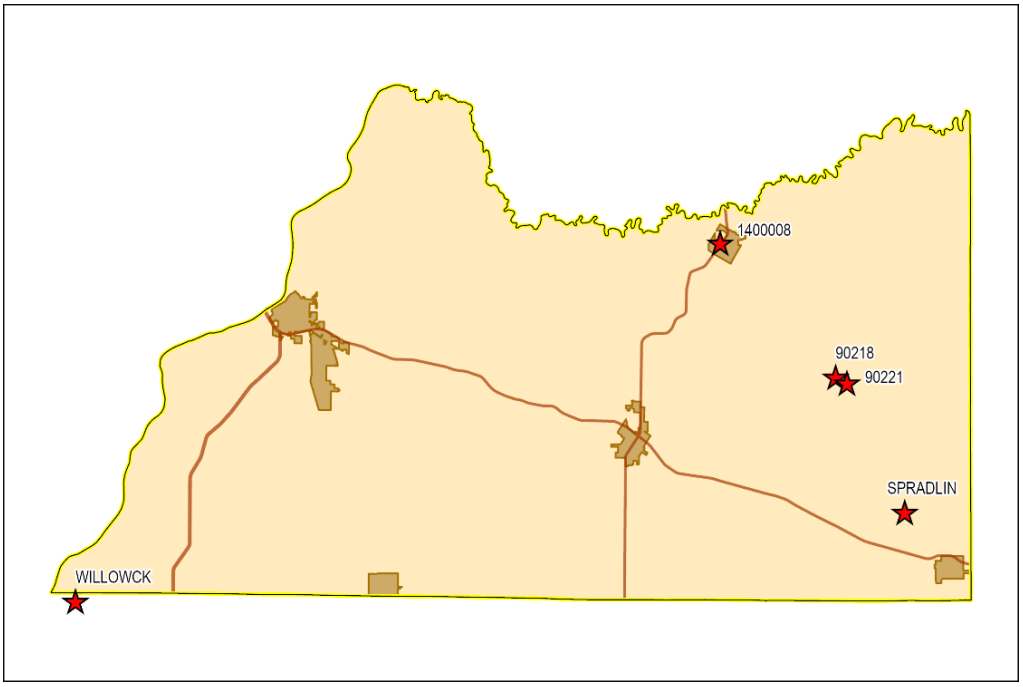


Figure 46. Wildfire reports within 1 km of Cass County (1992-2018). Source: USDA Forest Service

There have been five reported fires in Cass County, all of which were human induced (Figure 46). Four of the fires were three acres or smaller, while one fire near Chandlerville in 2014 was 20 acres.

Social Vulnerability

Among the most socially vulnerable to wildfires are the elderly, children, and people with underlying respiratory health conditions.[119] Air pollution and other particulates associated with wildfires are more harmful to these

[118] Midwestern Regional Climate Center, "Living with Weather: Wildfires", accessed Dec 2022. https://mrcc.illinois.edu/living_wx/wildfires/index.html

[119] D'Evelyn, S. M., Jung, J., Alvarado, E., Baumgartner, J., Caligiuri, P., Hagmann, R. K., Henderson, S. B., Hessburg, P. F., Hopkins, S., Kasner, E. J., Krawchuk, M. A., Krenz, J. E., Lydersen, J. M., Marlier, M. E., Masuda, Y.

socially vulnerable groups, making wildfire-smoke inhalation dangerous and deadly. Existing respiratory diseases, such as asthma, can be exacerbated by wildfire-smoke. Cardiorespiratory-related excess deaths have been reported in the days following wildfires, particularly among the elderly.[120] People with outdoor occupations may also be more at risk, particularly if they do not have the proper equipment to protect their respiratory systems from smoke.

Rural and low-income communities may also be more susceptible to wildfires. Many of Cass County's fire departments are volunteer staffed and may not have the resources, personnel, or training required to extinguish big wildfires. People without access to transportation, which frequently intersects rural and low-income populations, may not have the ability to evacuate in case of a wildfire. Beardstown has the highest percentage of residents without vehicles.

Climate Change

While Illinois has a relatively low risk for wildfires, studies have shown an increase in wildfire season length, wildfire frequency, and burned area due to climate change.[121] Climate change threatens to increase the frequency, extent, and severity of fires through increased temperatures and drought. Crop and orchard fires are the most common type of agricultural fire in the US. Cass County's extensive farmland and farmers may be at risk of crop loss as climate changes.

J., Metlen, K., Mittelstaedt, G., Prichard, S. J., Schollaert, C. L., … Spector, J. T. (2022). Wildfire, Smoke Exposure, Human Health, and Environmental Justice Need to be Integrated into Forest Restoration and Management. Current Environmental Health Reports, 9(3), 366–385. https://doi.org/10.1007/s40572-022-00355-7

[120] Kochi, I., Champ, P. A., Loomis, J. B., & Donovan, G. H. (2012). Valuing mortality impacts of smoke exposure from major southern California wildfires. Journal of Forest Economics, 18(1), 61–75. https://doi.org/10.1016/j.jfe.2011.10.002

[121] U.S. Global Change Research Program. (2018). Impacts, risks, and adaptation in the United States: Fourth National Climate Assessment, volume II. Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.). https://nca2018.globalchange.gov/downloads. doi:10.7930/NCA4.2018.

SECTION 5

MITIGATION STRATEGIES

INTRODUCTION

Hazard mitigation planning reduces loss of life and property during disasters and builds stronger communities. In Cass County, the process began with local community representatives identifying natural hazards and vulnerabilities within their communities that could cause disasters using a natural hazard risk assessment. Community representatives then developed short-term and long-term mitigation strategies for protecting people and property from disasters.

Risk assessments were handed out to all jurisdictions in Cass County at the first meeting on August 18, 2022. One-on-one hazard mitigation project meetings were held in-person with each jurisdiction on April 27, 2023. Outstanding risk assessments and capability assessments were completed by all jurisdictions at these meetings.

SUMMARY OF CHANGES

A status update of mitigation actions identified in the *2012 Cass County Multi-Hazard Mitigation Plan* can be found in Table 34.

Table 34. Status of 2012 Mitigation Actions.

Mitigation Strategy	Jurisdiction	Hazard	Priority	Status	Comments
Institute a buy-out plan for repetitive loss properties	Beardstown and unincorporated Cass County	Floods	N/A	Complete	Removed
Distribute weather radios to mobile home parks and recreational parks	All jurisdictions	All Hazards	M	Complete	Another round of weather radio distributions is contingent on finding partners/funding
Purchase and install new warning sirens within the county	Beardstown, Ashland, State Parks	Tornado and Severe Thunderstorms	H	Ongoing	Beardstown and Virginia have best warning systems; other jurisdictions dependent on funding
Continue buy-outs for repetitive loss properties.	All jurisdictions	Floods	N/A	Complete	Continue if necessary
Improve storm drainage and upgrade culverts in Arenzville	Arenzville	Floods	N/A	Complete	New repairs contingent on funding
Upgrade culverts	All jurisdictions	Floods	M	Ongoing	USACE is continuing to do this
Procure back-up generators or transfer switches for critical facilities and warning systems, especially in Beardstown	All jurisdictions	Tornado and Severe Thunderstorm	L	Ongoing	Cass 911 and highway building in Virginia have acquired backup generators; still needed in Beardstown, school districts, courthouse, housing authority; contingent on funding

Mitigation Strategy	Jurisdiction	Hazard	Priority	Status	Comments
Bury critical utility lines to prevent power outages or loss of telecommunications to essential or critical facilities during a severe winter storm or other type of severe weather event.	All jurisdictions	Winter storm, Tornado, Thunderstorm	N/A	Removed	Too expensive, minimal benefit, no legal jurisdiction
Repair and/or improve levees, control underseepage, and maintain pumps in Beardstown and along the Illinois River.	Beardstown and unincorporated Cass County	Flood	H	Ongoing	Drainage districts will continue to work with USACE; some efforts contingent on funding
Implement Nixle for mass media release via e-mail and text messages	All jurisdictions	Tornado and Severe Thunderstorms	H	Ongoing	High priority for Cass County and Beardstown; interpreter/pre-recorded messages in multiple languages are needed
Establish safe rooms/tornado shelters in critical facilities	All jurisdictions	Tornado and Severe Thunderstorms	M	Ongoing	Red Cross can provide space on request
Harden infrastructure, especially essential facilities	All jurisdictions	Tornado and Severe Thunderstorm	M	Ongoing	Contingent on funding
Conduct a commodity flow study	All jurisdictions	Hazmat	N/A	Removed	Funding not available
Trim trees to minimize the amount/duration of power outages	All jurisdictions	Winter Storms, Tornados, and Severe Thunderstorms	L	Ongoing	Ameren takes care of this
Improve rail crossing and warning system for the Burlington Northern and Santa Fe Railroad south of Beardstown.	Beardstown	Hazmat	L	Ongoing	Maintain good working relationship with Burlington Northern

Mitigation Strategy	Jurisdiction	Hazard	Priority	Status	Comments
Establish a plan for implementing water restrictions during droughts	All jurisdictions	Heat and Drought	L	Ongoing	Water superintendents monitor and place restrictions on a case-by-case basis by city ordinance; no burn requests have been implemented successfully
Establish a backup water supply for Ashland.	Ashland	All Hazards	M	Ongoing	Contingent on funding
Implement natural snow fences/tree barriers and adjust road grades.	All jurisdictions	Winter Storms, High Winds	M	Ongoing	Contingent on funding
Establish warming centers in key locations within the county	All jurisdictions	Winter Storm	L	Ongoing	Contingent on funding
Maintain compliance with the state floodplain ordinances.	All jurisdictions	Flood	M	Ongoing	All jurisdictions currently in good standing with the NFIP
Separate the storm and sanitary sewers in Beardstown	Beardstown	Flood	L	Ongoing	Contingent on funding

MITIGATION GOALS

To create goals for the *2024 Cass County Hazard Mitigation Plan*, the previous goals from the *2012 Cass County Multi Hazard Mitigation Plan* goals and objectives were discussed. As follows, 2012 goals and objectives were:

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

(a) Objective: Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weatherproofing.
(b) Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards.
(c) Objective: Minimize the amount of infrastructure exposed to hazards.
(d) Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.
(e) Objective: Improve emergency sheltering in Cass County.

Goal 2: Create new or revise existing plans/maps for Cass County

(a) Objective: Support compliance with the NFIP for each jurisdiction in Cass County.
(b) Objective: Review and update existing, or create new, community plans and ordinances to support hazard mitigation.
(c) Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies.

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

(a) Objective: Raise public awareness on hazard mitigation.
(b) Objective: Improve education and training of emergency personnel and public officials.

These goals and objectives were kept for the *2024 Cass County Hazard Mitigation Plan*. A fourth goal was added by to include the protection of life:

Goal 4: Protect life and livelihoods in Cass County

MITIGATION ACTIONS

Natural hazard mitigation project ideas came from members of the community who spent time considering the natural hazards affecting their area and residents. Separate meetings were held with representatives from Cass County, Arenzville, Ashland, Beardstown, Chandlerville, and Virginia on April 27, 2023. Members of the community ranked priorities and the cost and benefit of each project, discussed funding sources, and developed a proposed schedule with the assistance of the planning committee. Projects were ranked high, medium, or low based on the urgency of the project, availability of funding, and capacity of the jurisdiction. Potential projects include construction, education, policy, communication, preparedness, and response. Funding for projects can come from local operating budgets, in-kind donations, donations from local businesses, volunteers donating time, regional funding opportunities, state and federal grants and low-interest loan programs.

The projects were prioritized within each jurisdiction by using the following method. The implementation of all actions is desirable regardless of prioritized order. Actions assigned to Priority H (high) have a permanent or more far-reaching affect than actions under Priority M (medium), although both address the most significant natural hazards in the county. Priority L (low) actions all address the less significant natural hazards.

The committee assigned preliminary cost/benefit assessments to each identified project, using general terms of high, medium, and low related to both the cost and benefit. A high rating on cost means it is unlikely the jurisdiction could accomplish the project without outside funding, a rating of medium on cost implies that while the cost may exceed normal maintenance or operating budgets, and a low-cost rating, conversely, means that is likely the jurisdiction can accomplish the project without outside funding. A high rating on benefit relates to how well the project would mitigate the situation. A medium benefit would potentially protect property, but the scope may be limited, such as in an educational project. A low benefit could potentially protect property, but the scope of project may be limited or applicable to only one hazard.

JURISDICTIONAL PROJECT GRID INSTRUCTIONS

Under the **Goal** column, a goal for the project should be listed. Example of goals could include, but are not limited to, *protect life, protect property, reduce [hazard] risk, educate public, enhance coordination and communication between responding agencies.*

Under the **Community** column, wherever '*Cass County*' is listed alone, the implication is that the project would apply to unincorporated areas. Wherever a specific municipality is listed, the project has been identified by community representatives as needed in their respective municipality. Wherever *'All'* is listed, the project applies to all incorporated municipalities in the county.

Under the **Project Type** column, the following codes can be used to categorize projects: *C = Construction Project; E = Education Project; P = Policy Project; COM = Communication; PR = Preparedness; R = Response;* and *BO = Buyout*.

Under the **Hazard** column, the following codes can be used to identify the hazard being addressed: *A = All hazards; W = Wind; H = Hail; L = Lightning; T = Tornado; RF = Riverine Flooding; FF = Flash Flooding; DF = Dam/Levee Failure; WW = Winter Weather; IS = Ice Storms; D = Drought; HW = Heat Wave; CW = Cold Wave; E = Earthquake; WF = Wildfire; HM = HazMat Spill;* and *P = Pandemic***.** Multiple hazards can be addressed by one project.

Under the **Possible Funding** column, the potential source of funding should be listed. Examples of potential sources include, but are not limited to, public agencies such as *FEMA, HUD, USDA,* or *local* funding; private agencies can be included too if relevant. *Local* funding can refer to local operating budgets. Where *VT* is listed, the project is done by volunteers donating their time for coordination for that project.

- **REQUIRED:** each jurisdiction must have at least one project funded by *FEMA*.

Under the **Project** column, a short description of the project should be provided.

Under the **Priority** column, the following codes can be used to categorize priorities: *H = High; M = Medium;* and *L = Low.*

Under the **Lead or Contact** column, wherever *Emergency Manager/EMA* is listed, the implication is that the *Emergency Manager/EMA* will be assisted by municipal employees and others who meet regularly with the *Emergency Manager/EMA*.

Under the **Proposed Schedule** column, a timeframe for the project should be provided. Examples of timelines could include a start year and end year (e.g., 2022-2024) or the expected duration of a project (e.g., 5-7 years)

Under the **Benefit, Cost** column, the following codes can be used to identify the benefit and cost to the community: *H = High; M = Medium;* and *L = Low.* There should be one code each for benefit and cost.

Table 35. Mitigation strategies for Cass County.

Goals	Jurisdiction	Action	Hazard	Funding	Description	Priority	Contact	Timeline	Benefit, Cost
Goal 1, 4	All	C	W, T	FEMA	Identify and/or develop a wind resistant shelter for tornado sheltering use	L	EMA, city councils	1-5 years	H, H
Goal 1, 3, 4	All	P	A	Local, County EMA budget, VT	Form an active unmet needs committee that meets on a regular basis	M/L	EMA, Mayors, Boards	1-5 years	H, L
Goal 4	All	C	A	FEMA	Purchase backup generators for all critical infrastructure, including County Courthouse (Virginia)	M	Mayors/Boards, FD, PD, Cass EMA	1-5 years	H, H
Goal 3, 4	All	E, COM	A	Local, FEMA, County EMA budget, VT	Improve/develop/enhance emergency communication to the general public; explore and utilize every means of contact with the general public	H	County, Communities, Industry, Schools	1-3 years	H, H
Goal 3, 4	All	COM, E	All	Local, private, USDA Rural Development	Emergency Alert Public Notification System(s); explore purchasing sirens, work with local industry, schools, and local governments to develop public notification during emergencies and disastrous situations	H	EMA	1-3 years	H, H
Goal 1, 4	All	COM	All	Local, n/a, County EMA budget, VT	Revamp, reorganize, and revitalize the Local Emergency Planning Commission (LEPC)	H	EMA	1-3 years	H, L
Goal 1	Chandlerville	C	RF	Local, FEMA, County EMA budget	Work with Chandlerville to pursue a FEMA Flood Map Revision (such as Letter of Map Revision (LOMR))	M/H	EMA, Mayor of Chandlerville	1-5 years	H, H
Goal 1, 2, 3, 4	All	PR	RF, FF	FEMA, County EMA budget, IDNR	Join the Community Rating System (CRS)	M/H	Mayor, Floodplain Coordinator	1-3 years	M, L
Goal 1, 4	All	PR	All	Local, n/a, County EMA/First Responders budget	Meet annually with every fire and law enforcement department	M/H	EMA, FD, PD, County Sherriff	1 year	H, L
Goal 1, 4	All	C	W, T, HM	FEMA, Private	Demolition of abandoned structures to reduce the chance of flying debris during severe wind and tornadic events	H	EMA, Mayors, Boards, Corporate Stakeholders	1-5 years	H, H
Goal 1, 4	All	R	T	Local operating budgets	Install tornado sirens in the community to alert residents during severe weather events	M/H	EMA, Mayors, Boards	1-3 years	H, M

Table 36. Mitigation strategies for the Village of Arenzville.

Goals	Jurisdiction	Action	Hazard	Funding	Description	Priority	Contact	Timeline	Benefit, Cost
Goal 1, 4	All	C	W, T	FEMA	Identify and/or develop a wind resistant shelter for tornado sheltering use	H	EMA, city councils	1-5 years	H, H
Goal 1, 4	Arenzville	C, BO	WW, IS, HM	IDOT, Local, Public	Buy property (house) in order to widen a dangerous, sharp corner to reduce accidents. This is a main truck and school bus route	H	EMA, Mayor, Board	1 year	H, M
Goal 3, 4	Arenzville	COM	A, T	FEMA	Install/update siren/alarm system	H	Mayor, Board, Fire Department	1-3 years	L, L
Goal 1, 2, 3, 4	Arenzville	PR	RF, FF	FEMA, County EMA budget, IDNR	Join the Community Rating System (CRS)	M	Mayor, Floodplain Coordinator	1-3 years	M, L
Goal 1, 4	Arenzville	C	RF, FF	FEMA, IDOT	Continue to improve storm drainage and upgrade culverts	H	Mayor, Board, EMA	1-3 years	H, H

Table 37. Mitigation strategies for Village of Ashland.

Goals	Jurisdiction	Action	Hazard	Funding	Description	Priority	Contact	Timeline	Benefit, Cost
Goal 1, 4	All	C	W, T	FEMA	Identify and/or develop a wind resistant shelter for tornado sheltering use	H	EMA, city councils	1-5 years	H, H
Goal 3, 4	Ashland	PR	All	USDA Rural Development	Purchase and place warning siren on the west side of the village	H	EMA, City Council	1 year	H, H
Goal 1, 4	Ashland	PR	All	Local, FEMA	Purchase generators to keep lift station, sewer plant, and water plant running in case of an electrical outage	H	EMA, City Council	1-5 years	H, H
Goal 1, 4	Ashland	PR	All	Local, FEMA	Purchase generator to keep power at Village Hall to use as a command center in case of a disaster	H	EMA, City Council	1-5 years	H, H
Goal 1, 4	Ashland	PR, R	FF	FEMA	4" Trash Pumps to help remove water from homes and streets during disaster	M	EMA, City Council	1-5 years	H, H
Goal 4	Ashland	PR	T, HW, WW	Local, Private churches, VT	Work with area churches to use church basements during tornado, extreme heat, or winter storms	H	Village President, City Council	1-3 years	H, L
Goal 4	Ashland	PR	All	Local, School budget, VT	Work with local school to use the gymnasium for Red Cross availability and to house residents if needed	M	Village President, City Council	1-3 years	H, L
Goal 1, 4	Ashland	PR, R	WW	Local, n/a, VT	In case of large snowfall, work with area people with equipment to help with removal	M	Village President, City Council	1-3 years	M, L
Goal 4	Ashland	R	All	Local, corporate	Work with Casey's, Jones Bros., and Dollar General for food to serve people in need during emergencies	M	Village President, City Council	1-3 years	M, L
Goal 1, 2, 3, 4	Ashland	PR	RF, FF	FEMA, County EMA budget, IDNR	Join the Community Rating System (CRS)	M	Mayor, Floodplain Coordinator	1-3 years	M, L

Table 38. Mitigation strategies for City of Beardstown.

Goals	Jurisdiction	Action	Hazard	Funding	Description	Priority	Contact	Timeline	Benefit, Cost
Goal 1, 4	All	C	W, T	FEMA	Identify and/or develop a wind resistant shelter for tornado sheltering use	H	EMA, city councils	1-5 years	H, H
Goal 3, 4	Beardstown	COM, PR	All	Local, FEMA	Install evacuation signs on evacuation routes for residents to use in case of an emergency	H	Mayor, Council	1-5 years	H, M
Goal 1, 4	Beardstown	PR	All	Local, USDA Rural Development - WEP	Connect to rural water system for emergency use	H	Mayor, Council	1-5 years	M, H
Goal 4	Beardstown	PR, R	All	Local, USDA Rural Development - WEP	Acquire generator (contact Jacksonville?) for public works; public works remains dry even at flood stage	H	Mayor, Council	1-5 years	H, H
Goal 3, 4	Beardstown	COM, PR	All	Local, FEMA	Acquire revised 911 system	H	Mayor, Council	1-5 years	H, M
Goal 1, 2, 3, 4	Beardstown	C, PR	All	FEMA, County EMA budget, IDNR	Join the community rating system (CRS)	H	Mayor, Council	1-3 years	H, M
Goal 3, 4	Beardstown	E, COM	RF	Local, County EMA/First Responders budget	Develop a flood evacuation plan for the City of Beardstown based on the Breach Analysis compiled by the US Army Corps of Engineers	H	Cass EMA, Beardstown Fire, Pd, PW, Cass Sherrif Dept, JBS, Schools	1-2 years	H, L

Table 39. Mitigation strategies for the Village of Chandlerville.

Goals	Jurisdiction	Action	Hazard	Funding	Description	Priority	Contact	Timeline	Benefit, Cost
Goal 1, 4	All	C	W, T	FEMA	Identify and/or develop a wind resistant shelter for tornado sheltering use	H	EMA, city councils	1-5 years	H, H
Goal 1, 2, 3, 4	Chandlerville	PR	RF, FF	FEMA, County EMA budget, IDNR	Join the Community Rating System (CRS)	M	Mayor, Floodplain Coordinator	1-3 years	M, L
Goal 1, 4	Chandlerville	C	W, T, FF, RF	Local operating budgets	Tear down, replace, and rebuild old buildings as appropriate	H	Mayor, Village Council	1-5 years	H, H
Goal 1, 4	Chandlerville	C	RF	FEMA	Acquire new levee pump	H	Mayor, Village Council	1-5 years	H, H
Goal 3, 4	Chandlerville	PR	ALL	USDA Rural Development	Install sirens or other emergency notification system	H	Mayor, Village Council	1-3 years	H, M
Goal 4	Chandlerville	PR	ALL	Local, Illinois State Fire Marshall Grant, IDNR Volunteer Fire Assistance Program	Purchase generators for fire department, city hall	H	Mayor, Village Council	1-5 years	H, H
Goal 4	Chandlerville	R	ALL	n/a, VT	Join ILWARN	M	Mayor, Village Council	1-3 years	M, L

Table 40. Mitigation strategies for City of Virginia.

Goals	Jurisdiction	Action	Hazard	Funding	Description	Priority	Contact	Timeline	Benefit, Cost
Goal 1, 4	All	C	W, T	FEMA	Identify and/or develop a wind resistant shelter for tornado sheltering use	H	EMA, city councils	1-5 years	H, H
Goal 1, 4	Virginia	C	W, T, HM	FEMA, Private	Demolition of abandoned structures to reduce the chance of flying debris during severe wind and tornadic events	H	City Council and Corporate Stakeholders	1-5 years	H, H
Goal 1, 3, 4	Virginia	COM	A	FEMA	Develop early warning system for high-risk facilities and expand wireless capabilities for first responders; first call system, public alert	H	City Council and Local Stakeholders	1-2 years	H, M
Goal 1, 4	Virginia	C, BO	FF	FEMA	Improve city drainage system by improving culverts/ditches, separating storm and sanitary sewers, installing buffer strips, creating wetlands along creek	M	City Council and Local Stakeholders	1-10 years	H, H
Goal 4	Virginia	COM	A	FEMA	Purchase satellite phones, generator for the fire department	H	City Council	1 year	H, M (L – generator)
Goal 3, 4	Virginia	COM	A	FEMA, Private	Enhance internet hotspots throughout the community for use during emergencies	M	City Council, Corporate Stakeholders	1 year	M, M
Goal 1, 2, 3, 4	Virginia	PR	RF, FF	FEMA, County EMA budget, IDNR	Join the Community Rating System (CRS)	M	Mayor, Floodplain Coordinator	1-3 years	M, L
Goal 3, 4	Virginia	PR	All	USDA Rural Development	Purchase siren for south and northwest part of town	H	City Council, EMA	1-2 years	H, H

SECTION 6

APPENDIX

APPENDIX A: RISK ASSESSMENT

Cass County Risk Assessment

Cass County Multi-Jurisdictional Hazard Mitigation Plan

Risk Assessment

Name: Cass County / Roger D. Lauder

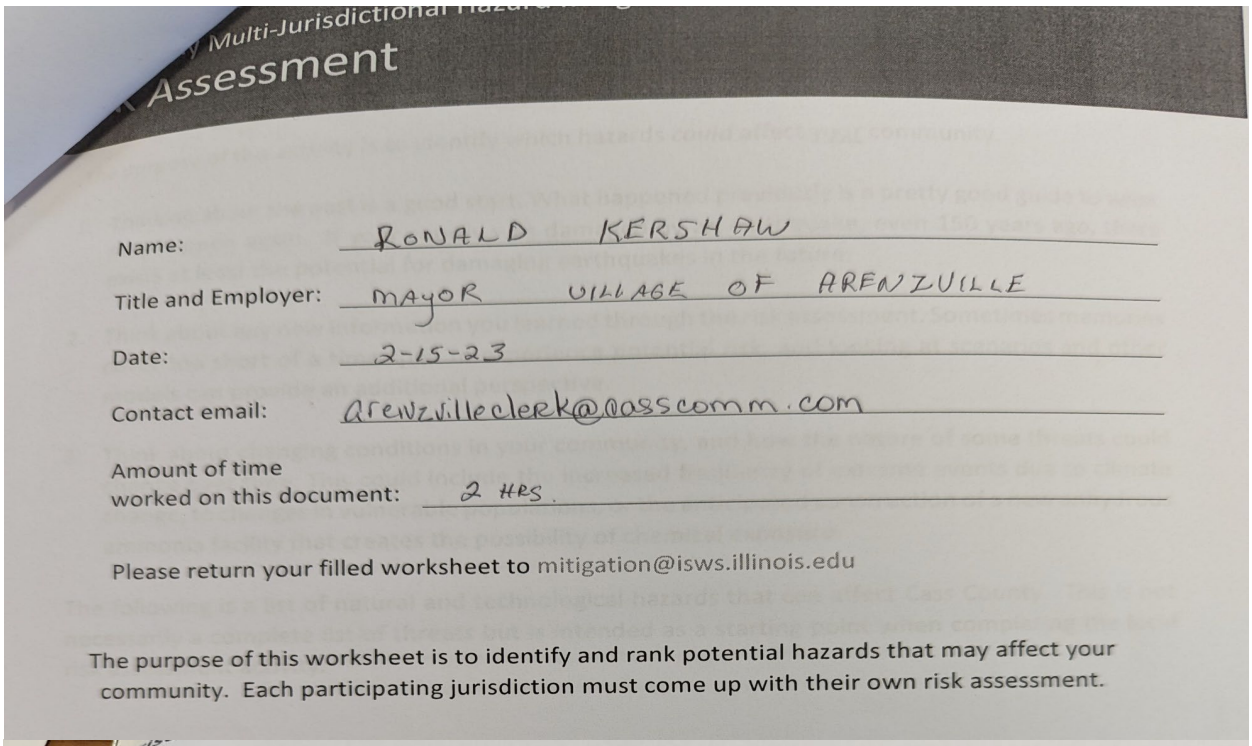
Title and Employer: Director Emergency Management / Disaster Agency

Date: 02/09/2023

Contact email: rdlauder@

Hazard	Probability (1-4)	Severity (1,2,4,8)	Risk (P x S)	Ranking
Dam Failure				7
Drought				6
Earthquake N/A				N/A
Extreme Heat				6
Extreme Cold				5
Flash Flooding }				1
Riverine Flooding }				
HazMat Spill				4
Mine Subsidence N/A				N/A
Pandemic CASS COUNTY HEALTH DEPARTMENT PLAN				
Severe Storms				2
Severe Winter Storms				3
Tornado				2
Wildfire				8

Arenzville Risk Assessment



Multi-Jurisdictional

Assessment

Name: RONALD KERSHAW

Title and Employer: MAYOR VILLAGE OF ARENZVILLE

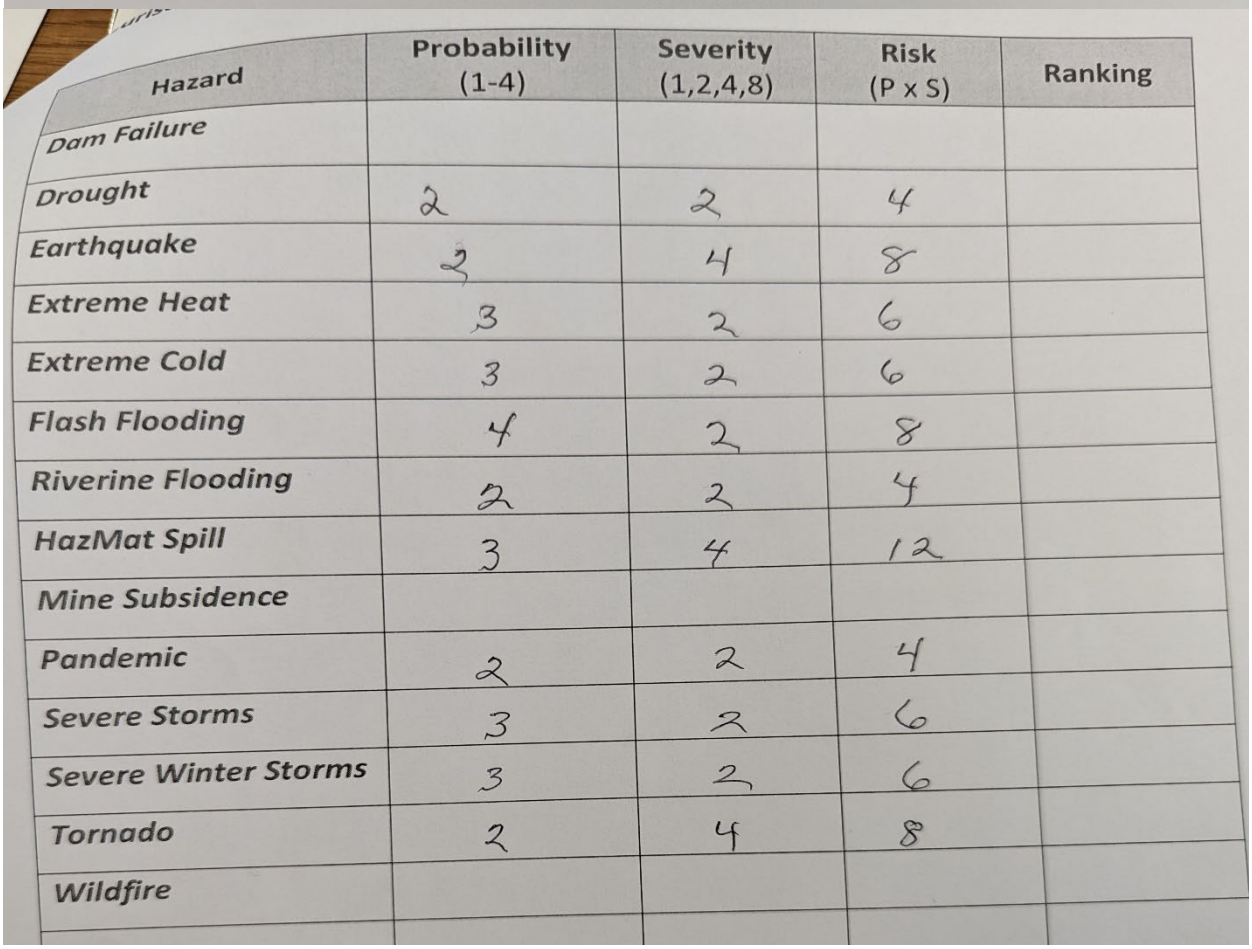
Date: 2-15-23

Contact email: arenzvilleclerk@casscomm.com

Amount of time worked on this document: 2 HRS.

Please return your filled worksheet to mitigation@isws.illinois.edu

The purpose of this worksheet is to identify and rank potential hazards that may affect your community. Each participating jurisdiction must come up with their own risk assessment.



Hazard	Probability (1-4)	Severity (1,2,4,8)	Risk (P x S)	Ranking
Dam Failure				
Drought	2	2	4	
Earthquake	2	4	8	
Extreme Heat	3	2	6	
Extreme Cold	3	2	6	
Flash Flooding	4	2	8	
Riverine Flooding	2	2	4	
HazMat Spill	3	4	12	
Mine Subsidence				
Pandemic	2	2	4	
Severe Storms	3	2	6	
Severe Winter Storms	3	2	6	
Tornado	2	4	8	
Wildfire				

Ashland Risk Assessment

Cass County Multi-Jurisdictional Hazard Mitigation Plan

Risk Assessment

Name: Kitty Mau

Title and Employer: Village President, Village of Ashland

Date: April 26, 2023

Contact email: ashland@casscomm.com

Hazard	Probability (1-4)	Severity (1,2,4,8)	Risk (P x S)	Ranking
Dam/Levee Failure	1	1	1	8
Drought	1	1	1	8
Earthquake	2	1	2	7
Extreme Heat	4	2	8	6
Extreme Cold	4	2	8	6
Flash Flooding	2	2	4	8
Riverine Flooding	1	1	1	9
HazMat Spill	3	8	24	2
Pandemic	4	8	32	1
Ice Storms	4	4	16	4
Winter Storms	4	4	16	3
Tornado	3	4	12	5
Wildfire	1	1	1	10
Lightning	4	2	8	6
Hail	4	2	8	6
Wind	4	4	8	6

Beardstown Risk Assessment

Cass County Multi-Jurisdictional Hazard Mitigation Plan

Risk Assessment

Name: Martin G. Coad

Title and Employer: Chief of Police, Beardstown IL

Date: 02/16/2023

Contact email: mcoad@beardstownpd.org

Hazard	Probability (1-4)	Severity (1,2,4,8)	Risk (P x S)	Ranking
Dam Failure	2	2	4	10
Drought	2	2	4	11
Earthquake	2	4	8	12
Extreme Heat	2	2	4	4
Extreme Cold	2	2	4	5
Flash Flooding	3	4	12	2
Riverine Flooding	3	4	12	6
HazMat Spill	3	4	12	1
Mine Subsidence	1	1	1	14
Pandemic	2	2	4	9
Severe Storms	3	4	12	3
Severe Winter Storms	2	4	8	7
Tornado	2	4	8	8
Wildfire	2	2	4	13

In case of any questions or comments, please email us at mitigation@isws.illinois.edu

Chandlerville Risk Assessment

Multi-Jurisdictional Hazard Mitigation Plan

Risk Assessment

Name: Tim Richard

Title and Employer: Mayor VILLAGE of Chandlerville

Date: 4-27-23

Amount of time worked on this document: 20. min.

Hazard	Probability (1-4)	Severity (1,2,4,8)	Risk (P x S)	Ranking
Dam/Levee Failure	1	8		
Drought	1	4		
Earthquake	1	8		
Extreme Heat	1	4		
Extreme Cold	1	4		
Flash Flooding	1	8		
Riverine Flooding	1	8		
HazMat Spill	1	8		
Pandemic	1	4		
Ice Storms	1	4		
Winter Storms	1	4		
Tornado	1	8		
Wildfire	1	4		
Lightning	1	4		
Hail	1	4		
Wind	1	4		

Virginia Risk Assessment

Cass County Multi-Jurisdictional Hazard Mitigation Plan

Risk Assessment

Name: W. David McMillan

Title and Employer: Designee, City of Virginia

Date: 01/26/2023

Contact email: mcmillan@ilrwa.org

Hazard	Probability (1-4)	Severity (1,2,4,8)	Risk (P x S)	Ranking
Dam Failure	*1*	1	1	8
Drought	*3*	2	6	6
Earthquake	2	4	8	5
Extreme Heat	4	2	8	5
Extreme Cold	4	2	8	5
Flash Flooding	4	2	8	5
Riverine Flooding	1	1	1	8
HazMat Spill	3	4	12	4
Mine Subsidence	2	2	4	7
Pandemic	4	8	32	1
Severe Storms	4	4	16	2
Severe Winter Storms	4	2	8	5
Tornado	3	4	12	3
Wildfire	1	1	1	3
Straight Line Winds	3	4	12	4
Rolling Blackout	3	2	6	6

In case of any questions or comments, please email us at mitigation@isws.illinois.edu

APPENDIX B: CAPABILITY ASSESSMENT

Cass County Capability Assessment

CAPABILITY ASSESSMENT CHECKLIST

Does the plan document each jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

Name: Roger D Lauer Jurisdiction Represented: Cass County

Title and employer: Emergency Director / Cass County

Date: 02/06/2023 Contact email: rdlauer@hotmail.com Time Spent: _____

Please return your filled worksheet to mitigation@isws.illinois.edu

Survey Components/ Subcomponents		Yes/ No
Planning and regulatory Capability	Comprehensive Plan	Yes
	Capital Improvements Plan	Yes
	Economic Development Plan	Yes
	Emergency Operational Plan	Yes
	Floodplain Management Plan	Yes
	Storm Water Management Plan	
	Zoning Ordinance	Yes
	Subdivision Regulation/Ordinance	
	Floodplain Ordinance	Yes NFIP
	Building Codes	Yes
	National Flood Insurance Program	YES
	Community Rating System	?
	Other (if any)	
Administrative & Technical Capability	Planning Commission	Yes
	Floodplain Administration	Yes
	GIS Capabilities	YES

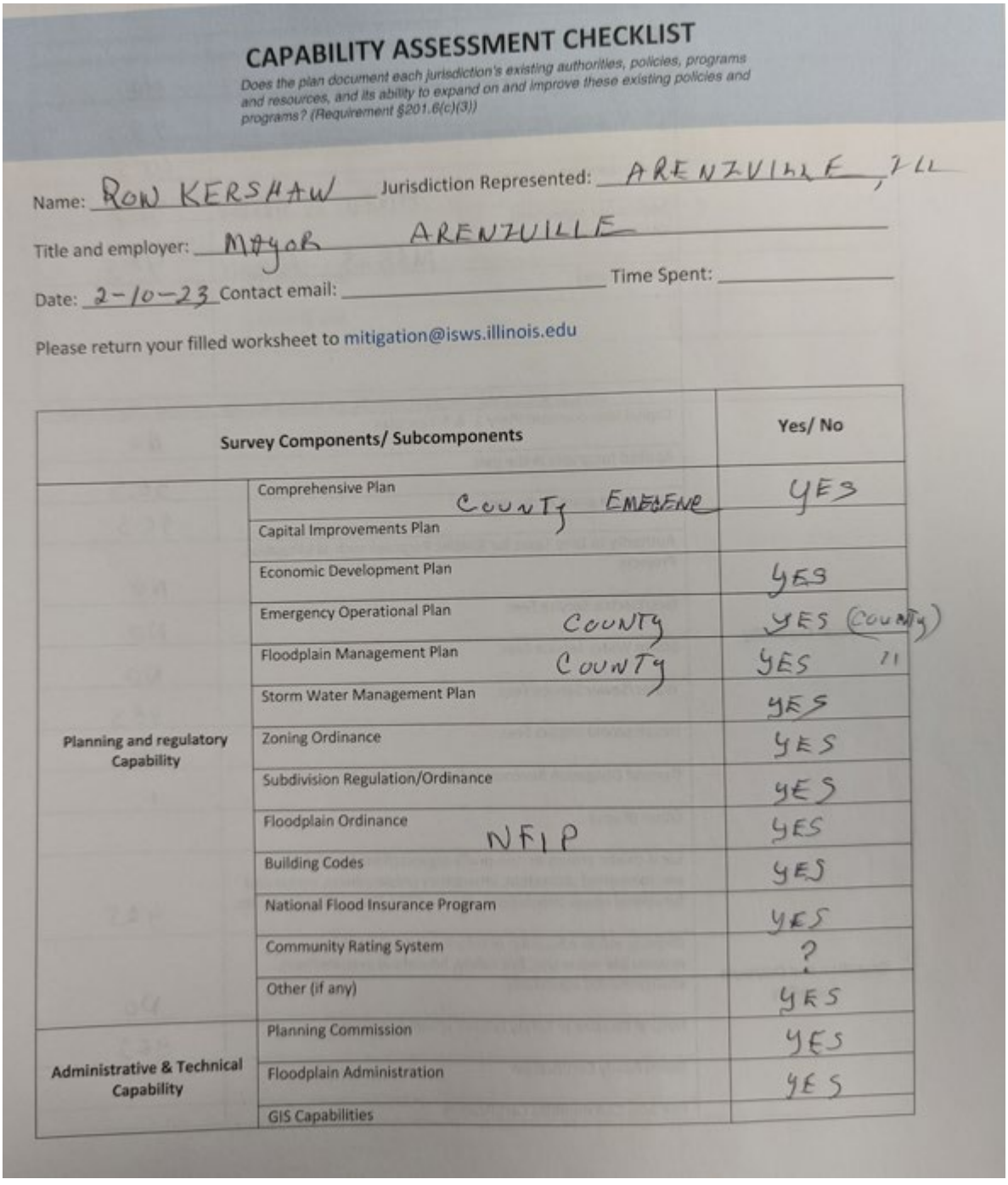
	Chief Building Official	Yes
	Civil Engineering	Yes
	Local Staff Who Can Assess Community's Vulnerability to Hazards	Yes
	Grant Manager Hire as needed	Yes
	Mutual Aid Agreement Other (if any)	yes
	Other (if any)	
Fiscal Capability	Capital Improvement Plan/ 1- & 5-Year plan	No
	Applied for grants in the past	Yes
	Awarded a grant in the past Very generic question	YES
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	No
	Gas/Electric Service Fees County seeks lesser rates for residents	
	Storm Water Service Fees	No
	Water/Sewer Service Fees	No
	Development Impact Fees to some extent via bonds	Yes
	General Obligation Revenue or Special Tax Bonds Have the authority but never have	
	Other (if any)	
Education and Outreach Capability	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	Yes
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	No
	Natural Disaster or Safety related school programs	No
	Storm Ready Certification	No
	Fire wise Communities Certification	?

Overall Capability	Limited/Moderate/High
Does the community have the financial resources needed to implement mitigation projects?	No
Does the community have the staff/expertise to implement projects?	Yes
Is there community support to implement projects?	Yes
Does the community staff have time to devote to hazard mitigation?	Yes

	Tree City USA	
	Other (if any)	

In case of any queries, please email us at mitigation@isws.illinois.edu

Arenzville Capability Assessment



CAPABILITY ASSESSMENT CHECKLIST

Does the plan document each jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

Name: RON KERSHAW Jurisdiction Represented: ARENZVILLE, IL

Title and employer: Mayor ARENZVILLE

Date: 2-10-23 Contact email: _____ Time Spent: _____

Please return your filled worksheet to mitigation@isws.illinois.edu

Survey Components/ Subcomponents		Yes/ No
Planning and regulatory Capability	Comprehensive Plan COUNTY EMERGENCY	YES
	Capital Improvements Plan	
	Economic Development Plan	YES
	Emergency Operational Plan COUNTY	YES (COUNTY)
	Floodplain Management Plan COUNTY	YES "
	Storm Water Management Plan	YES
	Zoning Ordinance	YES
	Subdivision Regulation/Ordinance	YES
	Floodplain Ordinance NFIP	YES
	Building Codes	YES
	National Flood Insurance Program	YES
	Community Rating System	?
	Other (if any)	YES
Administrative & Technical Capability	Planning Commission	YES
	Floodplain Administration	YES
	GIS Capabilities	

	Chief Building Official	No
	Civil Engineering	YES
	Local Staff Who Can Assess Community's Vulnerability to Hazards	YES
	Grant Manager HIRED AS NEEDED	YES
	Mutual Aid Agreement Other (if any) MABAS IPWMAN	YES
	Other (if any)	
Fiscal Capability	Capital Improvement Plan/ 1- & 5-Year plan	No
	Applied for grants in the past	YES
	Awarded a grant in the past	YES
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	NO
	Gas/Electric Service Fees	No
	Storm Water Service Fees	NO
	Water/Sewer Service Fees	YES
	Development Impact Fees	No
	General Obligation Revenue or Special Tax Bonds	1
	Other (if any)	
Education and Outreach Capability	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	YES
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	NO
	Natural Disaster or Safety related school programs	YES
	Storm Ready Certification	
	Fire wise Communities Certification	

Overall Capability	Limited/Moderate/High
Does the community have the financial resources needed to implement mitigation projects?	NO
Does the community have the staff/expertise to implement projects?	YES
Is there community support to implement projects?	YES
Does the community staff have time to devote to hazard mitigation?	YES

	Tree City USA	
	Other (if any)	

In case of any queries, please email us at mitigation@isws.illinois.edu

Ashland Capability Assessment

CAPABILITY ASSESSMENT CHECKLIST

Does the plan document each jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

Name: Kitty Mau Jurisdiction Represented: Village of Ashland

Title and employer: Village President

Date: 2-16- Contact email: ashland@casscom.com Time Spent: 10 min

Please return your filled worksheet to mitigation@isws.illinois.edu

Survey Components/ Subcomponents		Yes/ No
Planning and regulatory Capability	Comprehensive Plan	N
	Capital Improvements Plan	N
	Economic Development Plan	N
	Emergency Operational Plan	N
	Floodplain Management Plan	N
	Storm Water Management Plan	N
	Zoning Ordinance	N
	Subdivision Regulation/Ordinance	N
	Floodplain Ordinance	N
	Building Codes	N
	National Flood Insurance Program	N
	Community Rating System	N
	Other (if any)	N
Administrative & Technical Capability	Planning Commission	N
	Floodplain Administration	N
	GIS Capabilities	N

	Chief Building Official	N
	Civil Engineering	Y
	Local Staff Who Can Assess Community's Vulnerability to Hazards	Y
	Grant Manager	N
	Mutual Aid Agreement Other (if any)	Y
	Other (if any)	
Fiscal Capability	Capital Improvement Plan/ 1- & 5-Year plan	N
	Applied for grants in the past	N
	Awarded a grant in the past	N
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	N
	Gas/Electric Service Fees	
	Storm Water Service Fees	
	Water/Sewer Service Fees	
	Development Impact Fees	
	General Obligation Revenue or Special Tax Bonds	
	Other (if any)	
Education and Outreach Capability	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	Fire District Y
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	N
	Natural Disaster or Safety related school programs	N
	Storm Ready Certification	N
	Fire wise Communities Certification	N

Overall Capability	Limited/Moderate/High
Does the community have the financial resources needed to implement mitigation projects?	Y - Limited
Does the community have the staff/expertise to implement projects?	Y
Is there community support to implement projects?	Y
Does the community staff have time to devote to hazard mitigation?	Y

	Tree City USA	
	Other (if any)	

In case of any queries, please email us at mitigation@isws.illinois.edu

Beardstown Capability Assessment

CAPABILITY ASSESSMENT CHECKLIST

Does the plan document each jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

Name: Tim Harris Jurisdiction Represented: City of Beardstown

Title and employer: Major of the City of Beardstown

Date: 4-27-2023 Contact email: _____ Time Spent: _____

Please return your filled worksheet to mitigation@isws.illinois.edu

Survey Components/ Subcomponents		Yes/ No
Planning and regulatory Capability	Comprehensive Plan	??
	Capital Improvements Plan	?
	Economic Development Plan	Yes
	Emergency Operational Plan	Yes
	Floodplain Management Plan	Yes
	Storm Water Management Plan	Yes
	Zoning Ordinance	Yes
	Subdivision Regulation/Ordinance	Yes
	Floodplain Ordinance	Yes
	Building Codes	Yes
	National Flood Insurance Program	Yes
	Community Rating System	Goal
	Other (if any)	
Administrative & Technical Capability	Planning Commission	Yes
	Floodplain Administration	Yes
	GIS Capabilities	Yes
	Chief Building Official	Yes

	Civil Engineering	Yes
	Local Staff Who Can Assess Community's Vulnerability to Hazards	Yes
	Grant Manager	As needed
	Mutual Aid Agreement Other (if any)	Yes
	Other (if any)	
Fiscal Capability	Capital Improvement Plan/ 1- & 5-Year plan	Yes
	Applied for grants in the past	Yes
	Awarded a grant in the past	Yes
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	Yes
	Gas/Electric Service Fees	NO
	Storm Water Service Fees	NO
	Water/Sewer Service Fees	Yes
	Development Impact Fees	NO
	General Obligation Revenue or Special Tax Bonds	Yes As needed
	Other (if any)	
Education and Outreach Capability	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	Yes
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	NO
	Natural Disaster or Safety related school programs	Yes
	Storm Ready Certification	NO
	Fire wise Communities Certification	NO
	Tree City USA	NO
	Other (if any)	

Overall Capability	Limited/Moderate/High
Does the community have the financial resources needed to implement mitigation projects?	NO
Does the community have the staff/expertise to implement projects?	Yes
Is there community support to implement projects?	Yes
Does the community staff have time to devote to hazard mitigation?	Yes

In case of any queries, please email us at mitigation@isws.illinois.edu

Chandlerville Capability Assessment

CAPABILITY ASSESSMENT CHECKLIST

Does the plan document each jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

Name: Tim Richard Jurisdiction Represented: Chandlerville

Title and employer: Mayor, Village of Chandlerville

Date: 4-27-23 Contact email: tdrichard91@gmail.com Time Spent: 20 min

Please return your filled worksheet to mitigation@isws.illinois.edu

Survey Components/ Subcomponents		Yes/ No
Planning and regulatory Capability	Comprehensive Plan	yes.
	Capital Improvements Plan	?
	Economic Development Plan	?
	Emergency Operational Plan	yes
	Floodplain Management Plan	yes
	Storm Water Management Plan	NO
	Zoning Ordinance	yes
	Subdivision Regulation/Ordinance	N/A
	Floodplain Ordinance	yes
	Building Codes	yes
	National Flood Insurance Program	yes
	Community Rating System	yes
	Other (if any)	
Administrative & Technical Capability	Planning Commission	yes
	Floodplain Administration	yes
	GIS Capabilities	yes
	Chief Building Official	yes

	Civil Engineering	yes
	Local Staff Who Can Assess Community's Vulnerability to Hazards	yes
	Grant Manager	N/A
	Mutual Aid Agreement Other (if any)	yes
	Other (if any)	
Fiscal Capability	Capital Improvement Plan/ 1- & 5-Year plan	
	Applied for grants in the past	yes
	Awarded a grant in the past	yes
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	yes
	Gas/Electric Service Fees	NO
	Storm Water Service Fees	NO
	Water/Sewer Service Fees	yes
	Development Impact Fees	NO
	General Obligation Revenue or Special Tax Bonds	NO
	Other (if any)	
Education and Outreach Capability	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	yes
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	NO
	Natural Disaster or Safety related school programs	yes
	Storm Ready Certification	NO
	Fire wise Communities Certification	NO
	Tree City USA	NO
	Other (if any)	

Overall Capability	Limited/Moderate/High
Does the community have the financial resources needed to implement mitigation projects?	NO
Does the community have the staff/expertise to implement projects?	yes
Is there community support to implement projects?	yes
Does the community staff have time to devote to hazard mitigation?	yes

In case of any queries, please email us at mitigation@isws.illinois.edu

Virginia Capability Assessment

CAPABILITY ASSESSMENT CHECKLIST

Does the plan document each jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

Name: Randy McClure Jurisdiction Represented: Virginia

Title and employer: MAYOR

Date: 4-27-23 Contact email: cityofva@cassconn.com Time Spent: 6 HR.

Please return your filled worksheet to mitigation@isws.illinois.edu

Survey Components/ Subcomponents		Yes/ No
Planning and regulatory Capability	Comprehensive Plan	Yes
	Capital Improvements Plan	
	Economic Development Plan	Yes
	Emergency Operational Plan	Yes
	Floodplain Management Plan	Yes
	Storm Water Management Plan	Yes
	Zoning Ordinance	Yes
	Subdivision Regulation/Ordinance	Yes
	Floodplain Ordinance	Yes
	Building Codes	Yes
	National Flood Insurance Program	Yes
	Community Rating System	Yes
	Other (if any)	
Administrative & Technical Capability	Planning Commission	Yes
	Floodplain Administration	Yes
	GIS Capabilities	Yes
	Chief Building Official	Yes

	Civil Engineering	Yes
	Local Staff Who Can Assess Community's Vulnerability to Hazards	Yes
	Grant Manager	Yes
	Mutual Aid Agreement Other (if any)	Yes
	Other (if any)	N.A.
Fiscal Capability	Capital Improvement Plan/ 1- & 5-Year plan	Yes
	Applied for grants in the past	Yes
	Awarded a grant in the past	Yes
	Authority to Levy Taxes for Specific Purposes such as Mitigation Projects	Yes
	Gas/Electric Service Fees	No
	Storm Water Service Fees	No
	Water/Sewer Service Fees	Yes
	Development Impact Fees	No
	General Obligation Revenue or Special Tax Bonds	?
	Other (if any)	N.A.
Education and Outreach Capability	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. Ex. CERT Teams, Red Cross, etc.	Yes
	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	No
	Natural Disaster or Safety related school programs	Yes
	Storm Ready Certification	No
	Fire wise Communities Certification	No
	Tree City USA	No
	Other (if any)	N.A.

Overall Capability	Limited/Moderate/High
Does the community have the financial resources needed to implement mitigation projects?	No.
Does the community have the staff/expertise to implement projects?	Yes
Is there community support to implement projects?	Yes
Does the community staff have time to devote to hazard mitigation?	Yes

In case of any queries, please email us at mitigation@isws.illinois.edu

APPENDIX C: MEETING DOCUMENTS

C.1 Meeting 1 Documents

Meeting 1 Notes

Cass County Mitigation Planning Meeting Notes

Location: Virginia, IL

August 18, 2022 (6:30 PM)

Pre-Meeting Input:

- Roger said providing any mailing with his signature may have a bigger impact on attendance. Once he started calling each participant today's meeting attendance grew.
- JBS has language support services in various languages and would support the mitigation efforts within the Cass County.
- Beardstown has a radio program and small newspaper that could support getting the word out about the Mitigation Plan.
- Posts to the University of Illinois Extension website and social media accounts will support getting the word out about mitigation planning.
- Specific questionnaires in different languages and distributed through JBS would be beneficial to educate the public. (2000 plus employees at JBS).
- An additional School District Announcement about Mitigation can also reach parents throughout the county.
- Goals for the 2012 Mitigation Plan were shared with the group to discuss any changes or additions. The 2012 goals included: Lessen the impact of disasters, revise map, long-term strategies to educate, lessen impacts to residents and new and existing infrastructure.
- Roger suggested that the group create new goals for the updated plan.

New ideas identified during the meeting included: Developing an enhanced communication plan that bridges all languages spoken in the county. Ideas were:

1. Developing a goal to identifies educating the public,
2. Protecting the lives and health of residents.
3. Reduce the risk of life and property to natural disasters.
4. Protect and enhance your infrastructure. (Comment was made to have a survey of risks).
5. Develop and practice evacuation preparedness plan.

Other items discussed included the following points: Retrofit facilities, equip facilities to handle the secondary effects of flooding, wells, sand point and septic systems. Emergency sheltering: Roger said to look at a new sheltering facility in addition to the schools. One participant came up and stated that the old Jacksonville Mental Health facility could provide alternative sheltering with long-term planning.

Count of participants at this meeting: 23 people all jurisdictions except Ashland due to community event.

- Raise public awareness. Improve education of public officials and training.

- Compliance- Participants stated that census would show 5980 residents of Beardstown but estimates are around 12,000 population. Reports that many people would not fill out the census.
- 2 High Hazard dams were discussed in Cass County: Prairie Lake and Drake Lake. Virginia Lake Dam is a medium hazard. Group will need to reach out to the owner of dams on private property.

A discussion of what will happen at the November meeting was listed and meeting ended at 7:30 PM.

Meeting 1 Sign-In Sheet

Cass County Disaster Mitigation Planning Meeting #1 Sign-in Sheet
August 18, 2022 @ 6:30pm
St. Luke's Hall, 170 N. Main St., Virginia IL 62691

Name	Jurisdiction	Miles Traveled
Don Howell	Village of Arenzville	15
Rob Kershaw	Village of Arenzville Mayor	15
Jason Beck	Village of Arenzville	15
Marty + Dena Turner	Hager Slough + Lost Creek Drainage	~~15~~ 30
Charles Taylor	Clear Lake, Jobs Creek, South Sangamon	0.0 ~~10~~ 20
Gus Vermillion	City of Beardstown	~~15~~ 28
CLINT BREWER	CITY OF BEARDSTOWN	~~15~~ 28
Dave McMillan	IL Rural Water Assoc.	5
Randy McClure	City of Virginia	4
Stan Hoffman	Valley Drainage + Levee	15 x 2 = 30
Ross Cloninger	Village of Chandlerville	~~8~~ 16
Mekelle Neatherly	Virginia CUSD 64	2
Jennifer Russell	Univ. of IL Extension	51.5

C.2 Meeting 2 Documents

Meeting 2 Agenda

MEETING AGENDA

Cass County Hazard Mitigation Plan

Meeting #2 – Hazard Profiles and Risk Assessment

St. Luke's Hall, Virginia, IL

December 15, 2022

6-7 pm

1. Welcome and Overview (5 min)
2. Community Web Map and Survey (10 min)
3. Identifying Community Vulnerabilities (15 min)
4. Hazard Profiles and Risk Assessments (15 min)
5. Risk Assessment Activity by Jurisdiction (10 min)
6. Wrap-up – Community profile, survey, community web map, risk assessment (5 min)
7. Adjourn

Meeting 2 Notes

Cass County Meeting #2 – Hazard Mitigation Plan
December 15th, 2022 | 6:00pm – 7:00pm
St Luke's Parish Hall

KEY INFORMATION

1) **Every jurisdiction must provide comments on the web map**. You can view the map at https://arcg.is/1iGb9X and send comments to mitigation@isws.illinois.edu.
2) **Every jurisdiction must complete a capability assessment and a risk assessment.** These can both be found in the community packets made available to each jurisdiction or electronic copies can be requested.
3) **A community survey is available for anyone in the community to complete.** It can be found here: https://surveys.illinois.edu/sec/1096332169
4) All information for the hazard mitigation plan can be found here: https://arcg.is/1iGb9X

INTRODUCTION

To goal of this meeting is to review natural hazards that may impact the county and communities, identify community vulnerabilities that might affect risk, discuss the community web map, reflect on the history of hazards within the county, and discuss next steps necessary to move forward.

VULNERABILITIES

Jennifer Russell provided a presentation on vulnerable populations within Cass County. Information came from Headwaterseconomics.org, which provides datasets that help identify what vulnerabilities exist in your community including age, race, ethnicity, housing, poverty, young populations, and rental housing rates. While recognizing that the data is not 100% accurate, it can be used as a tool to start the conversation about these vulnerabilities that may still be here, but not at those numbers. Local employers can help with getting more accurate numbers.

Key Indicators shared during the presentation:

- Between 1970 and 2020, United States had the largest percent change inpopulation (61.7%), and Cass County, IL had the smallest (-16.2%).
- In 2021, United States had the highest unemployment rate (5.3%), and CassCounty, IL had the lowest (4.9%).
- In 2020, Cass County, IL had the largest percent of total jobs in agriculture(6.64%), and United States had the smallest (1.36%).

HAZARD PROFILES

Meirah Williamson spent time going through the different hazards (17 total) that will be included in the plan. Time was spent discussing that flash floods and ice storms occur at a higher rate than the state average in Cass County. It was noted that all of the record river levels have occurred in the last 5 years, indicating an increasing risk of flooding.

The recent tornado in 2021 led to a discussion on whether communities have shelters available for the public. While they do have sirens, they do not have any shelters they are aware of. They have designation spaces for response staging after an event and would be interested in grant opportunities to acquire a shelter for the community.

NEXT STEPS

Meirah discussed the risk assessment activity and emphasized what should be focused on when doing the risk assessment, and how to fill it out using probability scores and severity scores (Risk = probability x severity).

Meirah also demonstrated how to use the community web map and where individuals can add comments. If any essential facilities are not included on the map, individuals can add them or share that information with us at mitigation@isws.illinois.edu.

The community survey is available for any community member to fill out, and can be found here: https://surveys.illinois.edu/sec/1096332169. A discussion on how to share this information with

community members included utilizing the health department, Facebook pages, the county website, the Jacksonville radio station, as well as including it on the Casscomm bill.

CONCLUDING REMARKS

The web map is on the website (https://arcg.is/1iGb9X). Please feel free to provide comments to mitigation@isws.illinois.edu.

Meeting 2 Sign-In Sheet

ATTENDEES

Attendee	Representation
Jennifer Russell	
Meirah Williamson	Illinois State Water Survey (ISWS)
Camden Arnold	ISWS
Ramona Douglass	
Tim	
Roger	
Dave McMillan	IRWA

C.3 Meeting 3 Documents

Meeting 3 Agenda

MEETING AGENDA

Cass County Hazard Mitigation Plan

Meeting #3 – Mitigation Goals and Projects

St. Luke's Hall, Virginia, IL

February 16, 2023

6-7 pm

1. Pre-meeting (5:45pm): Fill out **risk assessment** (15 min)
2. Welcome and overview (5 min)
3. Hazard mitigation goals (15 min)
4. Hazard mitigation projects (20 min)
5. Jurisdictional mitigation projects breakout (15 min)
6. Wrap-up and adjourn (5 min)

Meeting 3 Notes

Cass County Meeting #2 – Hazard Mitigation Plan
February 16, 2023 | 6:00pm – 7:00pm
St. Luke's Hall
KEY INFORMATION

1) **Every jurisdiction must provide comments on the web map**. You can view the map at https://arcg.is/1iGb9X and send comments to mitigation@isws.illinois.edu.
2) **Every jurisdiction must complete a capability assessment and a risk assessment.** These can both be found in the community packets made available to each jurisdiction or electronic copies can be requested.
3) **A community survey is available for anyone in the community to complete.** It can be found here: https://surveys.illinois.edu/sec/1096332169
4) All information for the hazard mitigation plan can be found here: https://arcg.is/1iGb9X

INTRODUCTION

Overviewed hazards addressed in 2023 Cass County HMP

2012 MITIGATION GOALS

Cass County could potentially add a **Goal 4** that is based around protecting people.
Roger noted that it seems redundant to add a goal
ROGER – PROGRESS ON 2012 PROJECTS
See 2012 mitigation goals sheet

MITIGATION STRATEGIES

ISWS will call individual communities over the next couple weeks.
Each community must have a FEMA fundable project. You don't have to do the project, but this makes you eligible for funding. FEMA wants you thinking about how you can use their funding. BRIC funding – over $3 billion this fiscal year. Rural Illinois has crumbling infrastructure. Choose some projects; a FEMA fundable project and ones that people are willing to work on; what can you practically do?
Communication can be very valuable; best benefit-cost ratio; public meetings, information dissemination
Building codes

- Hurricane strapping for modular/mobile homes
- Storm water: in addition to culverts, what can you build to prevent flooding? FEMA is encouraging nature based solutions and they're often cost effective

Promoting sound land use

- Do you have agricultural land, industrial land, residential land, or wetlands/nature preserves?
- Make sure people aren't draining wetlands, contaminating groundwater. There will likely be more unpredictable spotty storms

Structural retrofits

- Wind resistant buildings

Flood proofing retrofits

- Elevate properties
- Have lower floors unfinished, easy to hose out
- Relocation: move the whole town
- No elevated properties along the IL River that anyone knows of
- Levees/floodwalls
- Demolition

NFIP

- All communities are part of the NFIP and in good standing.

Informing the public

- Work through churches, talk about preparedness on local radio stations, keep elderly folks safe and prepared during severe weather, work with assisted living communities
- FEMA provides free information in February and March on preparedness; go to fema.gov for online resources
- Partner with Extension, Red Cross, other community groups. Think about what you'd like to educate your community about, and work with local groups at little to no cost

    - Pillowcase Project, Ready in the Middle
    - Kids are an excellent resource to get parents thinking about preparedness
- Community exercises: do nursing homes, other residents know how to evacuate during a disaster?
    - Who would lead post-disaster recovery?
- CERT team in the county?
    - Activate CERT team from IEMA; Cass is close to Springfield
    - Roger can access people who can train on CERT

Stormwater infrastructure

- Detention/retention ponds, rain gardens
- Permeable pavers – water drains between cracks

Plan implementation

- You need to know what you want to do in the community and activate the plan. Put projects in the plan that are doable and that you want to do. Education is very accessible and low cost.

FEMA fundable projects

- Buyout on property at dangerous intersection; likely funded by IDOT, but could be FEMA fundable
- Not all projects have to be FEMA fundable; put projects on list and apply to other agencies, such as USDA Rural Development, which will pay for, e.g., rural sirens
- Sirens are useful, but phone apps are useful too
    - Do phone apps count? No, but they should be added to the plan. FEMA will pay for room hardening, nature-based solutions. BRIC has funding ideas
- Population is getting older – people don't use Facebook, cellphones; TV is likely the only media that can reach people
- All Ashland needs is a siren; create an outreach system where people check on each other, possibly through an agency
- Water Survey will have a list of projects funded by BRIC
- Every community is different. Think about projects and systems that will best serve your community

Think outside the box for funding that exists in

Unmet Needs Committee

- There are funding streams/foundations that will be given to these committees that won't be given to government agencies
- Could create coed with Long Term Recovery Committee, Funding/Donations Committee

CONCLUDING REMARKS

The web map is on the website (https://arcg.is/CCG4q1). Please feel free to provide comments to mitigation@isws.illinois.edu.

Meeting 3 Sign-In Sheet

ATTENDEES

Attendee	Representation
Jennifer Russell	Illinois Extension
Dustin Fritsche	Illinois Extension
Carrie McKillip	Illinois Extension
Meirah Williamson	Illinois State Water Survey (ISWS)
Camden Arnold	ISWS
Roger Lauder	Cass County ESDA

C.4 Meeting 4 Documents

Meeting 4 Agenda

CASS COUNTY HMP UPDATE – MEETING 4 – PROJECTS AND PLAN REVIEW

Meeting Location:	In-Person, Virtual Available
Date & Time:	Thursday September 14, 2023 6:00PM – 7:00PM
Location:	St. Luke's Hall 170 N Main St, Virginia, IL 62691
Virtual Meeting Link:	https://illinois.zoom.us/j/89327227353?pwd=MHBLd2hPSDF1dkJmUEp1U0F4NGI1UT09 **Meeting ID**: 893 2722 7353 **Password**: 302077

AGENDA DETAILS

I. WELCOME AND OVERVIEW

II. PROJECT RECAP

III. MITIGATION PROJECTS

IV. PLAN REVIEW

V. PLAN MAINTENANCE/UPDATES

VI. NEXT STEPS

VII. WRAP UP

Meeting agendas, minutes, and materials will be stored on the Cass County HMP Update Webpage

VIII. ADJOURN

Meeting 4 Notes

CASS COUNTY HMP UPDATE – MEETING 4 – PROJECTS AND PLAN REVIEW

Meeting Location:	In-Person, Virtual Available
Date & Time:	Thursday September 14, 2023 6:00PM – 6:45PM
Location:	St. Luke's Hall 170 N Main St, Virginia, IL 62691
Virtual Meeting Link:	https://illinois.zoom.us/j/89327227353?pwd=MHBLd2hPSDF1dkJmUEp1U0F4NGI1UT09 **Meeting ID:** 893 2722 7353 **Password:** 302077

KEY INFORMATION

1) **Every jurisdiction must provide comments on the hazard mitigation plan**. You can view the plan at https://www.illinoisfloodmaps.org/hazard-mit-plans-cass.aspx and send comments to mitigation@isws.illinois.edu.
2) **Every jurisdiction must discuss a plan maintenance strategy.** This includes monitoring mitigation projects, evaluating the plan's usefulness, and preparing to update the plan in 2028. These actions should be undertaken at least once a year. See PLAN MAINTENANCE for more information.
3) **Every jurisdiction must adopt the plan.** This can be done by formal resolution, council minutes, or other adoptions allowed under local law.
4) Every participating jurisdiction will be eligible for federal mitigation funds.

AGENDA DETAILS

I. WELCOME AND OVERVIEW

The goal of this meeting is to review the natural hazard mitigation plan draft along with projects created by each community.

II. PROJECT RECAP

The four Mitigation Goals were reviewed. It was noted that the last goal (#4) is a requirement from FEMA. The list of hazards included in the plan was reviewed.

Participation - all communities have met the participation requirements thus far! The next action required from each community is to comment on the draft plan, or a response noting that there are no comments. Send all comments to mitigation email address.

The risk assessment results were reviewed. Pandemic was ranked highest, then hazmat, tornado, and hail. There was a question as to how the scores were calculated. The scores were a summary of the risk ranking sheets filled out by the communities. The high score of pandemic was questioned, and ISWS agreed to double-check the sheets provided.

Last, the hazard summary table was reviewed.

III. MITIGATION PROJECTS

The Mitigation Projects were reviewed. The text on the slides was small and not easy to read, so printed copies were provided. Questions included:

- Can you expand on FEMA funding for a generator?
    - HGMP and BRIC grants may be used for this. A generator by itself is not fundable, but something like building a tornado safe room that includes a generator could count
- What's the community rating system?
    - CRS is a voluntary program run by FEMA that communities can join in order to reduce NFIP premiums for citizens. Typically, a floodplain manager does the work for this. ISWS has received funding to be able to help communities with this as well (no contracts required).
- Beardstown's mitigation project list shows "acquire reverse 911 system"… But it should say 'revise', not reverse.
    - This is a good example of a comment. Write this on the sheet and ISWS will correct the plan.

IV. PLAN REVIEW

The draft plan was presented to those in attendance. It is available online on the Cass County HMP Update Webpage. All are welcome to review and provide comments on the plan. The webpage and the digital version of the HMP were shown on the screen. There was a suggestion to make a separate file of just the mitigation projects section available.

V. PLAN MAINTENANCE/UPDATES

Cass County's Hazard Mitigation Plan must be updated every five years (next update will be in 2028/2029). Plan maintenance includes:

- Monitoring: develop a process to track progress and status of mitigation projects
- Evaluating: develop criteria to determine if the plan is effective
- Updating: decide where, when, and who will participate in monitoring, evaluating, and the 2028 update process; check-ins should happen yearly
    - For example, the mayor, county clerk, or EMA could check in on mitigation project status every year
    - Or, jurisdictions can send one representative to a yearly group meeting called by the EMA to discuss mitigation projects and progress

Attendees agreed that Emergency Manager, Roger Lauder, will initiate check ins with each community during their yearly reports. At this time, information about upcoming grant opportunities can also be shared with the communities.

There is no formal submission required for the maintenance meetings, but ISWS would appreciate a communication letting them know the meeting occurred. Keeping a list or spreadsheet of which mitigation projects have been started/completed was suggested.

VI. NEXT STEPS

The community survey is available for any community member to fill out, and it can be found here: https://surveys.illinois.edu/sec/1096332169.

The draft plan can be found on the Cass County HMP Webpage, all are welcome to comment on the plan, each jurisdiction must provide comments: https://www.illinoisfloodmaps.org/hazard-mit-plans-cass.aspx

Once feedback has been submitted from each community, the plan will be sent to IEMA and FEMA for review. Assuming all reviews are passed, it's anticipated that communities will be asked to adopt the plan starting in January 2024. Adoptions can occur through whatever method each community normally uses to adopt formal plans.

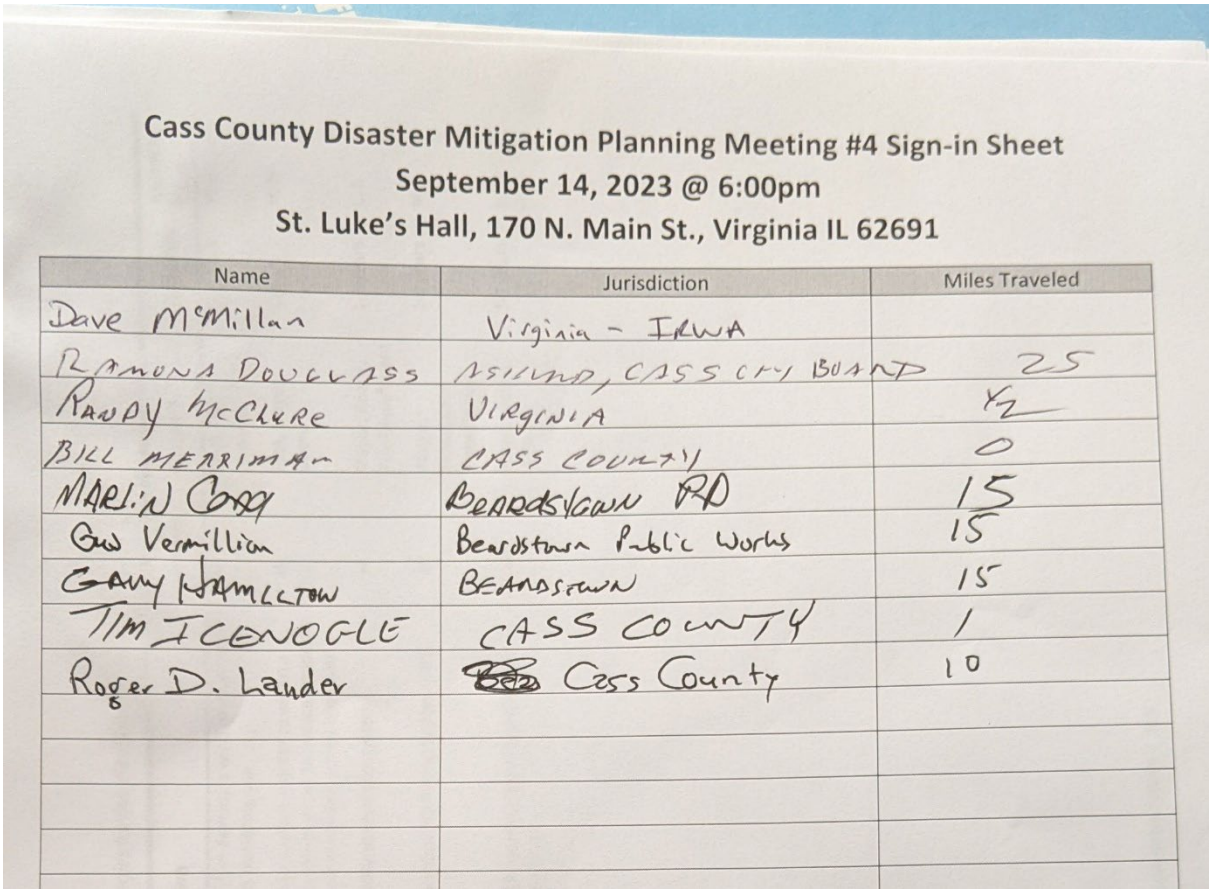
VII. WRAP UP

Meeting agendas, minutes, and materials will be stored on the Cass County HMP Update Webpage

VIII. ADJOURN

Meeting adjourned at 6:30 PM.

Meeting 4 Sign-In Sheet



Cass County Disaster Mitigation Planning Meeting #4 Sign-in Sheet
September 14, 2023 @ 6:00pm
St. Luke's Hall, 170 N. Main St., Virginia IL 62691

Name	Jurisdiction	Miles Traveled
Dave McMillan	Virginia - IRWA	
RAMONA DOUGLASS	ASHLAND, CASS CTY BOARD	25
RANDY McCLURE	VIRGINIA	½
BILL MERRIMAN	CASS COUNTY	0
MARLIN COOK	BEARDSTOWN RD	15
Gus Vermillion	Beardstown Public Works	15
GARY HAMILTON	BEARDSTOWN	15
TIM ICENOGLE	CASS COUNTY	1
Roger D. Lander	Cass County	10

APPENDIX D: PUBLIC INPUT SUMMARY

Comments were incorporated into the plan where applicable.

Comment Type	Comment
Comment from Jurisdiction	Error on page 28, the number of fire protection districts need to be indicated
Comment from Jurisdiction	The school district is in the process of putting together a Strategic Plan
Comment from Jurisdiction	Plan should be dated for 2024, unlikely to be adopted in 2023
Comment from Jurisdiction	Error on page 62, essential facilities listed are inaccurate
Comment from Jurisdiction	Error on page 48, spelling of employer inaccurate
Comment from Jurisdiction	Flooding should be higher on risk ranking
Comment from Jurisdiction	ISO rating for Virginia not listed correctly
Comment from Jurisdiction	Error on page 44, building exposure by community is inaccurate
Comment from Jurisdiction	Overall pleased with networking and structure of the planning process
Comment from Jurisdiction	Surprised that riverine flooding isn't higher on the risk ranking list
Comment from Jurisdiction	Sirens and warning systems should be added to mitigation project grids
Comment from Jurisdiction	Removal of abandoned or unoccupied buildings should be added to mitigation project grids
Comment from Jurisdiction	The mitigation planning process was interesting and thorough. Roger Lauder was great at keeping everyone informed

APPENDIX E: PUBLIC NOTIFICATIONS

Meeting 4 Public Notifications

Press Release

Immediate Press Release

Final Public Meeting To Discuss Cass County Local Hazard Mitigation Plan Set For September 14

Cass County along with the participating jurisdictions of Arenzville, Ashland, Beardstown, Chandlerville, and Virginia will be having their final public meeting on September 14, 2023, from 6-7 pm at St. Luke's Hall (170 N Main St, Virginia, IL 62691). The purpose of this meeting is to review hazard mitigation projects identified by each jurisdiction, discuss plan maintenance and future updates, and review the draft FEMA Hazard Mitigation Plan (HMP). If you are unable to go to the final meeting and want to make a comment, please email the Illinois State Water Survey at mitigation@isws.illinois.edu. Please visit the Cass County HMP webpage to access a virtual option.

Check out the Cass County HMP webpage for more information: https://www.illinoisfloodmaps.org/hazard-mit-plans-cass.aspx

All participating jurisdictions have been working with the Cass County Emergency Services & Disaster Agency, University of Illinois Extension, and the Illinois State Water to develop a plan that offers practical approaches for how communities can engage in effective planning to reduce long-term risk from natural hazards and disasters.

Under the Disaster Mitigation Act of 2000, the Federal Emergency Management Agency (FEMA) requires communities to develop a mitigation plan to minimize or eliminate the long-term risk to human life and property from known hazards. Mitigation is defined by FEMA as sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. Hazards that may pose risk and potentially result in disaster include but are not limited to flood, drought, severe storms, winter weather, tornado, and earthquake. Communities with a FEMA-approved plan are eligible for certain grant funding under the Hazard Mitigation Assistance (HMA) program to fund critical projects such as buyouts and structural elevation of repetitive flood loss structures, drainage projects and hardening critical facilities to minimize future damage from disasters that affect Cass County. Additional funds are also available post-disaster.

Planning meetings were held August 18, 2022, December 15, 2022, February 16, 2023, and April 27, 2023 in order to assist the Local Planning Team in identifying and analyzing potential hazards affecting residents. Possible actions were recommended to reduce hazard impact throughout Cass County and its communities. Once public comments are obtained, the plan will be submitted to FEMA for approval. It normally takes from 3-6 months for FEMA review. Upon FEMA approval, the plan will come back to each jurisdiction for final adoption to become the official Cass County Hazard Mitigation Plan. The plan is required by FEMA to be reviewed and updated every five years.

E-Flyer

Cass County Hazard Mitigation Plan
Final Public Meeting

We want to hear from you! Please join us on:

September 14, 2023

6:00-7:00pm

St Lukes Hall

170 N. Main St., Virginia, IL

Scan QR code to visit website with more information

Virtual attendance option available on website

APPENDIX F: ESSENTIAL FACILITIES

Emergency Operations Center

Name of Facility	Location
Cass County Emergency Operations Center	Virginia

Police Stations

Name of Facility	Location
Ashland Police Department	Ashland
Beardstown Police Department	Beardstown
Cass County Sheriffs Office	Virginia
Chandlerville Police Department	Chandlerville
Virginia Police Department	Virginia

Fire Facilities

Name of Facility	Location
Arenzville Volunteer Fire Department	Arenzville
Ashland Volunteer Fire Department	Ashland
Beardstown Fire Department	Beardstown
Chandlerville Volunteer Fire Department	Chandlerville
Virginia Volunteer Fire Department	Virginia

Medical Facilities

Name of Facility	Location
Cass County Health Clinic	Beardstown
Taylor Clinic	Beardstown
Cass County Health Clinic	Virginia

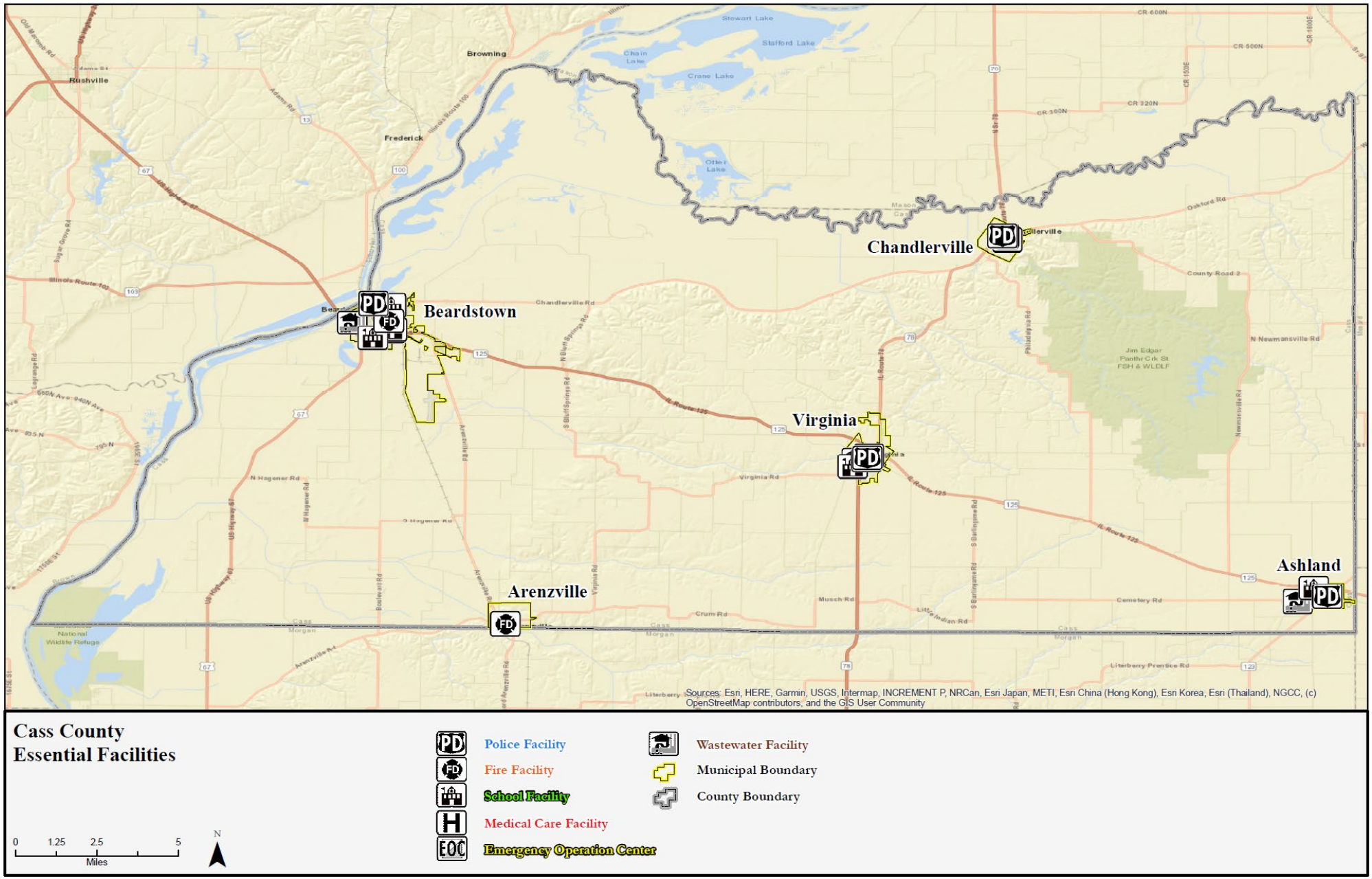
School Facilities

Name of Facility	Location
Trinity Lutheran School	Arenzville
A-C Central Middle School	Ashland
A-C Central High School	Ashland
Beardstown Christian Academy	Beardstown
Beardstown Jr/Sr High School	Beardstown
Grand Ave School	Beardstown
Gard Elementary School	Beardstown
A-C Central Elementary School	Chandlerville
Virginia Elem School	Virginia
Virginia Jr/ Sr High School	Virginia

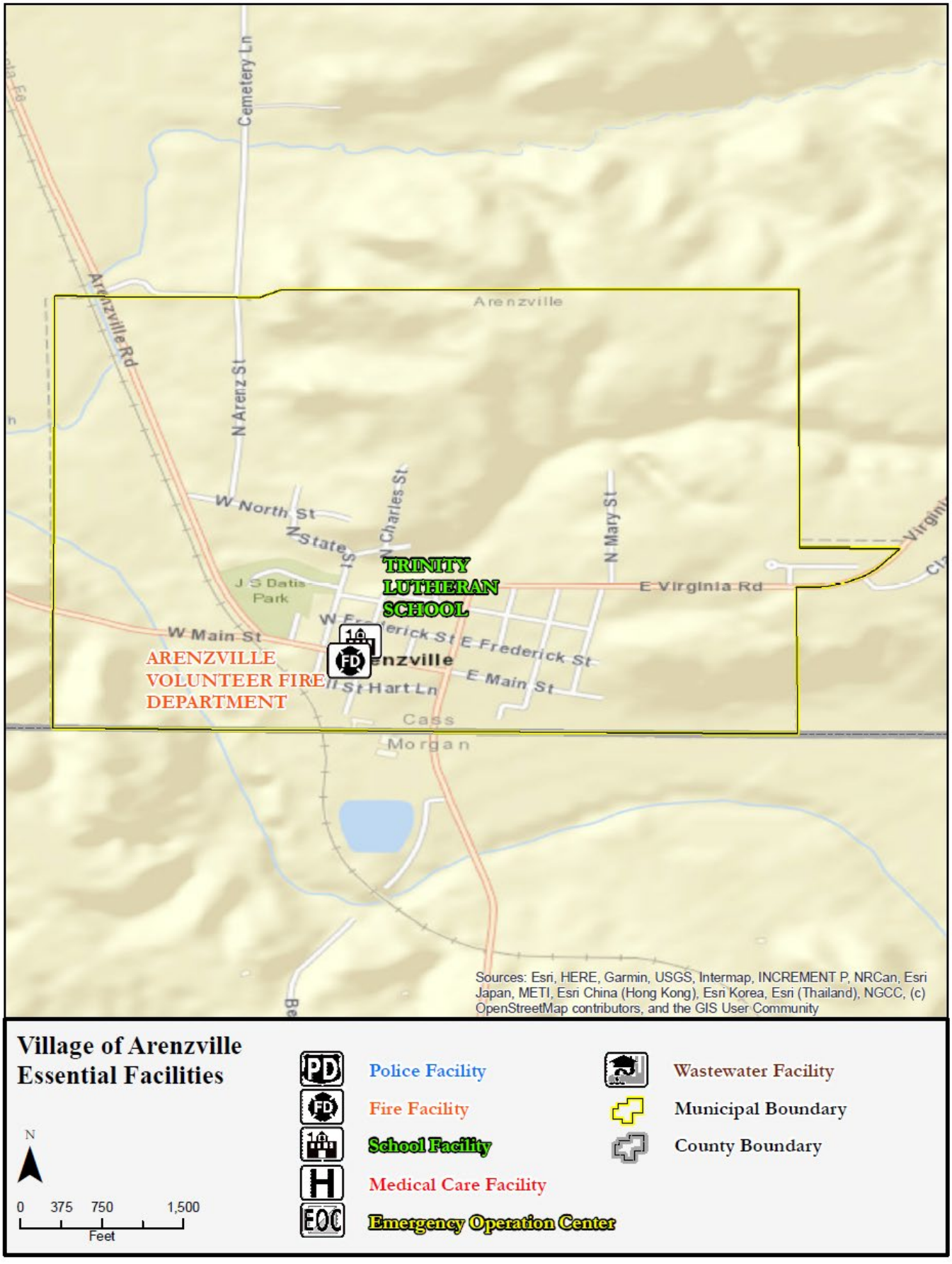
Waste Water Facilities

Name of Facility	Location
Ashland STP, Village of	Ashland
Beardstown SD STP	Beardstown
Virginia STP, City of	Virginia

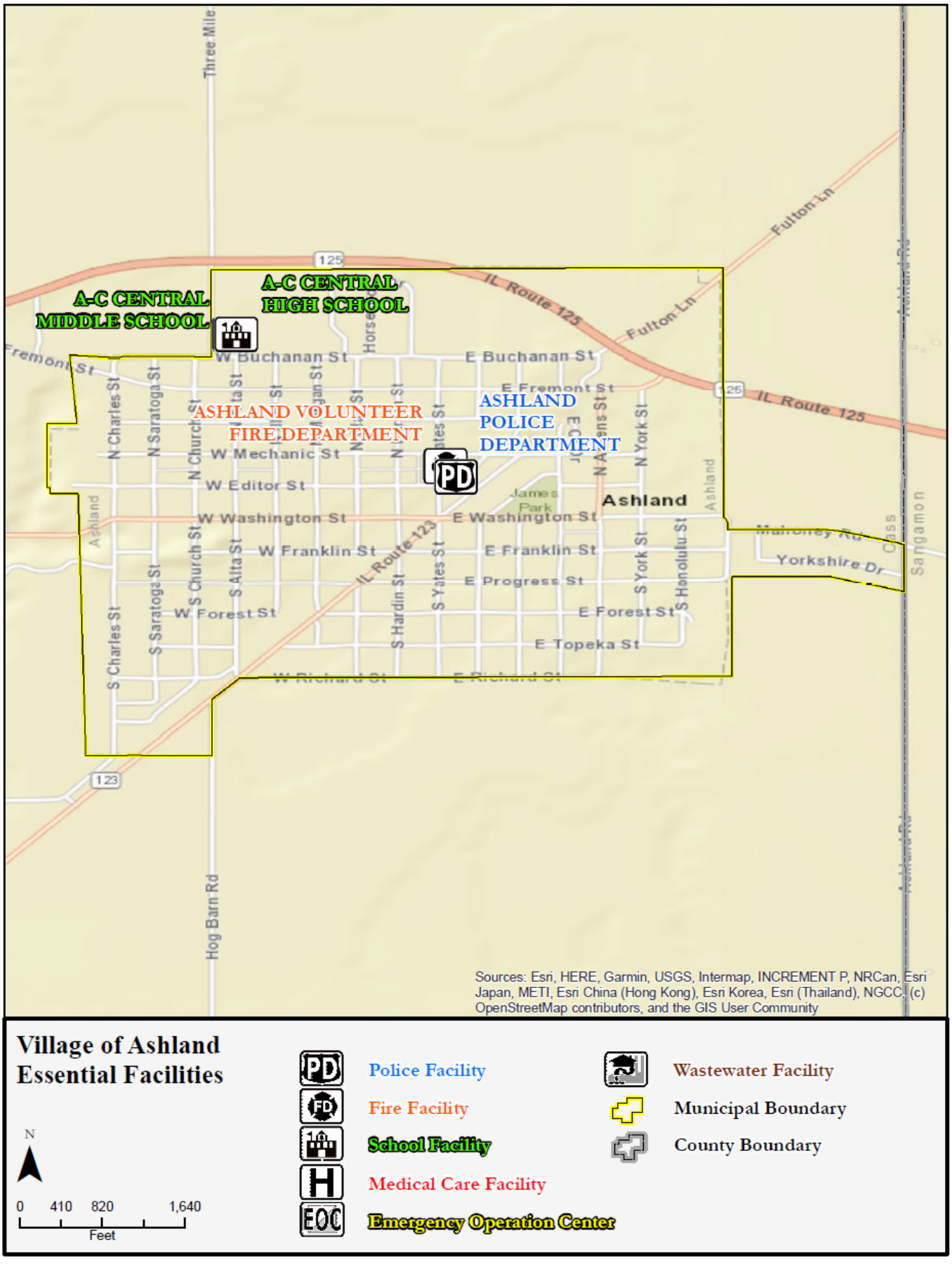
Cass County Essential Facilities Map



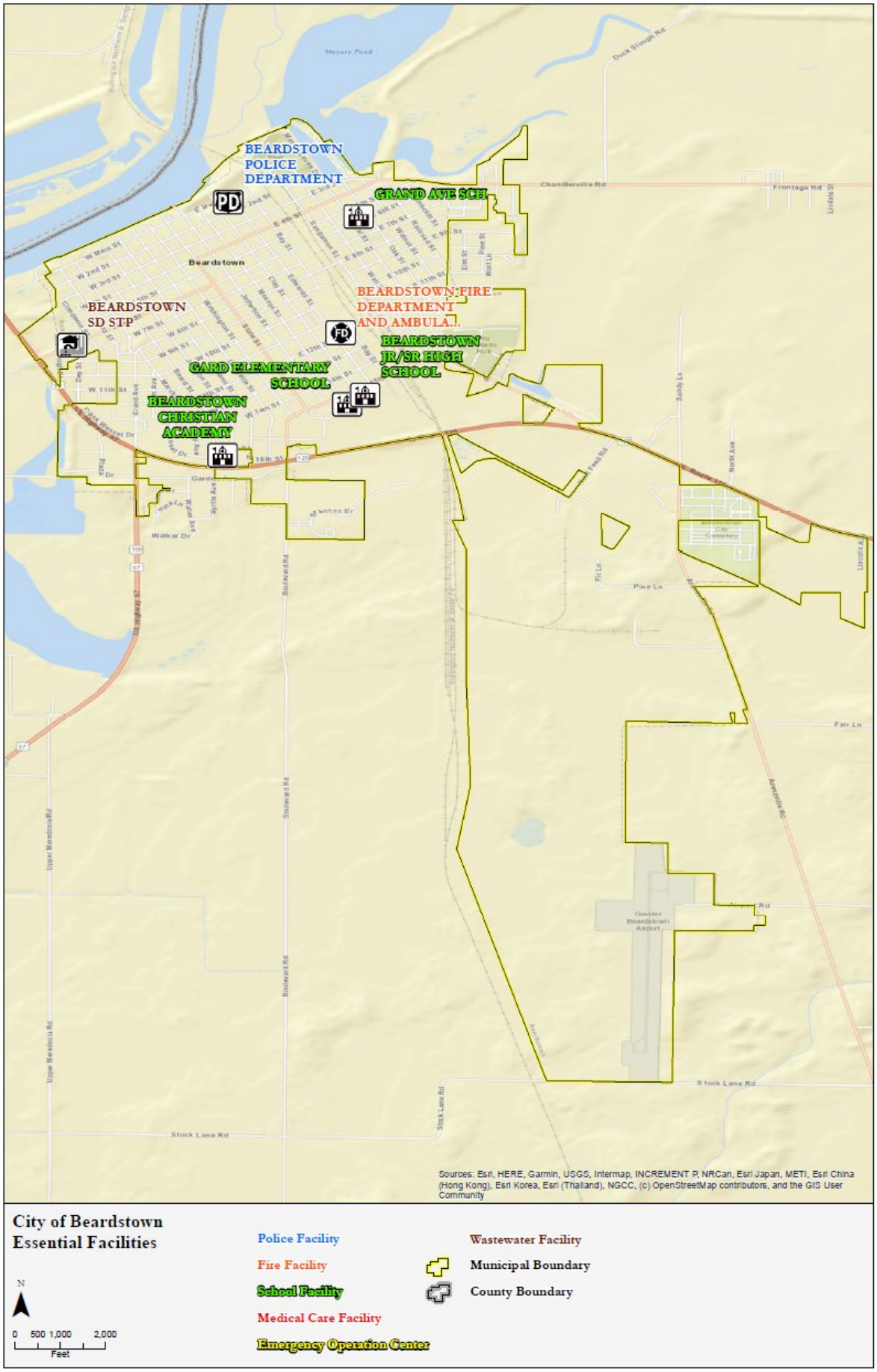
Arenzville Essential Facilities Map



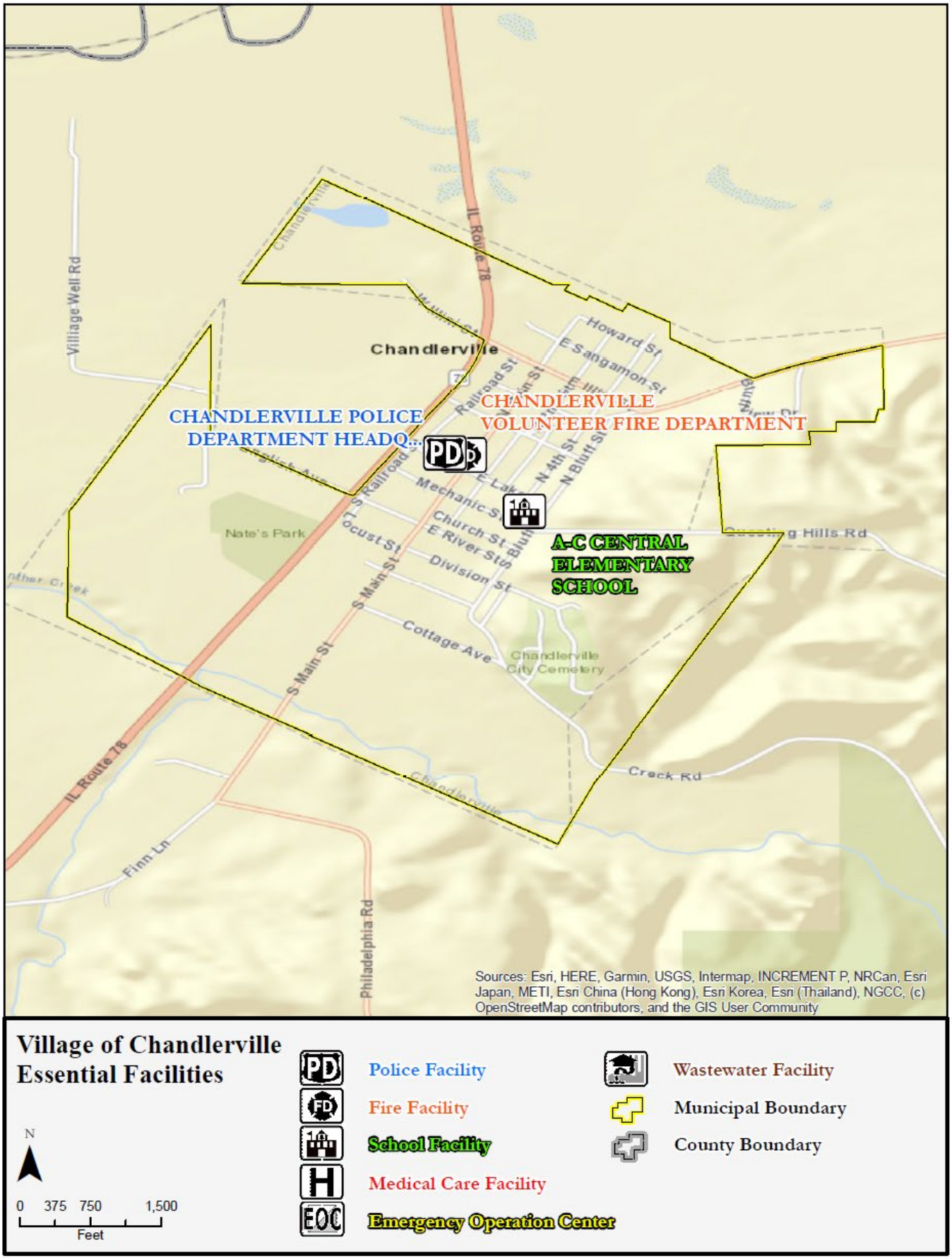
Ashland Essential Facilities Map



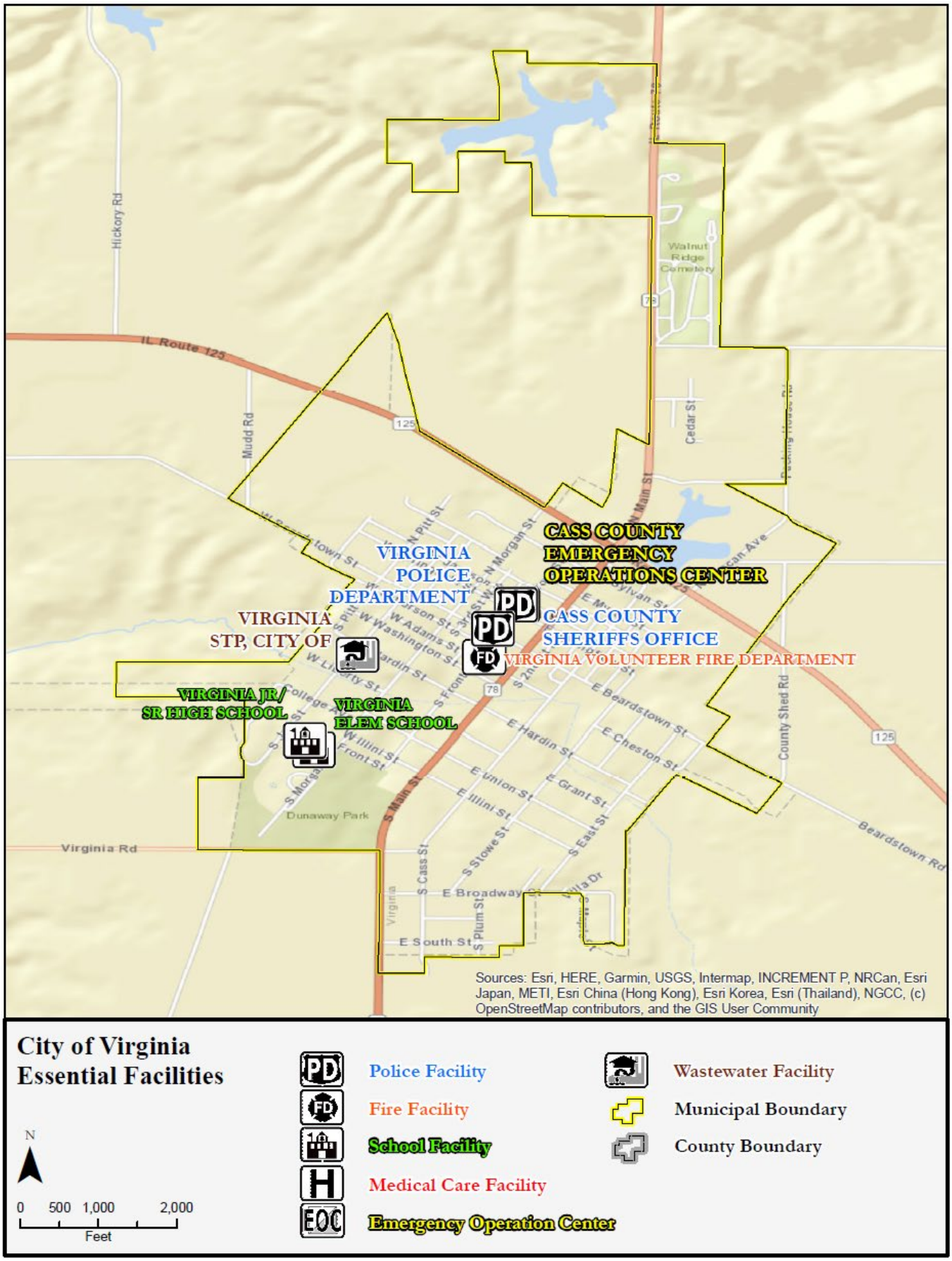
Beardstown Essential Facilities Map



Chandlerville Essential Facilities Map



Virginia Essential Facilities Map



APPENDIX G: ADOPTION RESOLUTIONS

FEMA Approval Pending Adoption Letter

U.S. Department of Homeland Security
FEMA Region 5
536 S. Clark St. 6th Floor
Chicago, IL 60605

FEMA

January 23, 2024

Zachary Krug
Hazard Mitigation Section Manager
Illinois Emergency Management Agency
1035 Outer Park Drive
Springfield, IL 62704

Dear Mr. Krug,

Thank you for submitting the Cass County, Illinois Hazard Mitigation Plan 2024 update for our review. The plan was reviewed based on the local plan criteria contained in 44 CFR Part 201, as authorized by the Disaster Mitigation Act of 2000. The Cass County, Illinois Hazard Mitigation Plan 2024 met the required criteria for a multi-jurisdiction hazard mitigation plan. Formal approval of this plan is contingent upon the adoption by the participating jurisdictions of this plan. Once FEMA Region 5 receives documentation of adoption from the participating jurisdictions, we will send a letter of official approval to your office.

An approved local mitigation plan, including adoption by the local government, is one of the conditions for applying for and/or receiving FEMA mitigation grants from the following programs:

- Hazard Mitigation Grant Program (HMGP)
- HMGP Post-Fire
- Building Resilient Infrastructure and Communities
- Flood Mitigation Assistance

Please note that participating jurisdictions that adopt the plan more than one year after APA status has been issued must either:

- Validate that their information in the plan remains current with respect to both the risk assessment (no recent hazard events, no changes in development) and their mitigation strategy (no changes necessary); or
- Make the necessary updates before submitting the adoption resolution to FEMA.

We look forward to receiving the adoption resolution(s) and discussing options for implementing this mitigation plan. If there are any questions from either you or the communities, please contact Maria Freeman at (202) 793-0810 or email at maria.freeman@fema.dhs.gov.

Sincerely,

JOHN A WETHINGTON

Digitally signed by JOHN A WETHINGTON
Date: 2024.01.23 12:55:09 -06'00'

John Wethington
Chief, Risk Analysis Branch
Mitigation Division

www.fema.gov

FEMA Approval Letter

U.S. Department of Homeland Security
FEMA Region 5
536 S. Clark St. 6th Floor
Chicago, IL 60605

FEMA

March 5, 2024

Zachary Krug
Hazard Mitigation Section Manager
Illinois Emergency Management Agency
1035 Outer Park Drive
Springfield, IL 62704

Dear Mr. Krug,

The Cass County, Illinois Hazard Mitigation Plan 2024 was reviewed based on the local plan criteria contained in 44 CFR Part 201, as authorized by the Disaster Mitigation Act of 2000. The Cass County, Illinois Hazard Mitigation Plan 2024 met the required criteria for a multi-jurisdictional hazard mitigation plan and the plan is now approved for: Arenzville village, Ashland village, Beardstown city, Cass County, Chandlerville village, & Virginia city.

The expiration date of the Cass County, Illinois Hazard Mitigation Plan 2024 is five years from the date of this letter.

An approved local mitigation plan, including adoption by the local government, is one of the conditions for applying for and/or receiving FEMA mitigation grants from the following programs:

- Hazard Mitigation Grant Program (HMGP)
- HMGP Post-Fire
- Building Resilient Infrastructure and Communities
- Flood Mitigation Assistance

Having an approved mitigation plan does not mean that mitigation grant funding will be awarded. Specific application and eligibility requirements for the programs listed above can be found in each FEMA grant program's respective policies and annual Notice of Funding Opportunities, as applicable.

To avoid a lapsed plan, the next plan update must be approved before the end of the approval period, including adoption by the participating jurisdictions. Before the end of the approval period, please allow sufficient time to secure funding for the update, including the review and approval process. Please include time for any revisions, if needed, and for your jurisdiction to formally adopt the plan after the review, if not adopted prior to submission. This will enable you to remain eligible to apply for and receive funding from FEMA's mitigation grant programs with a mitigation plan requirement. Local governments, including special districts, with a plan status of "Approvable Pending Adoption" are not eligible for FEMA's mitigation grant programs with a mitigation plan requirement.

We look forward to discussing options for implementing this mitigation plan. If there are any questions from either you or the communities, please contact Maria Freeman at (202) 793-0810 or email at maria.freeman@fema.dhs.gov.

Sincerely,

JOHN A WETHINGTON

Digitally signed by JOHN A WETHINGTON
Date: 2024.03.05 12:51:30 -06'00'

John Wethington
Chief, Risk Analysis Branch
Mitigation Division

Cass County Adoption Resolution

Adoption Resolution

County of Cass

ILLINOIS

RESOLUTION NO. 02-2024

A RESOLUTION OF THE COUNTY OF CASS ADOPTING THE

CASS COUNTY HAZARD MITIGATION PLAN – February 2024

WHEREAS the Cass County Chair Person and the Cass County Board recognizes the threat that natural hazards pose to people and property within County of Cass; and

WHEREAS the County of Cass has prepared a multi-hazard mitigation plan, hereby known as *Cass County Hazard Mitigation Plan – February 2024* in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS *Cass County Hazard Mitigation Plan – February 2024* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Cass County from the impacts of future hazards and disasters; and

WHEREAS adoption by the Cass County Chair Person and the Cass County Board demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the *Cass County Hazard Mitigation Plan – February 2024.*

NOW THEREFORE, BE IT RESOLVED BY THE, COUNTY OF CASS ILLINOIS, THAT:

Section 1. In accordance within their local rule for adopting resolutions, Cass County Chair Person and the Cass County Board adopts the *Cass County Hazard Mitigation Plan – February 2024.*

ADOPTED by a vote of 10 in favor and 0 against, and 0 abstaining, this 12th day of February 2024.

By: Bill Mentzer
(print name)

ATTEST:

By: Shelly Wessel
(print name)

APPROVED AS TO FORM:

By: _____
(print name

Arenzville Adoption Resolution

Adoption Resolution

Village of Arenzville

ILLINOIS

RESOLUTION NO. _____

A RESOLUTION OF THE VILLAGE OF ARENZVILLE ADOPTING THE

CASS COUNTY HAZARD MITIGATION PLAN – February 2024

WHEREAS the Village President and Village Board recognizes the threat that natural hazards pose to people and property within Village of Arenzville; and

WHEREAS the Village of Arenzville has prepared a multi-hazard mitigation plan, hereby known as *Cass County Hazard Mitigation Plan – February 2024* in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS *Cass County Hazard Mitigation Plan – February 2024* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Arenzville from the impacts of future hazards and disasters; and

WHEREAS adoption by the Village President and Village Board demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the *Cass County Hazard Mitigation Plan – February 2024.*

NOW THEREFORE, BE IT RESOLVED BY THE, VILLAGE OF ARENZVILLE ILLINOIS, THAT:

Section 1. In accordance within their local rule for adopting resolutions, the Village of Arenzville and the Village Board adopts the *Cass County Hazard Mitigation Plan – February 2024.*

ADOPTED by a vote of 6 in favor and ____ against, and ____ abstaining, this _____ day of February 2024.

By: RONALD KERSHAW
(print name)

ATTEST:

By: LORI RINY
(print name)

APPROVED AS TO FORM:

By: _____
(print name

Ashland Adoption Resolution

Adoption Resolution

Village of Ashland

ILLINOIS

RESOLUTION NO. 2024-1

A RESOLUTION OF THE VILLAGE OF ASHLAND ADOPTING THE

CASS COUNTY HAZARD MITIGATION PLAN – February 2024

WHEREAS the Village President and Village Board recognizes the threat that natural hazards pose to people and property within Village of Ashland; and

WHEREAS the Village of Ashland has prepared a multi-hazard mitigation plan, hereby known as *Cass County Hazard Mitigation Plan – February 2024* in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS *Cass County Hazard Mitigation Plan – February 2024* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Ashland from the impacts of future hazards and disasters; and

WHEREAS adoption by the Village President and Village Board demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the *Cass County Hazard Mitigation Plan – February 2024.*

NOW THEREFORE, BE IT RESOLVED BY THE, VILLAGE OF ASHLAND ILLINOIS, THAT:

Section 1. In accordance within their local rule for adopting resolutions, the Village of Ashland and the Village Board adopts the *Cass County Hazard Mitigation Plan – February 2024.*

ADOPTED by a vote of 6 in favor and 0 against, and 0 abstaining, this 14 day of February 2024.

By: Kitty Mau
(print name)

ATTEST:

By: Pam Gardner
(print name)

APPROVED AS TO FORM:

By: _____
(print name

Beardstown Adoption Resolution

Adoption Resolution

City of Beardstown

ILLINOIS

RESOLUTION NO. 2-6-2024

A RESOLUTION OF THE City of Beardstown ADOPTING THE

CASS COUNTY HAZARD MITIGATION PLAN – February 2024

WHEREAS the Mayor and City Council recognizes the threat that natural hazards pose to people and property within City of Beardstown; and

WHEREAS the City of Beardstown has prepared a multi-hazard mitigation plan, hereby known as *Cass County Hazard Mitigation Plan – February 2024* in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS *Cass County Hazard Mitigation Plan – February 2024* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Beardstown from the impacts of future hazards and disasters; and

WHEREAS adoption by the Mayor and City Council demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the *Cass County Hazard Mitigation Plan – February 2024*.

NOW THEREFORE, BE IT RESOLVED BY THE, CITY OF BEARDSTOWN ILLINOIS, THAT:

Section 1. In accordance within their local rule for adopting resolutions, the Mayor and City Council adopts the *Cass County Hazard Mitigation Plan – February 2024*.

ADOPTED by a vote of 8 in favor and 0 against, and 0 abstaining, this 6th day of February 2024.

By: Timothy Harris (MAYOR
(print name)

ATTEST:

By: BRIAN L RUTH - CITY CLERK
(print name)

APPROVED AS TO FORM:

By: _____
(print name

Chandlerville Adoption Resolution

Adoption Resolution

Village of Chandlerville

ILLINOIS

RESOLUTION NO. 2024-02

A RESOLUTION OF THE VILLAGE OF CHANDLERVILLE ADOPTING THE

CASS COUNTY HAZARD MITIGATION PLAN – February 2024

WHEREAS the Village President and Village Board recognizes the threat that natural hazards pose to people and property within Village of Chandlerville; and

WHEREAS the Village of Chandlerville has prepared a multi-hazard mitigation plan, hereby known as *Cass County Hazard Mitigation Plan – February 2024* in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS *Cass County Hazard Mitigation Plan – February 2024* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Chandlerville from the impacts of future hazards and disasters; and

WHEREAS adoption by the Village President and Village Board demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the *Cass County Hazard Mitigation Plan – February 2024*.

NOW THEREFORE, BE IT RESOLVED BY THE, VILLAGE OF CHANDLERVILLE ILLINOIS, THAT:

Section 1. In accordance within their local rule for adopting resolutions, the Village of Chandlerville and the Village Board adopts the *Cass County Hazard Mitigation Plan – February 2024*.

ADOPTED by a vote of 6 in favor and 0 against, and 0 abstaining, this 14 day of February 2024.

By: Jim Flynn
(print name)

ATTEST:

By: Dena L. Heinberger
(print name)

APPROVED AS TO FORM:

By: _____
(print name

Virgnia Adoption Resolution

Adoption Resolution

City of Virginia

ILLINOIS

RESOLUTION NO. 24-02

A RESOLUTION OF THE CITY OF VIRGINIA ADOPTING THE

CASS COUNTY HAZARD MITIGATION PLAN – February 2024

WHEREAS the Mayor and City Council recognizes the threat that natural hazards pose to people and property within City of Virginia; and

WHEREAS the City of Virginia has prepared a multi-hazard mitigation plan, hereby known as *Cass County Hazard Mitigation Plan – February 2024* in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS *Cass County Hazard Mitigation Plan – February 2024* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Virginia from the impacts of future hazards and disasters; and

WHEREAS adoption by the Mayor and City Council demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the *Cass County Hazard Mitigation Plan – February 2024.*

NOW THEREFORE, BE IT RESOLVED BY THE, CITY OF VIRGINIA ILLINOIS, THAT:

Section 1. In accordance within their local rule for adopting resolutions, the City of Virginia and the City Council adopts the *Cass County Hazard Mitigation Plan – February 2024.*

ADOPTED by a vote of ____ in favor and ____ against, and ____ abstaining, this _____ day of February 2024.

By: Randy McClure
(print name)

ATTEST:

By: Cleda Sandridge
(print name)

APPROVED AS TO FORM:

By: _____
(print name