Draft

Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Plan

Hamilton County, Illinois

Participants:

Broughton, Village of
Crook Township
Dahlgren, Village of
Dahlgren Township
Hamilton County
Hamilton County CUSD #10
Hamilton County Water District
McLeansboro, City of
McLeansboro Township
South Crouch Township

May 2020

The five year update of this Plan must be completed on or before (date).

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HAMILTON COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

HAMILTON COUNTY, ILLINOIS

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Researched and written for the Hamilton County Multi-Jurisdictional
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American Environmental Corporation

American Environmental

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1.0 INTRODUCTION

1.0 INTRODUCTION

Each year natural hazards (i.e., severe thunderstorms, tornadoes, severe winter storms, flooding, etc.) cause damage to property and threaten the lives and health of the residents of Hamilton County. Since 1989, Hamilton County has been included in six federally-declared disasters. **Figure I-1** identifies each declaration including the year the disaster was declared and the type of natural hazard that triggered the declaration. The natural hazard(s) recognized as contributing to the declaration for Hamilton County is identified in bold.

Figure I-1
Federal Disaster Declarations: Hamilton County

Declaration #	Year	Natural Hazard(s) Covered by Declaration
819	1989	***severe storms; tornadoes***
871	1990	severe storms***; tornadoes; flooding;*** heavy rain
1112	1996	severe storms***; flooding; heavy rain***
1416	2002	severe storms; tornadoes; flooding; ***heavy rain; hail***
1850	2009	***severe thunderstorms;*** flooding; ***flash flooding***; tornadoes
1991	2011	***severe thunderstorms; flooding; heavy rain; tornado***

In the last 10 years alone (2010-2019), there have been 33 excessive heat events, 22 severe winter storms, 19 heavy rain events, 18 thunderstorms with damaging winds, seven severe storms with hail one inch in diameter or greater, seven extreme cold events, seven riverine flood events, six flash flood events, four verified lightning strikes with damages, three droughts, two tornadoes and two earthquakes that have originated in the County.

While natural hazards cannot be avoided, their impacts can be reduced through effective hazard mitigation planning. This prevention-related concept of emergency management often receives the least amount of attention, yet it is one of the most important steps in creating a hazard-resistant community.

What is hazard mitigation planning?

Hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural hazards. This process helps the County and participating jurisdictions reduce their risk from these hazards by identifying vulnerabilities and developing mitigation actions to lessen and sometimes even eliminate the effects of a hazard. The results of this process are documented in a natural hazards mitigation plan.

Why develop a natural hazards mitigation plan?

By developing and adopting a natural hazards mitigation plan, participating jurisdictions become eligible to apply for and receive federal hazard mitigation funds to implement mitigation actions identified in the plan. These funds can help provide local government entities with the opportunity to complete mitigation projects and activities that would not otherwise be financially possible.

The federal hazard mitigation funds are made available through the Disaster Mitigation Act of 2000, an amendment to the Robert T. Stafford Disaster Relief and Emergency Assistance Act, which provides federal aid for mitigation projects, but only if the local government entity has a Federal Emergency Management Agency (FEMA) approved hazard mitigation plan.

How is this plan different from other emergency plans?

A natural hazards mitigation plan is aimed at identifying projects and activities that can be conducted prior to a natural disaster, unlike other emergency plans which provide direction on how to respond to a disaster after it occurs. This is the first time that Hamilton County has developed a hazard mitigation plan. This plan describes in detail the actions that can be taken to help reduce or eliminate damages caused by specific types of natural hazards.

1.1 PARTICIPATING JURISDICTIONS

Recognizing the benefits of having a natural hazards mitigation plan, the Hamilton County Board authorized the development of the Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Plan (hereto referred to as the Plan). The County then invited all the local government entities within Hamilton County to participate. **Figure I-2** identifies the participating jurisdictions that are represented in the Plan update.

Figure I-2 Participating Jurisdictions Represented in the Plan	
❖ Broughton, Village of	❖ Hamilton County CUSD #10
❖ Crook Township	❖ Hamilton County Water District
❖ Dahlgren, Village of	❖ McLeansboro, City of
❖ Dahlgren Township	❖ McLeansboro Township
❖ Hamilton County	❖ South Crouch Township

1.2 COUNTY PROFILE

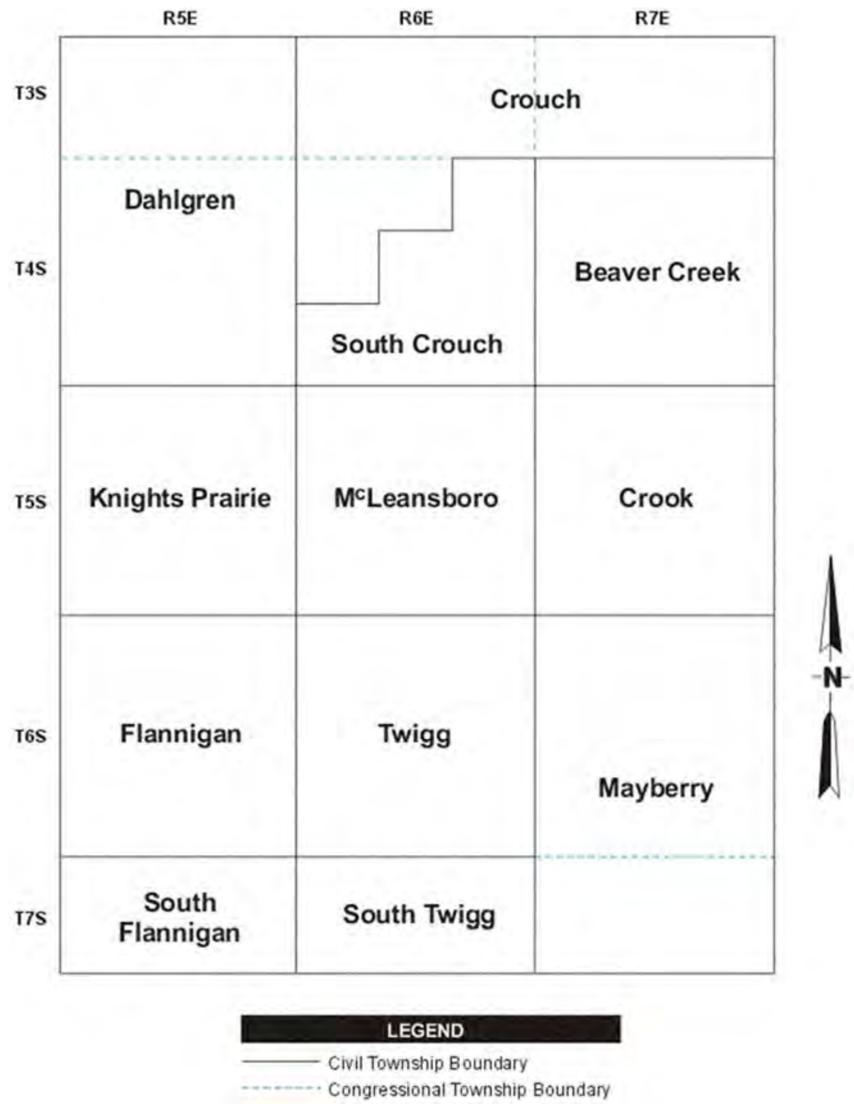
Hamilton County is located in southeastern Illinois and covers approximately 436 square miles. **Figure I-3** provides a location map of the County and the participating municipalities while **Figure I-4** identifies the township boundaries. The topography is generally flat to gently sloping. The County is bounded on the north by Wayne County, to the east by White County, to the south by Saline County and to the west by Franklin and Jefferson County. The City of McLeansboro is the county seat

Agriculture is the main enterprise in Hamilton County. According to the 2017 Census of Agriculture, there were 522 farms in Hamilton County occupying approximately 72.1% (200,603 acres) of the total land area in the County. The major crops include corn and soybeans while the major livestock includes cattle and hogs. The County ranks 71st in the State for crop cash receipts and 86th for livestock cash receipts.

The top three employment sectors in Hamilton County include health care and social assistance followed by mining/quarrying/oil and gas extraction and retail trade according to the Illinois Department of Commerce and Economic Opportunity.

Figure I-3
Location Map

Figure I-4
Township Boundary Map



In the fall of 2014, the Hamilton County Mine No. 1 began operations near Dahlgren. This underground mining operation utilizes longwall mining techniques to produce high-sulfur coal. According to Alliance Resources Partners, LP the Mine produced 6.3 million tons in 2018.

Figure I-5 provides demographic data on the County and each of the participating municipality and townships along with information on housing units and assessed values. The assessed values are for all residential structures and associated buildings (including farm homes and buildings associated with the main residence.) The assessed value of a residence in Hamilton County is approximately one-third of the market value.

Figure I-5
Demographic Data by Participating Jurisdiction

Participating Jurisdiction	Population (2010)	Projected Population (2025)	Total Area (Sq. Miles) (2010)	Number of Housing Units (2010)	Total Assessed Value of Housing Units 2019
Hamilton County (unincorporated)	4,738	4,659	429.435	2,248	$73,058,427
Broughton	194	191	1.997	98	$917,828
Dahlgren	525	516	0.996	242	$3,887,951
McLeansboro	2,883	2,835	2.744	1,456	$15,969,411
Crook Township	312	---	35.760	182	$3,708,851
Dahlgren Township	1,220	---	54.281	531	$11,505,156
McLeansboro Township	3,830	---	35.602	1,907	$27,801,401
South Crouch Township	260	---	25.088	119	$2,843,828

Sources: Clint Hopflinger, Hamilton County Supervisor of Assessments.
Illinois Department Public Health, Population Projects for Illinois Counties 2010 to 2025.
U. S. Census Bureau, 2010 Census U.S. Gazetteer Files.
U.S. Census Bureau, American FactFinder.

1.3 LAND USE AND DEVELOPMENT TRENDS

Population growth and economic development are two major factors that trigger changes in land use. Hamilton County is almost entirely rural with a population that has seen a steady decline between 1900 and 2000 from 20,197 to 8,621. Between 2000 and 2010 the population decreased by 1.9% from 8,621 to 8,457. McLeansboro experienced a slight decrease in its populations between 2000 and 2010, while Broughton remained steady and Dahlgren's populations increased marginally.

Land use in Hamilton County is primarily agricultural. As discussed in the previous section, approximately 72.1% of the land within the County is used for farming practices. Agriculture is and will continue to be a major industry within the County and a vital part of the County's economy.

According to the Hamilton County Emergency Management Agency Director, the only development and economic initiative planned in the participating jurisdictions in the next five years is a solar farm in the southeastern corner of the County.

There are no other large-scale economic development initiatives underway in the County. Substantial changes in land use (from forested and agricultural land to residential, commercial and industrial) are not anticipated within the County in the immediate future. No sizeable increases in commercial or industrial developments are expected within the next five years.

2.0 PLANNING PROCESS

2.0 PLANNING PROCESS

The Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Plan (the Plan) was developed through the Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee (Planning Committee). The Plan was prepared to comply with the Disaster Mitigation Act of 2000 and incorporates the Federal Emergency Management Agency's (FEMA) 10-step planning process approach. **Figure PP-1** provides a brief description of the process utilized to prepare this Plan.

Figure PP-1
Description of Planning Process

Tasks	Description
Task One: Organize	The Planning Committee was formed with broad representation and specific expertise to assist the County and the Consultant in updating the Plan.
Task Two: Public Involvement	Early and ongoing public involvement activities were conducted throughout the Plan's development to ensure the public was given every opportunity to participate and provide input.
Task Three: Coordination	Agencies and organizations were contacted to identify plans and activities currently being implemented that impact or might potentially impact hazard mitigation activities.
Task Four: Risk Assessment	The Consultant identified and profiled the natural hazards that have impacted the County and conducted a vulnerability assessment to evaluate the risk to each participating jurisdiction.
Task Five: Goal Setting	After reviewing existing plans and completing the risk assessment, the Consultant assisted the Planning Committee in updating the goals and objectives for the Plan.
Task Six: Mitigation Activities	The participating jurisdictions were asked to identify mitigation actions that had been started and/or completed since the original Plan was adopted. In addition, they were also asked to identify any new mitigation actions based on the results of the risk assessment. The new mitigation actions were then analyzed, categorized and prioritized.
Task Seven: Draft Plan	The draft Plan summarized the results of Tasks One through Six. In addition, it described the responsibilities to monitor, evaluate and update the Plan. The draft Plan was reviewed by the participants and a public forum was held to give the public an additional opportunity to provide input. Comments received were incorporated into the draft Plan and submitted to the Illinois Emergency Management Agency (IEMA) and FEMA for review and approval.
Task Eight: Final Plan	Comments received from IEMA and FEMA were incorporated in to the final Plan. The final Plan was then submitted to the County and participating jurisdictions for adoption. The Plan will be reviewed periodically and updated again in five years.

The normal planning process generally takes 12 to 14 months to complete. Due to changes in the funding mechanism, the process was compressed and accelerated to ensure the draft Plan was completed and submitted to IEMA no later than May 31, 2020. To accommodate this schedule, three Planning Committee meetings instead of five were conducted and additional coordination was handled via verbal and written correspondence.

The accelerated schedule was further complicated by the Covid-19 outbreak in the winter/spring of 2020. Executive orders 2020-10, 2020-18 and 2020-32 issued and extended stay-at-home order and prohibited any gatherings of more than 10 people from Saturday March 21 through Sunday, May 31, 2020. As a result the third Planning Committee meeting was not conducted in the traditional manner and was instead handled as a teleconference.

The Plan and development was led at the staff level by John Nathan Taylor, the Hamilton County Emergency Management Agency (EMA) Director. American Environmental Corp. (AEC), an environmental consulting firm, with experience in hazard mitigation, risk assessment and public involvement, was employed to guide the County and participating jurisdictions through the planning process.

Participation in the planning process, especially by the County and local government representatives, was crucial to the development of the Plan. To ensure that all participating jurisdictions took part in the planning process, participation requirements were established. Each participating jurisdiction agreed to satisfy the following requirements in order to be included in the Plan. All of the participating jurisdictions met the participation requirements.

- Attend at least one of the three Planning Committee meetings.
- Identify/submit a list of documents (i.e., plans, studies, reports, maps, etc.) relevant to the natural hazard mitigation planning process.
- Identify/submit a list of critical infrastructure and facilities.
- Review the risk assessment and provide additional information on events and damages when available.
- Participate in the of the mitigation goals.
- Submit a list of mitigation actions started and/or completed since the adoption of the original Plan.
- Identify and submit a list of new mitigation actions.
- Review and comment on the draft Plan.
- Formally adopt the Plan.
- Where applicable, incorporate the Plan into existing planning efforts.
- Participate in the Plan maintenance.

2.1 PLANNING COMMITTEE

As previously mentioned, at the start of the planning process, the Hamilton County Multi-Jurisdictional Natural Mitigation Planning Committee was formed to develop the hazard mitigation plan. The Planning Committee included representatives from each participating jurisdiction, as well as emergency services (fire and law enforcement), healthcare, insurance and utilities.

Figure PP-2 details the entities represented on the Planning Committee and the individuals who attended on their behalf. The Planning Committee was chaired by the Hamilton County EMA.

Additional technical expertise was provided by the staff at the Illinois Emergency Management Agency, Illinois Department of Natural Resources Office of Water Resources and Illinois Environmental Protection Agency.

Figure PP-2
Hamilton County Planning Committee Member Attendance Record

Representing	Name	Title	11/6/2019	3/4/2020	5/13/2020
American Environmental Corp.	Bostwick, Andrea	Senior Project Manager	X	X	
American Environmental Corp.	Krug, Zachary	Environmental Specialist	X	X	
Broughton, Village of	Alley, Laura	Trustee		X	
Broughton, Village of	Essary, Lisa	Water Clerk		X	
Broughton, Village of	Sivok, Mollie	Village Clerk	X		
Crook Township	Wilson, Sharon	Township Supervisor	X	X	
Dahlgren Township	Perryman, Aaron	Clerk	X	X	
Dahlgren, Village of	Wilkerson, Steve	Mayor	X		
Dahlgren, Village of	Wilkerson, Sue	Village Clerk	X	X	
Hamilton County - 911 (ETSB)	Smith, Dorothy	Chairman	X	X	
Hamilton County - Assessment Office	Hopfinger, Clint	Supervisor of Assessments	X		
Hamilton County - Clerk & Record's Office	Hopfinger, Mary Anne	Clerk & Recorder	X		
Hamilton County - EMA	Taylor, John	Director	X	X	
Hamilton County - Highway	Perryman, Aaron	Technician	X	X	
Hamilton County - Sheriff's Office	Bryson, Mathew	Deputy	X		
Hamilton County - State's Attorney Office	Flannigan, Colton	Assistant State's Attorney		X	
Hamilton County - State's Attorney Office	Hood, Justin	State's Attorney	X		
Hamilton County - Treasurer's Office	Hall, Sarah	Treasurer	X		
Hamilton County CUSD #10	Epperson, Christina	Principal	X		
Hamilton County CUSD #10	Fetcho, Jeff	Superintendent	X		
Hamilton County CUSD #10	Ragan, Clint	Executive Secretary - School Board		X	
Hamilton County Fair Board	Wilson, Robert	President	X	X	
Hamilton County Water District	Biggerstaff, Dale	General Manager		X	
Hamilton County Water District	Drake, Robert	Chairman	X	X	
Hamilton County Water District	Harmon, David	Water Operator	X		
Hamilton Memorial Hospital District	Kerans, Mike	Safety Officer	X	X	
Hamilton Memorial Nursing Center	Rodriguez, Gil	Maintenance Director	X	X	
McLeansboro Township	Drake, Robert	Highway Commissioner	X	X	
McLeansboro Township	Gray, Clydus	Township Supervisor	X	X	
McLeansboro Township	Woods, Richard	Township Clerk	X		
McLeansboro Volunteer Fire Department	Morris, Jim	Fire Chief	X	X	
McLeansboro, City of	Inboden, Cindy	Deputy Clerk		X	
McLeansboro, City of	Partain, Chase	Patrolman		X	
McLeansboro, City of	Vallowe, Fred	City Clerk	X		
McLeansboro, City of	Webb, Justin	Police Officer / Patrolman	X	X	
South Crouch Township	Parmley, Dustin	Trustee		X	
South Crouch Township	Parmley, Jackie	Township Supervisor	X	X	
South Flannigan Township	McFarland, Shannon	Road Commissioner	X		
State Farm Insurance	Braden, Lynn	Agent	X	X	
Twigg Township	Smith, Ron	Township Supervisor		X	
Wayne Fire Protection District #1	Bernard, Jeff	Lieutenant / Firefighter	X		

Mission Statement

Based on early communications with Planning Committee members, a draft mission statement was developed that described their objectives for the Plan and distributed electronically for review. The Planning Committee then reviewed the mission statement at the first meeting and approved it with no changes.

"The mission of the Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee is to develop a mitigation plan that documents projects and activities to reduce the negative impacts of natural hazards on citizens, infrastructure, private property and critical facilities."

Planning Committee Meetings

The Planning Committee met three times between November 2019 and May 2020. **Figure PP-2** identifies the representatives present at each meeting. **Appendices A** and **B** contain copies of the attendance sheets and meeting minutes for each meeting. The purpose of each meeting, including the topics discussed, is provided below.

As mentioned previously, the process was compressed and accelerated to ensure the draft Plan was completed and submitted to IEMA no later than May 31, 2020. To accommodate this schedule, three Planning Committee meetings instead of five were conducted and additional coordination was handled via verbal and written correspondence.

As a result of the Covid-19 outbreak in the Winter/Spring 2020, the third Planning Committee meeting was not conducted in the traditional manner. Instead it was handled via teleconference to comply with the stay-at-home order and gathering restrictions.

First Planning Committee Meeting – 11/06/2019

At this meeting the planning process was explained to the Planning Committee members, including a brief overview of what a natural hazards mitigation plan is, why it needs to be developed, and the benefits. As part of the plan development, representatives for the County and the participating jurisdictions were asked to complete the forms entitled "List of Existing Planning Documents," "Critical Facilities" and "Identification of Severe Weather Shelters" and return them before the next meeting. Copies of a "Hazard Events Questionnaire," "Damages to Critical Facilities Damage Questionnaire" and "Citizen Questionnaire" were also distributed.

Committee members were asked to identify any natural hazard events that have occurred within the County. A discussion regarding the hazards to be included in the Plan was conducted and Committee members chose not to include landslides due to their limited impact on the people and infrastructure within the County. Portions of the draft natural hazard risk assessment section were then presented for review.

Following the review of risk assessment, the Planning Committee members participated in an exercise to help calculate the Risk Priority Index which can assist participants in determining hazards present the highest risks and therefore which ones to focus on when formulating mitigation projects and activities.

Next, mitigation actions were defined and examples were discussed. As part of the plan development, individual mitigation action lists will be created for each participating jurisdiction. Ideas for potential mitigation projects and activities were presented. Representatives for the County and the participating jurisdictions were asked to complete the form entitled "Hazard Mitigation Projects" and return them before the next meeting.

Drafts of the mission statement and mitigation goals were presented for review. After a discussion, the Planning Committee chose to finalize both with no revisions.

Finally, community participation was discussed. The County and participating jurisdictions were asked to make information available on the planning process at their offices and in their communities.

Second Planning Committee Meeting – 03/04/2020

At this meeting the Planning Committee members discussed vulnerable community assets and completed the form entitled "Critical Facilities Vulnerability Survey" which will be used in the vulnerability analyses. The results of the Risk Priority Index exercise conducted at the previous meeting were presented. Thunderstorms with damaging winds scored the highest followed by heavy rains, tornadoes and flooding.

Next, an explanation of what a mitigation actions prioritization methodology is was provided. The various ways that mitigation actions can be prioritized and example methodologies were discussed. The Planning Committee chose to use a methodology based on hazard frequency and degree of mitigation.

A presentation on how the mitigation projects and activities identified by the participating jurisdictions would be presented in the Plan was provided. Then, the Planning Committee members reviewed the draft jurisdiction-specific mitigation action tables which identified and prioritized the new mitigation projects and activities submitted by the participants. Members were given the opportunity to add additional projects and activities to their tables.

The sections outlining the mitigation strategy and plan maintenance were also reviewed. The participating jurisdictions will meet annually to monitor the status of the mitigation projects and activities, evaluate the effectiveness of the Plan and provide information on the events that have occurred since the committee met previously. The Plan must be reviewed, revised and resubmitted to IEMA and FEMA at least once every five years. The public forum and adoption process were then discussed, and a date for the public forum was set.

Third Planning Committee Meeting – 05/13/2020

At this Planning Committee meeting the public was provided the opportunity to participate in a teleconference and given the opportunity to ask questions about the draft Plan which was made available online.

2.2 PUBLIC INVOLVEMENT

To engage the public in the planning process, a comprehensive public involvement strategy was developed. The strategy was structured to engage the public in a two-way dialogue, encouraging the exchange of information throughout the planning process. A mix of public involvement techniques and practices were utilized to:

- disseminate information;
- identify additional useful information about natural hazard occurrences and impacts;
- assure that interested residents would be involved throughout the Plan's development; and
- cultivate ownership of the Plan, thus increasing the likelihood of adoption by the participating jurisdictions.

The dialogue with the public followed proven risk communication principles to help assure clarity and avoid overstating or understating the impacts posed by the natural hazards identified in the Plan. The following public involvement techniques and practices were applied to give the public an opportunity to access information and participate in the dialogue at their level of interest and availability.

Citizen Questionnaire

A citizen questionnaire was developed to gather facts and gauge public perceptions about natural hazards that affect Hamilton County. The questionnaire was distributed to the Planning Committee members who were encouraged to make it to their residents. A copy of the questionnaire is contained in **Appendix C**.

A total of twenty-eight (28) questionnaires were completed and returned to the Planning Committee. Questionnaires were completed by residents in each participating jurisdiction. These responses provide useful information to decision makers as they determine how best to disseminate information on natural hazards and safeguard the public. Additionally, these responses identify the types of projects and activities the public is most likely to support. The following provides a summary of the results.

- Respondents felt that severe summer weather was the most frequently encountered natural hazard in Hamilton County followed by flooding and severe winter storms. These results are consistent with the weather records compiled for the County and as described in this Plan.
- The most effective means of communication identified by respondents to disseminate information about natural hazards were the internet and social media (Facebook, Twitter, etc.) followed closely by mail and the Fire Department / Law Enforcement. Information disseminated via television, the radio and fact sheets/ brochures also received strong support among respondents.
- In terms of the most needed mitigation projects and activities, the following four categories received the strongest support:
    - maintain roadway passages during snow storms and heavy rains (71%);
    - provide flood or drainage protection (71%) – the respondents who selected this category felt that culvert and drainage ditch maintenance was the most needed activity followed by hydraulic studies.;
    - install/maintain sirens and other alert systems (63%); and

- maintain power during storms by burying power lines, trimming trees and/or purchasing backup generators (58%).

FAQ Fact Sheet
A "Frequently Asked Questions" fact sheet was created and disseminated to help explain what a natural hazards mitigation plan is and briefly described the planning process. The fact sheet was made available at the participating jurisdictions. A copy of the fact sheet is contained in **Appendix D**.

Press Releases
Press releases were prepared and submitted to local media outlets prior to each Planning Committee meeting. The releases announced the purpose of the meetings and how the public could become involved in the Plan's development. **Appendix E** contains a list of the media outlets that received the press releases while copies of the releases and any news articles published can be found in **Appendix F**.

Planning Committee Meetings
All of the meetings conducted by the Planning Committee were open to the public and publicized in advance to encourage public participation. At the end of each meeting, time was set aside for public comment. In addition, Committee members were available throughout the planning process to talk with residents and local government officials and were responsible for relaying any concerns and questions voiced by the public to the Planning Committee.

Public Forum
Due to the Covid-19 outbreak, the final meeting of the Planning Committee which was to be held as an open house public forum on Thursday, April 23, 2020 was cancelled. Executive Orders 2020-10, 2020-18 and 2020-32 issued and extended a stay-at-home order and prohibited any gatherings of more than 10 people from Saturday, March 21 through Sunday, May 31, 2020. Given the May 31 plan submission deadline and the extension of the stay-at-home order, IEMA and FEMA agreed to allow the County to conduct the public forum via teleconference and place the draft Plan for review and comment.

At the public forum teleconference, held on Wednesday, May 13, a brief summary of the planning process was provided; the Plan's availability was discussed and individuals were given the opportunity to ask questions or provide comments. Individuals participating in the public forum were provided a two-page handout summarizing the planning process and directed to an online comment survey that could be used to provide feedback on the draft Plan. **Appendices G** and **H** contain copies of these materials.

Public Comment Period
The draft Plan was made available for public review and comment on the Emergency Management page of the County's website from May 13 through May 20, 2020. Those unable to access the Plan via the website were directed to contact the Hamilton County EMA Director to view a paper copy of the Plan. Individuals were encouraged to submit their comments electronically.

Results of Public Involvement

The public involvement strategy implemented during the planning process created a dialogue among participants and interested residents, which resulted in many benefits, a few of which are highlighted below.

- *Acquired additional information about natural hazards.* Verifiable hazard event and damage information was obtained from participants that presents a clearer assessment of the extent and magnitude of natural hazards that have impacted the County. This information included details about flooding and severe winter storms not available from state and federal databases.
- *Obtained critical facilities damage information.* Data collection surveys soliciting information about critical facilities damaged by natural hazards were used to supplement information obtained from government databases. This information was vital to the preparation of the vulnerability analysis.
- *Increased awareness of the impacts associated with natural hazard events within the County.* Understanding how mitigation actions can reduce risk to life and property helped generate ***seventy-nine (79) mitigation projects and activities*** at the local level that had not been previously identified in any other planning process. In addition, four townships, three municipalities, one school district, one hospital, and one water district chose to participate in the Plan's development.

2.3 PARTICIPATION OPPORTUNITIES FOR INTERESTED PARTIES

Businesses, schools, not-for-profit organizations, neighboring counties, and other interested parties were provided multiple opportunities to participate in the planning process. Wide-reaching applications were combined with direct, person-to-person contacts to identify anyone who might have an interest or possess information which could be helpful in developing the Plan.

Business Community

Input was sought from the business community to provide balance and context for discussions on property damages, not only to business, but also to residences. An experienced local insurance agent represented the insurance industry, helping to answer questions and provide information regarding storm damages. Utility companies serving the area were also invited to participate in the development of the Plan. A representative from the Hamilton County Water District served on the Planning Committee.

Schools

Hamilton County CUSD #10 served on the Planning Committee. The Superintendent, Principal and a board member coordinated with other members of the district in considering what types of mitigation projects and activities would be most beneficial.

Healthcare

Input was sought from the healthcare community. Representatives from Hamilton Memorial Hospital District and Hamilton Memorial Nursing Center attended all the Planning Committee meetings and provided input into the planning process.

Neighboring Counties

A memo was sent to EMA/ESDA/OEM coordinators in the neighboring counties inviting them to participate in the mitigation planning process. The counties contacted included Franklin, Gallatin, Jefferson, Saline, Wayne and White. **Appendix I** contains a copy of the invitation memo.

2.4 INCORPORATING EXISTING PLANNING DOCUMENTS

As part of the planning process, the County and each participating jurisdiction was asked to identify and provide existing documents (plans, studies, reports and technical information) relevant to the Plan update. **Figure PP-3** summarizes the availability of existing planning documents by participating jurisdiction. These documents were reviewed and incorporated into the Plan update whenever applicable.

Hamilton County and most of the participating jurisdictions have limited resources and abilities to expand on and improve the existing policies and programs identified in Figure PP-3. This conclusion is based on an examination of their capabilities related to: staff and organization; technical capability; fiscal situation; policies and programs; present legal authority; and political resolve.

The lack of legal authority and policies/programs currently in place, especially with regards to building and zoning ordinances, hamper the participating jurisdictions' abilities to expand and strengthen existing policies and programs. A general resistance from many residents towards these types of regulations has resulted in an unwillingness by county and municipal officials to implement such policies. In addition, the fiscal and staffing situations of the participating jurisdictions are extremely limited, bordering on inadequate in some cases. The economy of Hamilton County is supported by revenue streams that are barely able to sustain the most critical of services. Many local government officials are part-time and lack the technical expertise and funds to expand or implement new programs and policies.

Overcoming these limitations will require time and a range of actions including, but not limited to: 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. These actions have been initiated through the planning process, and some of the initial results are noted below.

- ***Awareness***. Participants in the Plan development process now have more information that they are sharing with residents about the damages caused by natural hazards. Before the development of the NHMP in Hamilton County, knowledge about natural hazard damages was largely anecdotal and stored piecemeal in files not accessible by the general public. This shared information can help change attitudes and foster a collective understanding of the need to work on loss prevention.
- ***Planning & Economic Support***. Hamilton County is a member of the Southeastern Illinois Regional Planning and Development Commission. This Commission provides planning support and assists members in obtaining grants and loans. Participants were made aware of the services offered by the Commission and encouraged to contact them.

- ***State Government Support***. During the Plan development process, the Planning Committee was told repeatedly how support for existing programs as well as funding for mitigation actions can come from sources other than IEMA and FEMA. Specific examples were provided to all participants. The Illinois Department of Agriculture (IDOA) and the Illinois Environmental Protection Agency (IEPA), and the Illinois Department of Natural Resources (IDNR), have helped other counties and municipalities with improving existing programs by filling the gaps when ordinances and funding is non-existent.

Figure PP-3
Existing Planning Documents by Participating Jurisdiction

Existing Planning Documents	Participating Jurisdiction									
	Hamilton County	Broughton	Dahlgren	McLeansboro	Crook Township	Dahlgren Township	McLeansboro Township	South Crouch Township	Hamilton County Water District	Hamilton County CUSD
PLANS										
Municipal/County/Other										
Comprehensive Plan				X					X	
Emergency Management Plan	X		X	X						
Land Use Plan	X			X					X	
Townships										
Road/Bridge Improvement Plan						X	X	X		
Park/Recreational Area Shelter Plan										
School Districts										
Strategic Plan										
Capital Improvement Plan										
Crisis Plan										X
Hospitals										
Strategic Plan										
Capital Improvement Plan										
Risk Management Plan										
Emergency Operations Plan										
Severe Weather Plan										
CODES & ORDINANCES										
Municipal/County										
Building Codes										
Drainage Ordinances										
Historic Preservation Ordinance				X						
Subdivision Ordinance(s)			X	X						
Zoning Ordinances				X						
Townships										
Building Codes										
Septic Ordinance/Sewage Disposal Plan										
MAPS										
Municipal/County/Other										
Existing Land Use Map	X								X	
Infrastructure Map			X	X					X	
Zoning Map				X						
Townships										
Road/Bridge Map						X	X	X		
Park/Recreation Map										
Zoning Map										
Transit System Route Map										
Food Pantry Location Map										
School Districts										
District Boundary Map										X
Floor Plan Map										X
Hospitals										
Flood Plan Maps										
Facilities Map										
OTHER TECHNICAL DOCUMENTS										
Municipal/County										
Flood Ordinance(s)		X								
Flood Insurance Rate Maps		X								
Repetitive Flood Loss List										
Elevation Certificates for Buildings										
Townships										
Property Tax Assessments						X	X			
Treasurer's Report					X	X	X	X		
Food Pantry Location/User Report										

3.0 RISK ASSESSMENT

3.0 RISK ASSESSMENT

Overview

Risk assessment is the process of evaluating the vulnerability of people, buildings and infrastructure in order to estimate the potential loss of life, personal injury, economic injury and property damage resulting from natural hazards. This section summarizes the results of the risk assessment conducted on the natural hazards in Hamilton County. The information contained in this section was gathered by evaluating local, state and federal records from the last 30 to 70 years.

This risk assessment identifies the natural hazards deemed most important to the Planning Committee and includes a profile of each hazard that identifies past occurrences, the severity or extent of the events, and the likelihood of future occurrences. It also provides a vulnerability analysis which identifies the impacts to public health and property, evaluates the assets of the participating jurisdictions (i.e., residential buildings, critical facilities and infrastructure) and estimates the potential impacts each natural hazard would have on the health and safety of the residents as well as buildings, critical facilities and infrastructure. Where applicable, the differences in vulnerability between participating jurisdictions are described.

The subsequent sections provide detailed information on each of the selected natural hazards. The sections are color coded and ordered by the frequency with which the natural hazard has previously occurred within the County. Each natural hazard section contains three subsections: hazard identification, hazard profile and hazard vulnerability.

Hazard Selection

One of the responsibilities of the Planning Committee was to determine which natural hazards to include in the Plan. Over the course of the first two meetings, the Planning Committee members discussed their experiences with natural hazard events and reviewed information on various hazards. After much discussion, the Planning Committee chose to include the following hazards in this Plan:

- severe storms (thunderstorms, hail, lighting & heavy rain)
- severe winter storms (snow, ice & extreme cold)
- excessive heat
- floods
- tornadoes
- earthquakes
- drought
- mine subsidence
- dam failures

The Planning Committee chose not to include the following hazards in the Plan: levee failures and landslides. According to the US Army Corps of Engineers, there are no levees located in Hamilton County or any of the participating jurisdictions that have the potential to cause adverse impacts. A review of the USGS Landslide Susceptibility Viewer indicates that a majority of the County has a low incidence of landslides. There are portions in the northeast and southeast corners of the County with moderate landslide susceptibility but low incidence. The Illinois State Geological Survey's *Landslide Inventory of Illinois* do not contain any instances of landslide in Hamilton County and discussions with the Planning Committee did not reveal any isolated problems.

Risk Priority Index

After reviewing the preliminary results of the risk assessment at the second meeting, Planning Committee members and the participating jurisdictions were asked to complete a Risk Priority Index (RPI) exercise for the hazards that have the potential to impact the City. The RPI provides quantitative guidance for ranking the hazards and offers participants with another tool to determine which hazards present the highest risk and therefore which ones to focus on when formulating mitigation actions.

Each hazard was scored on three categories: 1) frequency, 2) impacts on life and health and 3) impacts on property and infrastructure. A scoring system was developed that assigned specific factors to point values ranging from 1 to 4 for each category. The higher the point value, the greater the risk associated with that hazard. **Figure R-1** identifies the factors and point values associated with each category. Participants were asked to score the selected hazards based on the perspective of the entity they represented on the Planning Committee.

Figure R-1
Risk Priority Index Scoring System

<table>
<tr><th>Category</th><th>Factors</th><th>Point Value</th></tr>
<tr><td rowspan="4">Hazard Frequency</td><td>An event is anticipated to occur within the next year.
Based on previous history, at least one event is expected to occur in any given year.</td><td>4</td></tr>
<tr><td>An event is likely to occur in the next 1 to 3 years.
Based on previous history, an event has at least a 33% chance of occurring in any given year.</td><td>3</td></tr>
<tr><td>An event is possible in the next 3 to 10 years.
Based on previous history, an event has a 10% to 33% chance of occurring in any given year.</td><td>2</td></tr>
<tr><td>An event is unlikely to occur within the next 10 years.
These events occur infrequently and based on previous history have a less than 10% chance of occurring in any given year.</td><td>1</td></tr>
<tr><td rowspan="4">Impacts on Life & Health</td><td>Fatalities are expected to occur during the event.</td><td>4</td></tr>
<tr><td>While fatalities are unlikely, injuries, some requiring hospitalization, may occur during the event.</td><td>3</td></tr>
<tr><td>Minor injuries not requiring hospitalization may occur during the event.</td><td>2</td></tr>
<tr><td>Injuries or fatalities are unlikely to occur during the event.</td><td>1</td></tr>
<tr><td rowspan="4">Impacts on Property & Infrastructure</td><td>- Substantial property damage is likely to occur including damage to infrastructure and critical facilities.
AND/OR
- Loss of access/operations at multiple infrastructure and critical facilities (i.e., road & school closures, loss of power to drinking water/wastewater treatment facilities, municipal buildings, etc.) is anticipated for an extended period of time (i.e., a day or more).</td><td>4</td></tr>
<tr><td>- Property damage is expected to occur including superficial damage to infrastructure and critical facilities.
AND/OR
- Loss of access/operations at multiple infrastructure and critical facilities is anticipated for a period of time (i.e., a day or less).</td><td>3</td></tr>
<tr><td>- Some minor property damage is anticipated (i.e., shingles & siding torn off homes, windows broken, etc.) but no damage to infrastructure or critical facilities is anticipated.
AND/OR
- Loss of access/operations to infrastructure and critical facilities is anticipated but only for a short period of time (i.e. up to a couple hours).</td><td>2</td></tr>
<tr><td>Property damage is likely to be negligible and no loss of access/operations is anticipated at any infrastructure/critical facilities during the event.</td><td>1</td></tr>
</table>

The Consultant took the point values assigned to each category and averaged the remaining results and came up with an overall value for each category. The values for each category were then added together to calculate a RPI score for each hazard. A ranking was then assigned to each hazard based on the RPI score. **Figure R-2** provides the RPI scores and rankings for the County and participating municipalities while **Figure R-3** provides the scores and rankings for the participating special districts (CUSD, Water District & townships.)

Figure R-2
Risk Priority Index Scores by Hazard by County & Participating Municipalities

Hazard	**Participating Jurisdictions**							
	Hamilton County		Broughton		Dahlgren		McLeansboro	
	RPI Score	Hazard Ranking	RPI Score	Hazard Ranking	RPI Score	Hazard Ranking	RPI Score	Hazard Ranking
Dam Failures	2.6	13	3.0	12/13/14	3.0	13/14	4.5	13
Drought	6.2	11	5.0	11	6.5	10	5.6	11
Earthquakes	7.2	7	7.0	7	7.0	7/8/9	7.3	5
Excessive Heat	6.6	8	6.0	8/9/10	6.0	11/12	5.9	9
Extreme Cold	6.4	9/10	6.0	8/9/10	6.0	11/12	6.5	7
Floods	8.3	3/4	9.0	4	**8.0**	**2**	7.5	4
Hail	7.5	6	8.0	5/6	7.0	7/8/9	6.3	8
Heavy Rain	**8.4**	**2**	**10.0**	**3**	7.5	3/4/5/6	**8.8**	**3**
Landslides	3.1	14	3.0	12/13/14	3.0	13/14	3.0	14
Lightning	6.1	12	6.0	8/9/10	7.0	7/8/9	5.8	10
Mine Subsidence	6.4	9/10	3.0	12/13/14	7.5	3/4/5/6	5.0	12
Thunderstorms	**9.1**	**1**	**11.0**	**1/2**	**8.5**	**1**	**9.6**	**1**
Tornadoes	8.3	3/4	**11.0**	**1/2**	7.5	3/4/5/6	**9.1**	**2**
Winter Storms	7.8	5	8.0	5/6	7.5	3/4/5/6	7.0	6

Critical Facilities & Infrastructure

Critical facilities and infrastructure are structures, institutions and systems that are critical for life safety and economic viability and necessary for a community's response to and recovery from emergencies. The loss of function of any of these assets can intensify the severity of the impacts and speed of recovery associated a hazard event. Critical facilities and infrastructure may include, but are not limited to the following:

- ***Essential Facilities***: Facilities essential to the health and welfare of the whole population including hospitals and other medical facilities, police and fire stations, emergency operations centers, evacuation shelters and schools.
- ***Government Facilities***: Facilities associated with the continued operations of government services such as courthouses, city/village halls, township buildings and highway/maintenance centers.
- ***Infrastructure Systems***: Infrastructure associated with drinking water, wastewater, transportation (roads, railways, waterways), communication systems, electric power, natural gas and oil.

Figure R-3
Risk Priority Index Scores by Hazard by Participating Special District

Hazard	Hamilton County CUSD #10		Hamilton County Water District		Crook Township		Dahlgren Township		McLeansboro Township		South Crook Township	
	RPI Score	Hazard Ranking	RPI Score	Hazard Ranking	RPI Score	Hazard Ranking	RPI Score	Hazard Ranking	RPI Score	Hazard Ranking	RPI Score	Hazard Ranking
Dam Failures	5.0	12	3.0	11/12/13/14	3.0	12/13/14	3.0	13/14	4.3	13	3.0	13/14
Drought	6.0	11	3.0	11/12/13/14	5.0	11	7.0	9	7.7	7	9.0	6/7/8/9
Earthquakes	8.0	5	4.0	10	**8.0**	**1/2/3/4/5**	9.0	2/3/4/5/6	8.0	6	6.0	10/11
Excessive Heat	7.5	6/7	5.0	7/8/9	**8.0**	**1/2/3/4/5**	8.0	7/8	5.3	11/12	**12.0**	**1/2/3/4/5**
Extreme Cold	9.0	3/4	5.0	7/8/9	**8.0**	**1/2/3/4/5**	4.0	11/12	5.3	11/12	**12.0**	**1/2/3/4/5**
Floods	6.5	10	8.0	3/4	6.0	7/8/9/10	9.0	2/3/4/5/6	9.3	4	9.0	6/7/8/9
Hail	7.5	6/7	5.0	7/8/9	6.0	7/8/9/10	6.0	10	6.0	10	**12.0**	**1/2/3/4/5**
Heavy Rain	7.0	8/9	6.0	5/6	**8.0**	**1/2/3/4/5**	9.0	2/3/4/5/6	11.0	3	9.0	6/7/8/9
Landslides	3.0	14	3.0	11/12/13/14	3.0	12/13/14	3.0	13/14	3.3	14	3.0	13/14
Lightning	4.5	13	6.0	5/6	4.0	12/13/14	4.0	11/12	7.0	8/9	6.0	10/11
Mine Subsidence	7.0	8/9	8.0	3/4	6.0	7/8/9/10	9.0	2/3/4/5/6	7.0	8/9	4.0	12
Thunderstorms	**10.5**	**1**	**9.0**	**1/2**	7.0	6	**10.0**	**1**	**11.3**	**1/2**	**12.0**	**1/2/3/4/5**
Tornadoes	**10.0**	**2**	**9.0**	**1/2**	6.0	7/8/9/10	8.0	7/8	8.3	5	9.0	6/7/8/9
Winter Storms	9.0	3/4	3.0	11/12/13/14	**8.0**	**1/2/3/4/5**	9.0	2/3/4/5/6	**11.3**	**1/2**	**12.0**	**1/2/3/4/5**

- ***Housing Facilities***: Facilities that serve populations that have access and function needs such as nursing homes, skilled and memory care facilities, residential group homes and day care centers.
- ***High Potential Loss Facilities***: Facilities that would have an impact or high loss associated with them if their functionality is compromised such as nuclear power plants, dams, levees, military installations and facilities housing industrial or hazardous materials.
- ***Gathering Places***: Facilities such as parks, libraries, community centers and churches.

As part of the planning process each participating jurisdiction completed a questionnaire identifying the critical facilities and infrastructure located within their jurisdiction, both publicly and privately-owned. **Figure R-4** identifies the number of critical facilities and infrastructure located in each participating jurisdiction for select categories. Identifying these assets makes local leaders more aware of the critical facilities and infrastructure located within their jurisdictions and helps them make informed choices on how to better protect these key resources.

While considered "local government entities" for planning purposes, neither the townships, the Hamilton County Community Unit School District (CUSD) #10 or the Hamilton County Water District have an extensive inventory of assets in which to consider when conducting the risk assessment. Hamilton County CUSD's critical facilities are all located within a participating municipality (Dahlgren and McLeansboro). Since the assets of the CUSD are located within participating municipalities and are a subset of these municipality's critical facilities, their risk is considered to be the same or similar to the risk experienced by the municipalities for those hazards that either impact the entire planning area or can occur at any location within the planning area (i.e., severe storms, severe winter storms, etc.) The same is true for the Hamilton County Water District's main office and the McLeansboro Township building which are both located in McLeansboro. For those hazards where the risk to the CUSD, the Hamilton County Water District's main office and the McLeansboro Township building varies from the risk facing the municipalities, a separate narrative assessment will be provided under the appropriate hazard's vulnerability subsection.

The Hamilton County Water District's critical infrastructure is scattered throughout unincorporated Hamilton County as are the critical facilities for the three remaining townships. Their risk is considered to be the same or similar to the risk experienced by the County for those hazards that either impact the entire planning area or can occur at any location within the planning area (i.e., severe storms, severe winter storms, etc.) For those hazards where the risk to the Hamilton County Water District's critical infrastructure and the township critical facilities varies from the risk facing the planning area (i.e., County), a separate narrative assessment will be provided under the appropriate hazard's vulnerability subsection.

Critical Facilities Vulnerability Survey

The participating jurisdictions were also asked to complete a Critical Facilities Vulnerability Survey at the second meeting to assist in the preparation of an overall summary of each jurisdiction's vulnerability to the studied hazards. The Survey asked participants to describe their jurisdiction's greatest vulnerability and identify critical facilities/infrastructure they felt have the greatest vulnerability to natural hazards and the hazard(s) they are most vulnerable to. This information is summarized under the appropriate hazard's vulnerability subsection.

Figure R-4
Critical Facilities & Infrastructure by Jurisdiction

Participating Jurisdiction	Critical Facilities				Critical Infrastructure						
	Government[1]	Emergency Protection[2]	Medical & Healthcare[3]	Schools	Drinking Water[4]	Wastewater Treatment[5]	Rail Lines	Bridges	Interstates US/State Routes & Key Roads	Power Plants	Comm. Systems
Hamilton County	3	1	2	---	---	---	1	---	9	---	4
Broughton	2	---	---0	0---	1	2	---	---	1	---	---
Dahlgren	2	1	1	1	1	4	1	---	3	---	2
McLeansboro	2	3	14	3	2	11	1	3	7	1	1
Hamilton Co. CUSD	---	---	---	5	---	---	---	---	---	---	---
Hamilton Co. Water District	1	---	---	---	7	---	---	---	---	---	5
Crook Township	1	---	---	---	---	---	1	1	3	---	---
Dahlgren Township	1	---	---	--	---	---	---	n/a	8	---	2
McLeansboro Township	1	---	---	--	---	---	1	n/a	3	---	1
South Crouch Township	1	---	---	--	---	---	1	n/a	n/a	---	---

[1] Government includes: courthouses, city/village halls, township buildings, highway/road maintenance centers, libraries, etc.
[2] Emergency Protection includes: sheriff's department, police, fire, ambulance, emergency operations centers, jail/correctional facilities and evacuation shelters.
[3] Medical & Healthcare includes: public health departments, hospitals, urgent/prompt care and medical clinics, nursing homes, skilled nursing facilities, memory care facilities, residential group homes, etc.
[4] Drinking Water includes: drinking water treatment plants, drinking water wells and water storage towers/tanks.
[5] Wastewater Treatment includes: wastewater treatment plants and lift stations.

3.1 Severe Storms (Thunderstorms, Hail, Lightning & Heavy Rain)

Hazard Identification

What is the definition of a severe storm?

The National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) defines a "severe storm" as any thunderstorm that produces one or more of the following:

- winds with gust of 50 knots (58 mph) or greater;
- hail that is at least one inch in diameter (quarter size) or larger; and/or
- a tornado.

While severe storms are capable of producing deadly lightning and heavy rain that may lead to flash flooding, the NWS does not use either to define a severe storm. However, a discussion of both lightning and heavy rain is included in this section because both are capable of causing extensive damage. For the purposes of this report, tornadoes and flooding are categorized as separate hazards and are not discussed under severe storms.

What is a thunderstorm?

A thunderstorm is a rain shower accompanied by lightning and thunder. An average thunderstorm is approximately 15 miles in diameter, affecting a relatively small area when compared to winter storms or hurricanes, and lasts an average of 30 minutes. Thunderstorms can bring heavy rain, damaging winds, hail, lightning and tornadoes.

There are four basic types of thunderstorms: single-cell, multi-cell, squall line, and supercell. The following provides a brief description of each.

Single-cell Thunderstorm

Single cell storms are small, weak storms that only last about ½ hour to an hour and are not usually considered severe. They are typically driven by heating on a summer afternoon. Occasionally a single cell storm will become severe, but only briefly. When this happens, it is called a pulse severe storm.

Multi-cell Thunderstorm

Multi-cell storms are the most common type of thunderstorms. A multi-cell storm is organized in clusters of at least two to four short-lived cells. Each cell usually lasts 30 to 60 minutes while the system as whole may persist for many hours. Multi-cell storms may produce hail, strong winds, brief tornadoes, and/or flooding.

Squall Line

A Squall line is a group of storms arranged in a line, often accompanied by "squalls" of high wind and heavy rain. The line of storms can be continuous or there can be gaps and breaks in the line. Squall lines tend to pass quickly and can be hundreds of miles long but are typically only 10 to 20 miles wide. A "bow echo" is a radar signature of a squall line that "bows out" as winds fall behind the line and circulation develops on either end.

Supercell Thunderstorm

Supercell storms are long-lived (greater than one hour) and highly organized storms that feed off a rising current of air (an updraft). The main characteristic that sets a supercell storm apart from other thunderstorm types is the presence of rotation in the updraft. The rotating updraft of a supercell (called a mesocyclone when visible on radar) helps a supercell storm produce extreme weather events. Supercell storms are potentially the most dangerous storm type and have been observed to generate the vast majority of large and violet tornadoes, as well as downburst winds and large hail.

Despite their size, all thunderstorms are dangerous and capable of threatening life and property. Of the estimated 100,000 thunderstorms that occur each year in the United States, roughly 10% are classified as severe.

What kinds of damaging winds are produced by a thunderstorm?

Aside from tornadoes, thunderstorms can produce straight-line winds. A straight-line wind is defined as any wind produced by a thunderstorm that is not associated with rotation. There are several types of straight-line winds including downdrafts, downbursts, microbursts, gust fronts and derechos.

Damage from straight-line winds is more common than damage from tornadoes and accounts for most thunderstorm wind damage. Straight-line wind speeds can exceed 87 knots (100 mph), produce a damage pathway extending for hundreds of miles and can cause damage equivalent to a strong tornado.

The NWS measures a storm's wind speed in knots or nautical miles. A wind speed of one knot is equal to approximately 1.15 miles per hour. **Figure SS-1** shows conversions from knots to miles per hour for various wind speeds.

Figure SS-1
Wind Speed Conversions

Knots (kts)	Miles Per Hour (mph)	Knots (kts)	Miles Per Hour (mph)
50 kts	58 mph	60 kts	69 mph
52 kts	60 mph	65 kts	75 mph
55 kts	63 mph	70 kts	81 mph
58 kts	67 mph	80 kts	92 mph

What is hail?

Hail is precipitation in the form of spherical or irregular-shaped pellets of ice that occur within a thunderstorm when strong rising currents of air (updrafts) carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice.

Hailstones grow by colliding with supercooled water drops. The supercooled water drops freeze on contact with ice crystals, frozen rain drops, dust, etc. Thunderstorms with strong updrafts continue lifting the hailstones to the top of the cloud where they encounter more supercooled water and continue to grow. Eventually the updraft can no longer support the weight of the hail or the updraft weakens and the hail falls to the ground.

In the United States, hail causes more than $1 billion in damages to property and crops annually. Hail has been known to cause injuries, although it rarely causes fatalities or serious injury.

How is the severity of a hail event measured?

The severity or magnitude of a hail event is measured in terms of the size (diameter) of the hailstones. The hail size is estimated by comparing it to known objects. **Figure SS-2** provides descriptions for various hail sizes.

Figure SS-2
Hail Size Descriptions

Hail Diameter (inches)	Description	Hail Diameter (inches)	Description
0.25 in.	pea	1.75 in.	golf ball
0.50 in.	marble/mothball	2.50 in.	tennis ball
0.75 in.	penny	2.75 in.	baseball
0.88 in.	nickel	3.00 in.	tea cup
1.00 in.	quarter	4.00 in.	grapefruit
1.50 in.	ping pong ball	4.50 in.	softball

Source: NOAA, National Severe Storm Laboratory.

Hail size can vary widely. Hailstones may be as small as 0.25 inches in diameter (pea-sized) or, under extreme circumstances, as large as 4.50 inches in diameter (softball-sized). Typically hail that is one (1) inch in diameter (quarter-sized) or larger is considered severe.

The severity of a hail event can also be measured or rated using the TORRO Hailstorm Intensity Scale. This scale was developed in 1986 by the Tornado and Storm Research Organisation of the United Kingdom. It measures the intensity or damage potential of a hail event based on several factors including: maximum hailstone size, distribution, shape and texture, numbers, fall speed and strength of the accompanying winds.

The Hailstorm Intensity Scale identifies ten different categories of hail intensity, H0 through H10. **Figure SS-3** gives a brief description of each category. This scale is unique because it recognizes that, while the maximum hailstone size is the most important parameter relating to structural damage, size alone is insufficient to accurately categorize the intensity and damage potential of a hail event.

It should be noted that the typical damage impacts associated with each intensity category reflect the building materials predominately used in the United Kingdom. These descriptions may need to be modified for use in other countries to take into account the differences in building materials typically used (i.e., whether roofing materials are predominately shingle, slate or concrete, etc.).

Figure SS-3
TORRO Hailstorm Intensity Scale

Intensity Category		Typical Hail Diameter millimeters (approx.)*	Typical Hail Diameter inches (approx.)*	Description	Typical Damage Impacts
H0	Hard Hail	5 mm	0.2”	pea	no damage
H1	Potentially Damaging	5-15 mm	0.2” – 0.6”	pea / mothball	slight general damage to plants, crops
H2	Significant	10-20 mm	0.4” – 0.8”	dime / penny	significant damage to fruit, crops, vegetation
H3	Severe	20-30 mm	0.8” – 1.2”	nickel / quarter	severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40 mm	1.0” – 1.6”	half dollar / ping pong ball	widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50 mm	1.2” – 2.0”	golf ball	wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60 mm	1.6” – 2.4”	golf ball / egg	bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75 mm	2.0” – 3.0”	egg / tennis ball	severe roof damage, risk of serious injuries
H8	Destructive	60-90 mm	2.4” – 3.5”	tennis ball / tea cup	severe damage to aircraft bodywork
H9	Super Hailstorms	75-100 mm	3.0” – 4.0”	tea cup / grapefruit	extensive structural damage, risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	> 100 mm	> 4.0”	softball	extensive structural damage, risk of severe or even fatal injuries to persons caught in the open

* Approximate range since other factors (i.e., number and density of hailstones, hail fall speed and surface wind speed) affect severity.

Source: Tornado and Storm Research Organisation, TORRO Hailstorm Intensity Scale Table.

What is lightning?

Lightning, a component of all thunderstorms, is a visible electrical discharge that results from the buildup of charged particles within storm clouds. It can occur from cloud-to-ground, cloud-to-cloud, within a cloud or cloud-to-air. The air near a lightning strike is heated to approximately 50,000°F (hotter than the surface of the sun). The rapid heating and cooling of the air near the lightning strike causes a shock wave that produces thunder.

Lightning on average causes 60 fatalities and 400 injuries annually in the United States. Most fatalities and injuries occur when people are caught outdoors in the summer months during the afternoons and evenings. In addition, lightning can cause structure and forest fires. Many of the wildfires in the western United States and Alaska are started by lightning. According to the NWS lightning strikes cost more than $1 billion in insured losses each year.

Are alerts issued for severe storms?

Yes. The NWS Weather Forecast Office in Paducah, Kentucky is responsible for issuing ***severe thunderstorm watches*** and ***warning****s* for Hamilton County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Watch.** A severe thunderstorm watch is issued when severe thunderstorms are possible in or near the watch area. Individuals should stay alert for the latest weather information and be prepared to take shelter.
- **Significant Weather Advisory.** A significant weather advisory is issued to alert the public to thunderstorms approaching severe criteria. This includes strong storms that generally produce winds of at least 40 mph, hail ½ inch or larger and/or very intense cloud-to-ground lightning.
- **Warning.** A severe thunderstorm warning is issued when a thunderstorm producing hail one inch in diameter or larger and/or winds of at least 50 knots (58 mph) is occurring or imminent. Warnings indicate imminent danger to life and property for those who are in the path of the storm and individuals should seek safe shelter.

HAZARD PROFILE

The following identifies past occurrences of severe storms; details the severity or extent of each event (if known); identifies the locations potentially affected; and estimates the likelihood of future occurrences.

When have severe storms occurred previously? What is the extent of these previous severe storms?

Tables 1, 2, 3 and 4, located in **Appendix J,** summarize the previous occurrences as well as the extent or magnitude of severe storm events recorded in Hamilton County. Severe storm events are separated into four categories: thunderstorms with damaging winds, hail, lightning and heavy rain. In Hamilton County, severe storms are the most frequently occurring natural hazard.

Severe Storms Fast Facts – Occurrences

Number of recorded Thunderstorms with Damaging Winds (1981 - 2019): ***55***

Number of recorded Severe Hail Events (2001 - 2019): ***18***

Number recorded of Lightning Strike Events (2014 - 2019): ***4***

Number of recorded Heavy Rain Events (1990 – 2019): ***89***

Highest Recorded Wind Speed: ***104 knots (April 19, 2011)***

Largest Hail Recorded: ***1.75 inches (on five occasions)***

Most Likely Month for Thunderstorms with Damaging Winds to Occur: ***June***

Most Likely Month for Severe Hail to Occur: ***April***

Most Likely Month for Heavy Rain to Occur: ***November***

Most Likely Time for Thunderstorms with Damaging Winds to Occur: ***Afternoon***

Most Likely Time for Severe Hail to Occur: ***Afternoon***

Most Likely Time for Heavy Rain to Occur: ***Afternoon/Evening***

Thunderstorms with Damaging Winds

NOAA's Storm Events Database was used to document 55 reported occurrences of thunderstorms with damaging winds in Hamilton County between 1981 and 2019. Of the 55 occurrences, 41 had reported wind speeds of 50 knots or greater. There were 14 occurrences, however, where the wind speed was not recorded.

The highest wind speed recorded in Hamilton County occurred in Walpole on April 19, 2011 when winds reached 104 knots (120 mph) during a thunderstorm event. Thunderstorms with damaging winds have been *recorded* in every participating jurisdiction within the County on multiple occasions.

Figure SS-4 charts the reported occurrences of thunderstorms with damaging winds in Hamilton County by month. Of the 55 events, 43 (78%) took place in April, May, June, and July making this the peak period for thunderstorms with damaging winds in Hamilton County. Of the 55 events, 14 (25%) occurred during June, making this the peak month for thunderstorms with damaging winds.

Figure SS-4
Thunderstorms with Damaging Winds by Month
1981 – 2019

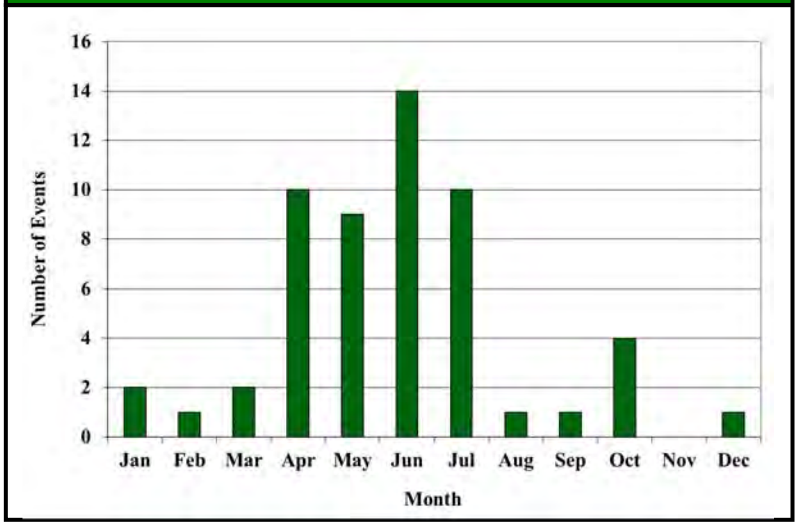


Figure SS-5 charts the reported occurrences of thunderstorms with damaging winds by hour. Of the 55 occurrences, approximately 76% of all thunderstorms with damaging winds occurred during the p.m. hours, with 21 of the events (38%) taking place between 3 p.m. and 7 p.m.

<u>Hail</u>

NOAA's Storm Events Database was used to document 18 reported occurrences of severe storms with hail one (1) inch in diameter or greater in Hamilton County between 2001 and 2019. Of the 18 occurrences, 5 produced hailstones 1.50 inches or larger in diameter.

The largest hail stones documented in Hamilton County measured 1.75 inches in diameter (golf ball sized) and fell on five different occasions, most recently on August 6, 2019. Hail one (1) inch in diameter or greater has been *recorded* in every participating municipality on at least one occasion.

Figure SS-6 charts the reported occurrences of hail by month. Of the 18 occurrences, 12 (67%) took place in March, April, and May making this the peak period for hail in Hamilton County. Of the 18 events, six (33%) occurred during April, making this the peak month for hail events.

Figure SS-5
Thunderstorms with Damaging Winds by Hour
1981 – 2019

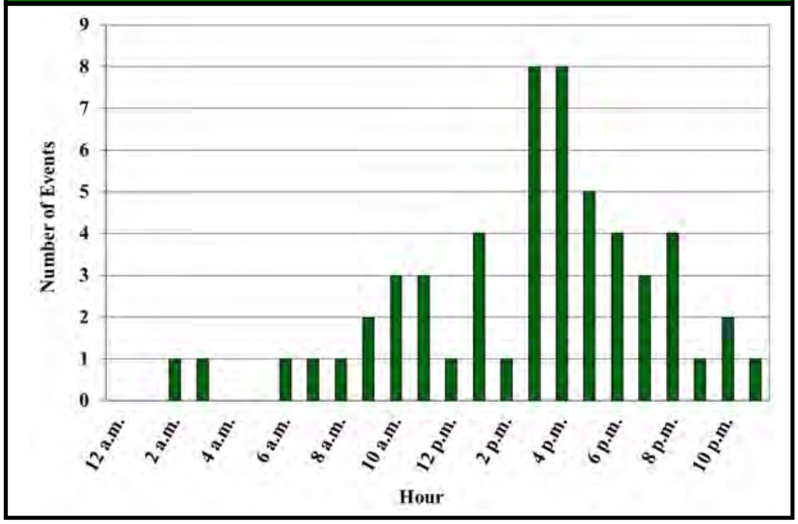


Figure SS-6
Hail Events by Month
2001 - 2019

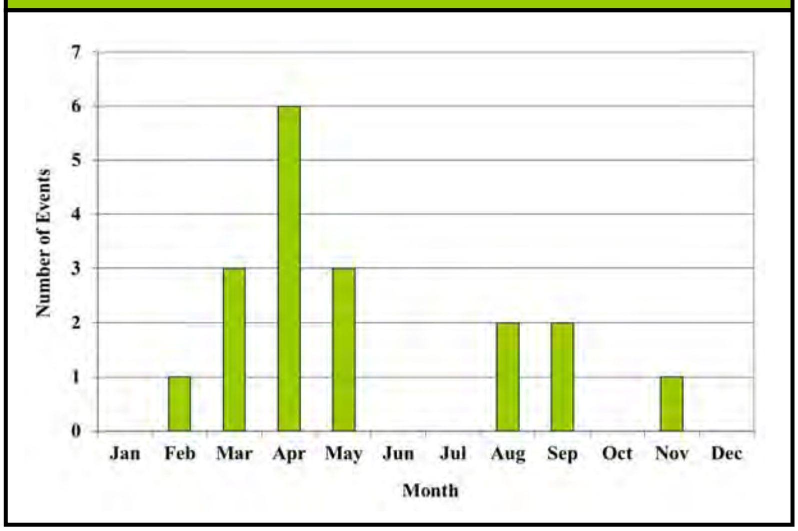
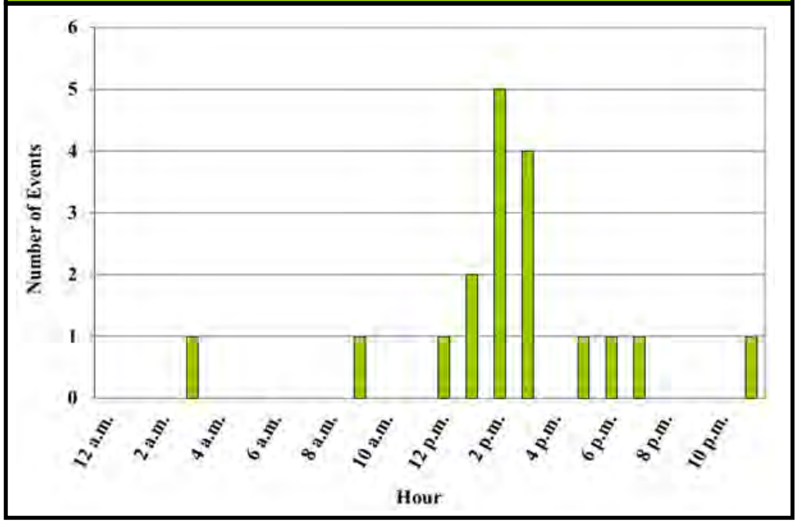


Figure SS-7 charts the reported occurrences of hail by hour. Approximately 89% of all the hail events occurred during the p.m. hours, with 9 of the events (50%) taking place between 2 p.m. and 4 p.m.

<u>*Lightning*</u>

While lightning strike events occur regularly across southern Illinois, NOAA's Storm Events Database does not include any *recorded* lightning strike events for Hamilton County. This is almost certainly due to the rural nature of the County. Planning Committee member information records four lightning strikes since 2014 that caused damage in the county.

Figure SS-7
Hail Events by Hour
2001 - 2019



According to data from Vaisala's National Lightning Detection Network, Hamilton County averaged close to 12 to 20 cloud-to-ground lightning flashes per square mile annually between 2009 and 2018. **Figure SS-8** illustrates the cloud-to-ground lightning flash density (number of cloud-to-ground flashes per square mile per year) by county for the continental United States. In comparison, Illinois averaged 12.7 cloud-to-ground lightning flashes per square mile from 2009 to 2018, ranking it eighth in the Country for lightning flash density.

Heavy Rain

While heavy rain events occur on a fairly regular basis across southern Illinois, NWS's COOP data records have documented 89 reported occurrences of heavy rain in Hamilton County between 1990 and 2019. Of the 89 occurrences, 20 events (22%) produced three inches or more of rain.

Figure SS-9 charts the reported occurrences of heavy rain by month. Of the 89 events, 28 (31%) took place in September, October, and November while an additional 27 (31%) took place in May, June and July making these the peak periods for heavy rain in Hamilton County. Of the 89 events, 12 (13%) occurred during November, making this the peak month for heavy rains.

Figure SS-10 charts the reported occurrences of heavy rain by hour. Of the 89 occurrences, start times were unavailable for 31 events. Of the remaining 58 events with recorded times, approximately 64% occurred during the p.m. hours. Twenty-seven of the events (47%) took place between 4 p.m. and 9 p.m.

Figure SS-8
Cloud-to-Ground Lightning Flash Density: Continental United States

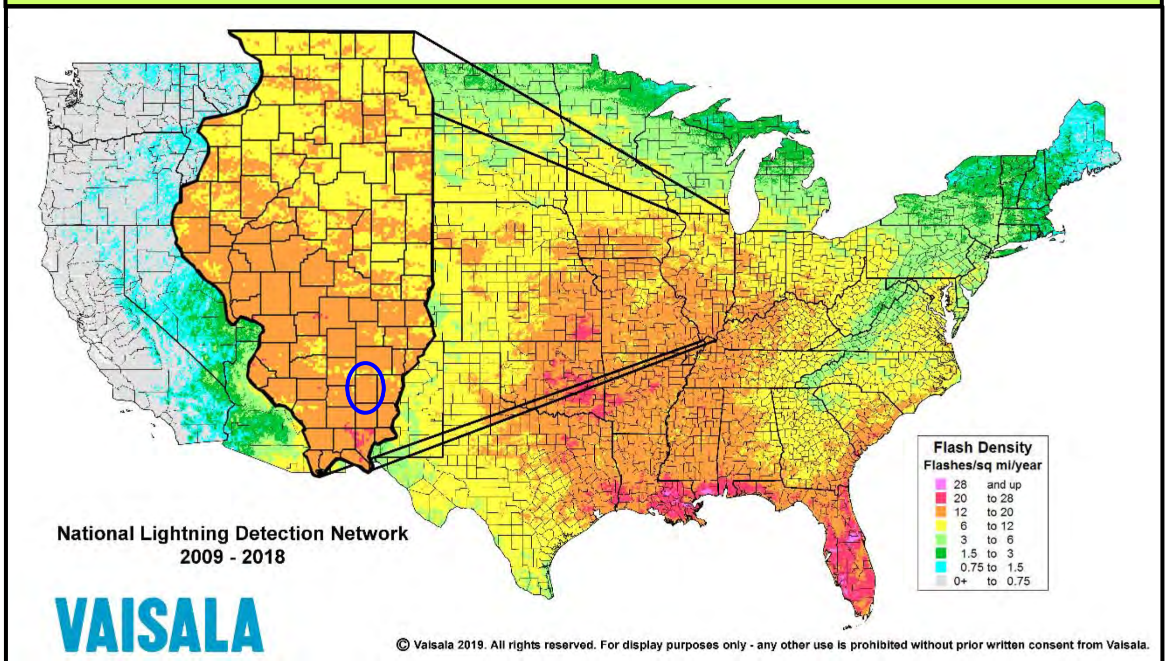


Figure SS-9
Heavy Rain Events by Month
1990 - 2019

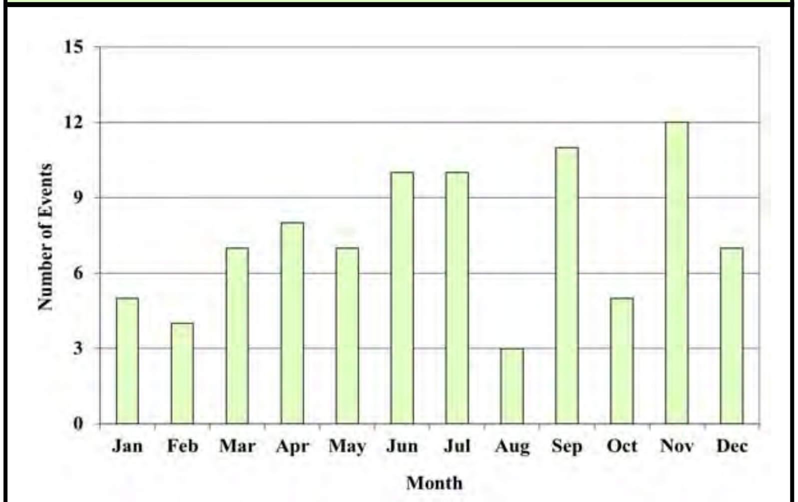
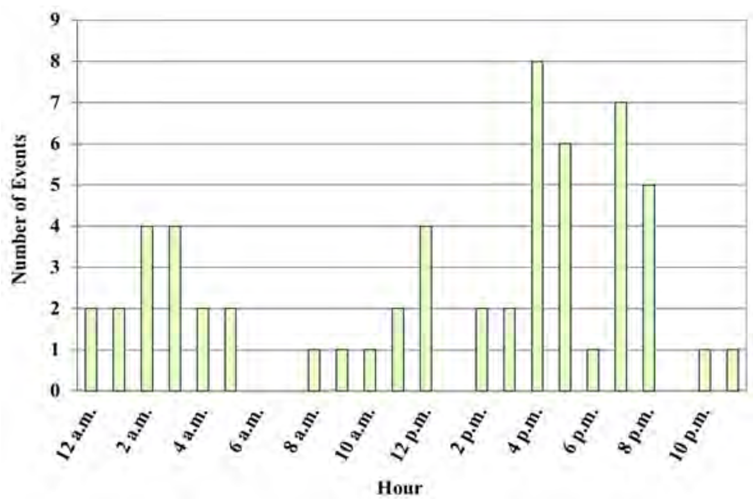


Figure SS-10
Heavy Rain Events by Hour
1990 - 2019



What locations are affected by severe storms?

Severe storms affect the entire County. A single severe storm event will generally extend across the entire County and affect multiple locations. The *2018 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency (IEMA) classifies Hamilton County's hazard rating for severe storms as "high." (IEMA's overall hazard rating system has five levels: very low, low, medium, high and severe.)

What is the probability of future severe storm events occurring?

Thunderstorms with Damaging Winds

Hamilton County has had 55 verified occurrences of thunderstorms with damaging winds between 1981 and 2019. With 55 occurrences over the past 39 years, Hamilton County should expect to experience at least one thunderstorm with damaging winds each year. There were eight years over the last 39 years where multiple (three or more) thunderstorms with damaging winds occurred. This indicates that the probability that multiple thunderstorms with damaging winds may occur during any given year within the County is 21%.

Hail

There have been 18 verified occurrences of hail one (1) inch in diameter or greater between 2001 and 2019. With 18 occurrences over the past 19 years, Hamilton County should expect to experience about one severe storm with hail one inch or greater each year. There were three years over the last 19 years where two or more hail events occurred. This indicates that the probability that more than one severe storm with hail may occur during any given year within the County is 16%.

HAZARD VULNERABILITY

The following describes the vulnerability to participating jurisdictions, identifies the impacts on public health and property (if known) and estimates the potential impacts on public health and safety as well as buildings, infrastructure and critical facilities from severe storms.

Are the participating jurisdictions vulnerable to severe storms?

Yes. All of Hamilton County is vulnerable to the dangers presented by severe storms due to the topography of the region and its location in relation to the movement of weather fronts across southern Illinois. Since 2010, Hamilton County has recorded 19 heavy rain events, 18 thunderstorms with damaging winds, seven severe storms with hail one (1) inch in diameter or greater and four verified lightning strikes.

Figure SS-11 details the number thunderstorms with damaging winds and hail events that were recorded in or near each participating municipality while **Figure SS-12** details the number of thunderstorms with damaging winds and hail events that were recorded in or near unincorporated areas of Hamilton County. Three of the four reported lightning strikes recorded occurred in or near McLeansboro which is in McLeansboro Township.

Figure SS-11
Verified Severe Storm Events by Participating Municipality

Participating Municipality	Number of Events	
	Thunderstorm & High Wind	Severe Hail
Broughton	3	1
Dahlgren[2]	7	4
McLeansboro[3]	27	10

[1] Located in Crook Township
[2] Located in Dahlgren Township
[3] Located in McLeansboro Township
[4] Located in South Crouch Township

Figure SS-12
Verified Severe Storm Events in Unincorporated Hamilton County

Unincorporated Area	Number of Events	
	Thunderstorm & High Wind	Severe Hail
Blairsville	1	0
Bungay	1	0
Dale	7	0
Delafield[2]	1	0
Dolan Lake[1]	1	0
Piopolis	4	3
Walpole	2	0

Of the participating municipalities, McLeansboro has had more recorded occurrences of thunderstorms with damaging winds and the greatest number of recorded hail events than any of the other municipalities. The difference in the number of recorded events may be due in part to the size of the City as well as the fact that the only active, long-term NWS COOP Observation Station for Hamilton County was located in the McLeansboro.

Do Any of the participating jurisdictions consider severe storms to be among their community's greatest vulnerabilities?

Yes. Based on responses to a Critical Facilities Vulnerability Survey distributed to the participating jurisdictions, the following respondents considered severe storms to be among their jurisdiction's greatest vulnerabilities.

- *South Crouch Township*: Severe thunderstorms cause damage to homes.

- *Hamilton County Water District*: Lightning strikes have damaged booster pumps stations. Lightning protection layers have been added but they don't always work.

As part of the Critical Facilities Vulnerability Survey, participating jurisdictions were also asked to identify critical facilities and infrastructure within their communities they felt have the greatest vulnerability to natural hazards and to which hazards. The following identifies by participating jurisdiction the infrastructure with specific vulnerability.

- *Broughton*: Lightning strikes to Village infrastructure.
- *McLeansboro*: Lightning strikes to sewer treatment plant
- *Hamilton County CUSD #10*: Wind damage to elementary schools and preschool.
- *Hamilton County Water District*: Water booster pumps to lightning strikes (the booster pump at 1325 N & 600 E has been struck by lightning).
- *Crook Township*: Wind damage to power lines.
- *County Highway Department/Dahlgren Township*: Winds down power lines and trees blocking roads.
- *County*: Wind damage to power lines.

What impacts resulted from the recorded severe storms?

Severe storms as a whole have caused an estimated $1.5 million in recorded property damages and an estimated $250 in recorded crop damages. The following provides a breakdown of impacts by category.

Thunderstorms with Damaging Winds

Data obtained from NOAA's Storm Events Database indicates that between 1981 and 2019, 36 of the 55 thunderstorms with damaging winds caused $586,550 in property damages and $250 in crop damages. Damage information was either unavailable or none was recorded for the remaining 19 reported occurrences.

No injuries or fatalities as the result of thunderstorm with damaging wind events.

Hail

Data obtained from NOAA's Storm Events Database indicates that between 2001 and 2019, two of the 18 hail events caused $850,000 in property damages. Damage information was either unavailable or none was recorded for the remaining 16 reported occurrences.

No injuries or fatalities were reported as a result of any of the recorded hail events.

Severe Storms Fast Facts – Impacts/Risk

Thunderstorms with Damaging Winds Impacts:
- Total Property Damage (36 events): ***$586,550***
- Total Crop Damage (1 event): ***$250***
- Injuries: ***0***
- Fatalities: ***0***

Severe Hail Impacts:
- Total Property Damage (2 events): ***$850,000***
- Total Crop Damage: ***0***
- Injuries: ***0***
- Fatalities: ***0***

Lightning Strike Impacts:
- Total Property Damage (4 events): ***$71,020***
- Total Crop Damage: ***0***
- Injuries: ***0***
- Fatalities: ***0***

Severe Storms Risk/Vulnerability:
- Public Health & Safety: ***Low***
- Buildings/Infrastructure/Critical Facilities: ***Medium***

Lightning

Data obtained Planning Committee member records indicates that between 2014 and 2019, the four lightning strike events caused $71,020 in property damage to critical facilities and infrastructure.

What other impacts can result from severe storms?

In Hamilton County, the greatest risk to health and safety from severe storms is vehicle accidents. Hazardous driving conditions resulting from severe storms (i.e., wet pavement, poor visibility, high winds, etc.) can contribute to accidents that result in injuries and fatalities. Traffic accident data assembled by the Illinois Department of Transportation from 2014 through 2018 indicates that wet road surface conditions were present for 6.2% to 21.1% of all crashes recorded annually in the County.

While other circumstances cause wet road surface conditions (i.e., melting snow, condensation, light showers, etc.), law enforcement officials agree that hazardous driving conditions caused by severe storms add to the number of crashes. **Figure SS-13** provides a breakdown by year of the number of crashes and corresponding injuries and fatalities that occurred when wet road surface conditions were present.

Figure SS-13
Severe Weather Crash Data for Hamilton County

Year	Total # of Crashes	Presence of Wet Road Surface Conditions		
		# of Crashes	# of Injuries	# of Fatalities
2014	145	20	5	0
2015	152	19	5	0
2016	129	8	2	0
2017	133	28	5	0
2018	199	18	9	1
Total:	**758**	**93**	**26**	**1**

Source: Illinois Department of Transportation.

What is the level of risk/vulnerability to public health and safety from severe storms?

For Hamilton County the level of risk or vulnerability posed by severe storms to public health and safety is considered to be ***low***. This assessment is based on the fact that despite their relative frequency, the number of injuries and fatalities is low.

Are existing buildings, infrastructure and critical facilities vulnerable to severe storms?

Yes. All existing buildings, infrastructure and critical facilities located in Hamilton County and the participating jurisdictions are vulnerable to damage from severe storms. Structural damage to buildings is a relatively common occurrence with severe storms. Damage to roofs, siding, awnings and windows can occur from hail, flying and falling debris and high winds. Lightning strikes can damage electrical components and equipment (i.e., appliances, computers etc.) and can cause fires that consume buildings. If the roof is compromised or windows are broken, rain can cause additional damage to the structure and contents of a building.

Infrastructure and critical facilities tend to be just as vulnerable to severe storm damage as buildings. The infrastructure and critical facilities that are the most vulnerable to severe storms are related to power distribution and communications. High winds, lightning and flying and falling debris have the potential to cause damage to communication and power lines; power substations; transformers and poles; and communication antennas and towers.

The damage inflicted by severe storms often leads to disruptions in communication and creates power outages. Depending on the damage, it can take anywhere from several hours to several days to restore service. Power outages and disruptions in communications can impair vital services, particularly when backup power generators are not available.

In addition to affecting power distribution and communications, debris and flooding from severe storms can block state and local roads hampering travel. When transportation is disrupted, emergency and medical services are delayed, rescue efforts are hindered and government services can be affected.

Based on the frequency with which severe storms occur in Hamilton County, the amount of property damage previously reported and the potential for disruptions to power distribution and communication; the risk or vulnerability to buildings, infrastructure and critical facilities from severe storms is ***medium***.

Are future buildings, infrastructure and critical facilities vulnerable to severe storms?

Yes. None of the participating jurisdictions have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from severe storms.

In addition, infrastructure such as new communication and power lines will continue to be vulnerable to severe storms as long as they are located above ground. High winds, lightning and flying and falling debris can disrupt power and communication. Steps to bury all new lines would eliminate the vulnerability, but this action would be cost prohibitive in most areas.

What are the potential dollar losses to vulnerable structures from severe storms?

Unlike other natural hazards, such as tornadoes, there are no standard loss estimation models or methodologies for severe storms. With only 43 of the 166 recorded events listing property damage numbers for all categories of severe storms, there is no way to accurately estimate future potential dollar losses. Since all existing structures within Hamilton County are vulnerable to damage, it is highly probable that there will be future dollar losses from severe storms.

3.2 SEVERE WINTER STORMS & EXTREME COLD

HAZARD IDENTIFICATION

What is the definition of a severe winter storm?

A severe winter storm can range from moderate snow over a few hours to significant accumulations of sleet and/or ice to blizzard conditions with blinding, wind-driven snow that last several days. The amount of snow or ice, air temperature, wind speed and event duration all influence the severity and type of severe winter storm that results. In general, there are three types of severe winter storms: blizzards, heavy snow storms and ice storms. The following provides a brief description of each type as defined by the National Weather Service (NWS).

- **Blizzards.** Blizzards are characterized by strong winds of at least 35 miles per hour and are accompanied by considerable falling and/or blowing snow that reduces visibility to ¼ mile or less. Blizzards are the most dangerous of all winter storms.
- **Heavy Snow Storms.** Heavy snow storms are generally defined as producing snowfall accumulations of four inches or more in 12 hours or less or six inches or more in 24 hours or less.
- **Ice Storms.** An ice storm occurs when substantial accumulations of ice, generally ¼ inch or more, build up on the ground, trees and utility lines as a result of freezing rain.

While extreme cold (i.e., dangerously low temperatures and wind chill values) often accompanies or is left in the wake of a severe winter storm, the NWS does not use it to define a severe winter storm. However, a discussion of extreme cold is included in this section since it has the ability to cause property damage, injuries and even fatalities (whether or not it is accompanied by freezing rain, ice or snow).

What is snow?

Snow is precipitation in the form of ice crystals. These ice crystals are formed directly from the freezing of water vapor in wintertime clouds. As the ice crystals fall toward the ground, they cling to each other creating snowflakes. Snow will only fall if the temperature remains at or below 32°F from the cloud base to the ground.

What is sleet?

Sleet is precipitation in the form of ice pellets. These ice pellets are composed of frozen or partially frozen rain drops or refrozen partially melted snowflakes. Sleet typically forms in winter storms when snowflakes partially melt while falling through a thin layer of warm air. The partially melted snowflakes then refreeze and form ice pellets as they fall through the colder air mass closer to the ground. Sleet usually bounces after hitting the ground or other hard surfaces and does not stick to objects.

What is freezing rain?

Freezing rain is precipitation that falls in the form of a liquid (i.e., rain drops), but freezes into a glaze of ice upon contact with the ground or other hard surfaces. This occurs when snowflakes descend into a warmer layer of air and melt completely. When the rain drops that result from this melting fall through another thin layer of freezing air just above the surface they become "supercooled", but they do not have time to refreeze before reaching the ground. However, because the rain drops are "supercooled", they instantly refreeze upon contact with anything that is at or below 32°F (i.e., the ground, trees, utility lines, etc.).

What is wind chill?

Wind chill, or wind chill factor, is a measure of the rate of heat loss from exposed skin resulting from the combined effects of wind and temperature. As the wind increases, heat is carried away from the body at a faster rate, driving down both the skin temperature and eventually the internal body temperature.

The unit of measurement used to describe the wind chill factor is known as the wind chill temperature. The wind chill temperature is calculated using a formula. **Figure SWS-1** identifies the formula and calculates the wind chill temperatures for certain air temperatures and wind speeds.

Figure SWS-1
Wind Chill Chart

Temperature (°F)

Wind (mph) / Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Source: NOAA, National Weather Service.

As an example, if the air temperature is 5°F and the wind speed is 20 miles per hour, then the wind chill temperature would be -15°F. The wind chill temperature is only defined for air temperatures at or below 50°F and wind speeds above three miles per hour. In addition, the wind chill temperature does not take into consideration the effects of bright sunlight which may increase the wind chill temperature by 10°F to 18°F.

Use of the current Wind Chill Temperature (WCT) index was implemented by the NWS on November 1, 2001. The new WCT index was designed to more accurately calculate how cold air feels on human skin. The new index uses advances in science, technology and computer modeling to provide an accurate, understandable and useful formula for calculating the dangers from winter winds and freezing temperatures. The former index was based on research done in 1945 by Antarctic researchers Siple and Passel.

Exposure to extreme wind chills can be life threatening. As wind chills edge toward -19°F and below, there is an increased likelihood that exposure will lead to individuals developing cold-related illnesses.

What cold-related illnesses are associated with severe winter storms?

Frostbite and hypothermia are both cold-related illnesses that can result when individuals are exposed to dangerously low temperatures and wind chills that can accompany severe winter storms. The following provides a brief description of the symptoms associated with each.

- **Frostbite.** During exposure to extremely cold weather the body reduces circulation to the extremities (i.e., feet, hands, nose, cheeks, ears, etc.) in order to maintain its core temperature. If the extremities are exposed, then this reduction in circulation coupled with the cold temperatures can cause the tissue to freeze.

  Frostbite is characterized by a loss of feeling and a white or pale appearance. At a wind chill of -19°F, exposed skin can freeze in as little as 30 minutes. Seek medical attention immediately if frostbite is suspected. It can permanently damage tissue and in severe cases can lead to amputation.

- **Hypothermia.** Hypothermia occurs when the body's temperature begins to fall because it is losing heat faster than it can produce it. If an individual's body temperature falls below 95°F, then hypothermia has set in and immediate medical attention should be sought.

  Hypothermia is characterized by uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness and exhaustion. Left untreated, hypothermia will lead to death. Hypothermia occurs most commonly at very cold temperatures, but can occur at cool temperatures (above 40°F) if an individual isn't properly clothed or becomes chilled.

Are alerts issued for severe winter storms?

Yes. The NWS Weather Forecast Office in Paducah, Kentucky is responsible for issuing ***winter storm watches*** and ***warnings*** for Hamilton County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Watch.** The following watches are issued in advance of a storm and indicate the potential for significant winter weather within the next 12 to 48 hours.
  - **Winter Storm Watch.** A winter storm watch is issued if there is a threat of heavy snow, sleet, significant accumulations of freezing rain or freezing drizzle, or any combination thereof.

- ❖ **Wind Chill Watch.** A wind chill watch may be issued if conditions are favorable for wind chill temperatures to meet or exceed warning criteria.

- **Advisories.** Winter advisories are issued when wintry precipitation such as snow, sleet, freezing rain or drizzle or a combination is expected but accumulations will not reach warning criteria. The following advisories will be issued when an event is occurring, is imminent or has a high probability of occurring.
  - ❖ **Winter Weather Advisory.** Depending on the time of occurrence and the temperature, a winter weather advisory is issued for:
    - ❑ snowfall of 2 to 4 inches;
    - ❑ ice accumulations averaging under ¼ inch; or
    - ❑ when blowing and drifting snow will frequently reduce the visibility to ¼ mile or less and make for hazardous travel conditions.
  - ❖ **Wind Chill Advisory.** A wind chill advisory is issued when the wind chill temperatures are expected to be between -10°F and -24°F preferably with wind speeds of at least 10 mph.

- **Warnings.** Winter weather warnings are issued for events that can be life threatening. The following warnings will be issued when an event is occurring, is imminent, or has a high probability of occurring.
  - ❖ **Blizzard Warning.** A blizzard warning is issued when sustained winds or frequent gusts greater than or equal to 35 mph are accompanied by falling and/or blowing snow that frequently reduces visibility to less than ¼ mile for three hours or more.
  - ❖ **Ice Storm Warning.** An ice storm warning is issued ice accumulations of ¼ inch or more are expected.
  - ❖ **Winter Storm Warning.** A winter storm warning is issued if there is a high probability that a mix of severe winter weather will occur such as heavy snow (at least 4 inches or more in 12 hours or 6 inches or more in 24 hours), sleet, significant accumulations of freezing rain or drizzle or a combination thereof.
  - ❖ **Wind Chill Warning.** A wind chill warning is issued when wind chill temperatures are expected to be -25°F or below preferably with wind speeds of at least 10 mph.

HAZARD PROFILE

The following identifies past occurrences of severe winter storms and extreme cold; details the severity or extent of each event (if known); identifies the locations potentially affected; and estimates the likelihood of future occurrences.

When have severe winter storms and extreme cold occurred previously? What is the extent of these previous severe winter storms and extreme cold events?

Tables 5 and **6**, located in **Appendix J**, summarize the previous occurrences as well as the extent or magnitude of severe winter storms (snow & ice) and extreme cold events recorded in Hamilton County.

Severe Winter Storm Fast Facts – Occurrences

Number of Severe Winter Storm Events Reported (1950 - 2019): ***102***

Number of Extreme Cold Events Reported (1996 - 2019): ***18***

Maximum 24-Hour Snow Accumulation: ***11 inches (March 26 & 27, 1947)***

Coldest Temperature Recorded in the County: ***-23°F (January 18, 1930 at McLeansboro)***

Most Likely Month for Severe Winter Storms to Occur: ***January***

Most Likely Month for Extreme Cold Events to Occur: ***January***

Most Likely Time for Severe Winter Storms to Occur: ***early morning***

Severe Winter Storms

NOAA's Storm Events Database and NWS's COOP Data records were used to document 102 reported occurrences of severe winter storms (snow, ice and/or a combination of both) in Hamilton County between 1950 and 2019. Of the 102 recorded occurrences there were:

- 58 heavy snow storms or blizzards;
- 40 combination events (freezing rain, sleet, ice and/or snow); and
- 4 ice or sleet storms.

Figure SWS-2 charts the reported occurrences of severe winter storms by month. Of the 102 events, 83 (82%) took place in December, January, and February. Of these 83 events, 31 (37%) occurred during January, making this the peak month for severe winter storms.

Figure SWS-2
Severe Winter Storms by Month
1950 - 2019

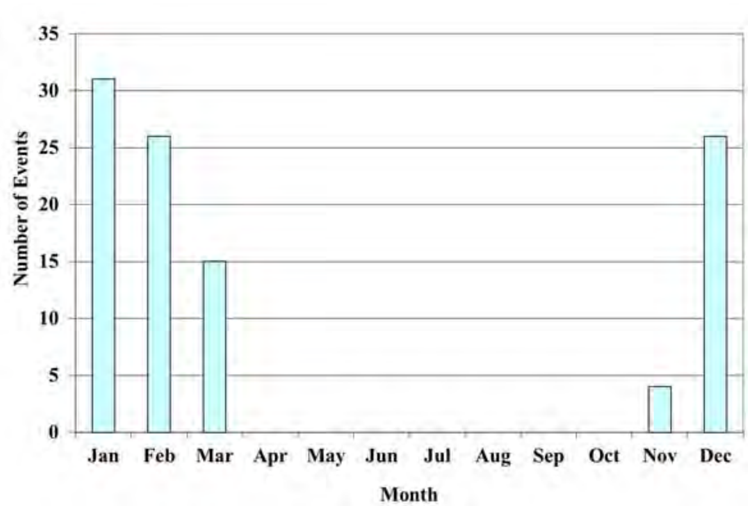
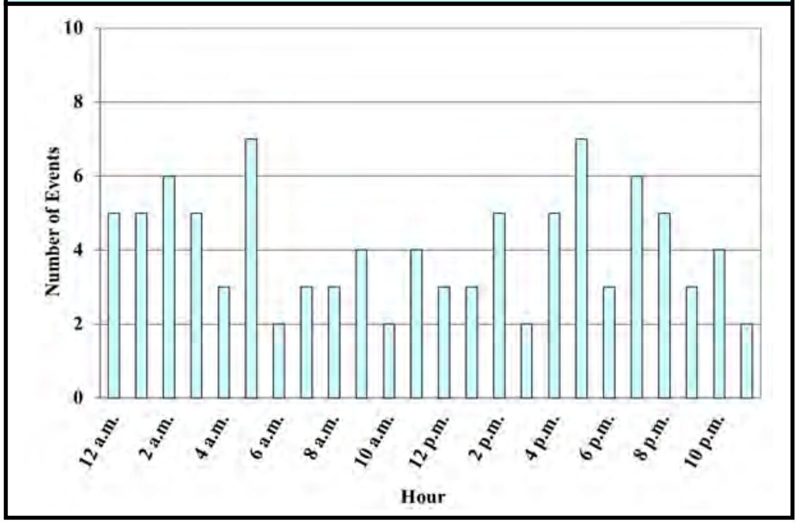


Figure SWS-3 charts the reported occurrences of severe winter storms by hour. Of the 102 occurrences, start times were unavailable for 5 events. Of the remaining 97 severe winter storm events with recorded times, approximately 51% began during the a.m. hours, with 31 (32%) beginning between 12 a.m. and 6 a.m.

Figure SWS-3
Severe Winter Storms by Hour
1950 - 2019



According to the NWS's COOP data records, the maximum 24-hour snow accumulation in Hamilton County is 11 inches, which occurred on March 26 & 27, 1947.

<u>*Extreme Cold*</u>

While extreme cold events occur across southern Illinois, NOAA's Storm Events Database has only 14 *recorded* occurrences of extreme cold (dangerously low temperatures and wind chill values) in Hamilton County between 1996 and 2019. These represent the ***reported occurrences*** of extreme cold. The NWS acknowledges that extreme cold events are not well documented. Only those events with impacts are reported. As a result, extreme cold events often go unreported and therefore, more events have almost certainly occurred than are documented in this section.

Ten of the 18 events (56%) took place in January, making this the peak month for extreme cold events. The remaining events took place in December and February. Approximately (94%) of all the extreme cold events with recorded times began during the a.m. hours.

According to the Midwestern Regional Climate Center, continuous temperature records for Hamilton County were kept from 1892 to 2002 by the NWS COOP Observer Station at McLeansboro. Based on the available records, the coldest temperature recorded in Hamilton County was -23°F on January 18, 1930. **Figure SW-4** lists the coldest days recorded at the McLeansboro observation station.

Figure SWS-4 Coldest Days Recorded at McLeansboro NWS COOP Observer Station					
	Date	**Temperature**		**Date**	**Temperature**
1	1/18/1930	-23°F	6	1/7/1912	-19°F
2	1/17/1977	-21°F	7	1/13/1912	-19°F
3	1/18/1977	-20°F	8	12/23/1989	-19°F
4	12/22/1989	-20°F	9	12/24/1989	-19°F
5	2/9/1899	-19°F			

Source: Midwest Regional Climate Center cli-MATE

What locations are affected by severe winter storms and extreme cold?

Severe winter storms and extreme cold affect the entire County. All the participating jurisdictions in Hamilton County have been affected by severe winter storms and extreme cold. Severe winter storms and extreme cold generally extend across the entire County and affect multiple locations. The *2018 Illinois Natural Hazard Mitigation Plan* prepared by IEMA classifies Hamilton County's hazard rating for severe winter storms as "high."

Do any of the participating jurisdictions have designated warming centers?

Yes. Three of the seven participating municipalities/townships have designated warming centers. A "designated" warming center is identified as any facility that has been *formally* identified by the municipality (through emergency planning, resolution, Memorandum of Agreement, etc.) as a location available for use by residents during severe winter storms and extreme cold events. **Figure SW-5** identifies the location of each warming center by jurisdiction. At this time Broughton, Crook Township, McLeansboro Township and South Crouch Township do not have any warming centers designated y their jurisdictions. In addition, there are no State of Illinois-designated warming centers in Hamilton County.

Figure SWS-5 Designated Warming Centers by Participating Jurisdiction	
Name/Address	**Name/Address**
Dahlgren	*McLeansboro*
Village Hall, 106 North 3rd Street	Hamilton Memorial Hospital, 611 S. Marshall Ave.
Dahlgren Township	Hamilton Co. Court House, 100 S. Jackson St.
Dahlgren Township Building, 19283 Co. Rd. 200 E.	Turning Point Church of God, 107 E. Broadway

What is the probability of future severe winter storms occurring?

Severe Winter Storms

Hamilton County has had 102 verified occurrences of severe winter storms between 1950 and 2019. With 102 occurrences over the past 70 years, Hamilton County should expect at least one severe winter storm each year. There were 28 years over the past 70 years where two or more severe winter storms occurred. This indicates the probability that more than one severe winter storm may occur during any given year within the County is 40%.

Extreme Cold Events

Given the limited amount of data available for extreme cold events, it is difficult to establish a precise probability; however, Hamilton County should expect to experience additional extreme cold events in the future.

HAZARD VULNERABILITY

The following describes the vulnerability to participating jurisdictions, identifies the impacts on public health and property (if known) and estimates the potential impacts on public health and safety as well as buildings, infrastructure and critical facilities from severe winter storms and extreme cold.

Are the participating jurisdictions vulnerable to severe winter storms and extreme cold?

Yes. All of Hamilton County, including the participating municipalities and townships, is vulnerable to the dangers presented by severe winter storms and extreme cold. Severe winter storms are among the more frequently occurring natural hazards in Illinois. Since 2010, Hamilton County has experienced 22 severe winter storms and seven extreme cold events.

Severe winter storms have immobilized portions of the County, blocking roads; downing power lines, trees and branches; causing power outages and property damage; and contributing to vehicle accidents. In addition, the County, townships and municipalities must budget for snow removal and de-icing of roads and bridges as well as for roadway repairs.

Do Any of the participating jurisdictions consider severe winter storms to be among their community's greatest vulnerabilities?

No. Based on responses to a Critical Facilities Vulnerability Survey distributed to the participating jurisdictions, none of the participants consider severe winter storms to be among their community's greatest vulnerabilities.

As part of the Critical Facilities Vulnerability Survey, participating jurisdictions were also asked to identify critical facilities and infrastructure within their communities they felt have the greatest vulnerability to natural hazards and to which hazards. The following identifies by participating jurisdiction the infrastructure with specific vulnerability.

- *Crook Township*: Power lines to ice storms.
- *County Highway Department/Dahlgren Township*: Township roads to snow and ice storms.
- *McLeansboro Township*: Township roads to ice storms.
- *County*: Power lines to ice storms.

What impacts resulted from the recorded severe winter storms and extreme cold?

The following summarize the impacts of severe winter storms and extreme cold events recorded in Hamilton County.

Severe Winter Storms

Data obtained from NOAA's Storm Events Database indicates that between 1950 and 2019, one of the 102 severe winter storms caused $100,000 in property damages. Property damage information was either unavailable or none was recorded for the remaining 101 reported occurrences.

Severe Winter Storms & Extreme Cold Events
Fast Facts – Impacts/Risk

Severe Winter Storm (Snow & Ice) Impacts:
- Total Property Damage (1 event): ***$100,000***
- Injuries: ***0***
- Fatalities: ***0***

Extreme Cold Impacts:
- Total Property Damage: ***n/a***
- Injuries: ***0***
- Fatalities: ***0***

Severe Winter Storm Risk/Vulnerability:
- Public Health & Safety: ***Low to Medium***
- Buildings/Infrastructure/Critical Facilities: ***Medium***

In comparison, the State of Illinois has averaged $102 million annually in winter storm losses according to the Illinois State Water Survey's Climate Atlas of Illinois, ranking winter storms second only to flooding in terms of economic loss in the State. While behind floods in terms of the amount of property damage caused, severe winter storms have a greater ability to immobilize larger areas, with rural areas being particularly vulnerable.

No injuries or fatalities were reported as a result of any of the recorded severe winter storms

Extreme Cold

Damage information was either unavailable or none was recorded for any of the 18 reported extreme cold events between 1996 and 2019. No injuries or fatalities were reported as a result of any of the recorded extreme cold events either.

In comparison, the State of Illinois averages 18 cold-related fatalities annually according to the Illinois State Water Survey's Climate Atlas of Illinois.

What other impacts can result from severe winter storms?

In Hamilton County, vehicle accidents are the largest risk to health and safety from severe winter storms. Hazardous driving conditions (i.e., reduced visibility, icy road conditions, strong winds, etc.) contribute to the increase in accidents that result in injuries and fatalities. A majority of all severe winter storm injuries result from vehicle accidents.

Traffic accident data assembled by the Illinois Department of Transportation from 2014 through 2018 indicates that treacherous road conditions caused by snow/slush and ice were present for 1.3% to 7.0% of all crashes recorded annually in the County. **Figure SWS-6** provides a breakdown by year of the number of crashes and corresponding injuries and fatalities that occurred when treacherous road conditions caused by snow and ice were present.

Persons who are outdoors during and immediately following severe winter storms and extreme cold events can experience other health and safety problems. Frostbite to hands, feet, ears and nose and hypothermia are common injuries. Treacherous walking conditions also lead to falls which can result in serious injuries, including fractures and broken bones, especially in the elderly.

Over exertion from shoveling driveways and walks can lead to life-threatening conditions such as heart attacks in middle-aged and older adults who are susceptible.

Figure SWS-6
Severe Winter Weather Crash Data for Hamilton County

Year	Total # of Crashes	Presence of Treacherous Road Conditions caused by Snow/slush and Ice		
		# of Crashes	# of Injuries	# of Fatalities
2014	199	14	4	0
2015	133	5	1	0
2016	129	5	2	0
2017	152	2	0	0
2018	145	9	8	0
Total:	**758**	**35**	**15**	**0**

Source: Illinois Department of Transportation.

What is the level of risk/vulnerability to public health and safety from severe winter storms and extreme cold?

While severe winter storms and extreme cold occur regularly in Hamilton County, the number of injuries and fatalities is relatively low. Taking into consideration the potential for hazardous driving conditions; snow-removal related injuries; and power outages that could leave individuals vulnerable to hypothermia, the risk to public health and safety from severe winter storms is seen as ***low to medium***.

Are existing buildings, infrastructure and critical facilities vulnerable to severe winter storms and extreme cold?

Yes. All existing buildings, infrastructure and critical facilities located in Hamilton County and the participating jurisdictions are vulnerable to damage from severe winter storms and extreme cold. The following summarize the vulnerabilities by severe winter storms and extreme cold events.

Based on the frequency with which severe winter storms and extreme cold events have occurred in Hamilton County; the damages described; the amount of property damage previously reported; and the potential for disruptions to power distribution and communication; the risk or vulnerability to buildings, infrastructure and critical facilities from severe winter storms is ***medium***.

Winter Storm

Structural damage to buildings caused by severe winter storms (snow and ice) is very rare, but can occur particularly to flat rooftops. Information gathered from Hamilton County residents indicates that snow and ice accumulations on communication and power lines as well as key roads presents the greatest vulnerability to infrastructure and critical facilities within the County. Snow and ice accumulations on lines often lead to disruptions in communications and create power outages. Depending on the damage, it can take anywhere from several hours to several days to restore service.

In addition to affecting communication and power lines, snow and ice accumulations on state and local roads hampers travel and can cause dangerous driving conditions. Blowing and drifting snow can lead to road closures and increases the risk of automobile accidents. Even small accumulations of ice can be extremely dangerous to motorists since bridges and overpasses freeze before other surfaces.

When transportation is disrupted, schools close, emergency and medical services are delayed, some businesses close and government services can be affected. When a severe winter storm hits there is also an increase in cost to the County, townships and municipalities for snow removal and de-icing. Road resurfacing and pothole repairs are additional costs incurred each year as a result of severe winter storms.

Extreme Cold

Extreme cold events can also have a detrimental impact on buildings, infrastructure and critical facilities. Pipes and water mains are especially susceptible to freezing during extreme cold events. This freezing can lead to cracks or ruptures in the pipes in buildings as well as in buried service lines and mains. As a result, flooding can occur as well as disruptions in service. Since most buried service lines and water mains are located under local streets and roads, fixing a break requires portions of the street or road to be blocked off, excavated and eventually repaired. These activities can be costly and must be carried out under less than ideal working conditions.

Are future buildings, infrastructure and critical facilities vulnerable to severe winter storms and extreme cold?

Yes. None of the participating jurisdictions have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from severe storms.

In addition, infrastructure such as new communication and power lines will continue to be vulnerable to severe winter storms, especially to ice accumulations, as long as they are located above ground. Rural areas of Hamilton County have experienced extended periods without power due to severe winter storms. Steps to bury all new lines would eliminate the vulnerability, but this action would be cost prohibitive in most areas. In terms of new roads and bridges, there is very little that can be done to reduce or eliminate their vulnerability to severe winter storms.

What are the potential dollar losses to vulnerable structures from severe winter storms and extreme cold?

Unlike other natural hazards, such as tornadoes, there are no standard loss estimation models or methodologies for severe winter storms and extreme cold events. With only one of the 120 recorded events listing property damage numbers for severe winter storms and extreme cold, there is no way to accurately estimate future potential dollar losses. Since all existing structures within Hamilton County are vulnerable to damage, it is likely that there will be future dollar losses from severe winter storms and extreme cold.

3.3 EXCESSIVE HEAT

HAZARD IDENTIFICATION

What is the definition of excessive heat?

Excessive heat is generally characterized by a prolonged period of summertime weather that is substantially hotter and more humid than the average for a location at that time of year. Excessive heat criteria typically shift by location and time of year. As a result, reliable fixed absolute criteria are not generally specified (i.e., a summer day with a maximum temperature of at least 90°F).

Excessive heat events are usually a result of both high temperatures and high relative humidity. (Relative humidity refers to the amount of moisture in the air.) The higher the relative humidity or the more moisture in the air, the less likely that evaporation will take place. This becomes significant when high relative humidity is coupled with soaring temperatures.

On hot days the human body relies on the evaporation of perspiration or sweat to cool and regulate the body's internal temperature. Sweating does nothing to cool the body unless the water is removed by evaporation. When the relative humidity is high, then the evaporation process is hindered, robbing the body of its ability to cool itself.

Excessive heat is a leading cause of weather-related fatalities in the United States. According to the Centers for Disease Control and Prevention, a total of 7,415 people died from heat-related illnesses between 1999 and 2010, an average of 618 fatalities a year.

What is the Heat Index?

In an effort to raise the public's awareness of the hazards of excessive heat, the National Weather Service (NWS) devised the "Heat Index". The Heat Index, sometimes referred to as the "apparent temperature", is a measure of how hot it feels when relative humidity is added to the actual air temperature. **Figure EH-1** shows the Heat Index as it corresponds to various air temperatures and relative humidity.

As an example, if the air temperature is 96°F and the relative humidity is 65%, then the Heat Index would be 121°F. It should be noted that the Heat Index values were devised for shady, light wind conditions. Exposure to full sunshine can increase Heat Index values by up to 15°F. Also, strong winds, particularly with very hot, very dry air, can be extremely hazardous. When the Heat Index reaches 105°F or greater, there is an increased likelihood that continued exposure and/or physical activity will lead to individuals developing severe heat disorders.

What are heat disorders?

Heat disorders are a group of illnesses caused by prolonged exposure to hot temperatures and are characterized by the body's inability to shed excess heat. These disorders develop when the heat gain exceeds the level the body can remove or if the body cannot compensate for fluids and salt lost through perspiration. In either case the body loses its ability to regulate its internal temperature. All heat disorders share one common feature: the individual has been overexposed to heat, or over exercised for their age and physical condition on a hot day. The following describes the symptoms associated with the different heat disorders.

Figure EH-1
Heat Index

Temperature (°F)

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

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Source: NOAA, National Weather Service.

- **Heat Rash.** Heat rash is a skin irritation caused by excessive sweating during hot, humid weather and is characterized by red clusters of small blisters on the skin. It usually occurs on the neck, chest, groin or in elbow creases.
- **Sunburn.** Sunburn is characterized by redness and pain of skin exposed too long to the sun without proper protection. In severe cases it can cause swelling, blisters, fever and headaches and can significantly retard the skin's ability to shed excess heat.
- **Heat Cramps.** Heat cramps are characterized by heavy sweating and muscle pains or spasms, usually in the abdomen, arms or legs that during intense exercise. The loss of fluid through perspiration leaves the body dehydrated resulting in muscle cramps. This is usually the first sign that the body is experiencing trouble dealing with heat.
- **Heat Exhaustion.** Heat exhaustion is characterized by heavy sweating, muscle cramps, tiredness, weakness, dizziness, headache, nausea or vomiting and faintness. Breathing may become rapid and shallow and the pulse thready (weak). The skin may appear cool, moist and pale. If not treated, heat exhaustion may progress to heat stroke.
- **Heat Stroke (Sunstroke).** Heat stroke is a life-threatening condition characterized by a high body temperature (106°F or higher). The skin appears to be red, hot and dry with very little perspiration present. Other symptoms include a rapid and strong pulse, throbbing headache, dizziness, nausea and confusion. There is a possibility that the individual will become unconsciousness. If the body is not cooled quickly, then brain damage and death may result.

Studies indicate that, all things being equal, the severity of heat disorders tend to increase with age. Heat cramps in a 17-year-old may be heat exhaustion in someone 40 and heat stroke in a person over 60. Elderly persons, small children, chronic invalids, those on certain medications and persons with weight or alcohol problems are particularly susceptible to heat reactions.

Figure EH-2 below indicates the heat index at which individuals, particularly those in higher risk groups, might experience heat-related disorders. Generally, when the heat index is expected to exceed 105°F, the NWS will initiate excessive heat alert procedures.

Figure EH-2
Relationship between Heat Index and Heat Disorders

Heat Index (°F)	Heat Disorders
80°F – 90°F	Fatigue is possible with prolonged exposure and/or physical activity
90°F – 105°F	Heat cramps, heat exhaustion and heat stroke possible with prolonged exposure and/or physical activity
105°F – 130°F	Heat cramps, heat exhaustion and heat stroke likely; heat stroke possible with prolonged exposure and/or physical activity
130°F or Higher	Heat stroke highly likely with continued exposure

Source: NOAA, Heat Wave: A Major Summer Killer.

What is an excessive heat alert?

An excessive heat alert is an advisory or warning issued by the NWS when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines the type of alert issued. There are four types of alerts that can be issued for an extreme heat event. The following provides a brief description of each type of alert based on the ***excessive heat advisory/warning criteria*** established by NWS Weather Forecast Office in Paducah, Kentucky. The Paducah Office is responsible for issuing alerts for Hamilton County.

- **Outlook.** An excessive heat outlook is issued when the potential exists for an excessive heat event to develop over the next three (3) to seven (7) days.
- **Watch.** An excessive heat watch is issued when conditions are favorable for an excessive heat event to occur within the next 24 to 72 hours.
- **Advisory.** An excessive heat advisory is issued when the heat index is forecasted near or in excess of 105°F for any duration, *or* when heat indexes ranging from 100°F to 105°F are forecasted for at least four (4) consecutive days.
- **Warning.** An excessive heat warning is issued when the heat index is forecasted near or in excess of 110°F and the nighttime low heat index is expected to be at least 75°F for two (2) consecutive days *or* when the heat index is forecasted near or in excess of 105°F for four (4) consecutive days.

HAZARD PROFILE

The following identifies past occurrences of excessive heat, details the severity or extent of each event (if known); identifies the locations potentially affected and estimates the likelihood of future occurrences.

When have excessive heat events occurred previously? What is the extent of these events?

Table 7, located in **Appendix J**, summarizes the previous occurrences as well as the extent or magnitude of excessive heat events recorded in Hamilton County. NOAA's Storm Events Database and NWS's COOP Data records were used to document 48 occurrences of excessive heat in Hamilton County between 1997 and 2019.

Excessive Heat Fast Facts – Occurrences

Number of Excessive Heat Events Reported (1997 – 2019): ***48***

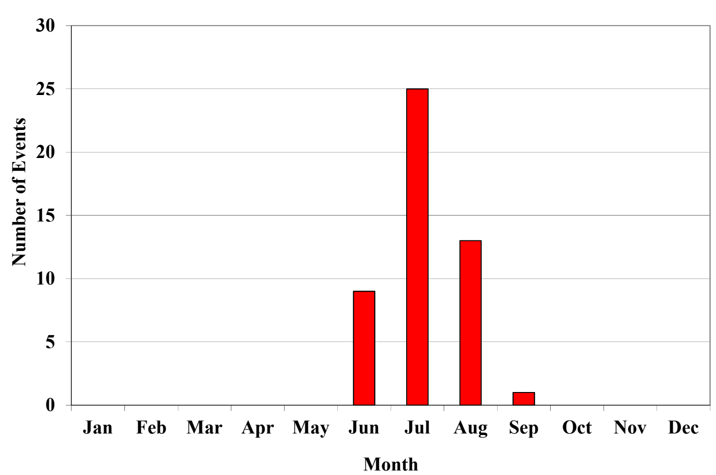
Hottest Temperature Recorded in the County: ***113°F***
(July 13 & 14, 1936 at McLeansboro COOP Station)

Most Likely Month for Excessive Heat Events to Occur: ***July***

Most Likely Time for Excessive Heat Events to Start: ***Late morning***

Figure 3 charts the reported occurrences of excessive heat events by month. Of the 48 events, 25 (52%) either began or took place in July making this the peak month for excessive heat events in Hamilton County. There were two events that spanned two months; however, for illustration purposes only the month the event started in is graphed. Of the 48 occurrences, 30 (63%) began during the a.m. hours,

Figure EH-3
Excessive Heat Events by Month
1997 – 2019



According to the Midwestern Regional Climate Center, continuous temperature records for Hamilton County were kept from 1896 to 2002 by the NWS COOP Observer Station at McLeansboro. Based on the available records, the hottest temperature recorded in Hamilton

County was 113°F at the McLeansboro COOP Station on July 13th & 14th 1936. **Figure EH-4** lists the hottest days recorded at the McLeansboro COOP observation station.

Figure EH-4
Hottest Days Recorded at McLeansboro NWS COOP Observer Station

	Date	Temperature			Date	Temperature
1	7/13/1936	113°F		7	7/22/1901	110°F
2	7/14/1936	113°F		8	8/17/1936	110°F
3	7/15/1936	112°F		9	8/18/1936	110°F
4	7/7/1936	111°F		10	8/5/1918	109°F
5	7/12/1936	111°F		11	7/10/1936	109°F
6	8/27/1936	111°F		12	8/19/1936	109°F

Source: Midwest Regional Climate Center cli-MATE

What locations are affected by excessive heat?

Excessive heat affects the entire County. Excessive heat events, like drought and severe winter storms, generally extend across an entire region and affecting multiple counties. The *2018 Illinois Natural Hazard Mitigation Plan* classifies Hamilton County's hazard rating for excessive heat as "high."

Do any of the participating jurisdictions have designated cooling centers?

Yes. of the seven participating municipalities/townships have designated cooling centers. A "designated" cooling center is identified as any facility that has been *formally* identified by the jurisdiction (through emergency planning, resolution, Memorandum of Agreement, etc.) as a location available for use by residents of the jurisdiction during excessive heat events.

Figure EH-5 identifies the location of each cooling center by jurisdiction. At this time Broughton, Crook Township, McLeansboro Township and South Crouch Township do not have any cooling centers designated by their jurisdictions. In addition, there are no State of Illinois-designated cooling centers in Hamilton County.

Figure EH-5
Designated Warming Centers by Participating Jurisdiction

Name/Address	Name/Address
Dahlgren	*McLeansboro*
Village Hall, 106 North 3rd Street	Hamilton Memorial Hospital, 611 S. Marshall Ave.
Dahlgren Township	Hamilton Co. Court House, 100 S. Jackson St.
Dahlgren Township Building, 19283 Co. Rd. 200 E.	Turning Point Church of God, 107 E. Broadway

What is the probability of future excessive heat events occurring?

Hamilton County has experienced 48 verified occurrences of excessive heat between 1997 and 2019. With 48 occurrences over the past 23 years, Hamilton County should expect to experience at least two excessive heat events a year. There were 14 years over the 23 years were two or more excessive heat events occurred. This indicates that the probability that more than one excessive heat event may occur during any given year within the County is 61 %

HAZARD VULNERABILITY

The following describes the vulnerability to participating jurisdictions, identifies the impacts on public health and property (if known) and estimates the potential impacts on public health and safety as well as buildings, infrastructure and critical facilities from excessive heat.

Are the participating jurisdictions vulnerable to excessive heat?

Yes. All of Hamilton County, including the participating municipalities and townships, is vulnerable to the dangers presented by excessive heat. Since 2010, Hamilton County has experienced 33 excessive heat events.

Do any of the participating jurisdictions consider excessive heat to be among their community's greatest vulnerabilities?

No. Based on responses to a Critical Facilities Vulnerability Survey distributed to the participating jurisdictions, none of the participating jurisdictions considered excessive heat to be among their community's greatest vulnerabilities. In addition, none of the jurisdictions identified any critical facilities or infrastructure within their communities as having a specific vulnerability to excessive heat.

What impacts resulted from the recorded excessive heat events?

Damage information was either unavailable or none was recorded and no injuries or fatalities were reported as a result of any of the excessive heat events.

In comparison, Illinois averages 74 heat-related fatalities annually according the Illinois State Water Survey's Climate Atlas of Illinois. Excessive heat has triggered more fatalities than any other natural hazard in Illinois. More fatalities are attributed to excessive heat than the combined number of fatalities attributed to floods, tornadoes, lightning and extreme cold.

Excessive Heat Fast Facts – Impacts/Risk

Excessive Heat Impacts:
- Total Property Damage: ***n/a***
- Total Crop Damage: ***n/a***
- Fatalities: ***n/a***
- Injuries: ***n/a***

Excessive Heat Risk/Vulnerability:
- Public Health & Safety – General Population: ***Low***
- Public Health & Safety – Sensitive Populations: ***Medium/high***
- Buildings/Infrastructure/Critical Facilities: ***Low***

While no recorded injuries or fatalities were reported as a result of excessive heat in Hamilton County, it does not mean that none occurred. It simply means that excessive heat was not identified as the primary cause. This is especially true for fatalities. Usually heat is not listed as the primary cause of death, but rather an underlying cause. The heat indices were sufficiently high for all the excessive heat events to produce heat cramps or heat exhaustion with the possibility of heat stroke in cases of prolonged exposure or physical activity.

What other impacts can result from excessive heat events?

Other impacts of excessive heat include road buckling, power outages, stress on livestock, early school dismissals and school closings. In addition, excessive heat events can also lead to an increase in water usage and may result in municipalities imposing water use restrictions. In

Hamilton County, excessive heat has the ability to impact the drinking water supplies of some of the participating municipalities. Hamilton County Water district, Dahlgren, and McLeansboro rely solely on surface water sources for their drinking water supplies.

What is the level of vulnerability to public health and safety from excessive heat?

Even if injuries and fatalities due to excessive heat were under reported in Hamilton County, the level of risk or vulnerability posed by excessive heat to the public health and safety of the *general population* is considered to be ***low***. This assessment is based on the absence of designated cooling centers in most of the participating jurisdictions tempered by the fact that Hamilton County does not have any large urban areas where living conditions (such as older, poorly-ventilated high rise buildings and low-income neighborhoods) tend to contribute to heat-related injuries and fatalities.

The level of risk or vulnerability posed by excessive heat to the public health and safety of *sensitive populations* is considered to be ***medium/high***. Sensitive populations such as older adults (those 70 years of age and older) and small children (those 5 years of age and younger) are more susceptible to heat-related reactions and therefore their risk is elevated. **Figure EH-6** identifies the percent of sensitive populations by participating jurisdiction based on 2010 census data.

Figure EH-6
Sensitive Populations by Participating Jurisdictions

Participating Jurisdiction	% of Population 70 year of age & Older	% of Population 5 years age & Younger	Total % of Sensitive Population
Broughton	17.5	6.2	23.7
Dahlgreen	11.8	6.5	18.3
McLeansboro	19.0	6.3	25.4
Unincorp. Hamilton County	11.6	5.6	17.2
Hamilton County	14.3	5.9	20.3
State of Illinois	8.8	6.5	15.3

Source: U. S. Census Bureau.

In addition, individuals with chronic conditions, those on certain medications, and persons with weight or alcohol problems are also considered sensitive populations. However, demographic information is not available for these segments of the population.

Are existing buildings, infrastructure and critical facilities vulnerable to excessive heat?

No. In general, existing buildings, infrastructure and critical facilities located in the County and the participating jurisdictions are not vulnerable to excessive heat. The primary concern is for the health and safety of those living in the County (including all of the municipalities).

While buildings do not typically sustain damage from excessive heat, in rare cases infrastructure and critical facilities may be directly or indirectly damaged. While uncommon, excessive heat has been known to contribute to damage caused to roadways within Hamilton County. The combination of excessive heat and vehicle loads has caused pavement cracking and buckling.

Excessive heat has also been known to indirectly contribute to disruptions in the electrical grid. When the temperatures rise, the demand for energy also rises in order to operate air conditioners, fans and other devices. This increase in demand places stress on the electrical grid components, increasing the likelihood of power outages. While not common in Hamilton County, there is the potential for this to occur. The potential may increase over the next two decades if new power plants are not built to replace the state's aging nuclear power facilities that are expected to be decommissioned.

In general, the risk or vulnerability to buildings, infrastructure and critical facilities from excessive heat is considered ***low***, even taking into consideration the potential for damage to roadways and disruptions to the electrical grid.

Are future buildings, infrastructure and critical facilities vulnerable to excessive heat?

No. Future buildings, infrastructure and critical facilities within the County and participating municipalities are no more vulnerable to excessive heat events than the existing building, infrastructure and critical facilities. As discussed above, buildings do not typically sustain damage from excessive heat. Infrastructure and critical facilities may, in rare cases, be damaged by excessive heat, but very little can be done to prevent this.

What are the potential dollar losses to vulnerable structures from excessive heat?

Unlike other natural hazards there are no standard loss estimation models or methodologies for excessive heat. With none of the recorded events listing property damage figures, there is no way to accurately estimate future potential dollar losses from excessive heat.

3.4 FLOODS

HAZARD IDENTIFICATION

What is the definition of a flood?

The Federal Emergency Management Agency (FEMA) defines a "flood" as a general or temporary condition where two or more acres of normally dry land or two or more properties are inundated by:

- overflow of inland or tidal waters;
- unusual and rapid accumulation or runoff of surface waters from any source;
- mudflows; or
- a sudden collapse or subsidence of shoreline land.

The severity of a flooding event is determined by a combination of topography and physiography, ground cover, precipitation and weather patterns and recent soil moisture conditions. On average, flooding causes more than $5 billion in damages each year in the United States. Floods cause utility damage and outages, infrastructure damage (both to transportation and communication systems), structural damage to buildings, crop loss, decreased land values and impede travel.

What types of flooding occur in the County?

There are two main types of flooding that affect Hamilton County: general flooding and flash flooding. General flooding can be broken down into two categories: riverine flooding and shallow flooding. The following provides a brief description of each type.

General Flooding – Riverine Flooding

Riverine flooding occurs when the water in a river or stream gradually rises and overflows its banks. This type of flooding affects low lying areas near rivers, streams, lakes and reservoirs and generally occurs when:

- persistent storm systems enter the area and remain for extended periods of time,
- winter and spring rains combine with melting snow to fill river basins with more water than the river or stream can handle,
- ice jams create natural dams which block normal water flow, and
- torrential rains from tropical systems make landfall.

General Flooding – Shallow Flooding

Shallow flooding occurs in flat areas where there are no clearly defined channels (i.e., rivers and streams) and water cannot easily drain away. There two main types of shallow flooding: sheet flow and ponding. If the surface runoff cannot find a channel, it may flow out over a large area at a somewhat uniform depth in what's called sheet flow. In other cases, the runoff may collect in depressions and low-lying areas where it cannot drain out, creating a ponding effect. Ponding floodwaters do not move or flow away, they remain in the temporary ponds until the water can infiltrate the soil, evaporate or are pumped out.

Flash Floods

Flash flooding occurs when there is a rapid rise of water along a stream or low-lying area. This type of flooding generally occurs within six hours of a significant rain event and is usually produced when heavy localized precipitation falls over an area in a short amount of time. Considered the most dangerous type of flood event, flash floods happen quickly with little or no warning. Typically, there is no time for the excess water to soak into the ground nor are the storm sewers able to handle the sheer volume of water. As a result, streams overflow their banks and low-lying (such as underpasses, basements etc.) areas can rapidly fill with water.

Flash floods are very strong and can tear out trees, destroy buildings and bridges and roll boulders the size of cars. Flash flood-producing rains can also weaken soil and trigger debris flows that damage homes, roads and property. A vehicle caught in swiftly moving water can be swept away in a matter of seconds. Twelve inches of water can float a car or small SUV and 18 inches of water can carry away large vehicles.

What is a base flood?

A base flood refers to any flood having a 1% chance of occurring in any given year. It is also known as the 100-year flood or the one percent annual chance flood. The base flood is the national standard used by the National Flood Insurance Program (NFIP) and the State of Illinois for the purposes of requiring the purchase of flood insurance and regulating new development.

Many individuals misinterpret the term “100-year flood”. This term is used to describe the risk of future flooding; it does not mean that it will occur once every 100 years. Statistically speaking, a 100-year flood has a 1/100 (1%) chance of occurring in any given year. In reality, a 100-year flood could occur two times in the same year or two years in a row, especially if there are other contributing factors such as unusual changes in weather conditions, stream channelization or changes in land use (i.e., open space land developed for housing or paved parking lots). It is also possible not to have a 100-year flood event over the course of 100 years.

While the base flood is the standard most commonly used for floodplain management and regulatory purposes in the United States, the 500-year flood is the national standard for protecting critical facilities, such as hospitals and power plants. A 500-year flood has a 1/500 (0.2%) chance of occurring in any given year.

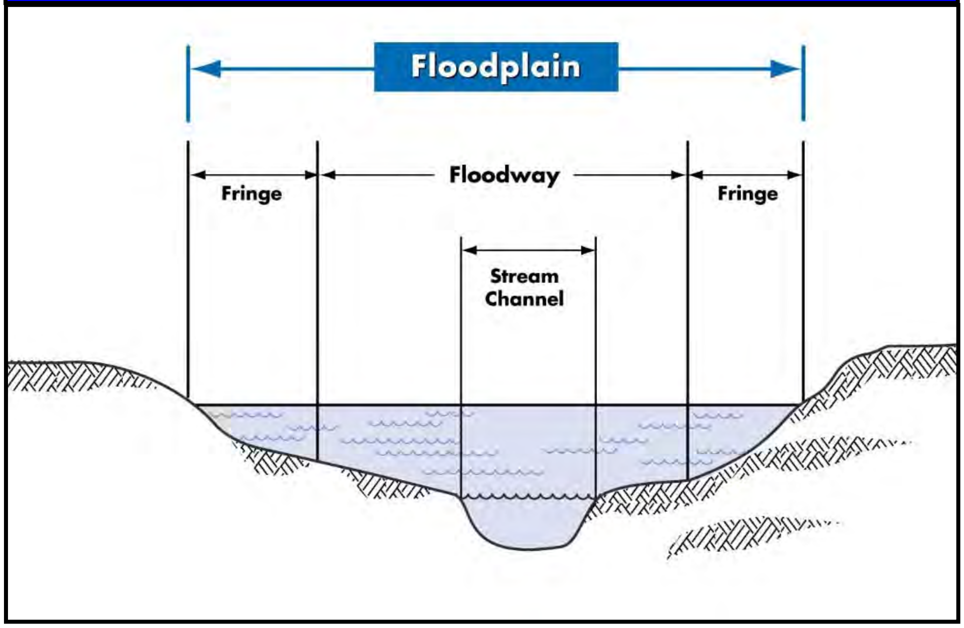
What is a floodplain?

The general definition of a floodplain is any land area susceptible to being inundated or flooded by water from any source (i.e., river, stream, lake, estuary, etc.). This general definition differs slightly from the regulatory definition of a floodplain.

A regulatory or base floodplain is defined as the land area that is covered by the floodwaters of the base flood. This land area is subject to a 1% chance of flooding in any given year. The base floodplain is also known as the 100-year floodplain or a Special Flood Hazard Area (SFHA). It is this second definition that is generally most familiar to people and the one that is used by the NFIP and the State of Illinois.

A base floodplain is divided into two parts: the floodway and the flood fringe. **Figure F-1** illustrates the various components of a base floodplain.

Figure F-1
Floodplain Illustration



Source: Illinois Department of Natural Resources, Quick Guide to Floodplain Management.

The floodway is the channel of a river or stream and the adjacent floodplain that is required to store and convey the base flood without increasing the water surface elevation. Typically, the floodway is the most hazardous portion of the floodplain because it carries the bulk of the base flood downstream and is usually the area where water is deepest and is moving the fastest. Floodplain regulations prohibit construction within the floodway that results in an increase in the floodwater's depth and velocity.

The flood fringe is the remaining area of the base floodplain, outside of the floodway, that is subject to shallow inundation and low velocity flows. In general, the flood fringe plays a relatively insignificant role in storing and discharging floodwaters. The flood fringe can be quite wide on large streams and quite small or nonexistent on small streams. Development within the flood fringe is typically allowed via permit if it will not significantly increase the floodwater's depth or velocity and the development is elevated above or otherwise protected to the base flood elevation.

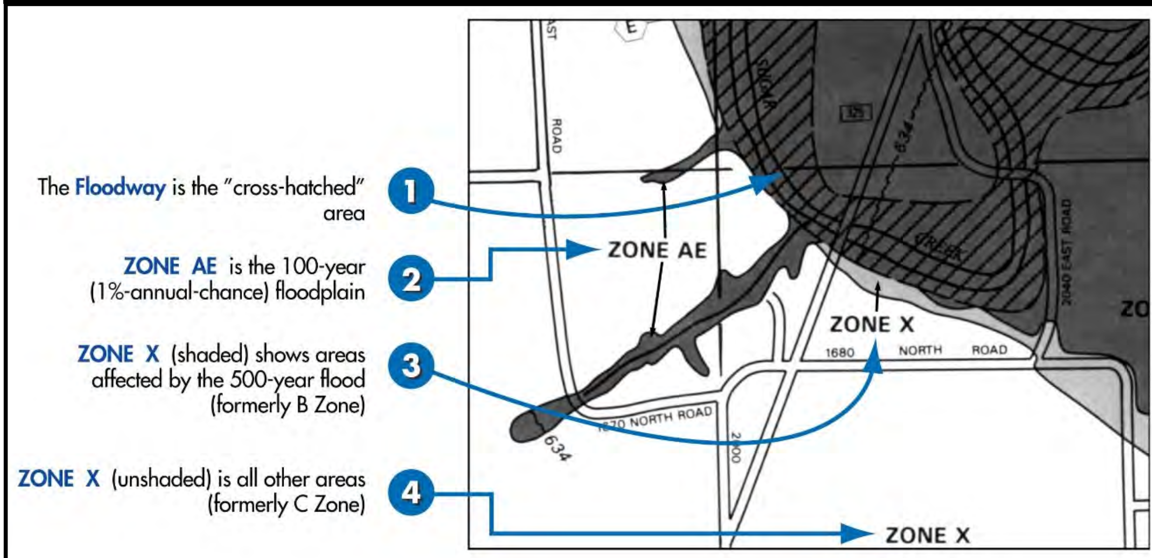
What is a Special Flood Hazard Area?

A Special Flood Hazard Area (SFHA) is the base floodplain. As discussed previously, this is the land area that is covered by the floodwaters of the base flood and has a 1% chance of flooding in any given year. The term SFHA is most commonly used when referring to the based floodplain on the Flood Insurance Rate Maps (FIRM) produced by FEMA. The SFHA is the area where floodplain regulations must be enforced by a community as a condition of participation in the NFIP and the area where mandatory flood insurance purchase requirements apply. SFHA are delineated on the FIRMs and may be designated as Zones A, AE, A1-30, AO, AH, AR, and A99 depending on the amount of flood data available, the severity of the flood hazard or the age of the flood map.

What are Flood Insurance Rate Maps?

Flood Insurance Rate Maps (FIRMs) are maps that identify both the SFHA and the risk premium zones applicable to a community. These maps are produced by FEMA in association with the NFIP for floodplain management and insurance purposes. Digital versions of these maps are referred to as DFIRMs. **Figure F-2** shows an example of a FIRM.

Figure F-2
Example of a Flood Insurance Rate Map (FIRM)



Source: Illinois Department of Natural Resources, Quick Guide to Floodplain Management.

A FIRM will generally shows a community's base flood elevations, flood zones and floodplain boundaries. The information presented on a FIRM is based on historic, meteorological, hydrologic and hydraulic data as well as open-space conditions, flood-control projects and development. ***These maps only define flooding that occurs when a creek or river becomes overwhelmed. They do not define overland flooding that occurs when an area receives extraordinarily intense rainfall and storm sewers and roadside ditches are unable to handle the surface runoff.***

What are flood zones?

Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk and type of flooding. These zones are depicted on a community's FIRM. The following provides a brief description of each flood zone.

- **Zone A.** Zone A, also known as the Special Flood Hazard Area (SFHA) or base floodplain, is defined as the floodplain area that has a 1% chance of flooding in any given year. There are multiple Zone A designations, including Zones A, AO, AH, A1-30, AE, AR or A99. Land areas located within Zone A are considered high-risk flood areas.

During a 30-year period, the length of many mortgages, there is at least a 1 in 4 chance that flooding will occur in a SFHA. The purchase of flood insurance is mandatory for all buildings in SFHAs receiving federal or federally-related financial assistance.

- **Zone X (shaded).** Zone X (shaded), formerly known as Zone B, is defined as the floodplain area between the limits of the base flood (Zone A) and the 500-year flood. Land areas located within Zone X (shaded) are affected by the 500-year flood and are considered at a moderate risk for flooding.

  Zone X (shaded) is also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, shallow flooding areas with average depths of less than one foot or drainage areas less than one square mile. While flood insurance is not federally required in Zone X (shaded), it is recommended for all property owners and renters.
- **Zone X (unshaded).** Zone X (unshaded), formerly known as Zone C, is defined as all other land areas outside of Zone A and Zone X (shaded). Land areas located in Zone X (unshaded) are considered to have a low or minimal risk of flooding. While flood insurance is not federally required in Zone X (unshaded), it is recommended for all property owners and renters.

What is a Repetitive Loss Structure or Property?

FEMA defines a "repetitive loss structure" as a National Flood Insurance Program-insured structure that has received two or more flood insurance claim payments of more than $1,000 each within any 10-year period since 1978. These structures/properties account for approximately one-fourth of all National Flood Insurance Program (NFIP) insurance claim payments since 1978.

Currently, repetitive loss properties make up about 2% of all NFIP policies, and account for approximately $9 billion in claims or approximately 16% of the total claims paid over the history of the Program. These structures not only increase the NFIP's annual losses, they drain funds needed to prepare for catastrophic events. As a result, FEMA and the NFIP are working with states and local governments to mitigate these properties.

What is floodplain management?

Floodplain management is the administration of an overall community program of corrective and preventative measures to reduce flood damage. These measures take a variety of forms and generally include zoning, subdivision or building requirements, special-purpose floodplain ordinances, flood control projects, education and planning. Where floodplain development is permitted, floodplain management provides a framework that minimizes the risk to life and property from floods by maintaining a floodplain's natural function. Floodplain management is a key component of the National Flood Insurance Program.

What is the National Flood Insurance Program?

The National Flood Insurance Program (NFIP) is a federal program, administered by FEMA, that:

- mitigates future flood losses nationwide through community-enforced building and zoning ordinances; and

- provides access to affordable, federally-backed insurance protection against losses from flooding to property owners in participating communities.

It is designed to provide an insurance alternative to disaster assistance to meet escalating costs of repairing damage to buildings and their contents due to flooding. The U.S. Congress established the NFIP on August 1, 1968 with the passage of the National Flood Insurance Act of 1968. This Program has been broadened and modified several times over the years, most recently with the passage of the Flood Insurance Reform Act of 2004.

Prior to the creation of the NFIP, the national response to flood disasters was generally limited to constructing flood-control projects such as dams, levees, sea-walls, etc. and providing disaster relief to flood victims. While flood-control projects were able to initially reduce losses, their gains were offset by unwise and uncontrolled development practices within floodplains. In light of the continued increase in flood losses and the escalating costs of disaster relief to taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for protection.

Participation in the NFIP is voluntary and based on an agreement between local communities and the federal government. If a community agrees to adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in a SFHA (base floodplain), then the government will make flood insurance available within the community as a financial protection against flood losses.

If a community chooses not to participate in the NFIP or a participating community decides not to adopt new floodplain management regulations or amend its existing regulations to reference new flood hazard data provided by FEMA, then the following sanctions will apply.

- Property owners will not be able to purchase NFIP flood insurance policies and existing policies will not be renewed.
- Federal disaster assistance will not be provided to repair or reconstruct insurable buildings located in identified flood hazard areas for presidentially-declared disasters that occur as a result of flooding.
- Federal mortgage insurance and loan guarantees, such as those written by the Federal Housing Administration and the Department of Veteran Affairs, will not be provided for acquisition or construction purposes within an identified flood hazard area. Federally-insured or regulated lending institutions, such as banks and credit unions, are allowed to make conventional loans for insurable buildings in identified flood hazard areas of non-participating communities. However, the lender must notify applicants that the property is in an identified flood hazard area and that it is not eligible for federal disaster assistance.
- Federal grants or loans for development will not be available in identified flood hazard areas under programs administered by federal agencies such as the Environmental Protection Agency, Small Business Administration and the Department of Housing and Urban Development.

What is the NFIP's Community Rating System?

The NFIP's Community Rating System (CRS) is a voluntary program developed by FEMA to provide incentives (in the form of flood insurance premium discounts) for NFIP participating communities that have gone beyond the minimum NFIP floodplain management requirements to develop extra measures to provide protection from flooding. CRS discounts on flood insurance premiums range from 5% up to 45%. The discounts provide an incentive for communities to implement new flood protection activities that can help save lives and property when a flood occurs.

Are alerts issued for flooding?

Yes. The National Weather Service Weather Forecast Office in Paducah, Kentucky is responsible for issuing ***flood watches*** and ***warnings*** for Hamilton County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Flood Watches.** A flood watch is issued to alert the public that there is a threat of flooding/flash flooding. It does not mean that flooding will occur, just that conditions are favorable. The watch usually covers a large geographic area.
- **Flood Warning**. A flood warning is issued when a gradual rise of waters resulting from heavy rains is expected to threaten life and/or property and persist for typically more than six hours. Flood warnings are also issued for a river forecast point that is expected to rise above flood stage or is already at or above flood state during rapid rises.
- **Flash Flood Warning.** A flash flood warning is issued when rapidly rising water is occurring or is imminent and expected to threaten life and/or property. Flash flooding occurs very quickly so individuals are advised to take action immediately.

HAZARD PROFILE

The following identifies past occurrences of floods; details the severity or extent of each event (if known); identifies the locations potentially affected; and estimates the likelihood of future occurrences.

When has flooding occurred previously? What is the extent of these previous floods?

Tables 8 and **9**, located in **Appendix J**, summarize the previous occurrences as well as the extent or magnitude of flood events recorded in Hamilton County. The flood events are separated into two categories: general floods (riverine and shallow/overland) and flash floods.

General Floods

NOAA's Storm Events Database and NOAA's Storm Data Publications have documented 10 occurrences of general flooding in Hamilton County between 1999 and 2019. Included in the 10 general flood events is one event that contributed to ***federal disaster declaration #1991***.

Flood Fast Facts – Occurrences

Number of General Floods Reported (1999– 2019): ***10***

Number of Flash Floods Reported (1996 – 2019): ***21***

Most Likely Month(s) for General Floods to Occur: ***August and December***

Most Likely Month for Flash Floods to Occur: ***May***

Number of Federal Disaster Declarations Related to General and Flash Flooding: ***3***

<u>*Flash Floods*</u>
NOAA's Storm Events Database and Planning Committee member records documented 21 reported occurrences of flash flooding in Hamilton County between 1996 and 2019. Included in the 21 flash flood events are four events that contributed to two separate federal disaster declarations in Hamilton County.

Figure F-3 charts the reported occurrences of flooding by month. Of the 10 general flood events, three (30%) began in August and three (30%) began during December making these the peak months for general floods in Hamilton County. There was one event that spanned two or more months; however, for illustration purposes only the month the event started in is graphed.

In comparison, 11 of the 21 flash flood events (52%) took place between April, May and June making this the peak period for flash floods. Of the 11 events, five (45%) occurred in May making this the peak month for flash flooding.

Figure F-3
Flood Events by Month

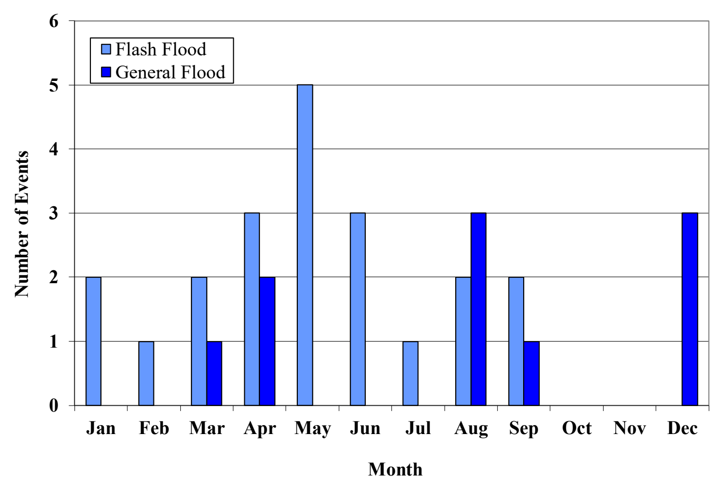
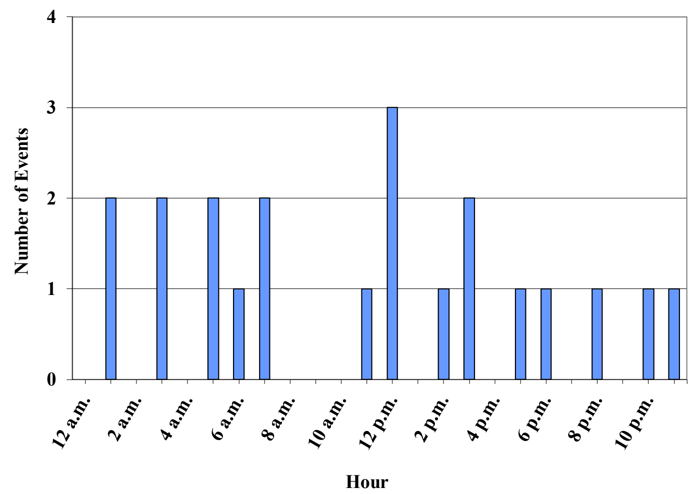


Figure F-4 charts the reported occurrences of flash flood events by hour. Approximately 52% of the 21 flash flood events began during the p.m. hours, with six of the events (29%) taking place between 12 p.m. and 4 p.m. In comparison an equal number of general flood events with recorded times began during the a.m. and p.m. hours.

What locations are affected by floods?

While specific locations are affected by general flooding, most areas of the County can be impacted by overland and flash flooding because of the topography and seasonally high-water table of the area. In Hamilton County approximately 24.9% of the area in County is designated as being within the base floodplain and susceptible to riverine floods. The *2018 Illinois Natural Hazard Mitigation Plan* classifies Hamilton County's hazard rating for floods as "medium."

Figure F-4
Flash Flood Events by Hour



FIRMs have only been developed for only one of the participating jurisdictions with Hamilton County. Broughton's map became effective in September 4, 1985. Copies of the FIRMs are located in **Appendix K**. While FIRMs have not been developed for the County, Flood Hazard Boundary Maps (FHBMs) were developed in 198 and became effective on January 2, 1981. Copies of the County FHBMs are located in **Appendix K.**

No other FIRMs or FHBMs have been developed for any of the municipalities in Hamilton County and none are anticipated to be completed or updated in the near future according to the Illinois State Water Survey's Countywide Digital FIRM Status Map.

Figure F-5 identifies the bodies of water within or immediately adjacent to participating jurisdictions that are known to cause flooding or have the potential to flood. Water bodies with Special Flood Hazard Areas are identified in bold.

Municipal, township and County officials have reported overland flood issues outside of the base floodplain in most of the participating municipalities and many unincorporated portions of the County. This overland flooding is known to impair travel.

What jurisdictions within the County take part in the NFIP?

Broughton and McLeansboro both participate in the NFIP. **Figure F-6** provides information on each NFIP-participating jurisdiction, including the date each participant joined, the date of their current effective FIRM and the year of their most recently adopted floodplain zoning ordinance.

Figure F-5 Bodies of Water Subject to Flooding	
Participating Jurisdiction	**Water Bodies**
Broughton	**Tributary Contrary Creek**
Dahlgren	Shelton Creek
McLeansboro	Bear Creek
Unincorporated Hamilton County	**Akin creek, Auxier creek, Auxier creek drain, Bear creek, Beaver creek, Big creek, Big Duck pond**, Black branch, **Cabbage Patch drain, Campbell branch**, Centerville Lake, **Contrary creek, Dry Island drain, East Outlet, Estes Lateral drain**, Ewing creek, **Ferguson creek, Ferguson creek drain, Greasy creek, Haw creek**, Helen Lake, **Hogg creek, Hyten Lateral Drain, Lakey creek, Lick Creek**, Long branch, **Lost creek**, L P Dolan Lake, **Main drain, Mayberry branch**, McLeansboro Lake, **Middle creek, Middle Fork Big Muddy River, Middle Fork Saline River, North Fork Saline River**, Olan Bullock Lake, **Opossum creek, Raders branch, Rector creek, Riley creek**, Rocky branch, **Shelton creek, Southern Outlet, Sullivan branch, Tenmile creek, Wheeler creek, Wheeler creek drain, Wolf creek, Wolf creek drain**

Source: FEMA FIRMs/FHBMs.

Figure F-6 NFIP Participating Jurisdictions				
Participating Jurisdictions	**Participation Date**	**Current Effective FIRM Date**	**CRS Participation**	**Most Recently Adopted Floodplain Zoning Ordinance**
Broughton, Village of	9/4/1985	9/4/1985	No	1985
McLeansboro, City of	9/4/1986	NSFHA	No	

Sources: FEMA, Community Status Book Report: Illinois.

Belle Prairie City, Dahlgren and Macedonia have no identified flood hazard boundaries within their corporate limits and are not required to participate in the NFIP. Hamilton County was suspended from the NFIP on January 17, 2000 according to FEMA's Community Status Book Report for Illinois.

Jurisdictions that participate in the NFIP are expected to adopt and enforce floodplain management regulations. Both Broughton and McLeansboro have adopted the State of Illinois model floodplain ordinance. As a result, both jurisdictions are in compliance with NFIP requirements.

Participating jurisdictions will continue to comply with the NFIP by implementing mitigation projects and activities that enforce this ordinance to reduce future flood risks to new construction within the SFHA. At this time no new construction is planned within the base floodplain. Continued compliance with NFIP requirements is addressed in the Mitigation Action Tables of the participating jurisdictions found in Section 4.6.

What is the probability of future flood events occurring?

General Floods

Hamilton County has had 10 verified occurrences of general flooding between 1999 and 2019. With 10 occurrences over the past 21 years, the probability or likelihood of a general flood event occurring in Hamilton County in any given year is 48%. There was one year over the past 21 years where two or more general flood events occurred. This indicates that the probability or likelihood that more than one general flood event may occur during any given year within the County 5%.

Flash Floods
There have been 21 verified flash flood events between 1996 and 2019. With 21 occurrences over the past 24 years, the probability or likelihood of a flash flood event occurring in Hamilton County in any given year is approximately 88%. There were six years over the past 24 years where two or more flash flood events occurred. This indicates that the probability that more than one flash flood event may occur during any given year within the County is approximately 25%.

HAZARD VULNERABILITY

The following describes the vulnerability to participating jurisdictions, identifies the impacts on public health and property (if known) and estimates the potential impacts on public health and safety as well as buildings, infrastructure and critical facilities from floods.

Several factors including topography, precipitation and an abundance of rivers and streams make Illinois especially vulnerable to flooding. According to the Illinois State Water Survey's Climate Atlas of Illinois, since the 1940s Illinois climate records have shown an increase in heavy precipitation which has led to increased flood peaks on Illinois rivers.

Are the participating jurisdictions vulnerable to flooding?
Yes. Hamilton County and the participating jurisdictions are vulnerable to the dangers presented by flooding. Precipitation levels and topography are factors that cumulatively make virtually the entire County susceptible to some form of flooding. Flooding occurs along the floodplains of all the rivers, streams and creeks within the County as well as outside of the floodplains in low-lying areas where drainage problems occur. Since 2010, Hamilton County has experienced six flash flood events and seven general flood events.

Nine of the 10 general flood events impacted the entire County or a large portion of it and were not location specific. The remaining event took place in Dahlgren. **Figure F-7** details the number of *recorded* flash flood events by participating jurisdiction.

Figure F-7
Verified Flash Flood Events by Participating Jurisdiction

Participating Municipality	Number	Year
Broughton	0	----
Dahlgren	0	---
McLeansboro	6	1996, 1998, 2000, 2000, 2004*, 2004
Countywide	9	1996, 1999, 2004, 2006, 2009, 2016, 2018
Eastern portion of County	1	2014
Northern portion of County	3	2006, 2018
Southern portion of County	1	2017

* Flash flood verified within the municipality.

Vulnerability to flooding can change depending on several factors, including land use. As land used primarily for agricultural and open space purposes is converted for residential and commercial/industrial uses, the number of buildings and impervious surfaces (i.e., parking lots, roads, sidewalks, etc.) increases. As the number of buildings and impervious surfaces increases, so too does the potential for flash flooding. Rather than infiltrating the ground slowly, rain and snowmelt that falls on impervious surfaces runs off and fills ditches and storm drains quickly creating drainage problems and flooding.

As described in Section 1.3 Land Use and Development Trends, substantial changes in land use (from forested, open and agricultural land to residential, commercial and industrial) are not anticipated within the County in the immediate future. No substantial increases in residential or commercial/industrial developments are expected within the next five years.

Do any of the participating jurisdictions consider flooding to be among their community's greatest vulnerabilities?

Yes. Based on responses to a Critical Facilities Vulnerability Survey distributed to the participating jurisdictions, the following respondents considered flooding to be among their jurisdiction's greatest vulnerabilities.

- *Broughton*: Heavy rains cause overtopping of Illinois Route 142 north and south of the Village, cutting off the main egress routes in and out of Broughton.
- *County Highway Department/Dahlgren Township*: Roads flood during heavy rain events which causes erosion and washes away culverts. Roads and bridges have been damaged by flooding.
- *McLeansboro Township:* Flooding washes out roadways and floods the main road through McLeansboro.
- *South Crouch Township*: Roads flood making them impassable for emergency vehicles.
- *County*: Roads in the northern and southern portions of the County flood making them impassable for emergency vehicles. Flash flooding of county roads continues to get worse.

As part of the Critical Facilities Vulnerability Survey, participating jurisdictions were also asked to identify critical facilities and infrastructure within their communities they felt have the greatest vulnerability to natural hazards and to which hazards. They were also asked to identify any mitigation actions being undertaken to reduce the vulnerability to the identified critical facilities/infrastructure. The following summarizes the respondent's responses.

- *Broughton*: Pump station to flooding.
- *McLeansboro*: Randolph Street under viaduct floods during heavy rain events.
- *County Highway Department/Dahlgren Township*: Roads to flooding (Piopolis, Norris City, East Broughton and Anderson School Road in particular.)
- *McLeansboro Township*: Roads to flooding.
- *South Crouch Township*: Roads to flooding.
- *County*: County roads to flooding and flash flooding (roads become impassable for emergency vehicles).

None of the other participating jurisdictions consider flooding to be among their community's greatest vulnerabilities.

What impacts resulted from the recorded floods?

Floods as a whole have caused a *minimum* of $575,000 in property damages and $40,000 in crop damages. The following provides a breakdown by category.

In comparison, the State of Illinois has averaged an estimated $257 million annually in property damage losses, making flooding the single most financially damaging natural hazard in Illinois.

General Floods

Data obtained from NOAA's Storm Events Database indicates that between 1999 and 2019, two of the 10 general flood events caused over $370,000 in property damages. Damage information was either unavailable or none was recorded for the remaining eight reported occurrences.

No injuries or fatalities were reported as a result of any of the recorded events.

Flood Fast Facts – Impacts/Risk

General Flood Impacts:
- Total Property Damage (2 events): ***$370,000***
- Total Crop Damage: ***n/a***
- Injuries: ***n/a***
- Fatalities: ***n/a***

Flash Flood Impacts:
- Total Property Damage (8 events): ***$298,000***
- Total Crop Damage (1 event): ***$40,000***
- Injuries: ***n/a***
- Fatalities: ***n/a***

Flood Risk/Vulnerability to:
- Public Health & Safety – General Flooding: ***Low***
- Public Health & Safety – Flash Flooding: ***Medium***
- Buildings/Infrastructure/Critical Facilities: ***Medium***

Flash Floods

Data obtained from NOAA's Storm Events Database and Planning Committee records indicates that between 1996 and 2019, eight of the 21 flash flood events caused approximately $398,000 in property damages and $40,000 in crop damages. Damage information was either unavailable or none was recorded for the remaining 13 reported occurrences.

No injuries or fatalities were reported as a result of any of the recorded events.

What other impacts can result from flooding?

One of the primary threats from flooding is drowning. Nearly half of all flash flood fatalities occur in vehicles as they are swept downstream. Most of these fatalities take place when people drive into flooded roadway dips and low drainage areas. It only takes two feet of water to carry away most vehicles.

Floodwaters also pose biological and chemical risks to public health. Flooding can force untreated sewage to mix with floodwaters. The polluted floodwaters then transport the biological contaminants into buildings and basements and onto streets and public areas. If left untreated, the floodwaters can serve as breeding grounds for bacteria and other disease-causing agents. Even if floodwaters are not contaminated with biological material, basements and buildings that are not properly cleaned can grow mold and mildew, which can pose a health hazard, especially for small children, the elderly and those with specific allergies.

Flooding can also cause chemical contaminants such as gasoline and oil to enter the floodwaters if underground storage tanks or pipelines crack and begin leaking during a flood event. Depending on the time of year, floodwaters also may carry away agricultural chemicals that have been applied to farm fields.

Structural damage, such as cracks forming in a foundation, can also result from flooding. In most cases, however, the structural damage sustained during a flood occurs to the flooring, drywall and wood framing. In addition to structural damage, a flood can also cause serious damage to a building's content.

Infrastructure and critical facilities are also vulnerable to flooding. Roadways, culverts and bridges can be weakened by floodwaters and have been known to collapse under the weight of a vehicle. Buried power and communication lines are also vulnerable to flooding. Water can infiltrate lines and cause disruptions in power and communication.

What is the level of vulnerability to public health and safety from floods?

While both general and flash floods occur on a fairly regular basis within the County, the number of injuries and fatalities is very low. In terms of the risk or vulnerability to public health and safety from *general floods*, the risk is seen as ***low***. However, two-thirds of the recorded flood events were the result of flash flooding. Since there is very little warning associated with flash flooding the risk to public health and safety from *flash floods* is elevated to ***medium***.

Are there any repetitive loss structures/properties within Hamilton County?

No. According to information obtained from FEMA, there are no repetitive or severe repetitive loss properties located in Hamilton County.

Are existing buildings, infrastructure and critical facilities vulnerable to flooding?

Yes. **Figure F-8** identifies the *estimated number* of existing residential structures by participating jurisdictions located within a base floodplain. These counts were prepared by the Consultant and are based on a review of the limited number of current FIRMs and FHBMs.

Figure F-8
Existing Residential Structures Located within a Base Floodplain by Participating Jurisdiction

Participating Jurisdiction	Number of Residential Structures	Participating Jurisdiction	Number of Residential Structures
Broughton	0	Dahlgren	0
McLeansboro	0	Unincorp. Hamilton County	15

Source: FEMA FIRMs

Aside from key roads and bridges and buried power and communication lines, only McLeansboro has specific infrastructure/critical facilities located within a floodplain. The McLeansboro wastewater treatment plant is located in the base floodplain.

Only one jurisdiction (Broughton) within Hamilton County has current effective FIRMs. This FIRM was prepared in 1985. While Flood Hazard Boundary Maps (FHBMs) were developed in 1981 for the unincorporated portions of Hamilton County, FIRMs have yet to be developed.

While 24.9% of the land area in Hamilton County lies within the base floodplain and is susceptible to riverine flooding, almost the entire County is vulnerable to flash flooding. As a result, a majority of the buildings, infrastructure and critical facilities that may be impacted by flooding are located outside of the base floodplain and are not easily identifiable.

The risk or vulnerability of existing buildings, infrastructure and critical facilities to all forms of flooding is considered to be medium based on: (a) the frequency and severity of recorded flood events within the County; (b) the fact that most of the County is vulnerable to flash flooding; and (c) a majority of the buildings, infrastructure and critical facilities that may be impacted are located outside of the base floodplain.

Are future buildings, infrastructure and critical facilities vulnerable to flooding?

The answer to this question depends on the type of flooding being discussed.

Riverine Flooding

In terms of riverine flooding, the vulnerability of future buildings, infrastructure and critical facilities located within NFIP-participating jurisdictions is low as long as the existing floodplain ordinances are enforced. Enforcement of the floodplain ordinance is the mechanism that ensures that new structures either are not built in flood-prone areas or are elevated or protected to the base flood elevation.

Flash Flooding

In terms of flash flooding, all future buildings, infrastructure and critical facilities are still vulnerable depending on the amount of precipitation that is received, the topography and any land use changes undertaken within the participating jurisdictions.

What are the potential dollar losses to vulnerable structures from flooding?

An estimate of the potential dollar losses to vulnerable *residential structures* located within the *participating jurisdictions* can be calculated if several assumptions are made. These assumptions represent a probable scenario based on the reported occurrences of flooding in Hamilton County.

The purpose of providing an estimate is to help residents and municipal and county officials make informed decisions about how they can better protect themselves and their communities. These estimates are meant to provide a ***general idea*** of the magnitude of the potential damage that could occur from a flood event.

Assumptions

To calculate the overall potential dollar losses to vulnerable residential structures from a flood, a set of decisions/assumptions must be made regarding:

- type of flood event;
- scope of the flood event;
- number of potentially-damaged housing units;
- value of the potentially-damaged housing units; and
- percent damage sustained by the potentially-damaged housing units (i.e., damage scenario.)

The following provides a detailed discussion of each decision/assumption.

Assumption #1

A riverine flood event will impact vulnerable residential structures.

Type of Flood Event. The first step towards calculating the potential dollar losses to vulnerable residential structures is to determine the type of flood event that will be used for this scenario. While flash flooding accounts for over two-thirds of all the recorded flood events, riverine floods have caused the more recorded damages in the County. In addition, identifying residential structures vulnerable to flash flooding is problematic because most are located outside of the base floodplain and the number of structures impacted can change with each event depending on the amount of precipitation received, the topography and the land use of the area.

Therefore, a riverine flood event will be used since it is (a) relatively easy to identify vulnerable residential structures within each jurisdiction (i.e., those structures located within the base floodplain or Special Flood Hazard Areas of any river, stream or creek); and (b) the number of structures impacted is generally the same from event to event.

Assumption #2

All base floodplains will flood and experience the same degree of flooding.

Scope of the Flood Event. To establish the number of vulnerable residential structures (potentially-damaged housing units), the scope of the riverine flood event must first be determined. In this scenario, the scope refers to the number of rivers, streams and creeks that overflow their banks and the degree of flooding experienced along base floodplains for each river, stream and creek.

Generally speaking, a riverine flood event only affects one or two rivers or streams at a time depending on the cause of the event (i.e., precipitation, snow melt, ice jam, etc.) and usually does not produce the same degree of flooding along the entire length of the river, stream or creek. However, for this scenario, it was decided that:

- all rivers, streams and creeks with base floodplains would overflow their banks, and
- the base floodplains of each river, stream and/or creek would experience the same degree of flooding.

This assumption results in the following conditions for each jurisdiction:

- Dahlgren and McLeansboro would not experience any residential flooding since there are no river, stream or creek base floodplains located within their municipal limits; and
- Broughton: Tributary of Contrary Creek would overflow its banks and flood the northeast corner of the Village.
- Unincorporated Hamilton County: All the rivers, streams and creeks would overflow their banks and flood portions of the County.

Assumption #3

The number of existing residential structures located within the base floodplain(s) will be used to determine the number of potentially-damaged housing units.

Number of Potentially-Damaged Housing Units. Since this scenario assumes that all the base floodplains will experience the same degree of flooding, the number of existing residential structures located within the base floodplain(s) can be used to determine the number of potentially-damaged housing units. **Figure F-8** identifies the total number of existing residential structures located within the base floodplains(s). While base floodplains are present in Broughton, there are no residential structures located within their limits.

Assumption #4

The average market value for a residential structure will be used to determine the value of potentially-damaged housing units.

Value of Potentially-Damaged Housing Units. Now that the number of potentially-damaged housing units has been determined, the monetary value of the units must be calculated. Typically, when damage estimates are prepared after a natural disaster such as a flood, they are based on the market value of the structure. Since it would be impractical to determine the individual market value of each potentially-damaged housing unit, the average market value for a residential structure will be used.

To determine the average market value, the average assessed value must first be calculated. The average assessed value is determined by taking the total assessed value of residential buildings within a jurisdiction and dividing that number by the total number of housing units within the jurisdiction. The average market value is then determined by taking the averaged assessed value and multiplying that number by three (the assessed value of a structure in Hamilton County is approximately one-third of the market value). **Figure F-9** provides a sample calculation. The total assessed value is based on 2019 tax assessment information provided by the Hamilton County Supervisor of Assessments. **Figure F-10** provides the average assessed value and average market value for each jurisdiction.

Figure F-9
Sample Calculation of Average Assessed Value & Average Market Value – Unincorporated Hamilton County

Average Assessed Value

Total Assessed Value of Residential Buildings in the Jurisdiction÷ Total Housing Units in the Jurisdiction = Average Assessed Value

Unincorporated Hamilton County: $51,456,097 ÷ 2,248 housing units = $22,890

Average Market Value

Average Assessed Value x 3 = Average Market Value
(Rounded to the Nearest Dollar)

Unincorporated Hamilton County: $22,890 x 3 = $68,669
($68,669)

Figure F-10
Average Market Value of Housing Units by Participating Jurisdiction

Participating Jurisdiction	Total Assessed Value of Residential Buildings 2019	Total Housing Units (2010)	Average Assessed Value	Average Market Value
Broughton	$917,828	98	$9,366	$28,098
Dahlgren	$3,887,951	242	$16,066	$48,198
McLeansboro	$15,969,411	1,456	$10,968	$32,904
Unincorporated Hamilton County	$51,456,097	2,248	$22,890	$68,669

Source: Hamilton County Supervisor of Assessments.

Assumption #5

The potentially-damaged housing units are manufactured homes and the flood depth is one foot.
Structural Damage = 44%
Content Damage = 66%

Damage Scenario. The final decision that must be made to calculate potential dollar losses is to determine the percent damage sustained by the structure and the structure's contents during the flood event. In order to determine the percent damage using FEMA's flood loss estimation tables, assumptions must be made regarding (a) the type of residential structure flooded (i.e., manufactured home, one story home without a basement, one- or two-story home with a basement, etc.) and (b) the flood depth. **Figure F-11** calculates the percent loss to a structure and its contents for different scenarios based on flood depth and structure type.

Figure F-11
FEMA Flood Loss Estimation Tables

Flood Building Loss Estimation Table

Flood Depth (feet)	One Story No Basement (% Building Damage)	Two Story No Basement (% Building damage)	One or Two Story With Basement (% Building damage)	Manufactured Home (% Building damage)
-2	0	0	4	0
-1	0	0	8	0
0	9	5	11	8
1	14	9	15	44
2	22	13	20	63
3	27	18	23	73
4	29	20	28	78
5	30	22	33	80
6	40	24	38	81
7	43	26	44	82
8	44	29	49	82
>8	45	33	51	82

Flood Content Loss Estimation Table

Flood Depth (feet)	One Story No Basement (% Contents Damage)	Two Story No Basement (% Contents damage)	One or Two Story With Basement (% Contents damage)	Manufactured Home (% Contents damage)
-2	0	0	6	0
-1	0	0	12	0
0	13.5	7.5	16.5	12
1	21	13.5	22.5	66
2	33	19.5	30	90
3	40.5	27	34.5	90
4	43.5	30	42	90
5	45	33	49.5	90
6	60	36	57	90
7	64.5	39	66	90
8	66	43.5	73.5	90
>8	67.5	49.5	76.5	90

Source: FEMA, Understanding Your Risks: Identifying Hazards and Estimating Losses

For this scenario it is assumed that the potentially-damaged housing units are manufactured homes and the flood depth is one foot. With these assumptions the expected percent damage sustained by the ***structure*** is estimated to be 44% and the expected percent damage sustained by the structure's ***contents*** is estimated to be 66%.

Potential Dollar Losses

Now that all of the decisions/assumptions have been made, the potential dollar losses can be calculated. First the potential dollar losses to the ***structure*** of the potentially-damaged housing units must be determined. This is done by taking the average market value for a residential structure and multiplying that by the percent damage (44%) to get the average structural damage per unit. Next the average structural damage per unit is multiplied by the number of potentially-damaged housing units. **Figure F-12** provides a sample calculation.

Figure F-12_ ***Structure:* Potential Dollar Loss Sample Calculation – Unincorporated Hamilton County**
Average Market Value of a Housing Unit with the Jurisdiction x Percent Damage = Average Structural Damage per Housing Unit
Unincorporated Hamilton County: $68,669 x 44% = $30,214.36 per housing unit
Average Structural Damage x Number of Potentially-Damaged Housing Units within the Jurisdiction = *Structure* Potential Dollar Losses (Rounded to the Nearest Dollar)
Unincorporated Hamilton County: $30,214.36 per housing unit x 15 housing unit = 453,215.40 **($453,215)**

Next the potential dollar losses to the ***content*** of the potentially-damaged housing units must be determined. Based on FEMA guidance, the value of a residential housing unit's content is approximately 50% of its market value. Therefore, start by taking one-half the average market value for a residential structure and multiply that by the percent damage (66%) to get the average content damage per unit. Then take the average content damage per unit and multiply that by the number of potentially-damaged housing units. **Figure F-13** provides a sample calculation.

Figure F-13 ***Content:* Potential Dollar Loss Sample Calculation – Unincorporated Hamilton County**
½ (Average Market Value of a Housing Unit with the Jurisdiction) x Percent Damage = Average Content Damage per Housing Unit
Unincorporated Hamilton County: ½ ($68,669) x 66% = $22,660.77 per housing unit
Average Content Damage per Housing Unit x Number of Potentially-Damaged Housing Units within the Jurisdiction = *Content* Potential Dollar Losses (Rounded to the Nearest Dollar)
Unincorporated Hamilton County: $22,660.77 per housing unit x 15 housing unit = $339,911.55 **($339,912)**

Finally, the ***total potential dollar losses*** may be calculated by adding together the potential dollar losses to the structure and the content. **Figure F-14** provides a breakdown of the total potential dollar losses by municipality/unincorporated area.

This assessment illustrates the *potential residential dollar losses* that should be considered when participating jurisdictions are deciding which mitigation projects to pursue. Potential dollar losses caused by riverine flooding to vulnerable residences within unincorporated Hamilton County would be expected to exceed $793,127. None of the participating municipalities in this scenario have residences considered vulnerable to riverine flooding.

Figure F-14
Estimated Potential Dollar Losses to Potentially-Damaged Housing Units from a Riverine Flood Event by Participating Jurisdiction

Participating Jurisdiction	Average Market Value 2019	Potentially-Damaged Housing Units	Potential Dollar Losses		Total Potential Dollar Losses (Rounded to the Nearest Dollar)
			Structure	Content	
Broughton	$28,097	0	$ 0	$ 0	$ 0
Dahlgren	$48,198	0	$ 0	$ 0	$ 0
McLeansboro	$32,904	0	$ 0	$ 0	$ 0
Unincorp. Hamilton County	$68,669	15	$453,215	$339,912	$793,127

Vulnerability of Infrastructure/Critical Facilities

The calculations presented above are meant to provide the reader with a sense of the scope or magnitude of a large riverine flood event in dollars. These calculations do not include the physical damages sustained by businesses or other infrastructure and critical facilities.

In terms of businesses, the impacts from a flood event can be physical and/or monetary. Monetary impacts can include loss of sales revenue either through temporary closure or loss of critical services (i.e., power, drinking water and sewer). Depending on the magnitude of the flood event, the damage sustained by infrastructure and critical facilities can be extensive in nature and expensive to repair. As a result, the cumulative monetary impacts to businesses and infrastructure can exceed the cumulative monetary impacts to residences. While average dollar amounts cannot be supplied for these items at this time, they should be taken into account when discussing the overall impacts that a large-scale riverine flood event could have on the participating jurisdictions.

In terms of specific infrastructure vulnerability, McLeansboro' s wastewater treatment plant is located in the base floodplain. No other above-ground infrastructure within the participating jurisdictions, other than key roads and bridges, were identified as being vulnerable to riverine flooding.

Considerations

While the potential dollar loss scenario was only for a riverine flood event, the participating jurisdictions have been made aware through the planning process of the impacts that can result from flash flood events. Hamilton County has experienced multiple events over the last 20 years as have adjoining and nearby counties. These events illustrate the need for officials to consider the overall monetary impacts of all forms of flooding on their communities. All participants should carefully consider the types of activities and projects that can be taken to minimize their vulnerability.

3.5 TORNADOES

HAZARD IDENTIFICATION

What is the definition of a tornado?

A tornado is a narrow violently rotating column of air, often visible as a funnel-shaped cloud that extends from the base of a thunderstorm cloud formation to the ground. The most violent tornadoes can have wind speeds of more than 300 miles per hour and can create damage paths in excess of one mile wide and 50 miles long.

Not all tornadoes have a visible funnel cloud. Some may appear nearly transparent until dust and debris are picked up or a cloud forms within the funnel. Generally, tornadoes move from southwest to northeast, but they have been known to travel in any direction, even backtracking. A typical tornado travels at around 10 to 20 mile per hour, but this may vary from almost stationary to 60 miles per hour. Tornadoes can occur at any time of the year and happen at any time of the day or night, although most occur between 4 p.m. and 9 p.m.

About 1,200 tornadoes hit the United States yearly, with an average 52 tornadoes occurring annually in Illinois. The destruction caused by a tornado may range from light to catastrophic depending on the intensity, size and duration of the storm. Tornadoes cause crop and property damage, power outages, environmental degradation, injuries and fatalities. Tornadoes are known to blow roofs off buildings, flip vehicles and demolish homes. Typically, tornadoes cause the greatest damage to structures of light construction, such as residential homes. On average, tornadoes cause 60 to 65 facilities and 1,500 injuries in the United States annually.

How are tornadoes rated?

Originally tornadoes were rated using the Fujita Scale (F-Scale), which related the degree of damage caused by a tornado to the intensity of the tornado's wind speed. The Scale identified six categories of damage, F0 through F5. **Figure T-1** gives a brief description of each category.

Use of the original Fujita Scale was discontinued on February 1, 2007 in favor of the Enhanced Fujita Scale. The original scale had several flaws including basing a tornado's intensity and damages on wind speeds that were never scientifically tested and proven. It also did not take into consideration that a multitude of factors (i.e. structure construction, wind direction and duration, flying debris, etc.) affect the damage caused by a tornado. In addition, the process of rating the damage itself was based on the judgment of the damage assessor. In many cases, meteorologists and engineers highly experienced in damage survey techniques often came up with different F-scale ratings for the same damage.

The Enhanced Fujita Scale (EF-Scale) was created to remedy the flaws in the original scale. It continues to use the F0 through F5 categories, but it incorporates 28 different damage indicators (mainly various building types, towers/poles and trees) as calibrated by engineers and meteorologists. For each damage indicator there are eight degrees of damage ranging from barely visible damage to complete destruction of the damage indicator. The wind speeds assigned to each category are estimates, not measurements, based on the damage assessment. **Figure T-1** identifies the Enhanced Fujita Scale.

Figure T-1
Fujita & Enhanced Fujita Tornado Measurement Scales

F-Scale		EF-Scale		Description
Category	Wind Speed (mph)	Category	Wind Speed (mph)	
F0	40 – 72	EF0	65 – 85	Light damage – some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; damage to sign boards
F1	73 – 112	EF1	86 – 110	Moderate damage – peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads
F2	113 – 157	EF2	111 – 135	Considerable damage – roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground
F3	158 – 207	EF3	136 – 165	Severe damage – roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off ground and thrown
F4	208 – 260	EF4	166 – 200	Devastating damage – well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated
F5	261 – 318	EF5	Over 200	Incredible damage – strong frame houses lifted off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 yards; trees debarked; incredible phenomena will occur

Source: NOAA, Storm Prediction Center.

The idea behind the EF-Scale is that a tornado scale needs to take into account the typical strengths and weaknesses of different types of construction, instead of applying a "one size fits all" approach. This is due to the fact that the same wind speed can cause different degrees of damage to different kinds of structures. In a real-life application, the degree of damage to each of the 28 indicators can be mapped together to create a comprehensive damage analysis. As with the original scale, the EF-Scale rates the tornado as a whole based on the most intense damage within the tornado's path.

While the EF-Scale is currently in use, ***the historical data presented in this report is based on the original F-Scale***. None of the tornadoes rated before February 1, 2007 will be re-evaluated using the EF-Scale.

Are alerts issued for tornadoes?

Yes. The National Weather Service Weather Forecast Office in Paducah, Kentucky is responsible for issuing ***tornado watches*** and ***warnings*** for Hamilton County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Watch.** A tornado watch is issued when tornadoes are possible in the area. Individuals need to be alert and prepared. Watches are typically large, covering numerous counties or even states.

- **Warning.** A tornado warning is issued when a tornado is expected to develop or one is sighted by a trained spotter or public official or indicated by Doppler radar. Warnings indicate imminent danger to life and property for those who are in the path of the tornado. Individuals should see shelter immediately. Typically, warnings encompass a much smaller area, such as a city or small county.

HAZARD PROFILE

The following identifies past occurrences of tornadoes; details the severity or extent of each event (if known); identifies the locations potentially affected; and estimates the likelihood of future occurrences.

When have tornadoes occurred previously? What is the extent of these previous tornadoes?

Table 10, located in **Appendix J**, summarize the previous occurrences as well as the extent or magnitude of tornado events recorded in Hamilton County. NOAA's Storm Events Database and NWS Storm Prediction Center's Severe Weather Database have documented 11 occurrences of tornadoes in Hamilton County between 1950 and 2019. In comparison, there have been 2,443 tornadoes statewide between 1950 and 2017 according to NOAA's Storm Prediction Center.

Tornado Fast Facts – Occurrences

Number of Tornadoes Reported (1950 - 2019): ***11***

Highest F-Scale Rating Recorded: ***F-4 (June 2, 1990)***

Peak Period for Tornadoes to Occur: ***March & April***

Most Likely Time for Tornadoes to Occur: ***Afternoon/Evening***

Average Length of a Tornado: ***3.8 miles***

Average Width of a Tornado: ***120 yards***

Average Damage Pathway of a Tornado: ***0.26 sq. mi.***

Longest Tornado Path in the County: ***13 miles (F3 on April 19, 1996)***

Widest Tornado Path in the County: ***400 yards (F3 on April 19, 1996)***

Figure F-2 charts the reported occurrences of tornadoes by magnitude. Of the 11 reported occurrences there was: 1 – F4, 3 – F3s, 3 – F2s, 2 – F1s, 1 – EF1s, and 1 – EF0s.

Figure F-3 charts the reported tornadoes by month. Of the 11 events, four (36%) took place in April and May making this the peak period for tornadoes in Hamilton County. Two tornadoes each have occurred in April, May, June and December. In comparison, 1,584 of the 2,443 tornadoes (65%) recorded in Illinois from 1950 through 2017 took place in April, May, and June.

Figure F-4 charts the reported tornadoes by hour. All 11 tornadoes occurred during the p.m. hours, with 9 of the events (82%) taking place between 4 p.m. and 9 p.m. In comparison, more than half of all Illinois tornadoes occur between 2 p.m. and 8 p.m.

The tornadoes that have impacted Hamilton County have varied from 0.1 miles to 13 miles in length and from 10 yards to 400 yards in width. The average length of a tornado in Hamilton County is 3.8 miles and the average width is 120 yards (0.068 miles).

Figure F-2
Tornadoes by Magnitude
1950 - 2019

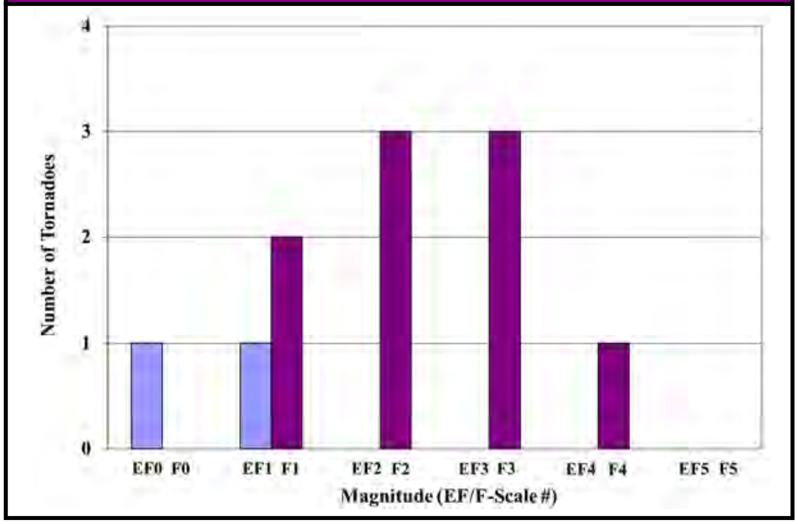
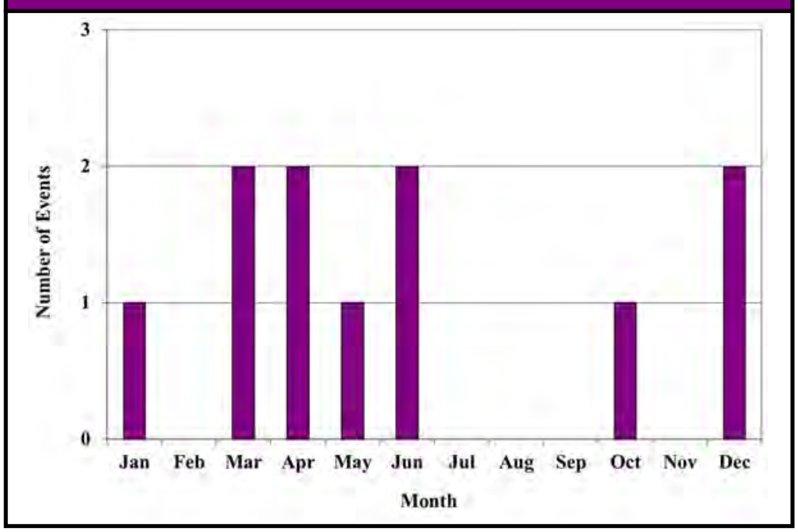
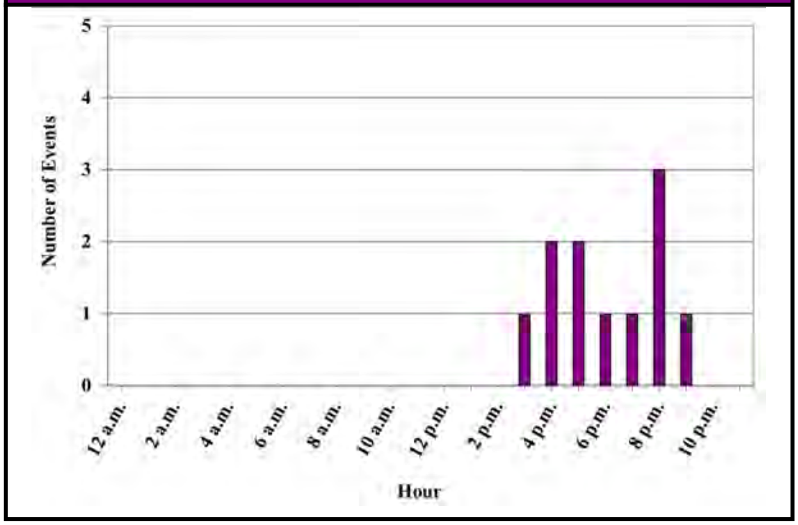


Figure F-3
Tornadoes by Month
1950 - 2019



Figures T-5 shows the pathway of each reported tornado. Records indicate that most of these tornadoes generally moved from southwest to northeast across the County. Unlike other natural hazards (i.e., severe winter storms, drought and excessive heat), tornadoes impact a relatively small area. Typically, the area impacted by a tornado is less than four square miles. In Hamilton County, the average damage pathway or area impacted by a tornado is 0.26 square miles.

Figure T-4
Tornadoes by Hour
1950 - 2019



The longest and widest tornado recorded in Hamilton County occurred on April 9, 1996. This F-3 tornado, measuring 17 miles in length and 400 yards in width, touched down in southeast Jefferson County and traveled northeast passing through Hamilton County before lifting off in southern Wayne County. The tornado was on the ground in Hamilton County for approximately 13 miles. The damage pathway of this tornado covered approximately 3.86 square miles, with 2.95 square miles occurring in Hamilton County.

What locations are affected by tornadoes?

Tornadoes have the potential to affect the entire County. Of the three participating municipalities, Dahlgren has had a reported occurrence of a tornado within its corporate limits. The *2018 Illinois Natural Hazard Mitigation Plan* prepared by IEMA classifies Hamilton County's hazard rating for tornadoes as "medium."

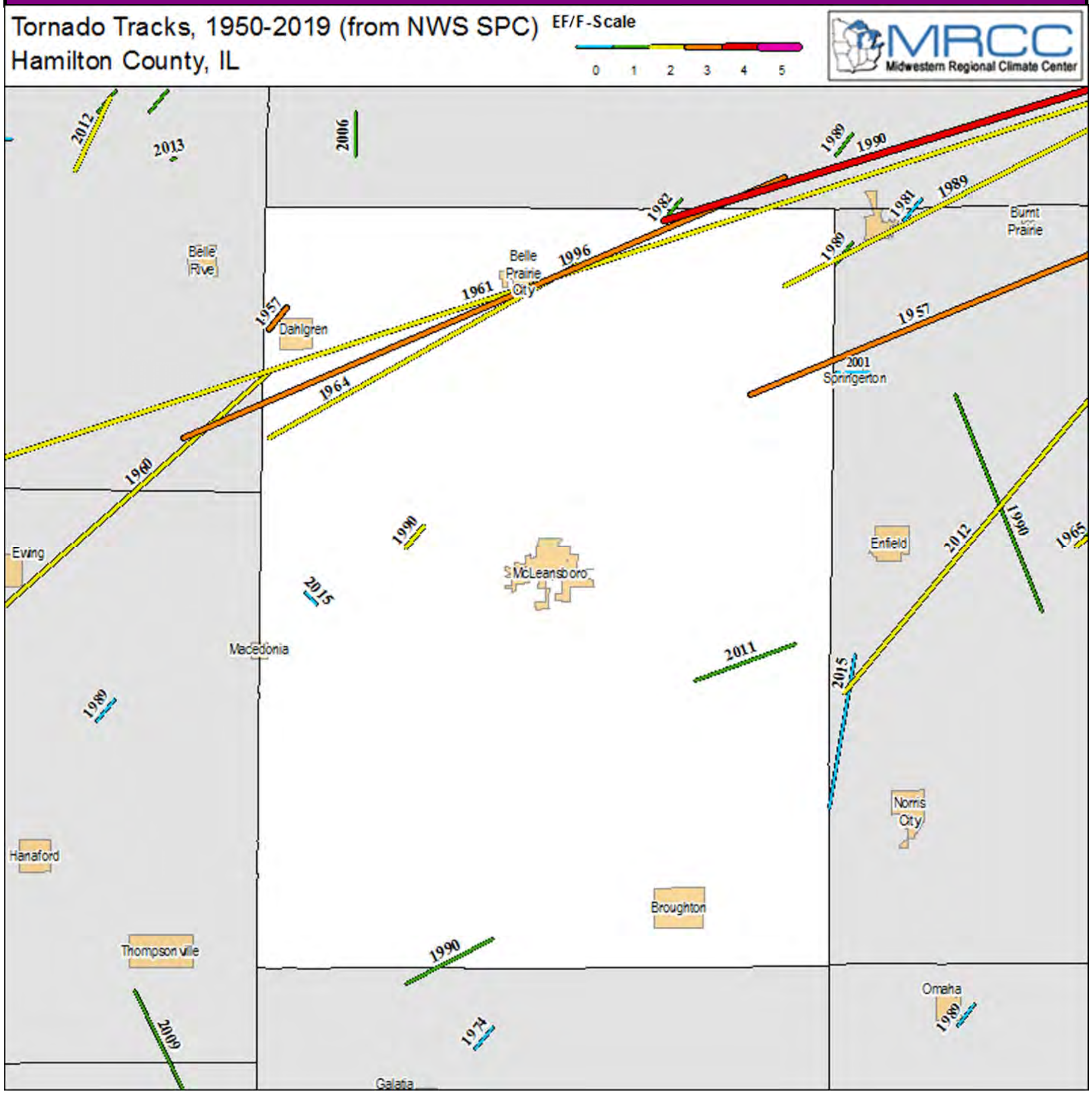
What is the probability of future tornadoes occurring?

Hamilton County has had 11 verified occurrences of tornadoes between 1950 and 2019. With 11 tornadoes over the past 70 years, the probability or likelihood that a tornado will touchdown somewhere in the County in any given year is 16%. There was one year over the last 70 years where more than one tornado occurred. This indicates that the probability that more than one tornado may occur during any given year within the County is 1%.

HAZARD VULNERABILITY

The following describes the vulnerability to participating jurisdictions, identifies the impacts on public health and property (if known) and estimates the potential impacts on public health and safety as well as buildings, infrastructure and critical facilities from tornadoes.

Figure T-5
Tornado Pathways in Hamilton County



Are the participating jurisdictions vulnerable to tornadoes?

Yes. All of Hamilton County is vulnerable to the dangers presented by tornadoes. According to NOAA's Storm Events Database and the Midwestern Regional Climate Center a majority of the tornadoes have touched down or passed through the northern part of the County. Since 2010, two tornadoes have been recorded in Hamilton County.

Of the participating municipalities, only Dahlgren has had a tornado touch down or pass through its municipal boundaries. **Figure T-6** lists the verified tornadoes that have touched down in or near or passed through each participating municipality.

Figure T-6 Verified Tornadoes In or Near Participating Municipalities			
Participating Municipality	**Number of Verified Tornadoes**	**Year**	
		Touched Down/Passed Through Municipality	**Touched Down/Passed Near Municipality**
Broughton	0	---	---
Dahlgren[2]	2	1957	1964
McLeansboro[3]	1	---	1990

[1] Located in Crook Township
[2] Located in Dahlgren Township
[3] Located in McLeansboro Township
[4] Located in South Crouch Township

In terms of unincorporated areas vulnerable to tornadoes, Aden has had three tornadoes touch down in or near their vicinity. **Figure T-7** details the verified tornadoes that have touched down in or near unincorporated areas of Hamilton County.

Figure T-7 Verified Tornadoes in or near Unincorporated Areas of Hamilton County			
Unincorporated Area	**Number of Verified Tornadoes**	**Year**	
		Touched Down/Passed *Through* Unincorporated Area	**Touched Down/Passed *Near* Unincorporated Area**
Aden	3		1982, 1990, 1996
Bungay	2	1957	1989
Cornerville	1		1990
Dale	1		2011
Delafield[2]	1		1996
Lake Dolan[1]	1	2011	
Piopolis	1	1996	
Walpole	1		1990

[1] Located in Crook Township
[2] Located in Dahlgren Township
[3] Located in McLeansboro Township
[4] Located in South Crouch Township

Do Any of the participating jurisdictions consider tornadoes to be among their community's greatest vulnerabilities?

Yes. Based on responses to a Critical Facilities Vulnerability Survey distributed to the participating jurisdictions, Dahlgren considers tornadoes to be among their community's greatest vulnerabilities. The Village feels that all of their systems are vulnerable to tornadoes, including their water tower. This survey was conducted on March 4, 2020. On March 19, 2020 and EF-1 tornado passed through the northwest side of Dahlgren, uprooting trees, downing power lines and damaging several roofs.

What impacts resulted from the recorded tornadoes?

Data obtained from NOAA's Storm Events Database indicates that between 1950 and 2019, eight of the 11 tornadoes caused $3.9 million in property damages and $10,000 in crop damages. Included in the property damage total is $250,000 in damages sustained as a result of the December 18, 1957 tornado event that occurred at 6 p.m. Damages represent losses incurred in three counties (including Hamilton County). A breakdown by county was unavailable.

Three of the 11 tornadoes have property damage totals of at least $250,000. Property damage information was either unavailable or none was recorded for the remaining two reported occurrences.

NOAA's Storm Events Database documented nine injuries as a result of three tornado events. Included in the injury total are four injuries sustained as a result of the December 18, 1957 tornado event that occurred at 6 p.m. The injury total represents losses incurred in three counties (including Hamilton County). A breakdown by county was unavailable. Detailed information on the injuries sustained was only available for one of the events. Two ladies suffered facial cuts from broken glass when home was destroyed by an F-2 tornado near Dahlgren on March 25, 1964.

Tornado Fast Facts – Impacts/Risk

Tornado Impacts:

- Total Property Damage (9 events): ***$3,902,000*** ^
- Total Crop Damage (1 event): ***$10,000***
- Injuries (3 events): ***9^***
- Fatalities: ***0***

Tornado Risk/Vulnerability:

- Public Health & Safety – Rural Areas: ***Low***
- Public Health & Safety – Municipalities: ***High***
- Buildings/Infrastructure/Critical Facilities – Rural Areas: ***Low***
- Buildings/Infrastructure/Critical Facilities – Municipalities/Populated Unincorp. Areas: ***High***

^ Included in the property damage total is $250,000 in damages and four injuries sustained as the result of the 6 p.m. December 18, 1957 tornado event and represents losses incurred in three counties (including Hamilton County). A breakdown by county was not available.

In comparison, Illinois averages roughly four tornado fatalities annually; however, this number varies widely from year to year.

What other impacts can result from tornadoes?

In addition to causing damage to buildings and properties, tornadoes can damage infrastructure and critical facilities such as roads, bridges, railroad tracks, drinking water treatment facilities, water towers, communication towers, antennae, power substations, transformers and poles. Depending on the damage done to the infrastructure and critical facilities, indirect impacts on individuals could range from inconvenient (i.e., adverse travel) to life-altering (i.e., loss of utilities for extended periods of time).

What is the level of risk/vulnerability to public health and safety from tornadoes?

According to the 2018 Illinois Natural Hazard Mitigation Plan, Hamilton County ***ranks in the bottom quarter of counties in Illinois in terms of tornado frequency***. This fact alone suggests that the overall risk posed by tornadoes to public health and safety is low. While frequency is important, other factors must be examined when assessing vulnerability including population distribution and density, the ratings and pathways of previously recorded tornadoes, the presence of high-risk living accommodations (such as high-rise buildings, mobile homes, etc.) and adequate access to health care for those injured following a tornado.

Hamilton County/Townships
For Hamilton County, including the townships, the level of risk or vulnerability posed by tornadoes to public health and safety is considered to be ***low***. This assessment is based on the fact that tornadoes do not occur frequently in the County and a large majority of the tornadoes that have impacted the County have touched down in rural areas away from concentrated populations. This has contributed to a low number of injuries and fatalities. In addition, the County is not densely populated and there is not a large number of high-risk living accommodations present.

In terms of adequate access to health care, the Hamilton Memorial Hospital District in McLeansboro is equipped to provide continuous care to persons injured by a tornado assuming that it is not directly impacted.

Participating Municipalities
In general, if a tornado were to touchdown or pass through any of the participating municipalities the risk to the public health and safety would be considered ***high***. This is based on the fact that a majority of the participating jurisdictions are small in size and have relatively dense and evenly distributed populations within their municipal boundaries. As a result, if a tornado were to touch down anywhere within the corporate limits of these municipalities it will have a greater likelihood of causing injuries or even fatalities.

Do any participating jurisdictions have community safe rooms?

Yes. McLeansboro considers the Hamilton County Courthouse to be a community safe room. None of the participating jurisdictions, including the townships or CUSD have community safe rooms. As a result, if a tornado were to touch down or pass through any of the population centers in the County, then there would be a greater likelihood of injuries and fatalities due to the lack of structures specifically designed and constructed to provide life-safety protection. Each jurisdiction should consider whether the potential impacts to public health and safety from a tornado are considered great enough to warrant the consideration of community safe rooms as a mitigation action.

Are existing buildings, infrastructure, and critical facilities vulnerable to tornadoes?

Yes. All existing buildings, infrastructure, and critical facilities located within the County and participating jurisdictions are vulnerable to tornado damage. Buildings, infrastructure, and critical facilities located in the path of a tornado usually suffer extensive damage, if not complete destruction.

While some buildings adjacent to a tornado's path may remain standing with little or no damage, all are vulnerable to damage from flying debris. It is common for flying debris to cause damage to roofs, siding, and windows. In addition, mobile homes, homes on crawlspaces, and buildings with large spans (i.e., schools, barns, airport hangers, factories, etc.) are more likely to suffer damage. Most workplaces and many residential units do not provide sufficient protection from tornadoes.

The damages sustained by infrastructure and critical facilities during a tornado are similar to those experienced during a severe storm. There is a high probability that power, communication, and transportation will be disrupted in and around the affected area.

Assessing the Vulnerability of Existing Residential Structures

One way to assess the vulnerability of existing residential structures is to estimate the number of housing units that may be potentially damaged if a tornado were to touch down or pass through any of the participating municipalities or the County. In order to accomplish this, a set of decisions/assumptions must be made regarding:

- the size (area impacted) by the tornado;
- the method used to estimate the area impacted by the tornado within each jurisdiction; and
- the method used to estimate the number of potentially-damaged housing units.

The following provides a brief discussion of each decision/assumption.

Assumption #1: Size of Tornado. To calculate the number of existing residential structures vulnerable to a tornado, the size (area impacted) by the tornado must first be determined. There are several scenarios that can be used to calculate the size, including the worst case and the average. For this analysis the area impacted by an average-sized tornado in Hamilton County will be used since it has a higher probability of recurring. In Hamilton County the area impacted by an average-sized tornado is 0.26 square miles. This average is based on more than 65 years of data.

Assumption #1

Size of Tornado = 0.26 sq. miles

Assumption #2: Method for Estimating the Area Impacted. Next, a method for determining the area within each jurisdiction impacted by the average-sized tornado needs to be chosen. There are several methods that can be used including creating an outline of the area impacted by the average-sized tornado and overlaying it on a map of each jurisdiction (most notably the municipalities) to see if any portion of the area falls outside of the corporate limits (which would require additional calculations) or just assume that the entire area of the average-sized tornado falls within the limits of each jurisdiction. For this discussion, it is assumed that the entire area of the average-sized tornado will fall within the limits of the participating jurisdictions.

Assumption #2

The entire area impacted by the average-sized tornado falls within the limits of each participating jurisdiction.

This method is quicker, easier and more likely to produce consistent results when the Plan is updated again. There is, however, a greater likelihood that the number of potentially-damaged housing units will be overestimated for those municipalities that have irregular shaped boundaries or occupy less than one square mile.

Assumption #3: Method for Estimating Potentially-Damaged Housing Units. With the size of the tornado selected and a method for estimating the area impacted chosen, a decision must be made on an approach for estimating the number of potentially-

Assumption #3

The average housing unit density for each municipality will be used to determine the number of potentially-damaged housing units.

damaged housing units. There are several methods that can be used including overlaying the average-sized tornado on a map of each jurisdiction and counting the impacted housing units or calculating the average housing unit density to estimate the number of potentially-damaged housing units.

For this analysis, the average housing unit density will be used since it provides a realistic perspective on potential residential damages without conducting extensive counts. Using the average housing unit density also allows future updates to the Plan to be easily recalculated and provides an exact comparison to previous estimates.

Calculating Average Housing Unit Density
The average housing unit density can be calculated by taking the number of housing units in a jurisdiction and dividing that by the land area within the jurisdiction. **Figure T-8** provides a sample calculation.

Figure T-8 **Calculation of Average Housing Unit Density – Hamilton County**
Total Housing Units in the Jurisdiction ÷ Land Area within the Jurisdiction = Average Housing Unit Density (Rounded Up to the Nearest Whole Number) Hamilton County: 4,104 housing units ÷ 434.665 sq. miles = 9.442 housing units/sq. mile **(10 housing units/sq. mile)**

Figure T-9 provides a breakdown of housing unit densities by participating municipality as well as for the unincorporated areas of the County and the County as a whole.

While the average housing unit density provides an adequate assessment of the number of housing units in areas where the housing density is fairly constant, such as municipalities, it does not provide a realistic assessment for those counties with large, sparsely populated rural areas such as Hamilton County.

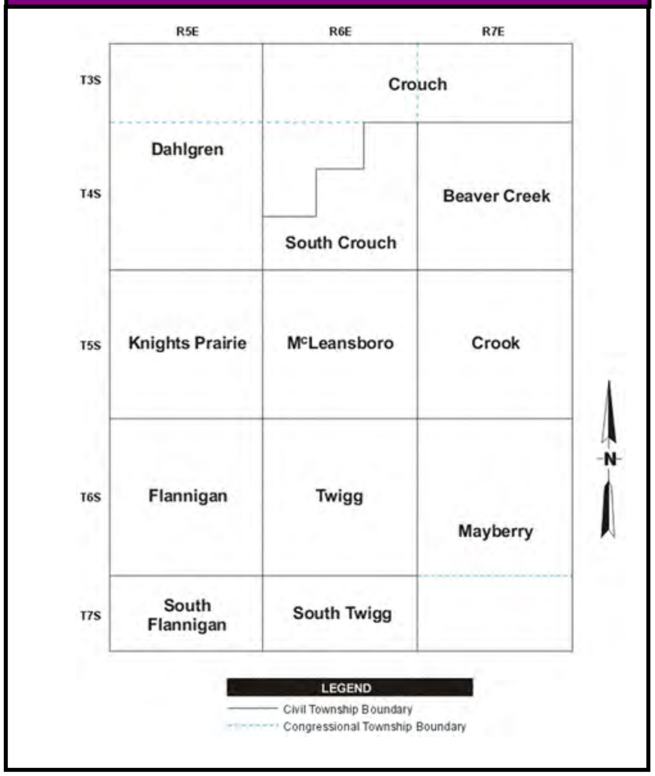
In Hamilton County, as well as many other southeastern Illinois counties, there are pronounced differences in housing unit densities. Approximately 78% of all housing units are located in 5 of the County's 12 townships (Dahlgren, Knight Prairie, Mayberry, McLeansboro, and Twigg) while approximately 69% of all mobile homes are located in 4 of the County's 12 townships (Dahlgren, Knight Prairie, Mayberry, and McLeansboro). **Figure T-10** identifies the township boundaries. Tornado damage to buildings (especially mobile homes), infrastructure and critical facilities in these more densely populated townships is likely to be greater than in the rest of the County. The three participating municipalities all have ordinances that require anchoring systems for mobile home that should help limit the damage from lower rated tornadoes.

Figure T-9 **Average Housing Unit Density by Participating Jurisdiction**				
Participating Jurisdiction	**Total Housing Units (2010)**	**Mobile Homes (2013-2017)***	**Land Area (Sq. Miles) (2010)**	**Average Housing Unit Density (Units/Sq. Mi.) (Raw)**
Broughton	98	34	1.874	52.295
Dahlgren	242	51	0.996	---
McLeansboro	1,456	126	2.613	557.214
Unincorp. County	2,248	515	428.468	5.247
County	4,104	746	434.665	9.442

* Information on additional housing characteristics, such as mobile homes, was not covered by the 2010 Census. Instead the U.S. Census Bureau has chosen to generate 5-year estimates from American Community Survey data. The 2013-2017 5-year estimate is the most recent year for which estimates were available.

Source: U. S. Census Bureau.

Figure T-10
Township Boundaries Hamilton County



Source: Illinois Secretary of State

This substantial difference in density skews the average county housing unit density in Hamilton County and is readily apparent when compared to the average housing unit densities for each of the townships within the County. **Figure T-11** provides a breakdown of housing unit densities by township and illustrates the differences between the various townships and the County as a whole.

For 10 of the 12 townships, the *average county* housing unit density is greater (in some cases considerably greater) than the *average township* housing unit densities. However, the *average county* housing unit density is considerably less than the housing unit density for the most populated township, McLeansboro township.

Figure T-11
Average Housing Unit Density by Township

Township	Total Housing Units (2010)	Mobile Homes (2013-2017)*	Land Area (Sq. Miles) (2010)	Average Housing Unit Density (Units/Sq. Mi.) (Raw)
Beaver Creek	126	22	36.385	3.463
Crook	182	26	35.760	5.089
Crouch	175	25	47.438	3.689
Dahlgren	531	99	54.281	9.782
Flannigan	160	41	36.171	4.423
Knight Prairie	261	119	36.318	7.187
Mayberry	248	117	54.601	4.542
McLeansboro	1,907	182	35.602	53.564
South Crouch	119	33	25.088	4.743
South Flannigan	74	33	18.376	4.027
South Twigg	71	6	18.391	3.861
Twigg	250	43	36.255	6.896
Townships - 5 most populated	3,197	560	217.057	14.729
Townships - 7 least populated	907	186	217.609	4.168

* Information on additional housing characteristics, such as mobile homes, was not covered by the 2010 Census. Instead the U.S. Census Bureau has chosen to generate 5-year estimates from American Community Survey data. The 2013-2017 5-year estimate is the most recent year for which estimates were available.

Source: U.S. Census Bureau.

Estimating the Number of Potentially-Damaged Housing Units

Before an estimate of the number of potentially-damaged housing units can be calculated for the participating municipalities, an additional factor needs to be taken into consideration: the presence of large tracts of undeveloped land, as well as some commercial and school properties. Occasionally villages and cities will annex large tracts of undeveloped land into their corporate limits. In many cases these large tracts of land are sparsely populated. Consequently, including these tracts of land in the calculations to determine the number of potentially-damaged housing units skews the results, especially for very small municipalities. Therefore, to provide a more realistic assessment of the number of potentially-damaged housing units, these undeveloped areas need to be subtracted from the land area figures obtained from the U.S. Census Bureau.

In Hamilton County, all of the participating municipalities have large, sparsely-populated open areas within their municipal boundaries. These areas account for approximately 25% to 85% of the land area in these municipalities. If these areas are subtracted from the U.S. Census Bureau land area figures, then the remaining land areas have fairly consistent housing unit densities and contain a majority of the housing units. **Figure T-12** provides a breakdown of the refined land area figures for select municipalities. These refined land area figures will be used to update the average housing unit density calculations for these municipalities.

Figure T-12
Refined Land Area Figures for Participating Municipalities with Large Tracts of Undeveloped Land

Participating Jurisdiction	Land Area (Sq. Miles) (2010)	Estimated Open Land Area & Commercial/ Industrial Tracts (Sq. Miles)	Refined Land Area (Sq. Miles)
Broughton	1.874	1.620	0.254
Dahlgren	0.996	0.480	0.516
McLeansboro	2.613	0.660	1.953

With updated average housing unit densities calculated it is relatively simple to provide an estimate of the number of existing potentially-damaged housing units. This can be done by multiplying the average housing unit density by the area impacted by the average-sized Hamilton County tornado. **Figure T-13** provides a sample calculation.

Figure T-13
Sample Calculation of Potentially-Damaged Housing Units – Hamilton County

Average Housing Unit Density x Area Impacted by the Average-Sized Hamilton County Tornado = Potentially-Damaged Housing Units (Rounded Up to the Nearest Whole Number)

Hamilton County: 9.442 housing units/sq. mile x 0.26 sq. miles = 2.45 housing units
(3 housing units)

For those municipalities that cover less than one square mile, the average housing unit density cannot be used to calculate the number of potentially-damaged housing units. The average housing unit density assumes that the land area within the municipality is at least one square mile and as a result distorts the number of potentially-damaged housing units for very small municipalities.

To calculate the number of potentially-damaged housing units for these municipalities, the area impacted by the averaged-sized Hamilton County tornado is divided by the land area within the municipality to get the impacted land area. The impacted land area is then multiplied by the total number of housing units within the municipality to get the number of potentially-damaged housing units. **Figure T-14** provides a sample calculation. Since the refined land area in Broughton is less than or equal to the average area impacted, it is assumed that all of the housing units within these villages will be potentially damaged.

Figure T-14 **Sample Calculation of Potentially-Damaged Housing Units** **for Municipalities Covering Less Than One Square Mile – Dahlgren**
Area Impacted by the Average-Sized Hamilton County Tornado ÷ Land Area within the Jurisdiction x Total Housing Units in the Jurisdiction = Potentially-Damaged Housing Units (Rounded Up to the Nearest Whole Number) Dahlgren: 0.26 sq. mile ÷ 0.516 sq. miles x 242 housing units = 121.94 **(122 housing units)**

Figures T-15 and **T-16** provide a breakdown of the number of potentially-damaged housing units by participating municipality as well as by township and for the unincorporated areas of the County and the County as a whole. It is important to note that for the 5 most densely populated townships, the estimated number of potentially-damaged housing units would only be reached if a tornado's pathway included the major municipality within the township. If the tornado remained in the rural portion of the township, then the number of potentially-damaged housing units would be considerably lower.

Figure T-15
Estimated Number of Housing Units by Participating Jurisdiction Potentially Damaged by a Tornado

Participating Jurisdiction	Total Housing Units (2010)	Land Area/Refined Land Area (Sq. Miles) (2010)	Average Housing Unit Density (Units/Sq. Mi.) (Raw)	Potentially-Damaged Housing Units (Units/0.26 Sq. Mi.) (Raw)	Potentially-Damaged Housing Units (Units/0.26 Sq. Mi.) (Rounded Up)
Broughton	98	0.254	---	98	98
Dahlgren	242	0.516	---	121.94	122
McLeansboro	1,456	1.953	745.520	193.84	194
Unincorp. County	2,248	428.468	5.247	1.36	2
County	4,104	434.665	9.442	2.45	3

* All jurisdictions contain large, undeveloped land areas and/or commercial/industrial tracts within their municipal boundaries. These areas account for between 25% and 85% of the land area in the municipalities and skew the potentially-damaged housing unit calculations. In order to provide a more realistic assessment of potentially-damage housing units, these undeveloped areas were subtracted from the land area figure obtained from the U.S. Census Bureau and the refined land area figures are used to calculate potentially-damaged housing units.

Figure T-16 Estimated Number of Housing Units by Township Potentially Damaged by a Tornado					
Township	**Total Housing Units (2010)**	**Land Area (Sq. Miles) (2010)**	**Average Housing Unit Density (Units/Sq. Mi.) (Raw)**	**Potentially-Damaged Housing Units (Units/0.26 Sq. Mi.) (Raw)**	**Potentially-Damaged Housing Units (Units/0.26 Sq. Mi.) (Rounded Up)**
Beaver Creek	126	36.385	3.463	0.90	1
Crook	182	35.760	5.089	1.32	2
Crouch	175	47.438	3.689	0.96	1
Dahlgren	531	54.281	9.782	2.54	3
Flannigan	160	36.171	4.423	1.15	2
Knight Prairie	261	36.318	7.187	1.87	2
Mayberry	248	54.601	4.542	1.18	2
McLeansboro	1,907	35.602	53.564	13.93	14
South Crouch	119	25.088	4.743	1.23	2
South Flannigan	74	18.376	4.027	1.05	2
South Twigg	71	18.391	3.861	1.00	2
Twigg	250	36.255	6.896	1.79	2
Townships - 5 most populated	3,197	217.057	14.729	2.21	3
Townships - 7 least populated	907	217.609	4.168	0.63	1

What is the level of risk/vulnerability to existing buildings, infrastructure and critical facilities vulnerable from tornadoes?

There are several factors that must be examined when assessing the vulnerability of existing buildings, infrastructure and critical facilities to tornadoes. These factors include tornado frequency, population distribution and density, the ratings and pathways of previously recorded tornadoes, and the presence of high-risk living accommodations (such as high-rise buildings, mobile homes, etc.)

Hamilton County/Townships

For Hamilton County, including the townships, the level of risk or vulnerability posed by tornadoes to existing buildings, infrastructure and critical facilities is considered to be ***low***. This assessment is based on the frequency with which tornadoes have occurred in the County as well as the amount of damage that has been sustained tempered by the low population density throughout most the County and the relative absence of high-risk living accommodations. While previously recorded tornadoes have followed largely rural pathways, they have caused significant damage on several occasions.

Participating Municipalities

In general, if a tornado were to touch down or pass through any of the participating municipalities the risk to existing buildings, infrastructure, and critical facilities would be considered ***high***. This assessment is based on the population and housing unit distribution within the municipalities where wide expanses of open spaces do not generally exist. As a result, if a tornado were to touch down within any of the municipalities it will have a greater likelihood of causing substantial property damage.

Are future buildings, infrastructure and critical facilities vulnerable to tornadoes?

Yes and No. While none of the participating jurisdictions have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from tornadoes, all three of the participating municipalities have tie-down ordinance that should less the damage to mobile homes form lower rated tornadoes.

Infrastructure such as new communication and power lines will continue to be vulnerable to tornadoes as long as they are located above ground. Flying debris can disrupt power and communication lines even if they are not directly in the path of the tornado. Steps to bury all new lines would eliminate the vulnerability, but this action would be cost prohibitive in most areas.

What are the potential dollar losses to vulnerable structures from tornadoes?

Unlike other hazards, such as flooding, there are no standard loss estimation models or methodologies for tornadoes. However, a rough estimate of potential dollar losses to the *potentially-damaged housing units* determined previously can be calculated if several additional decisions/assumptions are made regarding:

- the value of the potentially-damaged housing units; and
- the percent damage sustained by the potentially-damaged housing units (i.e., damage scenario).

These assumptions represent a ***probable scenario*** based on the reported historical occurrences of tornadoes in Hamilton County. The purpose of providing a rough estimate is to help residents and municipal/county officials make informed decisions to better protect themselves and their communities. These estimates are meant to provide a ***general idea*** of the magnitude of the potential damage that could occur. The following provides a brief discussion of each decision/assumption.

Assumption #4

The average market value for residential structures in each participating jurisdiction will be used to determine the value of potentially-damaged housing units.

Assumption #4: Value of Potentially-Damaged Housing Units. In order to determine the potential dollar losses to the potentially-damaged housing units, the monetary value of the units must first be calculated. Typically, when damage estimates are prepared after a natural disaster such as a tornado, they are based on the market value of the structure. Since it would be impractical to determine the individual market value of each potentially-damaged housing unit, the average market value of residential structures in each municipality will be used.

To determine the average market value, the average assessed value must first be calculated. The average assessed value is calculated by taking the total assessed value of residential buildings within a jurisdiction and dividing that number by the total number of housing units within the jurisdiction. The average market value is then determined by taking the average assessed value and multiplying that number by three (the assessed value of a structure in Hamilton County is approximately one-third of the market value). **Figure T-17** provides a sample calculation. The total assessed value is based on 2019 tax assessment information provided by the Hamilton County Supervisor of Assessments.

Figure T-17
Sample Calculation of Average Assessed Value & Average Market Value – McLeansboro

Average Assessed Value

Total Assessed Value of Residential Buildings in the Jurisdiction÷ Total Housing Units in the Jurisdiction = Average Assessed Value

McLeansboro: $15,969,411 ÷ 1,456 housing units = $10,968

Average Market Value

Average Assessed Value x 3 = Average Market Value
(Rounded to the Nearest Dollar)

McLeansboro: $10,968 x 3 = $32,904
($32,904)

Figures T-18 and **T-19** provide the average assessed value and average market value for each participating municipality as well as by township and for the unincorporated areas of the County and the County as a whole.

Figure T-18
Average Market Value of Housing Units by Municipality

Participating Jurisdiction	Total Assessed Value of Residential Buildings (2019)	Total Housing Units (2010)	Average Assessed Values	Average Market Value (2019)
Broughton	$917,828	98	$9,366	$28,097
Dahlgren	$3,887,951	242	$16,066	$48,198
McLeansboro	$15,969,411	1,456	$10,968	$32,904
Unincorp. County	$51,456,097	2,248	$22,890	$68,669
County	$73,058,427	4,104	$17,802	$53,405

Source: Hamilton County Supervisor of Assessments.

Assumption #5

The tornado would completely destroy the potentially-damaged housing units.

Structural Damage = 100%
Content Damage = 100%

Assumption #5: Damage Scenario. Finally, a decision must be made regarding the percent damage sustained by the potentially-damaged housing units and their contents. For this scenario, the expected percent damage sustained by the structure and its contents is 100%; in other words, all of the potentially-damaged housing units would be completely destroyed. While it is highly unlikely that each and every housing unit would sustain the maximum percent damage, identifying and calculating different degrees of damage within the average area impacted is complex and provides an additional complication when updating the Plan.

Figure T-19 **Average Market Value of Housing Units by Township**				
Participating Jurisdiction	**Total Assessed Value of Residential Buildings (2019)**	**Total Housing Units (2010)**	**Average Assessed Values**	**Average Market Value (2019)**
Beaver Creek	$2,669,234	126	$21,184	$63,553
Crook	$3,708,851	182	$20,378	$61,135
Crouch	$4,741,480	175	$27,094	$81,283
Dahlgren	$11,505,156	531	$21,667	$65,001
Flannigan	$3,171,118	160	$19,819	$59,458
Knight Prairie	$5,515,125	261	$21,131	$63,392
Mayberry	$4,014,654	248	$16,188	$48,564
McLeansboro	$27,801,401	1,907	$14,579	$43,736
South Crouch	$2,843,828	119	$23,898	$71,693
South Flannigan	$1,334,087	74	$18,028	$54,085
South Twigg	$1,352,495	71	$19,049	$57,148
Twigg	$4,400,998	250	$17,604	$52,812
Townships - 5 most populated	$53,237,334	3,197	$16,652	$49,957
Townships - 7 least populated	$19,821,093	907	$21,853	$65,560

Source: Hamilton County Supervisor of Assessments.

Calculating Potential Dollar Losses

With all the decisions and assumptions made, the potential dollar losses can now be calculated. First, the potential dollar losses to the ***structure*** of a potentially-damaged housing unit must be determined. This is done by taking the average market value for a residential structure and multiplying it by the percent damage (100%) to get the average structural damage per unit. Next the average structural damage per unit is multiplied by the number of potentially-damaged housing units. **Figure T-20** provides a sample calculation.

Figure T-20 ***Structure:*** **Potential Dollar Loss Sample Calculation – McLeansboro**
Average Market Value of a Housing Unit with the Jurisdiction x Percent Damage = Average Structural Damage per Housing Unit McLeansboro: $32,904 x 100% = $32,904 per housing unit
Average Structural Damage per Housing Unit x Number of Potentially-Damaged Housing Units within the Jurisdiction = *Structure* Potential Dollar Losses (Rounded to the Nearest Dollar) McLeansboro: $32,904 per housing unit x 194 housing units = $6,383,376 **($6,383,376)**

Next, the potential dollar losses to the ***content*** of a potentially-damaged housing unit must be determined. Based on FEMA guidance, the value of a residential housing unit's content is approximately 50% of its market value. Therefore, start by taking one-half the average market value for a residential structure and multiply by the percent damage (100%) to get the average content damage per unit. Next the average content damage per unit is multiplied by the number of potentially-damaged housing units. **Figure T-21** provides a sample calculation.

Figure T-21 *Content:* **Potential Dollar Loss Sample Calculation - McLeansboro**
½ (Average Market Value of a Housing Unit) with the Jurisdiction x Percent Damage = Average Content Damage per Housing Unit McLeansboro: ½ ($32,904) x 100% = $16,452 per housing unit
Average Content Damage per Housing Unit x Number of Potentially-Damaged Housing Units within the Jurisdiction = *Content* Potential Dollar Losses (Rounded to the Nearest Dollar) McLeansboro: $16,452 per housing unit x 194 housing units = $3,191,688 **($3,191,688)**

Finally, the ***total potential dollar losses*** may be calculated by adding together the potential dollar losses to the structure and content. **Figures T-22** and **T-23** give a breakdown of the total potential dollar losses by municipality and township.

This assessment illustrates why potential residential dollar losses should be considered when jurisdictions are deciding which mitigation projects to pursue. ***Potential dollar losses caused by an average tornado in Hamilton County would be expected to exceed at least $4.1 million in any of the participating municipalities***.

For comparison, an estimate of potential dollar losses was calculated for the entire County, the unincorporated portions of the County, the 5 most populated townships and the 7 least populated townships. As discussed previously, the estimate for the entire County is skewed because it does not take into consideration the differences in the housing density.

Figure T-22
Estimated Potential Dollar Losses to Potentially-Damaged Housing Units from a Tornado by Participating Jurisdiction

Participating Jurisdiction	Average Market Value (2019)	Potentially-Damaged Housing Units (Rounded Up)	Potential Dollar Losses		Total Potential Dollar Losses
			Structure	Content	
Broughton	$ 28,097	98	$2,753,506	$1,376,753	$4,130,259
Dahlgren	$ 48,198	122	$5,880,156	$2,940,078	$8,820,234
McLeansboro	$ 32,904	194	$6,383,376	$3,191,688	$9,575,064
Unincorp. County	$ 68,669	2	$137,338	$68,669	$206,007
County	$ 53,405	3	$160,215	$80,108	$240,323

Figure T-23
Estimated Potential Dollar Losses to Potentially-Damaged Housing Units from a Tornado by Township

Participating Jurisdiction	Average Market Value (2019)	Potentially-Damaged Housing Units (Rounded Up)	Potential Dollar Losses		Total Potential Dollar Losses
			Structure	Content	
Beaver Creek	$ 63,553	1	$63,553	$31,777	$95,330
Crook	$ 61,135	2	$122,270	$61,135	$183,405
Crouch	$ 81,283	1	$81,283	$40,642	$121,925
Dahlgren	$ 65,001	3	$195,003	$97,502	$292,505
Flannigan	$ 59,458	2	$118,916	$59,458	$178,374
Knight Prairie	$ 63,392	2	$126,784	$63,392	$190,176
Mayberry	$ 48,564	2	$97,128	$48,564	$145,692
McLeansboro	$ 43,736	14	$612,304	$306,152	$918,456
South Crouch	$ 71,693	2	$143,386	$71,693	$215,079
South Flannigan	$ 54,085	2	$108,170	$54,085	$162,255
South Twigg	$ 57,148	2	$114,296	$57,148	$171,444
Twigg	$ 52,812	2	$105,624	$52,812	$158,436
Townships - 5 most populated	$ 49,957	3	$149,871	$74,936	$224,807
Townships - 7 least populated	$ 65,560	1	$65,560	$32,780	$98,340

Vulnerability of Commercial/Industrial Businesses and Infrastructure/Critical Facilities

The calculations presented above are meant to provide the reader with a sense of the scope or magnitude of an average-sized tornado in term of residential dollar losses. These calculations do not include damages sustained by businesses or other infrastructure and critical facilities within the participating jurisdictions.

In terms of businesses, the impacts from an average-sized tornado event can be physical and/or monetary. Monetary impacts can include loss of sales revenue either through temporary closure or loss of critical services (i.e., power, drinking water, and sewer). Depending on the magnitude of the event, the damage sustained by infrastructure and critical facilities can be extensive in nature and expensive to repair. As a result, the cumulative monetary impacts to businesses and infrastructure can exceed the cumulative monetary impacts to residences. ***While average dollar amounts cannot be supplied for these items at this time, they should be taken into account*** when discussing the impacts that an average-sized tornado could have on the participating jurisdictions.

3.6 EARTHQUAKES

HAZARD IDENTIFICATION

What is the definition of an earthquake?

An earthquake is a sudden shaking of the ground caused when rocks forming the earth's crust slip or move past each other along a fault (a fracture in the rocks). Most earthquakes occur along the boundaries of the earth's tectonic plates. These slow-moving plates are being pulled and dragged in different directions, sliding over, under and past each other. Occasionally, as the plates move past each other, their jagged edges will catch or stick causing a gradual buildup of pressure (energy).

Eventually, the force exerted by the moving plates overcomes the resistance at the edges and the plates snap into a new position. This abrupt shift releases the pent-up energy, producing vibrations or seismic waves that travel outward from the earthquake's point of origin. The location below the earth's surface where the earthquake starts is known as the hypocenter or focus. The point on the earth's surface directly above the focus is the epicenter.

The destruction caused by an earthquake may range from light to catastrophic depending on a number of factors including the magnitude of the earthquake, the distance from the epicenter, the local geologic conditions as well as construction standards and time of day (i.e., rush hour). Earthquake damage may include power outages, general property damage, road and bridge failure, collapsed buildings and utility damage (ruptured gas lines, broken water mains, etc.).

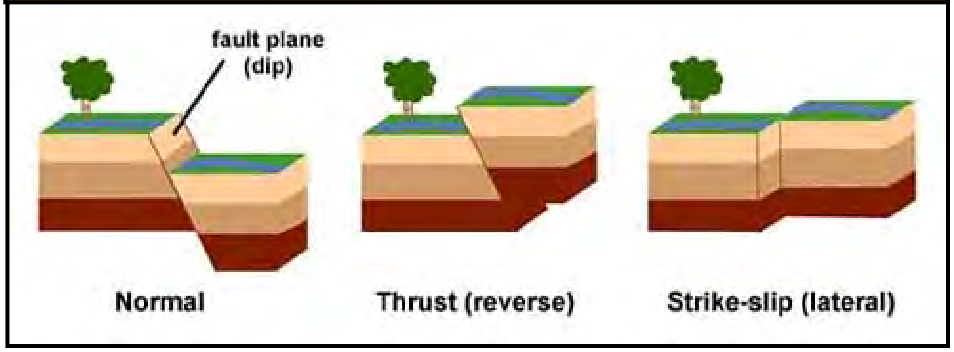
Most of the damage done by an earthquake is caused by its secondary or indirect effects. These secondary effects result from the seismic waves released by the earthquake and include ground shaking, surface faulting, liquefaction, landslides and, in rare cases, tsunamis.

According to the U.S. Geological Survey, more than 143 million Americans in the contiguous United States are exposed to potentially damaging ground shaking from earthquakes. Over 44 million of those Americans, located in 18 states, are exposed to very strong ground shaking from earthquakes. Illinois ranks 10th in terms of the number of individuals exposed to very strong ground shaking. The Federal Emergency Management Agency's Hazus analysis indicates that the annualized earthquake losses to the national building stock is $6.1 billion per year. A majority of the average annual loss is concentrated in California ($3.7 million). The central United States (including Illinois) ranks third in annualized earthquake losses at $480 billion, behind the pacific northwest (Washington and Oregon) with annualized earthquake losses at $710 billion.

What is a fault?

A fault is a fracture or zone of fractures in the earth's crust between two blocks of rock. They may range in length from a few millimeters to thousands of kilometers. Many faults form along tectonic plate boundaries. Faults are classified based on the angle of the fault with respect to the surface (known as the dip) and the direction of slip or movement along the fault. There are three main groups of faults: normal, thrust (reverse) and strike-slip (lateral). **Figure EQ-1** provides an illustration of each type of fault.

Figure EQ-1
Fault Illustration



Source: U. S. Geological Survey.

Normal faults occur in response to pulling or tension along the two blocks of rock causing the overlying block to move down the dip of the fault plane. Most of the faults in Illinois are normal faults. Thrust or reverse faults occur in response to squeezing or compression of the two blocks of rock causing the overlying block to move up the dip of the fault plane. Strike-slip or lateral faults can occur in response to either pulling/tension or squeezing/compression causing the blocks to move horizontally past each other.

Geologists have found that earthquakes tend to recur along faults, which reflect zones of weakness in the earth's crust. Even if a fault zone has recently experienced an earthquake, there is no guarantee that all the stress has been relieved. Another earthquake could still occur.

What are tectonic plates?

Tectonic plates are large, irregularly-shaped, relatively rigid sections of the earth's crust that float on the top, fluid layer of the earth's mantle. There are about a dozen tectonic plates that make up the surface of the planet. These plates are approximately 50 to 60 miles thick and the largest are millions of square miles in size.

How are earthquakes measured?

The severity of an earthquake is measured in terms of its magnitude and intensity. A brief description of both terms and the scales used to measure each are provided below.

Magnitude

Magnitude refers to the amount of seismic energy released at the hypocenter of an earthquake. The magnitude of an earthquake is determined from measurements of ground vibrations recorded by seismographs. As a result, magnitude is represented as a single, instrumentally determined value. A loose network of seismographs has been installed all over the world to help record and verify earthquake events.

There are several scales that measure the magnitude of an earthquake. The most well-known is the Richter Scale. This logarithmic scale provides a numeric representation of the magnitude of an earthquake through the use of whole numbers and decimal fractions. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in ground vibrations measured. In addition, each whole number increase corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number. It is important to note that the Richter Scale is used only to determine the magnitude of an earthquake, it does not assess the damage that results.

Once an earthquake's magnitude has been confirmed, it can be classified. **Figure EQ-2** categorizes earthquakes by class based on their magnitude (i.e., Richter Scale value). Any earthquake with a magnitude less than 3.0 on the Richter Scale is classified as a micro earthquake while any earthquake with a magnitude of 8.0 or greater on the Richter Scale is considered a "great" earthquake. Earthquakes with a magnitude of 2.0 or less are not commonly felt by individuals. The largest earthquake to occur in the United States since 1900 took place off the coast of Alaska in Prince William Sound on March 28, 1964 and registered a 9.2 on the Richter Scale.

Figure EQ-2
Earthquake Magnitude Classes

Class	Magnitude (Richter Scale)
micro	smaller than 3.0
minor	3.0 – 3.9
light	4.0 – 4.9
moderate	5.0 – 5.9
strong	6.0 – 6.9
major	7.0 – 7.9
great	8.0 or larger

Source: Michigan Technological University, Department of Geological and Mining Engineering and Sciences, UPSeis

Intensity

Intensity refers to the effect an earthquake has on a particular location. The intensity of an earthquake is determined from observations made of the damage inflicted on individuals, structures and the environment. As a result, intensity does not have a mathematical basis; instead it is an arbitrary ranking of observed effects. In addition, intensity generally diminishes with distance. There may be multiple intensity recordings for a region depending on a location's distance from the epicenter.

Although numerous intensity scales have been developed over the years, the one currently used in the United States is the Modified Mercalli Intensity Scale. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. The lower numbers of the intensity scale are based on human observations (i.e., felt only by a few people at rest, felt quite noticeably by persons indoors, etc.).

The higher numbers of the scale are based on observed structural damage (i.e., broken windows, general damage to foundations etc.). Structural engineers usually contribute information when assigning intensity values of VIII or greater. **Figure EQ-3** provides a description of the damages associated with each level of intensity as well as comparing Richter Scales values to Modified Mercalli Intensity Scale values.

Generally, the Modified Mercalli Intensity value assigned to a specific site after an earthquake is a more meaningful measure of severity to the general public than magnitude because intensity refers to the effects actually experienced at that location.

Figure EQ-3 **Comparison of Richter Scale and Modified Mercalli Intensity Scale**		
Richter Scale	**Modified Mercalli Scale**	**Observations**
1.0 – 1.9	I	Felt by very few people; barely noticeable. No damage.
2.0 – 2.9	II	Felt by a few people, especially on the upper floors of buildings. No damage.
3.0 – 3.9	III	Noticeable indoors, especially on the upper floors of buildings, but may not be recognized as an earthquake. Standing cars may rock slightly; vibrations similar to the passing of a truck. No damage.
4.0	IV	Felt by many indoors and a few outdoors. Dishes, windows, and doors disturbed. Standing cars rocked noticeably. No damage.
4.1 – 4.9	V	Felt by nearly everyone. Small, unstable objects displaced or upset; some dishes and glassware broken. Negligible damage.
5.0 – 5.9	VI	Felt by everyone. Difficult to stand. Some heavy furniture moved. Weak plaster may fall and some masonry, such as chimneys, may be slightly damaged. Slight damage.
6.0	VII	Slight to moderate damage to well-built ordinary structures. Considerable damage to poorly-built structures. Some chimneys may break. Some walls may fall.
6.1 – 6.9	VIII	Considerable damage to ordinary buildings. Severe damage to poorly built buildings. Some walls collapse. Chimneys, monuments, factory stacks, columns fall.
7.0	IX	Severe structural damage in substantial buildings, with partial collapses. Buildings shifted off foundations. Ground cracks noticeable.
7.1 – 7.9	X	Most masonry and frame structures and their foundations destroyed. Some well-built wooden structures destroyed. Train tracks bent. Ground badly cracked. Landslides.
8.0	XI	Few, if any structures remain standing. Bridges destroyed. Wide cracks in ground. Train tracks bent greatly. Wholesale destruction.
> 8.0	XII	Total damage. Lines of sight and level are distorted. Waves seen on the ground. Objects thrown up into the air.

Sources: Michigan Technological University, Department of Geological and Mining Engineering and Sciences, UPSeis.
U.S. Geological Survey.

When and where do earthquakes occur?

Earthquakes can strike any location at any time. However, history has shown that most earthquakes occur in the same general areas year after year, principally in three large zones around the globe. The world's greatest earthquake belt, the circum-Pacific seismic belt (nicknamed the "Ring of Fire"), is found along the rim of the Pacific Ocean, where about 81 percent of the world's largest earthquakes occur.

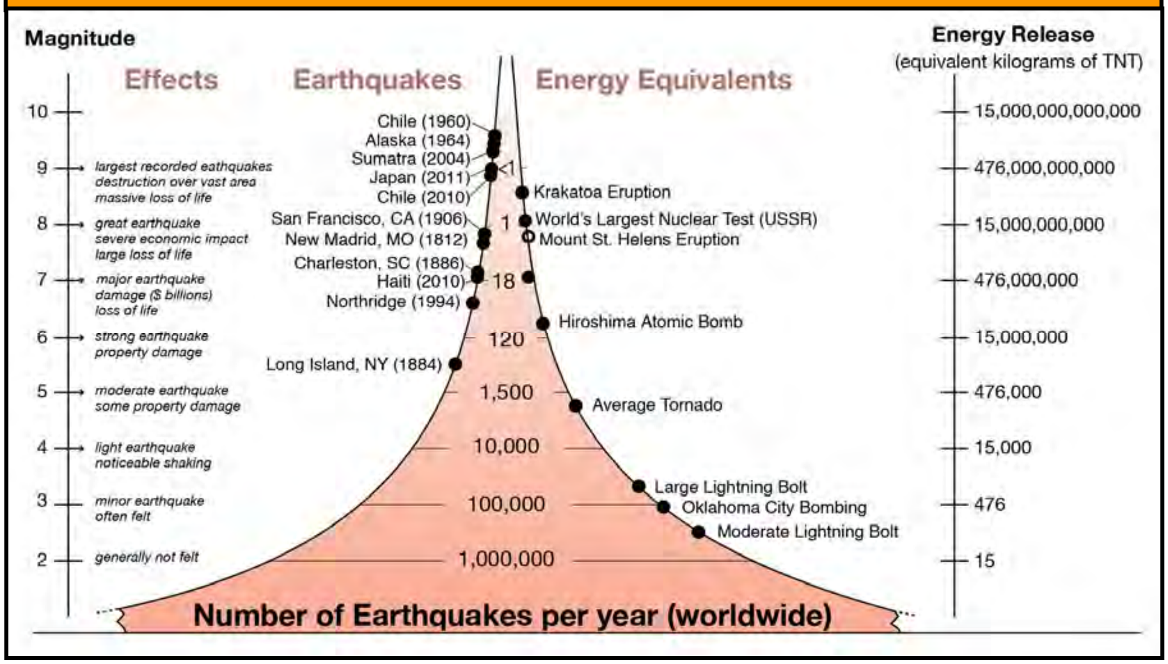
The second prominent belt is the Alpide, which extends from Java to Sumatra and through the Himalayan Mountains, the Mediterranean Sea and out into the Atlantic Ocean. It accounts for about 17 percent of the world's largest earthquakes, including those in Iran, Turkey and Pakistan. The third belt follows the submerged mid-Atlantic Ridge, the longest mountain range in the world, nearly splitting the entire Atlantic Ocean north to south.

While most earthquakes occur along plate boundaries some are known to occur within the interior of a plate. (As the plates continue to move and plate boundaries change over time, weakened boundary regions become part of the interiors of the plates.) Earthquakes can occur along zones of weakness within a plate in response to stresses that originate at the edges of the plate or from deep within the earth's crust. The New Madrid earthquakes of 1811 and 1812 occurred within the North American plate.

How often do earthquakes occur?

Earthquakes occur every day. Magnitude 2 and smaller earthquakes occur several hundred times a day worldwide. These earthquakes are known as micro earthquakes and are generally not felt by humans. Major earthquakes, greater than magnitude 7, generally occur at least once a month. **Figure EQ-4** illustrates the approximate number of earthquakes that occur worldwide per year based on magnitude. This figure also identifies manmade and natural events that release approximately the same amount of energy for comparison.

Figure EQ-4
Approximate Number of Earthquakes Recorded Annually



Source: Incorporated Research Institutions for Seismology, Education and Outreach Series, "How Often Do Earthquakes Occur?"

Hazard Profile

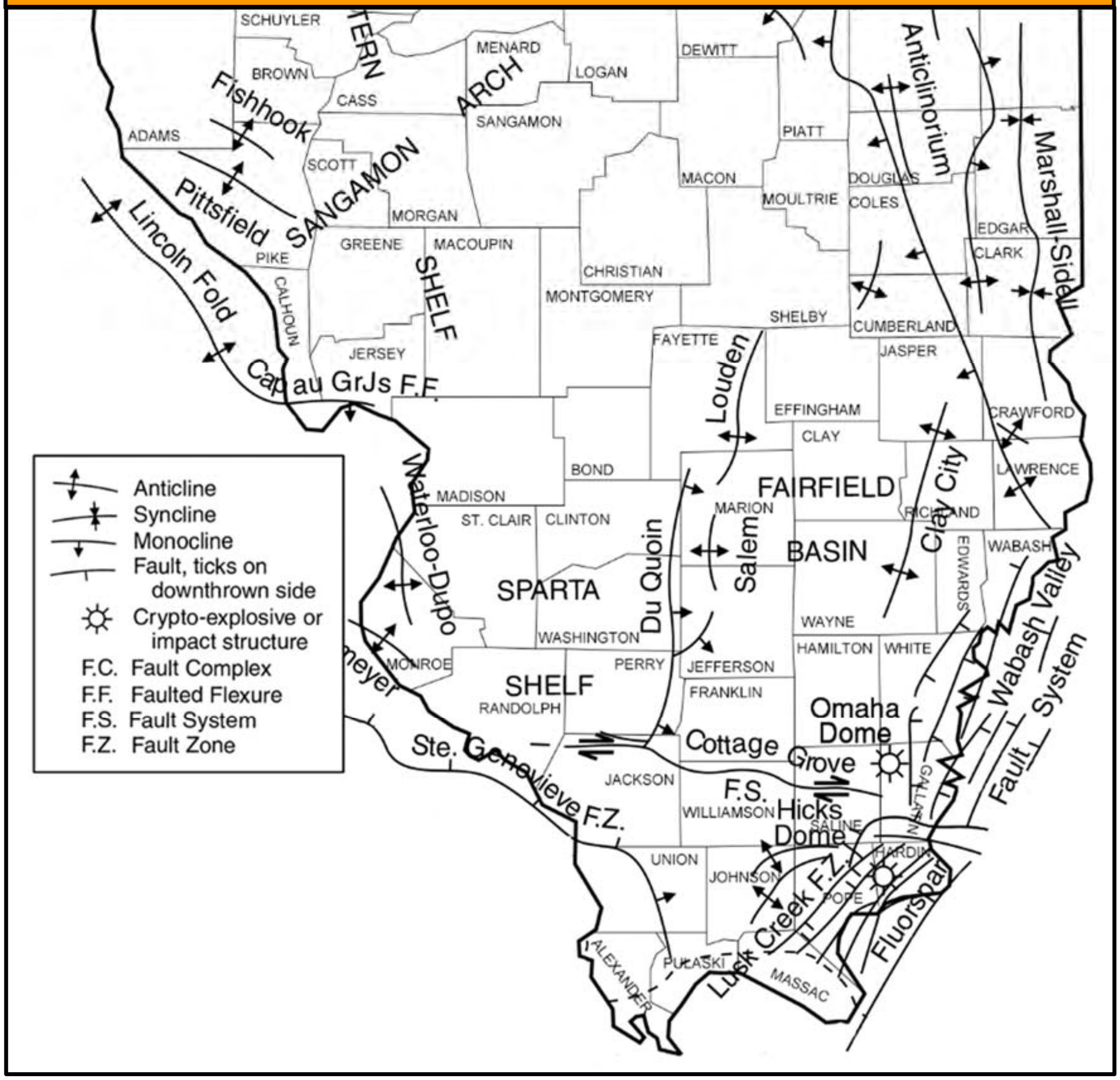
The following details the location of known fault zones and geologic structures, identifies past occurrences of earthquakes, details the severity or extent of each event (if known); identifies the locations potentially affected and estimates the likelihood of future occurrences.

Are there any faults located within the County?

No. There are no geological structures of significance, including faults, located in Hamilton County. However, there are several well-known faults in the immediate region: the Wabash Valley Fault

System, the Cottage Grove Fault System and the Rough Creek-Shawneetown Fault System. **Figure EQ-5** illustrates the location of these structures.

Figure EQ-5
Geological Structures in Southern Illinois



Source: Illinois State Geological Survey.

- *Wabash Valley Fault System*: The Wabash Valley Fault System straddles the southern Illinois-Indiana border and is about 55 miles long and as wide as 30 miles. This broad fracture system experiences moderate earthquake activity presently and there is evidence that strong earthquakes have occurred here within 10,000 years.
- *Cottage Grove Fault System*: The Cottage Grove Fault System is a complex fracture zone comprised of a "master fault", subsidiary faults, and a belt of anticlines mostly to the south. The zone is approximately 70 miles long and greater than 10 miles wide in some areas, that trends slightly north of west across southern Illinois from Gallatin County to Jackson County.

- *Rough Creek-Shawneetown Fault System*: The Rough Creek-Shawneetown Fault System is one of the largest fault systems in the Midwest. This braided fracture system is about 130 miles long and more than 5 miles wide in some places trending from northeastern Pope County, Illinois to Grayson County, Kentucky.

When have earthquakes occurred previously? What is the extent of these previous quakes?

Earthquake Fast Facts – Occurrences

Earthquakes Originating in the County (1795 – 2015): ***13***

Fault Zones Located within the County: ***none***

Fault Zones Located in the Region: ***3***

According to the Illinois State Geological Survey, US Geological Survey and the U.S. Geological Survey and the Center for Earthquake Research and Information (CERI) at the University of Memphis, at least 13 earthquakes have originated in Hamilton County for the last 50+ years. **Figure EQ-6** provides basic details on each event while **Figure EQ-7** illustrates the epicenter of these earthquake.

Figure EQ-6
Earthquakes Originating in Hamilton County

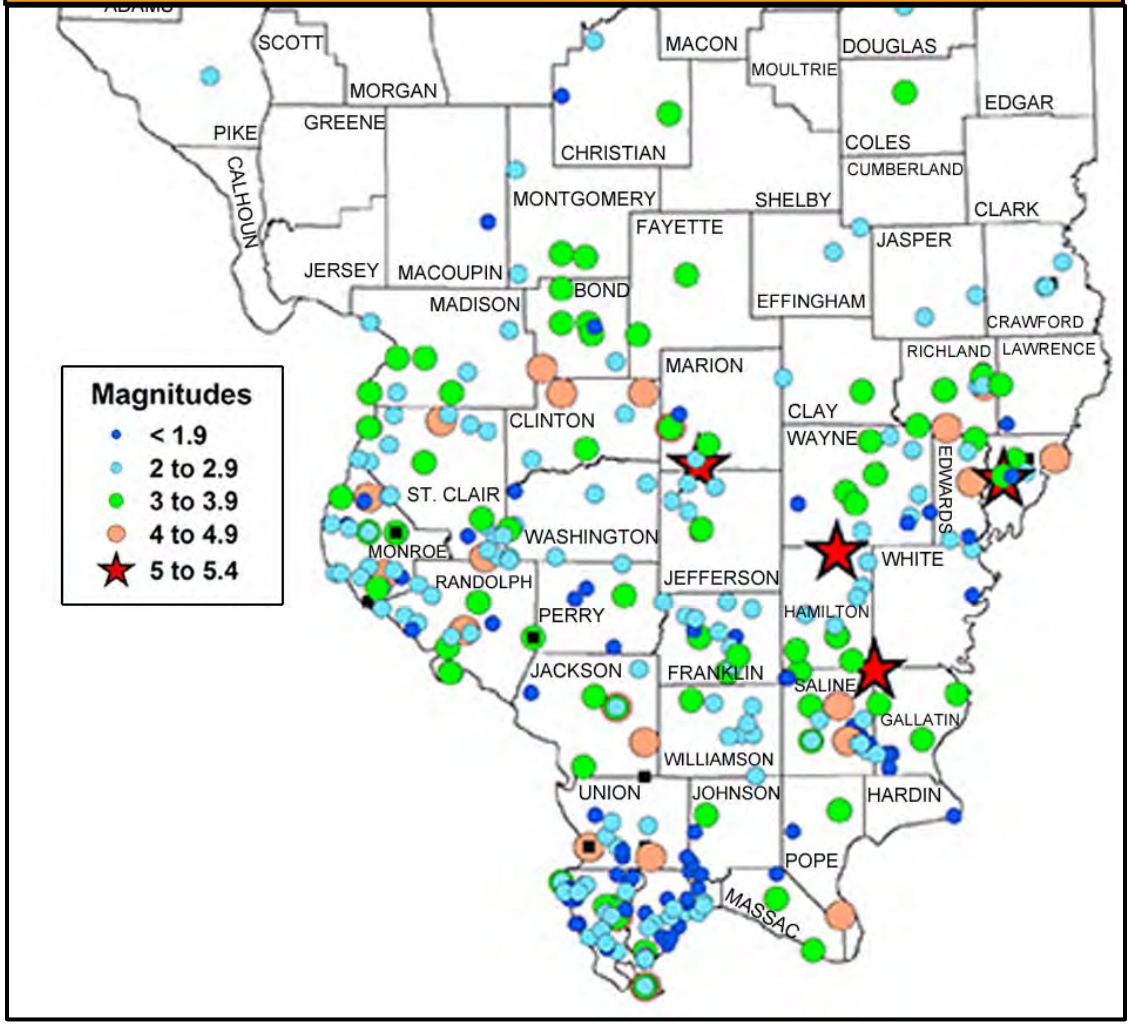
Date	Magnitude	Intensity	Location
11/9/1968	5.4	VII	1 mile northwest of Broughton
11/9/1968	3.8	---	½ mil northwest of Dale
11/9/1968	3.0	---	½ mil northwest of Dale
11/9/1968	3.0		½ mil northwest of Dale
11/11/1968	3.0		½ mil northwest of Dale
4/20/1975	2.3	---	2/ ½ miles northwest of Dale
6/19/1978	2.2	---	2 ¼ mile northeast of Bungay
3/13/1980	3.3	---	Broughton
6/3/1983	2.7	---	2 ¾ mile south of Bungay
9/3/1990	2.5	---	5 ½ mile east of McLeansboro
5/2/2003	3.2	---	¾ mile northwest of Rural Hill
4/19/2013	2.2	---	½ mile east of Flint
8/11/2016	2.4	---	1 ½ mile south of Broughton

The strongest earthquake in the central United States during the 20th century occurred along the Wabash Valley seismic zone in southeastern Illinois approximately 1 mile northwest of Broughton in Hamilton County. This magnitude 5.4 earthquake had an estimated intensity of VII for the area surrounding the epicenter. Ground shaking was felt over all or parts of 23 states in the central and eastern United States and southern Ontario, Canada.

Hamilton County residents also felt ground shaking caused by several earthquakes that have originated in southern Illinois. The following provides a brief description of a few of the larger events that have occurred.

- On April 18, 2008, a magnitude 5.2 earthquake was reported in southeastern Illinois near Bellmont in Wabash County. The earthquake was located along the Wabash Valley seismic zone. Minor structural damage was reported in several towns in Illinois and Kentucky. Ground shaking was felt over all or parts of 18 states in the central United States and southern Ontario, Canada.

Figure EQ-7
Earthquakes Originating in Southern Illinois



Source: Illinois State Geological Survey.

❖ A magnitude 5.2 earthquake took place on June 10, 1987 in southeastern Illinois near Olney in Richland County. This earthquake was also located along the Wabash Valley seismic zone. Only minor structural damage was reported in several towns in Illinois and Indiana. Ground shaking was felt over all or parts of 17 states in the central and eastern United States and southern Ontario, Canada.

❖ On October 8, 1857 a magnitude 5.3 earthquake took place in northeastern Clinton County about 5 miles southeast of Keyesport, east of Lake Carlyle. At Centralia chimneys were brought down and in St. Louis furniture moved, bricks were dislocated and plaster fell. The largest buildings rocked and possessions fell from mantles. Reports indicate that the Mississippi River was in tumult. Ground shaking was felt in many Illinois towns, along the Mississippi River south of Hannibal, Missouri, and in parts of three other states.

Three of the ten largest earthquakes ever recorded within the continental United States took place in 1811 and 1812 along the New Madrid seismic zone. This zone lies within the central Mississippi Valley and extends from northeast Arkansas through southeast Missouri, western Tennessee, western Kentucky and southern Illinois. These magnitude 7.5 and 7.3 major earthquakes were centered near the town of New Madrid, Missouri and caused widespread devastation to the surrounding region and were felt by people in cities as far away as Pittsburgh, Pennsylvania and Norfolk, Virginia.

The quakes locally changed the course of the Mississippi River creating Reelfoot Lake in northwestern Tennessee. These earthquakes were not an isolated incident. The New Madrid seismic zone is one of the most seismically active areas of the United States east of the Rockies. Since 1974 more than 4,000 earthquakes have been recorded within this seismic zone, most of which were too small to be felt.

What locations are affected by earthquakes? What is the extent of future potential earthquakes?

Earthquake events generally affect the entire County. Earthquakes, like drought and excessive heat, impact large areas extending across an entire region and affecting multiple counties. Hamilton County's proximity to the Wabash Valley Fault System, the Cottage Grove Fault System, the Rough Creek-Shawneetown Fault System, and the New Madrid Seismic Zone makes the entire area likely to be affected by an earthquake if these faults become seismically active. The *2018 Illinois Natural Hazard Mitigation Plan* classifies Hamilton County's hazard rating for earthquakes as "high."

According to the USGS, Hamilton County can expect 20 to 50 occurrences of damaging earthquake shaking over a 10,000-year period. **Figure EQ-8** illustrates the frequency of damaging earthquake shaking around the U.S.

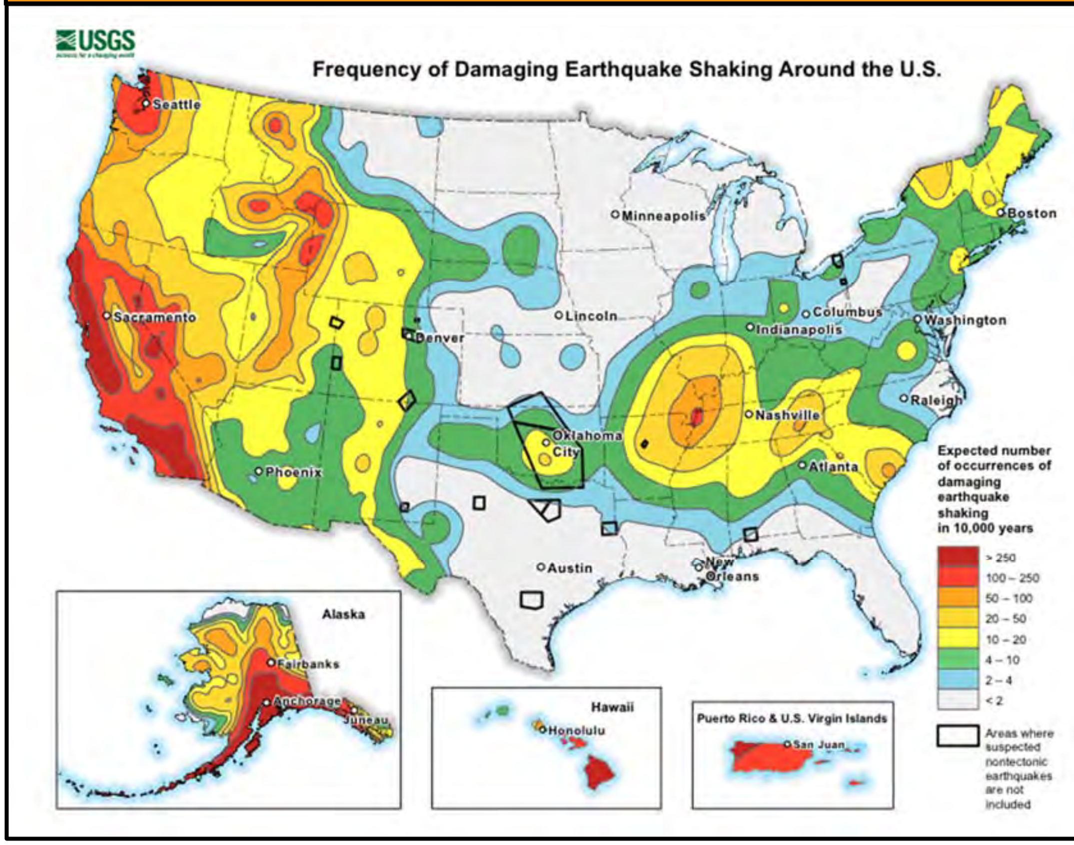
What is the probability of future earthquake events occurring?

As with flooding, calculating the probability of future earthquakes changes depending on the magnitude of the event. According to the ISGS, Illinois is expected to experience a magnitude 3.0 earthquake every year, a magnitude 4.0 earthquake every four years and a magnitude 5.0 earthquake every 20 years. The likelihood of an earthquake with a magnitude of 6.3 or greater occurring somewhere in the central United States within the next 50 years is between 86% and 97%.

While the major earthquakes of 1811 and 1812 do not occur often along the New Madrid seismic zone, they are not isolated events. In recent decades, scientists have collected evidence that earthquakes similar in size and location to those felt in 1811 and 1812 have occurred several times before within the central Mississippi Valley around 1450 A.D., 900 A.D. and 2350 B.C.

The general consensus among scientists is that earthquakes similar to the 1811-1812 earthquakes are expected to recur on average every 500 years. The U.S. Geological Survey and the Center for Earthquake Research and Information (CERI) at the University of Memphis estimates that for a 50-year period the probability of a repeat of the 1811-1812 earthquakes is between 7% and 10% and the probability of an earthquake with a magnitude of 6.0 or larger is between 25% and 40%.

Figure EQ-8
Frequency of Damaging Earthquake Shaking Around the U.S.



Source: United State Geological Survey.

HAZARD VULNERABILITY

The following describes the vulnerability to participating jurisdictions, identifies the impacts on public health and property (if known) and estimates the potential impacts on public health and safety as well as buildings, infrastructure and critical facilities from earthquakes.

Are the participating jurisdictions vulnerable to earthquakes?
Yes. All of Hamilton County is vulnerable to earthquakes. The unique geological formations topped with glacial drift soils found in the central United States conduct an earthquake's energy farther than in other parts of the Nation. Consequently, earthquakes that originate in the Midwest tend to be felt at greater distances than earthquakes with similar magnitudes that originate on the West Coast.

This vulnerability, found throughout most of Illinois and all of Hamilton County, is compounded by relatively high water tables within the region. When earthquake shaking mixes the groundwater and soil, ground support is further weakened thus adding to the potential structural damages experienced by buildings, roads, bridges, electrical lines and natural gas pipelines.

The *Projected Earthquake Intensities Map* prepared by the Missouri State Emergency Management Agency predicts that if a magnitude 6.7 earthquake were to take place anywhere along the New Madrid seismic zone, then the highest projected intensity felt in Hamilton County would be a VII on the Modified Mercalli Intensity Scale. If a magnitude 8.6 earthquake were to occur, then the highest projected intensity felt would be an IX.

Earthquake Fast Facts – Impacts/Risk

Earthquake Risk/Vulnerability:

- ❖ Public Health & Safety – Light/Moderate Quake within the County or immediate region: ***Low***
- ❖ Public Health & Safety – Major Quake Wabash Valley/New Madrid seismic zone: ***Medium***
- ❖ Buildings/Infrastructure/Critical Facilities – Light/ Moderate Quake within the County or immediate region: ***Low***
- ❖ Buildings/Infrastructure/Critical Facilities – Major Quake in the region: ***Medium/High***

Do any of the participating jurisdictions consider earthquakes to be among their community's greatest vulnerabilities?

Yes. Based on responses to a Critical Facilities Vulnerability Survey distributed to the participating jurisdictions, the following respondents considered earthquakes to be among their jurisdiction's greatest vulnerabilities.

- ❖ *Dahlgren*: The main village office is improvised and all systems are vulnerable to an earthquake.
- ❖ *Hamilton County CUSD #10*: Dahlgren Grade School and the old section of East Side Elementary School were built at least 100 years ago. Both buildings are unreinforced masonry and are highly susceptible to earthquake damage.

As part of the Critical Facilities Vulnerability Survey, participating jurisdictions were also asked to identify critical facilities and infrastructure within in their communities they felt have the greatest vulnerability to natural hazards and to which hazards. The following identifies by participating jurisdiction the infrastructure with specific vulnerability.

- ❖ *Hamilton County*: Hamilton County Courthouse
- ❖ *Hamilton County Highway/Dahlgren Township*: bridges.
- ❖ *Dahlgren*: Village Hall, wastewater treatment plant, water mains and gas distribution system.
- ❖ *Hamilton County CUSD #10*: East Side Elementary School and Dahlgren Grade School.
- ❖ *Crook Township*: water line system.

What impacts resulted from the recorded earthquake events?

Property damage figures were either unavailable or none were recorded for any of the documented earthquakes that occurred in Hamilton County. While no damage figures were available, damage descriptions were provided for the November 9, 1968 magnitude 5.4 earthquake. According to notes published by the Illinois State Geological Survey, this earthquake was most intense in the unincorporated areas of Dale, Walpole, and Braden in Hamilton County. Bricks were thrown or loosened from 40 percent of the chimneys in that area and tombstones were rotated or fallen indicating a high intensity earthquake had occurred. Damages also included cracked interior walls, fallen plaster, shear cracks in exterior concrete block walls, downed chimneys, cracked foundations, a television antenna thrown down, and lag bolts fixing guywires to a roof pulled out. At McLeansboro, shear cracks formed in brick exterior walls and cornices were dislodged from the top of the wall of the Methodist Church. Interior walls cracked at the Hamilton County Court House.

No injuries or fatalities were reported in Hamilton County as a result of this events; However, the St. Louis Post-Dispatch newspaper reported that a child was injured from falling chimney debris while playing in the yard at the time of the earthquake and a few other individuals were nearly injured by falling debris from buildings, objects fell from shelves and tables, and some windows broke.

What other impacts can result from earthquakes?

Earthquakes can impact human life, health and public safety. **Figure EQ-9** details the potential impacts that may be experienced by the County should a magnitude 6.0 or greater earthquake occur in the region.

What is the level of vulnerability to public health and safety from earthquakes?

The risk or vulnerability to public health and safety from an earthquake is dependent on the intensity and location of the event. While there are no known faults in Hamilton County, earthquakes have originated within the County increasing the probability of future occurrences. However, if a light earthquake originates within the County or from the faults in the immediate region, the risk or vulnerability to public health and safety is considered ***low***. This risk is elevated from ***medium*** for a major earthquake originating along the Wabash Valley or New Madrid seismic zones.

Are existing buildings, infrastructure and critical facilities vulnerable to earthquakes?

Yes. All existing buildings, infrastructure and critical facilities located in Hamilton County and the participating jurisdictions are vulnerable to damage from earthquakes. Given the County's size (just over 8,000 individuals), it's population density and the fact that there are virtually no buildings higher than two stories (with the exception of grain elevators and coal processing plants) tempered by the potential for magnitude 5.0 and above earthquakes to occur in the immediate region, the damage is anticipated to range from slight to considerable for well-built ordinary structures and considerable to severe for poorly-built structures.

If a strong earthquake (magnitude 6.0 to 6.9) were to occur in the region then unreinforced masonry buildings are most at risk during an earthquake because the walls are prone to collapse outward. Steel and wood buildings have more ability to absorb the energy from an earthquake while wood buildings with proper foundation ties have rarely collapsed in earthquakes. **Figure EQ-10** identifies the number of unreinforced masonry buildings that serve as critical facilities within the participating jurisdictions.

If the epicenter of a magnitude 7.6 earthquake were to originate anywhere along the New Madrid seismic zone, the highest projected Modified Mercalli intensity felt in Hamilton County would be VIII according to the Projected Earthquake Intensities Map prepared by the Missouri State Emergency Management Agency.

Figure EQ-9
Potential Earthquake Impacts

Direct	Indirect
Buildings • Temporary displacement of businesses, households, schools and other critical services where heat, water and power are disrupted • Long-term displacement of businesses, households, schools and other critical services due to structural damage or fires *Transportation* • Damages to bridges (i.e., cracking of abutments, subsidence of piers/supports, etc.) • Cracks in the pavement of critical roadways • Increased traffic on US and State Routes (especially if the quake originates along the Wabash Valley and New Madrid seismic zones) as residents move out of the area to seek shelter and medical care and as emergency response, support services and supplies move south to aid in recovery • Misalignment of rail lines due to landslides (most likely near stream crossings), fissures and/or heaving *Utilities* • Downed power and communication lines • Breaks in drinking water and sanitary sewer lines resulting in the temporary loss of service • Disruptions in the supply of natural gas due to cracking and breaking of pipelines *Health* • Injuries/deaths due to falling debris and fires *Other* • Cracks in the earthen dams of the lakes and reservoirs within the County which could lead to dam failures	*Health* • Use of County health facilities to treat individuals injured closer to the epicenter • Emergency services (ambulance, fire, law enforcement) may be needed to provide aid in areas where damage was greater *Other* • Disruptions in land line telephone service throughout an entire region • Depending on the seasonal conditions present, more displacements may be expected as those who may not have enough water and food supplies seek alternate shelter due to temperature extremes that make their current housing uninhabitable

An earthquake also has the ability to damage critical infrastructure such as roads and utilities. In the event of a major earthquake, bridges are expected to experience moderate damage such as cracking in the abutments and subsidence of piers and supports. The structural integrity may be compromised to the degree where safe passage is not possible, resulting in adverse travel times as alternate routes are taken. Some rural families may become isolated where alternate paved routes do not exist. In addition, cracks may form in the pavement of key roadways. **Figure R-4** lists the number of each type of critical infrastructure by jurisdiction.

Figure EQ-10 **Number of Unreinforced Masonry Buildings Serving as Critical Facilities by Jurisdiction in Hamilton County**									
Participating Jurisdiction	Government[1]	Law Enforcement	Fire Stations	Ambulance Service	Schools	Drinking Water	Wastewater Treatment	Medical[2]	Healthcare Facilities[3]
Broughton	1	---	---	---	---	---	---	---	---
Dahlgren	0	---	0	---	---	---	0	---	1
McLeansboro	1	1	0	0	---	---	1	1	2
Hamilton County CUSD	---	---	---	---	2	---	---	---	---
Hamilton County Water District	---	---	---	---	---	0	---	---	---
Crook Township	0	---	---	---	---	---	---	---	---
Dahlgren Township	0	---	0	---	1	---	---	---	---
McLeansboro Township	0	---	---	---	---	---	---	---	5
South Crouch Township	---	---	---	---	---	---	---	---	---
Hamilton County	1	1	---	---	---	---	---	1	0

[1] Government includes: courthouses, city/village halls, township buildings, highway/road maintenance centers, etc.
[2] Medical includes: public health departments, hospitals, urgent/prompt care and medical clinics.
[3] Healthcare Facilities include: nursing homes, skilled care facilities, memory care facilities, residential group homes, etc.
--- Indicates jurisdiction does not own/maintain any critical facilities within that category.

An earthquake may also down overhead power and communication lines causing power outages and disruptions in communications. Cracks or breaks may form in natural gas pipelines and drinking water and sewage lines resulting in temporary loss of service. In addition, an earthquake could cause cracks to form in the earthen dams located within the County, increasing the likelihood of a dam failure.

As with public health and safety, the risk or vulnerability to buildings, infrastructure and critical facilities is dependent on the intensity and location of the event. The risk to buildings, infrastructure and critical facilities is considered to be ***low*** for a light to moderate earthquake that originates within the County or immediate region. This risk is considered ***medium*** for a strong earthquake originating in the region.

Are future buildings, infrastructure and critical facilities vulnerable to earthquakes?

Yes. All future buildings, infrastructure and critical facilities located in Hamilton County and the participating jurisdictions are vulnerable to damage from earthquakes. None of the participating jurisdictions have building codes in place that would address structural vulnerability for earthquakes. As a result, future buildings, infrastructure and critical facilities face the same vulnerabilities as those of existing buildings, infrastructure and critical facilities described previously.

What are the potential dollar losses to vulnerable structures from earthquakes?

Since property damage information was either unavailable or none was recorded for the documented earthquakes that impacted Hamilton County, there is no way to accurately estimate future potential dollar losses to vulnerable structures. However, according to the Hamilton County Supervisor of Assessments the total assessed values of buildings in the planning area is $95,027,591. Since all of the structures in the planning area are susceptible to earthquake impacts to varying degrees, this total represents the countywide property exposure to earthquake events.

Given Hamilton County's proximity to geologic structures and fault zones, both large and small, and the fact that all structures within the County are vulnerable to damage, it is likely that there will be future dollar losses from any earthquake ranging from strong to great. As a result, participating jurisdictions were asked to consider mitigation projects that could provide wide ranging benefits for reducing the impacts or damages associated with earthquakes.

3.7 DROUGHTS

HAZARD IDENTIFICATION

What is the definition of a drought?

While difficult to define, the National Drought Mitigation Center (NDMC) considers "drought" in its most general sense to be a deficiency of precipitation over an extended period of time, usually a season or more, resulting in a water shortage.

Drought is a normal and recurrent feature of climate and can occur in all climate zones, though its characteristics and impacts vary significantly from one region to another. Unlike other natural hazards, drought does not have a clearly defined beginning or end. Droughts can be short, lasting just a few months, or they can persist for several years. There have been 26 drought events with losses exceeding $1 billion each (CPI-Adjusted) across the United States between 1980 and 2018. This is due in part to the sheer size of the areas affected.

What types of drought occur?

There are four main types of drought that occur: meteorological, agricultural, hydrological and socioeconomic. They are differentiated based on the use and need for water. The following provides a brief description of each type.

- **Meteorological Drought.** Meteorological drought is defined by the degree of dryness or rainfall deficit and the duration of the dry period. Due to climate differences, what might be considered a drought in one location of the country may not be in another location.
- **Agricultural Drought.** An agricultural drought refers to a period when rainfall deficits, soil moisture deficits, reduced ground water or reservoir levels needed for irrigation impact crop development and yields.
- **Hydrological Drought.** Hydrological drought refers to a period when precipitation deficits (including snowfall) impact surface (stream flow, reservoir and lake levels) and subsurface (aquifers) water supply levels.
- **Socioeconomic Drought.** Socioeconomic drought refers to a period when the demand for an economic good (fruit, vegetables, grains, etc.) exceeds the supply as a result of weather-related shortfall in the water supply.

How are droughts measured?

There are numerous quantitative measures (indicators and indices) that have been developed to measure drought. How these indicators and indices measure drought depends on the discipline affected (i.e., agriculture, hydrology, meteorology, etc.) and the region being considered. There is no single index or indicator that can account for and be applied to all types of drought.

Although none of the major indices are inherently superior to the rest, some are better suited than others for certain uses. The first comprehensive drought index developed in the United States was the Palmer Drought Severity Index (PDSI). The PDSI is calculated based on precipitation and temperature data, as well as the local Available Water Content of the soil. It is most effective measuring drought impacts on agriculture. For many years it was the only operational drought index and it is still very popular around the world.

The Standardized Precipitation Index (SPI), developed in 1993, uses precipitation records for any location to develop a probability of precipitation for any time scale in order to reflect the impact of drought on the availability of different water resources (groundwater, reservoir storage, streamflow, snowpack, etc.) In 2009 the World Meteorological Organization recommended SPI as the main meteorological drought index that countries should use to monitor and follow drought conditions.

The first operational 'composite' approach applied in the United States was the U.S. Drought Monitor (USDM). The USDM utilizes five key indicators, numerous supplementary indicators and local reports from expert observers around the country to produce a drought intensity rating that is ideal for monitoring droughts that have many impacts, especially on agriculture and water resources during all seasons over all climate types. NOAA's Storm Events Database records include USDM ratings and utilized them along with additional weather information to describe the severity of the drought conditions impacting affected counties. Therefore, this Plan will utilize USDM ratings to identify and describe previous drought events recorded within the County. The following provides a more detailed discussion of the USDM to aid the Plan's developers and the general public in understanding how droughts are identified and categorized.

U.S. Drought Monitor (USDM)

Established in 1999, the USDM is a relatively new index that combines quantitative measures with input from experts in the field. It is designed to provide the general public, media, government officials and others with an easily understandable "big picture" overview of drought conditions across the United States. It is unique in that it combines a variety of numeric-based drought indices and indicators with local expert input to create a single composite drought indicator, the results of which are illustrated via a weekly map that depicts the current drought conditions across the United States. The USDM is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the U.S. Department of Agriculture, and the National Oceanic and Atmospheric Administration.

The USDM has a scale of five intensity categories, D0 through D4, that are utilized to identify areas of drought. **Figure DR-1** provides a brief description of each category.

Because the ranges of the various indicators often don't coincide, the final drought category tends to be based on what a majority of the indictors show and on local observations. The authors also weight the indices according to how well they perform in various parts of the country and at different times of the year. It is the combination of the best available data, location observations and experts' best judgment that make the U.S. Drought Monitor more versatile than other drought indices.

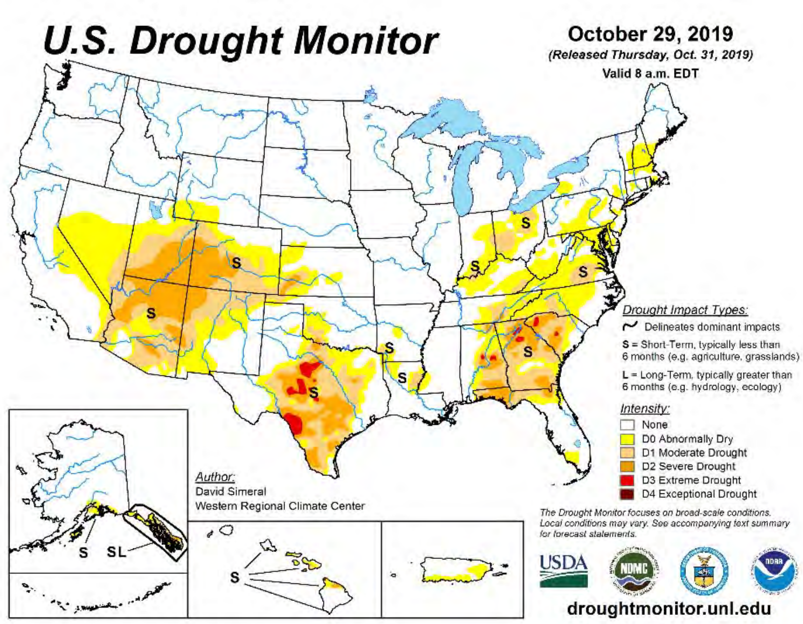
In addition to identifying and categorizing general areas of drought, the USDM also identifies whether a drought's impacts are short-term (typically less than 6 months – agriculture, grasslands) or long-term (typically more than 6 months – hydrology, ecology). **Figure DR-2** shows an example of the USDM weekly map. The USDM is designed to provide a consistent big-picture look at drought conditions in the United States. It is not designed to infer specifics about local conditions.

Figure DR-1
U.S. Drought Monitor – Drought Severity Classifications

Category	Possible Impacts
D0 (Abnormally Dry)	• Going into drought: - short-term dryness slowing planting, growth of crops or pastures. • Coming out of drought: - some lingering water deficits - pastures or crops not fully recovered
D1 (Moderate Drought)	• Some damage to crops, pastures • Streams, reservoirs, or wells low; some water shortages developing or imminent • Voluntary water-use restrictions requested
D2 (Severe Drought)	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3 (Extreme Drought)	• Major crop/pasture losses • Widespread water shortages or restrictions
D4 (Exceptional Drought)	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

Source: U.S. Drought Monitor.

Figure DR-2
U. S. Drought Monitor



The U.S. Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration. Map Courtesy of NDMC.

Are alerts issued for drought?

Yes. The National Weather Service Weather Forecast Office in Paducah, Kentucky is responsible for issuing ***drought statement*** for Hamitlon County depending on the weather conditions. A Drought Information Statement is issued when drought intensity reaches Severe (D2) based on the U.S. Drought Monitor. The Statement will provide a summary of drought conditions, precipitation deficits and impacts (agricultural, hydrological, fire weather, etc.) It will also provide the expected short and long-term forecast and drought outlook.

HAZARD PROFILE

The following identifies past occurrences of drought, details the severity or extent of each event (if known); identifies the locations potentially affected and estimates the likelihood of future occurrences.

When have droughts occurred previously? What is the extent of these previous droughts?

Drought Fast Facts – Occurrences

Number of Drought Events Reported (1980 – 2019): ***10***

Table 11, located in **Appendix J**, summarizes the previous occurrences as well as the extent or magnitude of the drought events recorded in Hamilton County. NOAA's Storm Events Database, the Illinois State Water Survey, the Illinois Emergency Management Agency (IEMA) and the USDA have been ten official droughts for Hamilton County between 1980 and 2019.

The State of Illinois Drought Preparedness and Response Plan identified seven outstanding statewide droughts since 1900 based on statewide summer values of the PDSI provided by NOAA's National Center for Environmental Information. Those seven droughts occurred in 1902, 1915, 1931, 1934, 1936, 1954 and 1964; however, the extent to which Hamilton County was impacted was unavailable.

What locations are affected by drought?

Drought events affect the entire County. Droughts, like excessive heat and severe winter storms, tend to impact large areas, extending across an entire region and affecting multiple counties. The *2018 Illinois Natural Hazard Mitigation Plan* classifies Hamilton County's hazard rating for drought as "medium."

What is the probability of future drought events occurring?

Hamilton County has experienced ten droughts between 1980 and 2019. With ten occurrences over 40 years, the probability or likelihood that the County may experience a drought in any given year is 25%. However, if earlier recorded droughts are factored in, then the probability that Hamilton County may experience a drought in any given year decreases to 14%.

HAZARD VULNERABILITY

The following describes the vulnerability to participating jurisdictions, identifies the impacts on public health and property (if known) and estimates the potential impacts on public health and safety as well as buildings, infrastructure and critical facilities from drought.

Are the participating jurisdictions vulnerable to drought?

Yes. All of Hamilton County, including the municipalities and townships, is vulnerable to drought. Neither the amount nor the distribution of precipitation; soil types; topography; or water table conditions provides protection for any area within the County. Since 2010, Hamilton County has experienced three droughts.

Do any of the participating jurisdictions consider drought to be among their community's greatest vulnerabilities?

No. Based on responses to a Critical Facilities Vulnerability Survey distributed to the participating jurisdictions, none of the participating jurisdictions considered drought to be among their community's greatest vulnerabilities. In addition, none of the jurisdictions identified any critical facilities or infrastructure within their communities as having a specific vulnerability to drought.

What impacts resulted from the recorded drought events?

Damage information was only available for one of the ten drought events experienced between 1980 and 2019. According to NOAA's Storm Events Database, the 2007 drought caused an estimated $3.45 million in damages to crops in Hamilton County. Damage information was either unavailable or none was recorded for the remaining four reported occurrences.

Of the ten drought events, disaster relief payment information was only available for one of the events. In 1988, landowners and farmers in Illinois were paid in excess of $382 million in relief payments; however, a breakdown by county was unavailable.

<u>Drought Fast Facts – Impacts/Risk</u>

<u>Drought Impacts:</u>
- Total Property Damage: ***n/a***
- Total Crop Damage (1 event): ***$3.45 million (2007 drought)***

<u>Drought Risk/Vulnerability:</u>
- Public Health & Safety: ***Low***
- General Buildings/Infrastructure/Critical Facilities: ***Low***
- Hamilton County Water District's Infrastructure: ***Medium***

What other impacts can result from drought events?

Based on statewide drought records available from the Illinois State Water Survey, the most common impacts that result from drought events in Illinois include reductions in crop yields and drinking water shortages.

<u>Crop Yield Reductions</u>

Agriculture is the main enterprise in Hamilton County. Farmland accounts for approximately 72.1% of all the land in the County. According to the 2017 Census of Agriculture, there were 552 farms in in the County occupying 200,603 acres. Of the land in farms, approximately 87% or 174,396 acres is in crop production.

According to the 2017 Census of Agriculture, crop sales accounted for $82.1 million in revenue while livestock sales accounted for $4.2 million. Hamilton County ranks 71st in Illinois for cash crop receipts and 86th for livestock cash receipts. A severe drought would have a major financial impact on the large agricultural community, particularly if it occurred during the growing season.

Dry weather conditions, particularly when accompanied by excessive heat, can result in diminished crop yields and place stress on livestock.

A reduction in crop yields was seen as a result of the 1983, 1988, 1998, 1999, 2002, 2005, 2007, 2010, 2011, and 2012 droughts. **Figure DR-3** illustrates the reduction yields seen for corn and soybeans during the 10 recorded drought events. The USDA's National Agricultural Statistics Service records show that the yield reductions for corn were most severe for the 2012 drought when there was a 74.3% reduction and soybean yield reductions were most severe for the 1983 drought when there was a 50.0% reduction.

Figure DR-3
Crop Yield Reductions Due to Drought – Hamilton County

Year	Corn		Soybeans	
	Yield (bushel)	% Reduction Previous Year	Yield (bushel)	% Reduction Previous Year
1982	99	---	27	---
1983	**34**	**65.7%**	**13.5**	**50.0%**
1984	84	---	20.5	---
1987	116	---	28.5	---
1988	**86**	**25.9%**	**25**	**12.5%**
1989	113	---	29	---
1997	106	---	37	---
1998	**104**	**1.9%**	**32**	**13.5%**
1999	**110**	**---**	**27**	**15.6%**
2000	132	---	38	---
2001	134	---	41	---
2002	**67**	**50.0%**	**28**	**31.7%**
2003	85	---	26	7.1%
2004	162	---	45	---
2005	**134**	**17.3%**	**44**	**2.2%**
2006	140	---	41	6.8%
2007	**110**	**21.4%**	**25**	**39.0%**
2008	160	---	40	---
2009	160.0	---	43.0	---
2010	**140.4**	**12.3%**	**37.1**	**13.7%**
2011	**122.8**	**12.5%**	**32.9**	**11.3%**
2012	**31.5**	**74.3%**	**28.2**	**14.3%**
2013	175.1	---	42.3	---

Source: USDA, National Agricultural Statistics Service.

<u>*Drinking Water Shortages*</u>
Communities that rely on surface water sources for their drinking water supplies are more vulnerable to shortages as a result of drought. Currently ***two of the three participating municipalities in the County rely on surface water sources*** for their drinking water supplies. Dahlgren and McLeansboro rely solely on surface water to obtain their drinking water. Dahlgren and McLeansboro purchase their water from Rend Lake Inter-City Water System and Dahlgren also has an emergency interconnect with Hamilton County Water District. The Hamilton County

Water District also purchases water from Rend Lake Inter-City Water System and has an emergency interconnect with the Western Wayne Water District.

Because most of the participants receive their drinking water from surface water sources, they are more vulnerable to shortages as a result of a prolonged drought or a series of droughts in close succession. While individuals with private water wells in unincorporated Hamilton County are less vulnerable to drinking water shortages, a prolonged drought or a series of droughts in close succession does have the potential to impact water levels in aquifers used for individual drinking water wells in rural areas. This is because individual (private) water wells tend to be shallower than municipal (public) water wells.

What is the level of vulnerability to public health and safety from drought?

Unlike other natural hazards that affect the County, drought events do not typically cause injuries or fatalities. The primary concern centers on the financial impacts that result from loss of crop yields and livestock and potential drinking water shortages. Even taking into consideration the potential impacts that a water shortage may have on the general public, the risk or vulnerability to public health and safety from drought is ***low***.

Are existing buildings, infrastructure and critical facilities vulnerable to drought?

No. In general, existing buildings, infrastructure and critical facilities located in Hamilton County and the participating municipalities are not vulnerable to drought. The primary concern centers on the financial impacts that result from loss of crop yields and livestock.

While buildings do not typically sustain damage from drought events, in rare cases infrastructure and critical facilities may be directly or indirectly impacted. While uncommon, droughts can contribute to roadway damage. Severe soil shrinkage can compromise the foundation of a roadway and lead to cracking and buckling.

Prolonged heat associated with drought can also increase the demand for energy to operate air conditioners, fans and other devices. This increase in demand places stress on the electrical grid, which increases the likelihood of power outages.

Additionally, droughts have impacted drinking water supplies. Reductions in aquifer water levels can cause water shortages that jeopardize the supply of water needed to provide drinking water and fight fires. While water use restrictions can be enacted in an effort to maintain a sufficient supply of water, they are only temporary and do not address long-term viability issues. Drinking water supplies vulnerable to drought, such as those that rely solely on surface water or shallow wells, need to consider mitigation measures that will provide long-term stability before a severe drought or a series of droughts occur. Effective mitigation measures include drilling additional wells, preferably deep wells, securing agreements with alternative water sources and constructing water lines to provide a backup water supply.

Even taking into consideration the potential impact a drought may have on drinking water supplies and the stress that prolonged heat may place on the electrical grid, the risk or vulnerability to buildings, infrastructure and critical facilities from drought is ***low*** for most of the participating jurisdictions. Because of the nature of their business and the source of their drinking water, the

Hamilton County Water District's risk or vulnerability to infrastructure from drought is considered to be ***medium.***

Are future buildings, infrastructure and critical facilities vulnerable to drought?

No. Future buildings, infrastructure and critical facilities within the County are no more vulnerable to drought than the existing building, infrastructure and critical facilities. As discussed above, buildings do not typically sustain damage from drought. Infrastructure and critical facilities may, in rare cases, be damaged by drought, but very little can be done to prevent this damage.

What are the potential dollar losses to vulnerable structures from drought?

Unlike other natural hazards there are no standard loss estimation models or methodologies for drought. Since drought typically does not cause structure damage, it is unlikely that future dollar losses will be excessive. The primary concern associated with drought is the financial impacts that result from loss of crop yields and the potential impacts to drinking water supplies. Since a majority of the County is involved in farming activities, it is likely that there will be future dollar losses to drought. In addition, reduced water levels and the water conservation measures that typically accompany a drought will most likely impact consumers as well as businesses and industries that are water-dependent (i.e., car washes, landscapers etc.).

3.8 MINE SUBSIDENCE

HAZARD IDENTIFICATION

What is a mine?

A mine is a pit or excavation made in the earth for the purpose of extracting minerals or ore. Mines were developed in Illinois to extract coal, clay, shale, limestone, dolomite, silica sand, tripoli, peat, ganister, lead, zinc and fluorite.

What is mining?

Mining is the process of extracting minerals or ore from a mine. There are two common mining methods: surface mining and sub-surface (underground) mining. This section focuses on underground mining practices since surface mining was not conducted in Hamilton County.

Mining has long figured prominently into Illinois' history. According to the Illinois State Geological Survey (ISGS), Illinois has the third largest recoverable reserves of coal in the country, behind only Montana and Wyoming. Coal deposits can be found under 86 of the 102 counties in Illinois and underground mining operations have been conducted in at least 72 counties. **Figure MS-1** shows the extent of coal deposits (Pennsylvanian rocks) present in Illinois and the mined-out areas from surface and underground coal mining. In 2015, Illinois ranked fourth in the United States in coal production according to the National Mining Association.

The first commercial coal mine in Illinois is thought have started in Jackson County about 1810. Since that time, there have been more than 3,800 underground coal mines and 363 underground metal and industrial mineral mines operated in Illinois. Almost all of these mines have been abandoned over the years. According to ISGS, there were 12 active underground coal mines in Illinois in 2015. The United States Geological Survey identified 10 active metal and industrial mineral underground mines in Illinois.

What methods are used in underground mining?

Much of Illinois coal lies too deep for surface mining and requires extraction using underground mining methods. There are three main methods of underground mining that have been used in Illinois over the years: room-and-pillar, high-extraction retreat and longwall. The following provides a brief description of each.

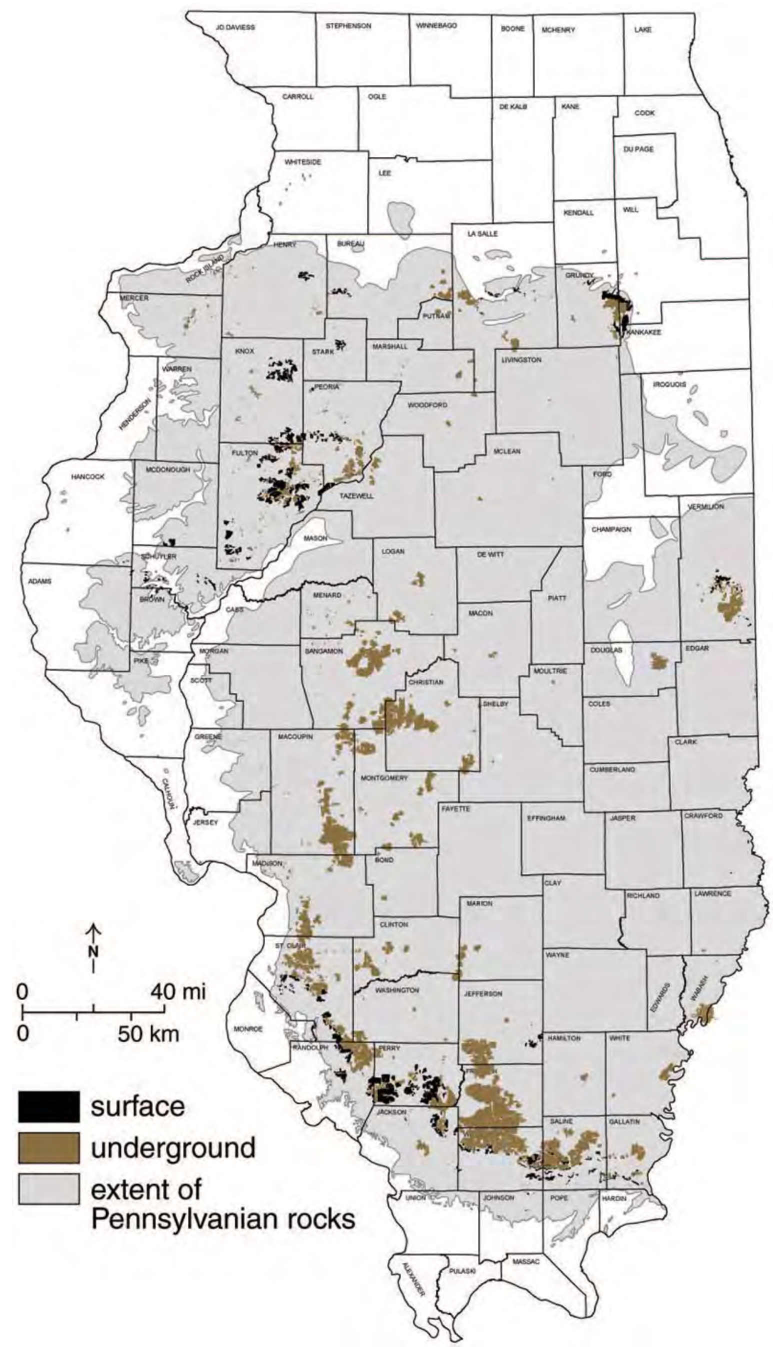
Room-and-Pillar

In the room-and-pillar system, the areas where coal is removed are referred to as "rooms" and the blocks of coal left in place to support the mine's roof and surface are referred to as "pillars". A "panel" refers to a group of rooms isolated from other room groups by surrounding pillars and generally accessed from only one entryway. The room-and-pillar method that was generally used before the early 1900s was characterized by rooms that varied considerably in length, width and sometimes direction, forming irregular mining patterns.

Modern room-and-pillar mines have a regular configuration of production areas (panels) and entryways, and the rooms and entries range from 18 to 24 feet, which is considerably narrower than in older mines. Generally modern room-and-pillar mining methods recover less than 50% to

60% of the coal in a panel. Most underground mines in Illinois have used a type of room-and-pillar pattern.

Figure MS-1
Coal Mine Deposits & Mined Areas in Illinois



Source: Illinois Department of Natural Resources & Illinois State Geological Survey.

High-Extraction Retreat

High-extraction retreat mining operations first develop a room-and-pillar production area (panel). The miners then systematically begin taking additional coal from the pillars that are left behind. The secondary extraction occurs in a retreating fashion, working from the outer edges of the panel to the main entries. Most of the coal pillars which support the roof are removed shortly after a few rows of rooms and pillars have been formed, leaving only small pillars.

The size and number of pillars left to maintain worker safety varies depending on underground geologic conditions. Roof collapses are controlled by the use of temporary roof supports and planned subsidence of the surface is initiated immediately. Since planned subsidence is part of this operation, this method requires the legal rights to the ground surface. High-extraction retreat methods recover up to 80% to 90% of the coal in a panel. No Illinois mines currently use high-extraction retreat mining, but from the 1940s to 2002, this method was used in the State.

Longwall

Modern longwall mining methods remove coal along a straight working face within defined panels (in this case a solid block of coal), up to 1 to 2 miles long and about 1,000 feet wide. Room-and-pillar methods must be used in conjunction with longwall mining. Like high-extraction retreat, longwall mining begins at the outer edges and works toward the main entries. This fully-mechanized method uses a rotating cutting drum or shearer that works back and forth across the coal face. The coal falls onto a conveyer below the cutting machine and is transported out of the mine.

All of this is performed under a canopy of steel supports that sustains the weight of the roof along the mining surface. As the coal is mined the steel supports advance. The mine roof immediately collapses behind the moving supports, causing 4 to 6 feet of maximum settling of the ground surface over the panel. Since planned subsidence is part of this operation, this method requires the legal rights to the ground surface. Longwall mining methods recover 100% of the coal in a panel.

What is mine subsidence?

Mine subsidence is the sinking or shifting of the ground surface resulting from the collapse of an underground mine. Subsidence is possible in any area where minerals or ore have been undermined. Most of the mine subsidence in Illinois is related to coal mining, which represents the largest volume extracted and area undermined of any solid commodity in the State.

Mine subsidence can be planned, as with modern high-extraction retreat and longwall mining techniques, or it can occur as the result of age and instability. For many years, underground mining was not tightly regulated and not much thought was given to the long-term stability of the mines since most of the land over the mine was sparsely populated. Once mining operations were complete, the mine was abandoned. As cities and towns grew up around the mines, many urban and residential areas were built over or near undermined areas.

ISGS estimates that approximately 333,000 housing units are located in close proximity to underground mines and may potentially be exposed to mine subsidence while approximately 201,000 acres of urban and developed land overlie or are immediately adjacent to underground mines. Most experts agree that room-and-pillar mines will eventually experience some degree of subsidence, but currently there is no way to know when or exactly where it will occur.

What types of mine subsidence can occur in Illinois?

In Illinois mine subsidence typically takes one of two forms: pit subsidence or sag (trough) subsidence. The following provides a brief description of each.

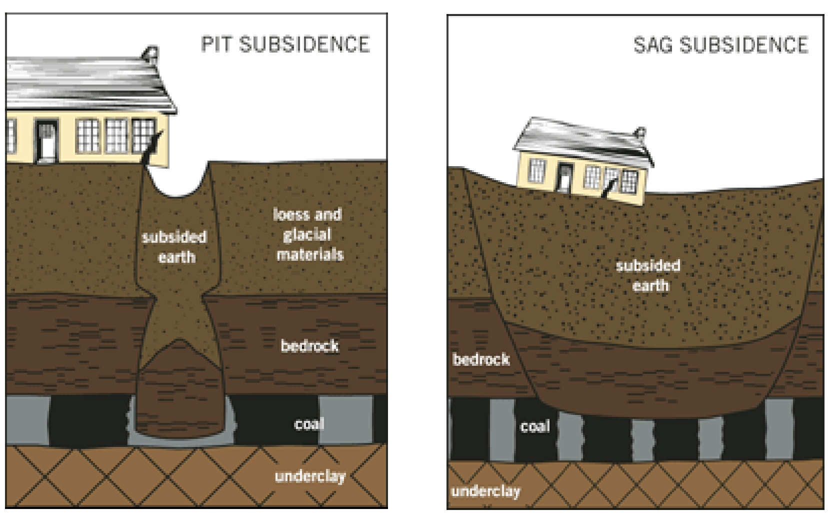
Pit Subsidence

Pit subsidence generally occurs when the roof of a shallow mine (less than 100 feet deep) collapses and forms a bell-shaped hole at the ground's surface, 6 to 8 feet deep and 2 to 40 feet across. **Figure MS-2** provides an illustration of pit subsidence. This type of subsidence forms very quickly causing sudden and swift ground movement. While the probability of a structure being damaged by pit subsidence is generally low since most pits are relatively small, structural damage can occur if pit subsidence develops under the corner of a building, the support posts of a foundation or another critical spot.

Sag (Trough) Subsidence

Sag or trough subsidence generally forms a gentle depression in the ground's surface that can spread over an entire mine panel and affect several acres of land. A major sag can develop suddenly within a few hours or days, or gradually over years. This type of subsidence may originate over places in the mine where pillars have disintegrated and collapsed or where pillars are being pushed into the relatively soft underclay that forms the floor of most mines. **Figure MS-2** illustrates sag subsidence. This is the most common type of mine subsidence and can develop over mines of any depth. Given the relatively large area covered by sag subsidence, buildings, roads, driveways, sidewalks, sewer and water pipes and other utilities may experience damage.

Figure MS-1_
Types of Mine Subsidence



Source: Illinois Mine Subsidence Insurance Fund.

What is the Illinois Mine Subsidence Insurance Fund?

Prior to 1979, traditional property owner's insurance did not cover mine subsidence nor was mine subsidence coverage available for purchase in Illinois. Since many mining companies in Illinois ceased operations long before mine subsidence occurred and insurance did not cover such damage, property owner who experienced subsidence damage had no recourse. Several high-profile incidents in the Metro East St. Louis area ultimately led to the passage of the Mine Subsidence Insurance Act in 1979. The Statute required insurers to make mine subsidence insurance available to Illinois homeowners and established the Illinois Mine Subsidence Insurance Fund (IMSIF). Later amendments to the Act gave the Fund the authority, with approval from the Director of Insurance, to set the maximum limits for mine subsidence coverage.

The IMSIF is a taxable enterprise created by Statute to operate as a private solution to a public problem. The purpose of the Fund is to assure financial resources are available to owners of property damaged by mine subsidence. The Fund fills a gap in the insurance market for the benefit of Illinois property owners at risk of experiencing mine subsidence damage.

All insurance companies authorized to write basic property insurance in Illinois are required to enter into a Reinsurance Agreement with the Fund and offer mine subsidence insurance coverage. Mine subsidence insurance covers damage caused by underground mining of any solid mineral resource. In the 34 counties where underground mining has been most prevalent, the Statute requires mine subsidence coverage be automatically included in both residential and commercial property policies. Coverage may be rejected in writing by the insured. **Figure MS-3** identifies the 34 counties where mine subsidence insurance is automatically included in property insurance policies.

In addition to providing reinsurance to insurers, the Fund also is responsible for conducting geotechnical investigations to determine if mine subsidence caused the damage, establishing rates and rating schedules, providing underwriting guidance to insurers, supporting and sponsoring mine subsidence related research and initiatives consistent with the public interest and educating the public about mine subsidence issues.

HAZARD PROFILE

The following details the location of underground mines, identifies past occurrences of mine subsidence, details the severity or extent of future potential subsidence (if known); identifies the locations potentially affected and estimates the likelihood of future occurrences.

Are there any areas in the County susceptible to mine subsidence?

Yes. According to the Illinois State Geological Survey's Directory of Coal Mines for Hamilton County, there are six documented underground mines located in the County. A copy of the Directory for Hamilton County is included in **Appendix L**. **Figure MS-4** illustrates the locations of

Mine Subsidence Fast Facts – Occurrences

Number of Underground Mines Located within the County: ***6***

Number of Mine Subsidence Events Reported: ***None***

Probability of Future Mine Subsidence Events: ***Low*** the mined areas susceptible to subsidence. To view detailed maps of the studied quadrangles, see **Appendix M**.

When has mine subsidence occurred previously? What is the extent of these previous occurrences?

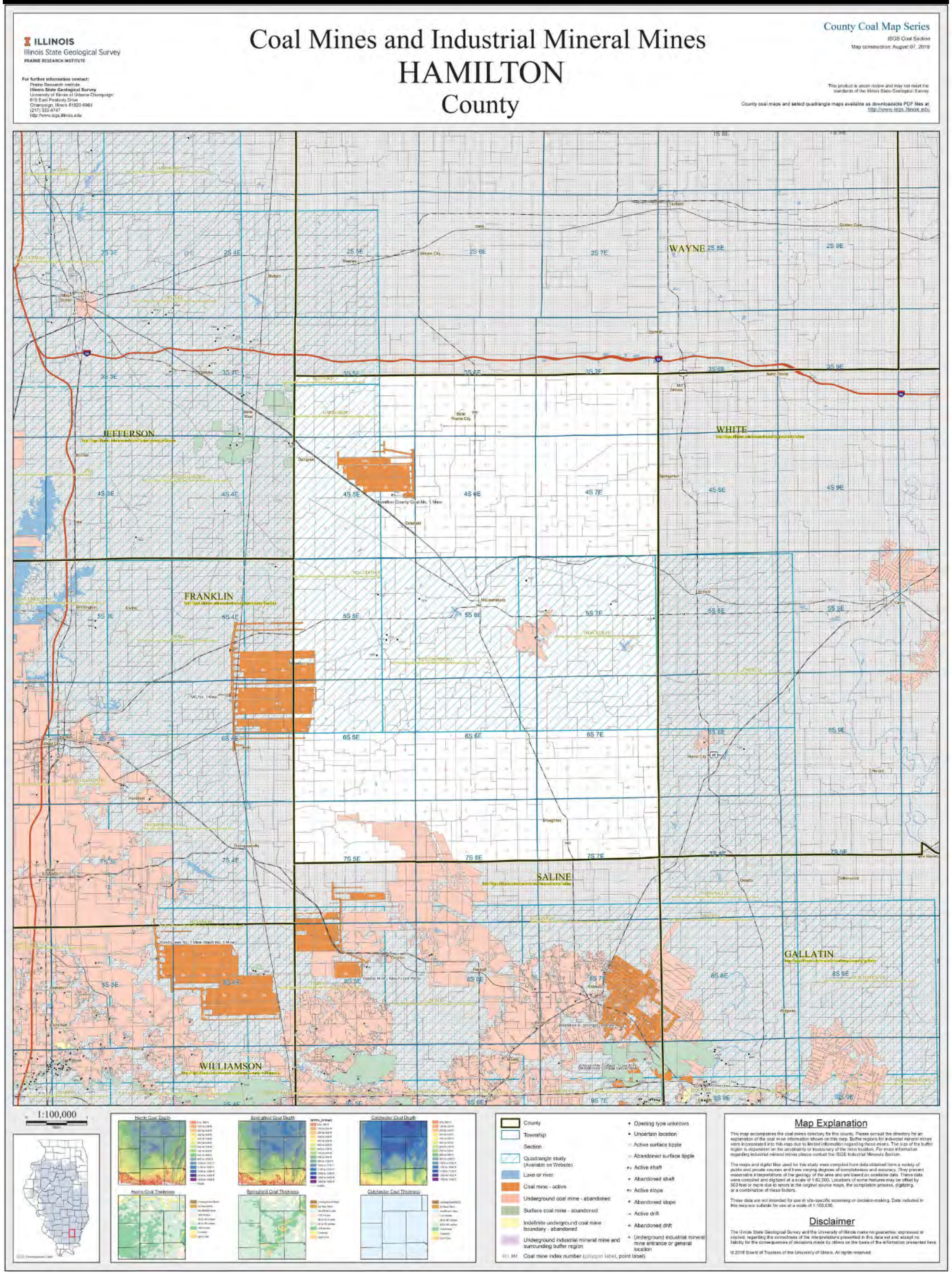
No comprehensive, publicly-accessible database detailing mine subsidence occurrences currently exists in Illinois. A review of local records and discussions with Planning Committee members did not identify any recorded mine subsidence events in Hamilton County.

According to the *Illinois Mine Subsidence Insurance Fund (IMSIF)*, there were no confirmed mine subsidence claims submitted to the IMSIF for Hamilton County between 2000 and 2018.

Figure MS-3
Counties Required to include Mine Subsidence Coverage in Property Insurance

Source: Illinois Mine Subsidence Insurance Fund.

Figure MS-4
Underground Mines Located in Hamilton County



Source: Illinois State Geological Survey.

What locations are affected by mine subsidence? What is the extent future potential mine subsidence?

According to the Illinois State Geological Survey's (ISGS) *Proximity of Underground Mines to Urban and Developed Lands in Illinois* study published in 2009, there are:

- ❖ Approximately 6,245 acres (2.3% of the land area) and 43 housing units (1.1% of the total housing units) in Hamilton County are located in Zone 1, land over or adjacent to mapped mines.
- ❖ An additional 2,563 acres (0.9% of the land area) and 20 housing units (0.5% of the total housing units) in the County are located in Zone 2, land surrounding Zone 1 that could be affected if the mine boundaries are inaccurate or uncertain.

Figure MS-5 identifies the location of the Zone 1 and 2 areas in Hamilton County. Based on this mapping, mine subsidence has the potential to impact parts of unincorporated Hamilton County in McLeansboro and Crook townships.

In the fall of 2014, the Hamilton County Mine No. 1 began operations near Delafield in Dahlgren Township. This underground mining operation utilizes longwall mining techniques to produce high-sulfur coal. Since this mine began operations after the publication of the *Proximity of Underground Mines to Urban and Developed Lands in Illinois* study, it is no included in the Zone 1 and 2 calculation above.

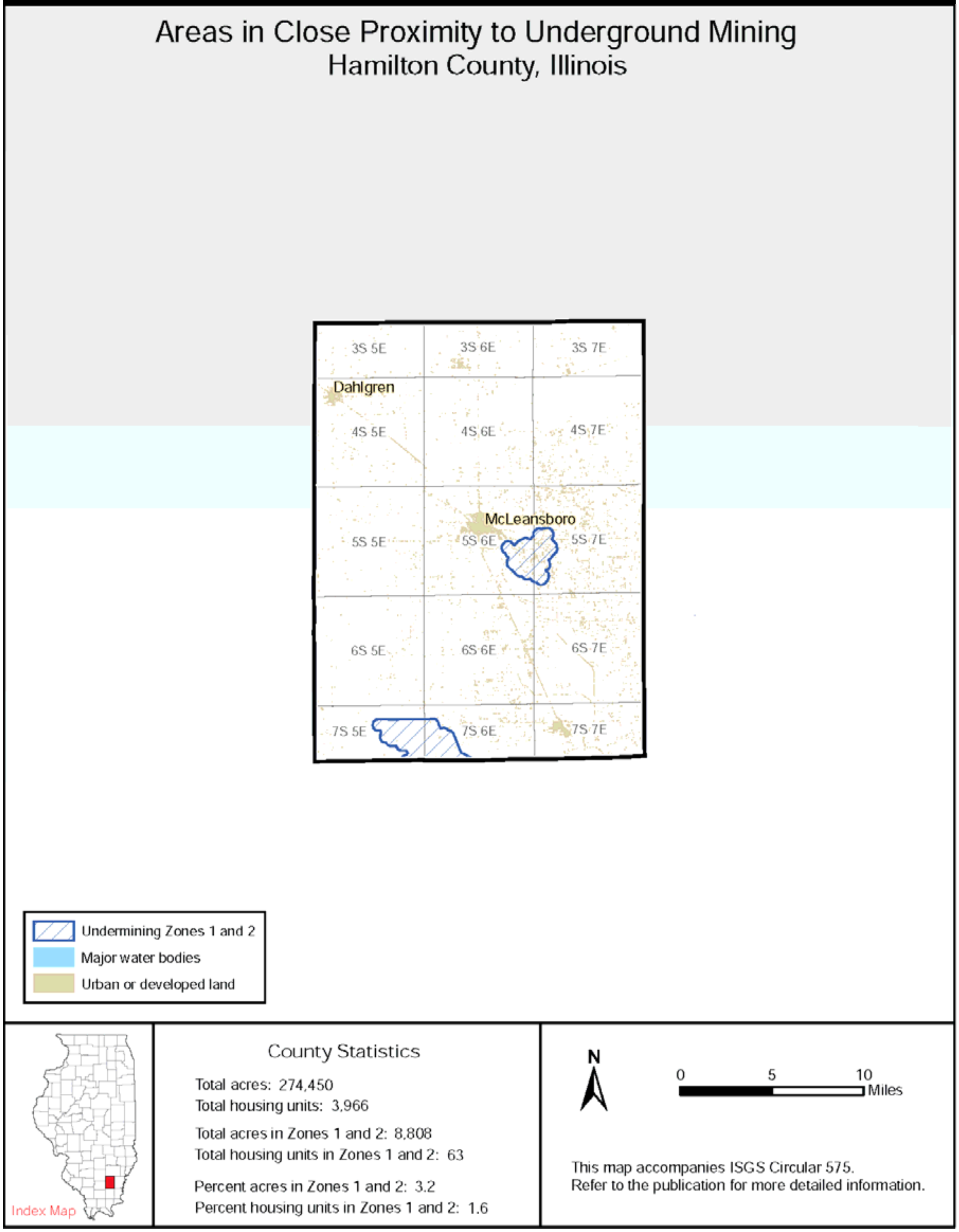
The extent of future potential mine subsidence events is a function of where current development is located relative to areas of past and present underground mining. According to the IMSIF, most experts agree that room and pillar mines will eventually experience some degree of collapse, but currently there is no way to know when or exactly where mine subsidence will occur.

What is the probability of future mine subsidence events occurring?

There are many variables that must be considered when calculating the probability of future mine subsidence events including whether subsidence has occurred previously in an area, the size, depth and age of the mine, the magnitude or extent of the failure as well as soil conditions. Given the unpredictability of mine subsidence events, the variables involved and the lack of data available for Hamilton County, it is difficult to specifically establish the probability of future mine subsidence events without extensive research.

However, given the mining methods used, the age and location of the mines and the number of housing units located over or adjacent to undermined areas in the County, the probability that parts of unincorporated Hamilton County (including Crook, Dahlgren and McLeansboro townships) will experience future mine subsidence events is estimated to be ***low***. For the purposes of this analysis "unlikely" is defined as having a less than 2% chance of occurring in any given year, "low" is defined as having a less than a 10% chance of occurring in any given year and "medium" is defined as having up to a 50% chance of occurring in any given year.

Figure MS-5
Areas Potentially Impacted by Mine Subsidence in Hamilton County



Source: Illinois State Geological Survey

HAZARD VULNERABILITY

The following describes the vulnerability to participating jurisdictions, identifies the impacts on public health and property (if known) and estimates the potential impacts on public health and safety as well as buildings, infrastructure and critical facilities from mine subsidence.

Are the participating jurisdictions vulnerable to mine subsidence?

Parts of Crook, Dahlgren and McLeansboro townships in unincorporated Hamilton County are vulnerable to mine subsidence. According to ISGS, at least 6,245 acres (2.3% of the land area) of Hamilton County are over or adjacent to mapped mines and vulnerable to mine subsidence while an additional 2,563 acres (0.9% of the land area) could be affected by mine subsidence if the mine boundaries are inaccurate or uncertain. These figures do not include the area associated with Hamilton County Mine No. 1 which began longwall mining operations in 2014. None of the other participating jurisdictions or the remainder of the County are considered vulnerable.

Do any of the participating jurisdictions consider mine subsidence failures to be among their community's greatest vulnerabilities?

No. Based on responses to a Critical Facilities Vulnerability Survey distributed to the participating jurisdictions, none of the participating jurisdictions considered mine subsidence to be among their community's greatest vulnerability. In addition, none of the jurisdictions identified any critical facilities or infrastructure within their communities as having a specific vulnerability to mine subsidence.

What impacts resulted from the recorded mine subsidence events?

Since there has been no *recorded* mine subsidence events in Hamilton County, there are no recorded impacts to report.

Mine Subsidence Fast Facts –Risk

Mine Subsidence Risk/Vulnerability:
- ❖ Public Health & Safety – Zones 1 & 2: ***Low***
- ❖ Public Health & Safety – Areas Outside Zones 1 & 2: ***Low***
- ❖ Buildings/Infrastructure/Critical Facilities – Zones 1 & 2: ***Low***
- ❖ Buildings/Infrastructure/Critical Facilities – Areas Outside Zones 1 & 2: ***Low***

What other impacts can result from mine subsidence events?

The initial damage to a property from mine subsidence may appear suddenly or occur gradually over many years. Damage to structures can include:

- ❖ cracked, broken or damaged foundations
- ❖ cracks in the basement walls, ceilings, garage floors, driveways, sidewalks or roadways
- ❖ jammed or broken doors and windows
- ❖ unlevel or tilted walls or floors
- ❖ doors that swing open or closed
- ❖ chimney, porch or steps that separate from the rest of the structure
- ❖ in extreme cases, ruptured water, sewer or gas lines

A structure need not lie directly over a mine to be affected by mine subsidence. It is extremely difficult to accurately gauge how far a property must be from a mine to ensure that it will be unaffected by mine subsidence. Each subsidence is unique and influenced by multiple factors.

What is the level of vulnerability to public health and safety from mine subsidence?

In terms of the risk or vulnerability to public health and safety from a mine subsidence event, there are several factors that must be taken into consideration including the age, size and depth of the mine; the mining method employed; the extent of the development and infrastructure in the vicinity of the mine; and soil and weather conditions. When all of the factors are taken into consideration, the overall risk to public health and safety posed by a mine subsidence event in Hamilton County is considered to be ***low*** for both Zones 1 and 2 and all other portions of the County.

Are existing buildings, infrastructure and critical facilities vulnerable to mine subsidence?

Yes. Buildings, infrastructure and critical facilities located within Zones 1 and 2 are vulnerable to mine subsidence. According to ISGS, at least 43 housing units (1.1% of the total housing units in the County) are located over or adjacent to mapped mines and vulnerable to mine subsidence while an additional 20 housing units (0.5% of the total housing units) could be affected by mine subsidence if the mine boundaries are inaccurate or uncertain.

In addition to impacting structures, mine subsidence can damage roads, bridges and utilities. Roadways, culverts and bridges can be weakened by mine subsidence and even destroyed if the subsidence occurs directly underneath of them. Water, sewer, power and communication lines, both above and below ground, are also vulnerable to mine subsidence. Depending on the location of the subsidence, water, sewer and power lines can experience ruptures causing major disruptions to vital services.

As with public health and safety, the risk or vulnerability to buildings, infrastructure and critical facilities is dependent on several factors including the age, size and depth of the mine; the mining method employed; the extent of the development and infrastructure in the vicinity of the mine; and soil and weather conditions. When these factors are taken into consideration, the overall risk posed by mine subsidence to vulnerability to buildings, infrastructure and critical facilities in Hamilton County is considered to be ***low*** for Zone 1 and ***low*** for Zone 2 and all other portions of the County.

Are future buildings, infrastructure and critical facilities vulnerable to mine subsidence?

Yes. Any future buildings, infrastructure and critical facilities located within Zones 1 and 2 are vulnerable to mine subsidence. As a result, future buildings, infrastructure and critical facilities face the same vulnerabilities as those of existing buildings, infrastructure and critical facilities described previously.

What are the potential dollar losses to vulnerable structures from mine subsidence?

Unlike other hazards, there are no standard loss estimation models or methodologies for mine subsidence. Given the lack of recorded events and unpredictability of mine subsidence, sufficient information was not available to prepare a reasonable estimate of future potential dollar losses to vulnerable structure from mine subsidence. However, those structures that reside in Zones 1 have the potential to experience future dollar losses from mine subsidence.

3.9 DAMS

HAZARD IDENTIFICATION

What is the definition of a dam?

A dam is an artificial barrier constructed across a stream channel or a man-made basin for the purpose of storing, controlling or diverting water. Dams typically are constructed of earth, rock, concrete or mine tailings. The area directly behind the dam where water is impounded or stored is referred to as a reservoir.

According to the U.S. Army Corps of Engineers' National Inventory of Dams (NID), there are approximately 91,468 dams in the United States and Puerto Rico, with 1,662 dams located in Illinois. (The NID is maintained by the U.S. Army Corps of Engineers and is updated approximately every two years.) Of the 1,662 dams in Illinois, approximately 93% are constructed of earth.

What is the definition of a dam failure?

A dam failure is the partial or total collapse, breach or other failure of a dam that causes flooding downstream. In the event of a dam failure, the people, property and infrastructure downstream could be subject to devastating damages. The potential severity of a full or partial dam failure is influenced by two factors:

- the capacity of the reservoir and
- the density, type and value of development/infrastructure located downstream.

There are two categories of dam failures, "flood" or "rainy day" failures and "sunny day" failures. A "flood" or "rainy day" failure usually results when excess precipitation and runoff cause overtopping or a buildup of pressure behind a dam which leads to a breach. Even normal storm events can lead to "flood" failures if debris plugs the water outlets. Given the conditions that lead to a "flood" failure (i.e., rainfall over a period of hours or days), there is usually a sufficient amount of time to warn and evacuate residents downstream.

Unlike a "flood" failure, there is generally no warning associated with a "sunny day" failure. A "sunny day" failure is usually the result of improper or poor dam maintenance, internal erosion, vandalism or an earthquake. This unexpected failure can be catastrophic because it may not allow enough time to warn and evacuate residents downstream.

No one knows precisely how many dam failures have occurred in the United States; however, it's estimated that hundreds have taken place over the last century. Some of the worst failures have caused catastrophic property and environmental damage and have taken hundreds of lives. The worst dam failure in the last 50 years occurred on February 26, 1972 in Buffalo Creek, West Virginia. A tailings dam owned by the Buffalo Mining Company failed, taking 125 lives, injuring 1,000 individuals, destroying 507 homes and causing property damage in excess of $50 million (approximately $298.6 million in 2017 based on the Bureau of Labor Statistics Consumer Price Index Inflation Calculator.)

Dam failures have been documented in every state, including Illinois. According to the Dam Incident Database compiled by the National Performance of Dams Program, there have been 10 reported dam failures with uncontrolled releases of the reservoir in Illinois since 1950.

What causes a dam failure?

Dam failures can result from one or more of the following:

- ***prolonged periods of rainfall and flooding*** (the cause of most failures);
- ***inadequate spillway capacity*** resulting in excess flow overtopping the dam;
- ***internal erosion*** caused by embankment or foundation leakage;
- ***improper maintenance*** (including failure to remove trees, repair internal seepage problems, maintain gates, valves and other operational components, etc.);
- ***improper design*** (including use of improper construction materials and practices);
- ***negligent operation*** (including failure to remove or open gates or valves during high flow periods);
- ***failure of an upstream dam on the same waterway***;
- ***landslides into reservoirs*** which cause surges that result in overtopping of the dam;
- ***high winds*** which can cause significant wave action and result in substantial erosion; and
- ***earthquakes*** which can cause longitudinal cracks at the tops of embankments that can weaken entire structures.

How are dams classified?

Each dam listed on the National Inventory of Dams is assigned a hazard potential classification rating per the "Federal Guidelines for Dam Safety: Hazard Potential Classification System for Dams." The classification system is based on the potential for loss of life and damage to property in the event of a dam failure. There are three classifications: High, Significant and Low. **Figure DF-1** provides a brief description of each hazard potential classification. It is important to note that the hazard potential classification assigned is not an indicator of the adequacy of the dam or its physical integrity and in no way reflects the current condition of the dam.

Figure DF-1
Dam Hazard Classification System

Hazard Potential Classification	Description
High	Those dams where failure or mis-operation result in probable loss of human life, regardless of the magnitude of other losses. The probable loss of human life is defined to signify one or more lives lost.
Significant	Those dams where failure or mis-operation result in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities or can impact other concerns. Significant hazard potential classification dams are often located in predominately rural or agricultural areas but could be located in areas with population and significant infrastructure.
Low	Those dams where failure or mis-operation results in no probable loss of human life and low economic and/or or environmental losses. Losses are principally limited to the dam owner's property.

Sources: Federal Emergency Management Agency
U.S. Army Corps of Engineers

HAZARD PROFILE

According to the USACE National Inventory of Dams, there are thirteen classified dams located in Hamilton County. Of those thirteen dams, only four have a hazard potential classification of "High". The remaining nine dams all have a hazard potential classification of "Significant" or "Low", do not have reservoirs with immense storage capacities and are not located in densely populated areas. Due to the limited impacts on the population, land use and infrastructure associated with a majority of the classified dams, only those dams that have "High" hazard potential classifications will be analyzed as part of this Plan.

The following details the location of "High" hazard classified dams, identifies past occurrences of dam failures, details the severity or extent of each event (if known); identifies the locations potentially affected and estimates the likelihood of future occurrences.

Dam Failure Fast Facts – Occurrences

Number of "High" Hazard Classified Dams Located in the County: ***4***

Number of Classified Dams owned by Participating Jurisdictions: ***1***

Number of Dam Failures Reported: ***0***

Probability of Future Dam Failure Events: ***Low***

Do any of the participating jurisdictions own "High" hazard classified dams?

Yes. There is one "High" hazard classified dams owned McLeansboro. **Figure DF-2** provides a brief description of the dam.

Are there any other publicly or privately-owned "High" hazard classified dams within the County?

Yes. There is one other publicly-owned and two privately-owned "High" hazard classified dams within Hamilton County. **Figure DF-2** provides a brief description of each dam.

When have dam failures occurred previously? What is the extent of these previous dam failures?

According to data from Stanford University's National Performance of Dams Incident Database and discussions with Planning Committee members, there are no known recorded dam failures associated with the High" hazard classified dams in Hamilton County.

What is the extent of future potential dam failures?

According to the National Inventory of Dams (NID), Emergency Action Plans (EAPs) defining the extent or magnitude of potential dam failures (water depth, speed of onset and warning times) were developed for all four dams. However, none of the EAPs were made available to the Hamilton County Emergency Management Agency for review. As a result, a data deficiency exists for all four "High" hazard classified dams.

What locations are affected by dam failure?

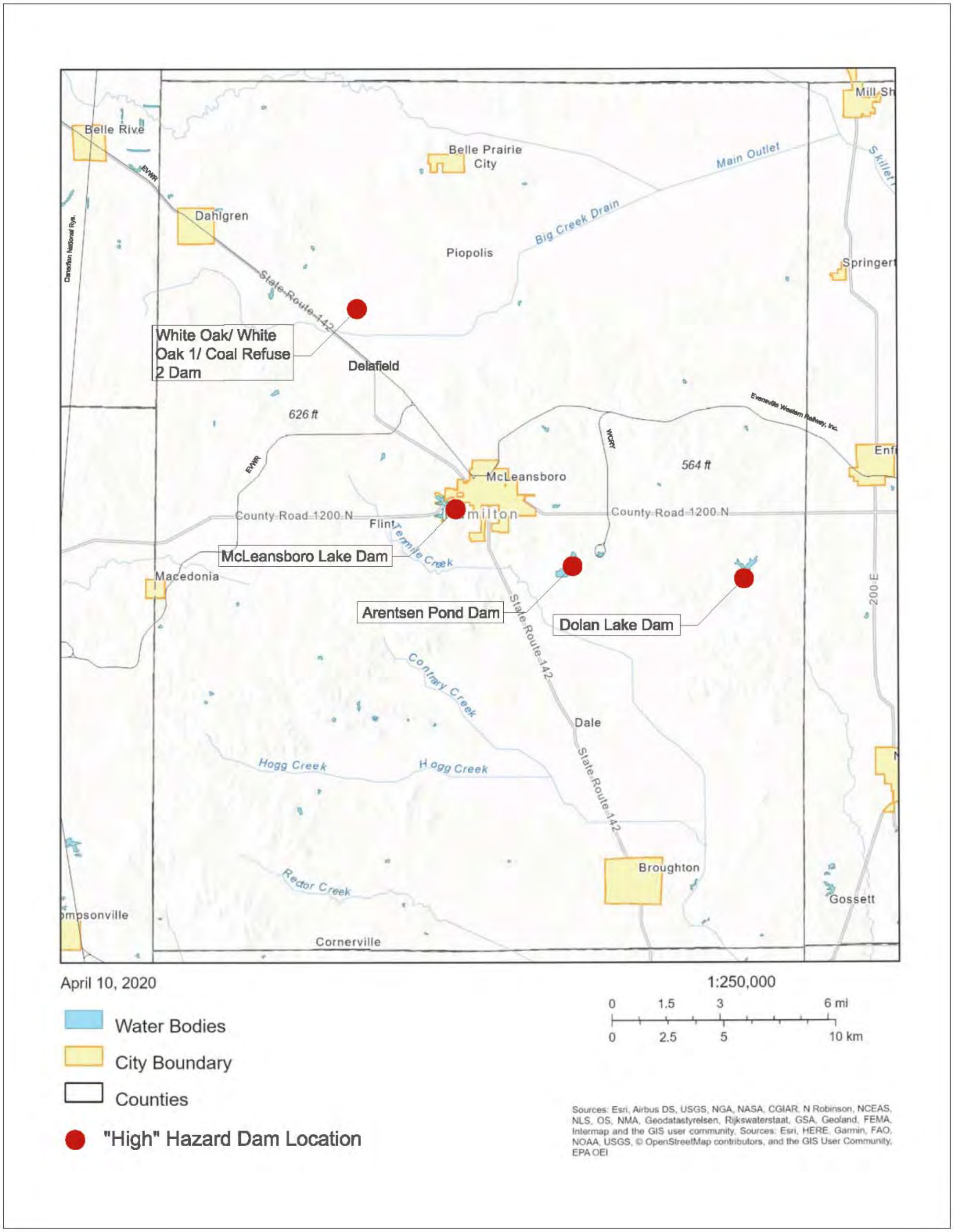
Figure DF-3 shows the locations of ***"High" hazard classified dams*** in Hamilton County. Dam failures have the potential to impact the following municipalities/unincorporated areas:

- ❖ McLeansboro (south of IL Route 14 and west of Fairground Road);
- ❖ Ten Mile Creek State Fish and Wildlife Area (Crook Township);

Figure DF-2 "High" Hazard Classified Dams Located in Hamilton County												
Dam Name	**Hazard Classification**	**Associated Waterway**	**Owner**	**Type**	**Primary Purpose**	**Completion Year**	**Height (feet)**	**Length (feet)**	**Storage (acre-feet)**	**Impoundment Surface Area (acres)**	**Drainage Area (square miles)**	**Emergency Action Plan**
Publicly-Owned												
McLeansboro Lake Dam	High	Bear Creek	City of McLeansboro	Earth	Recreation	1937	36 ft.	2,955 ft.	1,253 ac.-ft.	62 ac.	1.3 sq. mi.	Yes
Dolan Lake Dam	High	Lick Creek	Illinois Department of Natural Resources	Earth	Recreation	1962	30 ft.	830 ft.	1,507 ac.-ft.	76 ac.	1.7 sq. mi.	Yes
Privately-Owned												
Arentsen Pond Dam	High	Wheeler Creek	Kelly and the Colonel, Inc.	Earth	Other	1992	75 ft.	7,500 ft.	4,235 ac.-ft.	n/a	n/a	Yes
White Oak/ White Oak 1/ Coal Refuse 2 Dam	High	Tributary Big Creek	Hamilton County Coal LLC	Earth	Other	2016	76 ft.	10,800 ft.	4,454 ac.-ft.	n/a	n/a	Yes

Sources: U.S. Army Corps of Engineers, National Inventory of Dams Interactive Report.

Figure DF-3
Location of "High" Hazard Classified Dams in Hamilton County



- ❖ undeveloped and agricultural land approximately one and three-quarter miles southeast of the McLeansboro in McLeansboro Township (north of County Road 1025 N and west of County Road 1200 E); and
- ❖ undeveloped and agricultural land approximately one mile north of Delafield in Dahlgren Township (south of County Road 1800 N and east of County Road 9).

What is the probability of future dam failure events occurring?

Since none of the "High" hazard dams have experienced a dam failure, it is difficult to specifically establish the probability of a future failure. However, based on the capacity of the reservoirs and the scope and type of development and infrastructure located downstream, the probability is estimated to be ***low***. For the purposes of this analysis "low" is defined as having a less than 10% chance of occurring in any given year.

HAZARD VULNERABILITY

The following describes the vulnerability to participating jurisdictions, identifies the impacts on public health and property (if known) and estimates the potential impacts on public health and safety as well as buildings, infrastructure and critical facilities from dam failures.

Are the participating jurisdictions vulnerable to dam failures?

Yes. McLeansboro and portions of unincorporated Hamilton County (including Crook, Dahlgren, McLeansboro and South Crouch townships) are vulnerable to the dangers presented by dam failures. While McLeansboro and portions of unincorporated Hamilton County (including the townships) are vulnerable, most residents would not be impacted by a dam failure. None of the other participating jurisdictions or the remainder of the County are considered vulnerable.

Do any of the participating jurisdictions consider dam failures to be among their community's greatest vulnerabilities?

No. Based on responses to a Critical Facilities Vulnerability Survey distributed to the participating jurisdictions, none of the participating jurisdictions considered dam failures to be among their community's greatest vulnerability. In addition, none of the jurisdictions identified any critical facilities or infrastructure within their communities as having a specific vulnerability to dam failures.

What impacts resulted from the recorded dam failures?

Since there have been no *recorded* dam failures associated with the "High hazard classified dams in Hamilton County, there are no recorded impacts to report.

What other impacts can result from dam failures?

The impacts from a dam failure are similar to those of a flood. There is the potential for injuries, loss of life, property damage and crop damage. Depending on the type of dam failure, there may be little, if any warning that an event is about to occur, similar to flash flooding. As a result, one of the primary threats to individuals is from drowning. Motorists who choose to drive over flooded roadways run the risk of having their vehicles swept off the road and downstream. Flooding of roadways is also a major concern for emergency response personnel who would have to find alternative routes around any section of road that becomes flooded due to a dam failure.

Dam Failure Fast Facts – Risk

Dam Failure Risk/Vulnerability:
- ❖ Public Health & Safety: "High" Hazard Classification Dams – ***Low***
- ❖ Buildings/Infrastructure/Critical Facilities: "High" Hazard Classification Dams – ***Low***

In addition to concerns about injuries and death, the water released by a dam failure poses the same biological and chemical risks to public health as floodwaters. The flooding that results from a dam failure has the potential to force untreated sewage to mix with floodwaters. The polluted floodwaters then transport the biological contaminants into buildings and basements and onto roads and public areas. If left untreated, the floodwaters can serve as breeding grounds for bacteria and other disease-causing agents. Even if floodwaters are not contaminated with biological material, basements and buildings that are not properly cleaned can grow mold and mildew, which can pose a health hazard, especially for small children, the elderly and those with specific allergies.

Flooding from dam failures can also cause chemical contaminants such as gasoline and oil to enter floodwaters if underground storage tanks or pipelines crack and begin leaking during a dam failure event. Depending on the time of year, the water released by a dam failure may also carry away agricultural chemicals that have been applied to farm fields and cause damage to or loss of crops.

What is the level of vulnerability to public health and safety from dam failures?

In terms of the risk or vulnerability to public health and safety from a dam failure, there are several factors that must be taken into consideration including the severity of the event, the capacity of the reservoir and the extent and type of development and infrastructure located downstream. When these factors are taken into consideration, the overall risk to public health and safety posed by a "High" hazard classified failure in Hamilton County is considered to be ***low***.

Are existing buildings, infrastructure and critical facilities vulnerable to dam failures?

As discussed previously, EAPs detailing the existing buildings, infrastructure and critical facilities vulnerable to a dam failure no available of the "High" hazard classified dams. As a result a data deficiency exists in terms of comprehensively identifying existing buildings, infrastructure and critical facilities vulnerable to dam failures.

While detailed information was not available, a visual inspection of the areas surrounding the classified dams indicates that there are buildings, infrastructure and critical facilities that are vulnerable to dam failures. **Figure DF-4** provides a ***rough estimate*** of the buildings, infrastructure and critical facilities by dam vulnerable to a dam failure.

Depending on whether there is a full or partial dam failure, all of the vulnerable buildings, infrastructure and critical facilities may be inundated by water and structural damage may result. Because none of the reservoirs within the County are immense in size, the damage sustained from dam failure flooding may not be to the structure, but to the contents of the buildings or nearby infrastructure and critical facilities.

Figure DF-4
Buildings, Infrastructure & Critical Facilities Vulnerable to a Dam Failure

Dam Name	Location	Number of Vulnerable Buildings/Infrastructure			
		Residential	**Commercial**	**Infrastructure**	**Critical Facilities**
McLeansboro Lake Dam	McLeansboro	Single-Family 1-2 Multi-Family 1-6	1-3	- IL Rte. 14 - CR 850 E / Fairground Rd - Parkway Rd - Meadow Acres Dr - CR 1125 N	- Hamilton County Fair Grounds - McLeansboro Wastewater Treatment Plant - McLeansboro Municipal Airport
Dolan Lake Dam	Ten Mike Creek State Fish & Wildlife Area (Unincorp. Hamilton County Crook Township)	n/a	n/a	- Sunrise Point Rd	n/a
Arentsen Pond Dam	1 ¾ miles southeast of McLeansboro (Unincorp. Hamilton County McLeansboro Township)	2	n/a	- CR 1025 N - CR 1100 E	n/a
White Oak/ White Oak 1/ Coal Refuse 2 Dam	1 mile north of Delafield (Unincorp. Hamilton County Dalhgren Township)	5-10	2-4	- CR 9 - CR 1800 N - CR 600 E - CR 1750 N - CR 1650 N	n/a

In addition to impacting structures, a dam failure can damage roads and utilities. Roadways, culverts and bridges can be weakened by dam failure floodwaters and may collapse under the weight of a vehicle. Power and communication lines, both above and below ground, are also vulnerable to dam failure flooding. Depending on their location and the velocity of the water as it escapes the dam, power poles may be snapped causing disruptions to power and communication. Water may also get into any buried lines causing damage and disruptions.

As with public health and safety, the risk or vulnerability to buildings, infrastructure and critical facilities is dependent on several factors including the severity of the event, the capacity of the reservoir and the extent and type of development and infrastructure located downstream. When these factors are taken into consideration, the overall risk posed by a dam failure in Hamilton County is considered to be ***low*** for the "High" hazard classified dams.

Are future buildings, infrastructure and critical facilities vulnerable to dam failures?

Yes. Any future buildings, infrastructure and critical facilities located within the flood path of a classified dam are vulnerable to damage from a dam failure. As a result, future buildings, infrastructure and critical facilities face the same vulnerabilities as those of existing buildings, infrastructure and critical facilities described previously.

What are the potential dollar losses to vulnerable structures from dam failures?

Unlike other hazards, there are no standard loss estimation models or methodologies for dam failures. Given that there has been no recorded dam failures in Hamilton County, sufficient information was not available to prepare a reasonable estimate of future potential dollar losses to vulnerable structure from dam failures.

4.0 MITIGATION STRATEGY

4.0 MITIGATION STRATEGY

The mitigation strategy identifies how participating jurisdictions are going to reduce the potential loss of life and property damage that results from the natural hazards identified in the Risk Assessment section of this Plan. The strategy includes:

- Developing mitigation goals. Mitigation goals describe the objective(s) or desired outcome(s) that the participants would like to accomplish in term of hazard and loss prevention. These goals are intended to reduce or eliminate long-term vulnerabilities to natural hazards.
- Identifying a comprehensive range of jurisdiction-specific mitigation actions including those related to continued compliance with the National Flood Insurance Program (NFIP). Mitigation actions are projects, plans, activities or programs that achieve at least one of the mitigation goals identified.
- Analyzing the mitigation actions identified for each jurisdiction. This analysis ensures each action will reduce or eliminate future losses associated with the hazards identified in the Risk Assessment section.
- Developing the mitigation actions prioritization methodology. The prioritization methodology outlines the approach used to prioritize the implementation of each identified mitigation action.
- Identifying the entity(s) responsible for implementation and administration. For each mitigation action, the entity(s) responsible for implementing and administering that action is identified as well as the timeframes for completing the actions and potential funding sources.
- Conducting a preliminary cost/benefit analysis of each mitigation action. The qualitative cost/benefit analysis provides participants a general idea which actions are likely to provide the greatest benefit based on the financial cost and staffing efforts needed.

A detailed discussion of each aspect of the mitigation strategy is provided below.

4.1 MITIGATION GOALS REVIEW

Developing mitigation goals was the first step in creating the mitigation strategy. Based on early communications with the Planning Committee members, the consultant developed a preliminary list of eight hazard mitigation goals. This list of goals was distributed electronically to Committee members and posted on the Hamilton County Emergency Management Agency’s Facebook page. Members were asked to review the list before the first meeting and consider whether any changes needed to be made or if additional goals should be included. At the Planning Committee’s November 6, 2019 meeting, the group discussed the preliminary list of goals and approved them with no changes or additions. **Figure MIT-1** lists the approved mitigation goals.

Figure MIT-1 Mitigation Goals	
Goal 1	Educate people about the natural hazards they face and the ways they can protect themselves, their homes, and their businesses from those hazards.
Goal 2	Protect the lives, health, and safety of individuals living in the County from the dangers of natural hazards.
Goal 3	Protect existing infrastructure and design new infrastructure (buildings, roads, bridges, utilities, water supplies, sanitary sewer systems, etc.) to be resilient to the impacts of natural hazards.
Goal 4	Incorporate natural hazard mitigation into existing as well as new community plans and regulations.
Goal 5	Place a priority on protecting public services, including critical facilities, utilities, roads and schools.
Goal 6	Preserve and protect the streams and floodplains in our County.
Goal 7	Ensure that new developments do not create new exposures to damage from natural hazards.
Goal 8	Protect historic, cultural, and natural resources from the effects of natural hazards.

4.2 Mitigation Action Identification

Following the development of the mitigation goals, the Planning Committee members were asked to consult with their respective jurisdictions to identify a comprehensive range of ***jurisdiction-specific mitigation actions***. Representatives from Broughton and McLeansboro were also asked to identify mitigation actions that would ensure their continued compliance with the National Flood Insurance Program.

The compiled lists of new mitigation actions were then reviewed to assure the appropriateness and suitability of each action. Those actions that were not deemed appropriate and/or suitable were either reworded or eliminated.

4.3 Mitigation Action Analysis

The mitigation actions identified were then assigned to one of four broad mitigation action categories which allowed Planning Committee members to compare and consolidate similar actions. **Figure MIT-2** identifies each mitigation action category and provides a brief description.

Each mitigation action was then analyzed to determine:

- the hazard or hazards being mitigated;
- the general size of the population affected (i.e., small, medium or large);
- the goal or goals fulfilled;
- whether the action would reduce the effects on new or existing buildings and infrastructure; and
- whether the action would ensure continued compliance with the National Flood Insurance Program.

Figure MIT-2 Types of Mitigation Activities	
Category	**Description**
Local Plans & Regulations (LP&R)	Local Plans & Regulations include actions that influence the way land and buildings are being developed and built. Examples include: stormwater management plans, floodplain regulations, capital improvement projects, participation in the NFIP Community Rating System, comprehensive plans, and local ordinances (i.e., building codes, etc.)
Structure & Infrastructure Projects (S&IP)	Structure & Infrastructure Projects include actions that protect infrastructure and structures from a hazard or remove them from a hazard area. Examples include: acquisition and elevation of structures in flood prone areas, burying utility lines to critical facilities, construction of community safe rooms, install "hardening" materials (i.e., impact resistant window film, hail resistant shingles/doors, etc.) and detention/retention structures.
Natural System Protection (NSP)	Natural System Protection includes actions that minimize damage and losses and also preserve or restore natural systems. Examples include: sediment and erosion control, stream restoration and watershed management.
Education & Awareness Programs (E&A)	Education & Awareness Programs include actions to inform and educate citizens, elected officials and property owners about hazards and the potential ways to mitigate them. Examples include: outreach/school programs, brochures and handout materials, becoming a StormReady community, evacuation planning and drills, and volunteer activities (i.e., culvert cleanout days, initiatives to check in on the elderly/disabled during hazard events such as storms and extreme heat events, etc.)

4.4 MITIGATION ACTION PRIORITIZATION METHODOLOGY

Next, the Planning Committee worked with the Consultant to develop a method to prioritize mitigation actions. Various methodologies were discussed with the Committee members at the second meeting held on March 4, 2020. **Figure MIT-3** identifies and describes the four-tiered prioritization methodology adopted by the Planning Committee.

This methodology is based on two key factors: 1) the frequency of the hazard and 2) the degree of mitigation attained. The methodology developed provides a means of objectively determining which actions have a greater likelihood of reducing the long-term vulnerabilities associated with the most frequently-occurring natural hazards.

While prioritizing the actions is useful and provides participants with additional information, it is important to keep in mind that implementing any the mitigation actions is desirable regardless of which prioritization category an action falls under.

4.5 MITIGATION ACTION IMPLEMENTATION, ADMINISTRATION & COST/BENEFIT ANALYSIS

Finally, each participating jurisdiction was asked to identify how the mitigation actions will be implemented and administered. This included:

- Identifying the party or parties responsible for oversight and administration.
- Determining what funding source(s) are available or will be pursued.

- Describing the time frame for completion.
- Conducting a preliminary cost/benefit analysis.

<table>
<tr><th colspan="4">Figure MIT-3
Mitigation Action Prioritization Methodology</th></tr>
<tr><td colspan="2" rowspan="2"></td><th colspan="2">Hazard</th></tr>
<tr><td>Most Frequent Hazard
(M)
(i.e., severe storms, severe winter storms/extreme cold, floods, excessive heat)</td><td>Less Frequent Hazard
(L)
(i.e., drought, earthquakes, tornadoes, mine subsidence, dam failures)</td></tr>
<tr><th rowspan="2">Mitigation Action</th><td>Mitigation Action with the Potential to Virtually Eliminate or Significantly Reduce Impacts
(H)</td><td>HM
mitigation action will virtually eliminate damages and/or significantly reduce the probability of injuries and fatalities from the most frequently-occurring hazards</td><td>HL
mitigation action will virtually eliminate damages and/or significantly reduce the probability of injuries and fatalities from the less frequently-occurring hazards</td></tr>
<tr><td>Mitigation Action with the Potential to Reduce Impacts
(L)</td><td>LM
mitigation action has the potential to reduce damages, injuries and/or fatalities from the most frequently-occurring hazards</td><td>LL
mitigation action has the potential to reduce damages, injuries and/or fatalities from the less frequently-occurring hazards</td></tr>
</table>

Oversight & Administration

It is important to keep in mind that the County and all the participating jurisdictions have extremely limited capabilities related to organization and staffing for oversight and administration of the identified mitigation actions. According to the US Census Bureau, Hamilton County ranks among the smallest counites in Illinois with just over 8,457 residents. Four of the seven participating municipalities/townships are very small in size, with populations of less than 550 individuals. In most cases the participating jurisdictions have minimal staff who are only employed part-time. Their organizational structure is such that most have very few offices and/or departments. Those in charge of the offices/departments often lack the technical expertise needed to individually oversee and administer the identified mitigation actions. As a result, most of the participating jurisdiction identified their governing body (i.e., village board, city council or board) as the entity responsible for oversight and administration simply because it is the only practical option given their organizational constraints.

Funding Sources

While the Southeastern Illinois Regional Planning and Development Commission has the ability to provide grant writing services to Hamilton County, many of the participating jurisdictions do not have city/county administrators with grant writing capabilities. As a result, assistance was needed in identifying possible funding sources for the identified mitigation actions. The consultant provided written information to the participants about FEMA and non-FEMA funding opportunities that have been used previously to finance mitigation actions. In addition, funding information was discussed with participants during planning committee meetings and in one-on-one contacts so that an appropriate funding source could be identified for each mitigation action.

A handout was prepared and distributed that provided specific information on the non-FEMA grant sources available including the grant name, the government agency responsible for administering the grant, grant ceiling, contact person and application period among other key points. Specific grants from the following agencies were identified: United State Department of Agricultural – Rural Development (USDA – RD), Illinois Department of Agriculture (IDOA), Illinois Department of Commerce and Economic Opportunity (DCEO), Illinois Environmental Protection Agency (IEPA), Illinois Department of Natural Resources (IDNR) and Illinois Department of Transportation (IDOT).

The funding source identified for each action is the most likely source to be pursued. However if grant funding is unavailable through the most likely or other suggested sources, then implementation of medium and large-scale projects and activities is unlikely due to the budgetary constraints experienced by all of the participants due to their size, projected population growth and limited revenue streams. It is important to remember that the population for the entire County is just over 8,400 individuals. Four of the seven municipalities/townships have populations of less than 550 individuals. Most of the jurisdictions struggle to maintain and provide the most critical of services to their residents. Additional funding is necessary if implementation is to be achieved.

Time Frame for Completion

The time frame for completion identified for each action is the timespan in which participants would like to see the action successfully completed. In many cases, however, the time frame identified is dependent on obtaining the necessary funding. As a result, a time range has been identified for many of the mitigation actions to allow for unpredictability in securing funds.

Cost/Benefit Analysis

A preliminary qualitative cost/benefit analysis was conducted on each mitigation action. The costs and benefits were analyzed in terms of the general overall cost to complete an action as well as the action's likelihood of permanently eliminating or reducing the risk associated with a specific hazard. The general descriptors of high, medium and low were used. These terms are not meant to translate into a specific dollar amount, but rather to provide a relative comparison between the actions identified by each jurisdiction.

This analysis is only meant to give the participants a starting point to compare which actions are likely to provide the greatest benefit based on the financial cost and staffing effort needed. It was repeatedly communicated to the Planning Committee members that when a grant application is submitted to IEMA/FEMA for a specific action, a detailed cost/benefit analysis will be required to receive funding.

4.6 RESULTS OF MITIGATION STRATEGY

Figures MIT-4 through **MIT-13**, located at the end of this section, summarize the results of the mitigation strategy. The mitigation actions are arranged alphabetically by participating jurisdiction following the County and include both existing and new actions.

Figure MIT-4
Hamilton County Hazard Mitigation Actions
(Sheet 1 of 5)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
County Board											
HM	Purchase and install an automatic emergency backup generator at the Hamilton County Courthouse to provide uninterrupted power and maintain continuity of government and operations during power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	Chair / County Board	3 years	County / USDA – RD Community Facilities Programs	Medium/High
LM	Conduct a study to identify the corrective actions that must be undertaken to re-enter the National Flood Insurance Program.	F	E&A	Small	2, 3, 4, 5, 6	Yes	Yes	Chair / County Board	5 years	County	Low/Medium
HM	Purchase and install grounding system at Hamilton County Courthouse to protect critical systems and improve the building's resilience to lightning strikes ensuring continuity of government and operations.	SS	S&IP	Medium	2, 3, 5	n/a	Yes	Chair / County Board	2 years	County / USDA – RD Critical Facilities Programs	Medium/Medium
LL	Conduct a study/inspection to determine the amount of seismic damage sustained by the Hamilton County Courthouse and identify measures to increase the building's resilience to earthquakes.	EQ	E&A	Medium	2, 3, 5, 8	n/a	Yes	Chair / County Board	7 years	County	Low/Medium
HL	Install "hardening" materials at the Hamilton County Courthouse to make it resistant to natural hazard events, especially seismic activity. Measure could include but are not limited to seismic retrofits, shatter-resistant window film, hail resistant shingles/doors etc.).	EQ, SS, T	S&IP	Medium	2, 3, 5, 8	n/a	Yes	Chair / County Board	7-10 years	County / FEMA Pre-Disaster Mitigation	High/High

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the County's size (just over 8,400 individuals), projected population growth and budgetary constraints. The County works hard to maintain critical services to its residents. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

Priority	
HM	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the most frequent hazards
LM	Mitigation action with the potential to reduce impacts from the most frequent hazards
HL	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the less frequent hazards
LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:			
DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:			
E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-4
Hamilton County Hazard Mitigation Actions
(Sheet 2 of 5)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure: New	Reduce Effects of Hazard(s) on Buildings & Infrastructure: Existing	Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
Emergency Management Agency											
LM	Secure Memorandums of Agreement with Broughton, Dahlgren and McLeansboro to purchase and install new storm warning sirens.	SS, T	LP&R	Medium	2	n/a	n/a	Chair County Board / EMA Director	1 year	County	Low/Medium
HM	Purchase and install new storm warning sirens in Broughton, Dahlgren and McLeansboro.	SS, T	S&IP	Medium	2	n/a	n/a	Chair County Board / EMA Director	1-2 years	County / USDA – RD Community Facilities Programs	Medium/High
HM	Design, locate and construct a new multi-use Emergency Operations Center.	DF, EQ, F, MS, SS, SWS, T	S&IP	Large	2, 3, 5	Yes	n/a	Chair County Board / EMA Director	7 years	County / FEMA Emergency Management Performance Grant / USDA – RD Critical Facilities Programs	High/High
LL	Partner with classified dams owners to develop Emergency Action Plans (EAPs) that identify the extent (water depth, speed of onset, warning times, etc.) and location (inundation areas) of potential dam failures to address data deficiencies.	DF	E&A	Small	2, 3, 5	Yes	Yes	EMA Director / Classified Dam Owners	5 years	County / Classified Dam Owners	Low/Low

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the County's size (just over 8,400 individuals), projected population growth and budgetary constraints. The County works hard to maintain critical services to its residents. Additional funding is necessary if implementation is to be achieved within the time frames specified.

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Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-4
Hamilton County Hazard Mitigation Actions
(Sheet 3 of 3)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
Highway Department											
HM	Purchase and install an automatic emergency backup generator at the Hamilton County Highway Department to provide uninterrupted power and maintain continuity of operations during power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	Chair County Board / Highway Engineer	3 years	County / USDA – RD Community Facilities Programs	Medium/High
HM	Remove trees along critical access routes (including but not limited to Campbell's Corner Rd., South Dahlgren, 600E) to address downed limbs and trees blocking the roadways during natural hazard events.	SS	S&IP	Medium	2, 3, 5	n/a	Yes	Chair County Board / Highway Engineer	3 years	County	Low/High
LM	Conduct hydrologic/hydraulic study to determine the cause and identify design solutions to alleviate roadway flooding at various locations including but not limited to: Anderson School Rd., Piopolis Rd., Norris City Rd. and E. Broughton Rd.	F, SS	E&A	Small	2, 3, 5	n/a	Yes	Chair County Board / Highway Engineer	7 years	County / IDOT Local Roads	Medium/Medium
HM	Construct the identified design solutions to alleviate roadway flooding at various locations including but not limited to: Anderson School Rd., Piopolis Rd., Norris City Rd. and E. Broughton Rd.	F, SS	S&IP	Small	2, 3, 5	n/a	Yes	Chair County Board / Highway Engineer	7 years	County / IDOT Local Roads / USDA – RD Community Facilities Programs	High/Medium
HM	Replace structures as needed to address scour damage and erosion caused by heavy rain events and to increase the capacity of the structures to reduce the likelihood of future damage.	F, SS	S&IP	Small	2, 3, 5	n/a	Yes	Chair County Board / Highway Engineer	5-10 years	County / IDOT Local Roads	High/High

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the County's size (just over 8,400 individuals), projected population growth and budgetary constraints. The County works hard to maintain critical services to its residents. Additional funding is necessary if implementation is to be achieved within the time frames specified.

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Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-5
Broughton Hazard Mitigation Actions
(Sheet 1 of 3)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Purchase and install a storm warning siren. Currently there are not warning sirens in the Village.	SS, T	E&A	Large	2	n/a	n/a	President / Village Board	3-5 years	Village / USDA – RD Critical Facilities Programs	Medium/High
HM	Purchase and install an automatic emergency backup generator for the storm siren to provide uninterrupted power and maintain operations during power outages.	SS, T	S&IP	Large	2, 3, 5	Yes	Yes	President / Village Board	1-2 years	Village / USDA – RD Community Facilities Program	Medium/High
LM	Designate Community Hall as a warming/cooling center for area residents.	EC, EH	E&A	Large	2	n/a	n/a	President / Village Board	3-5 years	Village	Low/High
HM	Retrofit the Community Hall and/or construct a new standalone structure to serve as a community safe room (equipped with an emergency backup generator and HVAC units) that can also serve as a warming/cooling center for area residents.	EC, EH, SS, T	S&IP	Medium	2	Yes	Yes	President / Village Board	3-5 years	Village / FEMA Pre-Disaster Mitigation / USDA – RD Community Facilities Programs	High/High
HM	Purchase a portable backup generator for use at critical facilities to maintain operations during prolonged power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	President / Village Board	3-5 years	Village / USDA – RD Critical Facilities Programs	Medium/High

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the budgetary constraints experienced by a village of this size (less than 200 individuals). The Village struggles to provide even the most critical of services to its residents. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

Priority

HM	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the most frequent hazards
LM	Mitigation action with the potential to reduce impacts from the most frequent hazards
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LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-5
Broughton Hazard Mitigation Actions
(Sheet 2 of 3)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Purchase and install electrical hookups (pigtails) at designated critical facilities within the Village for use with portable emergency backup generators to maintain operations during prolonged power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	President / Village Board	3-5 years	Village / USDA – RD Critical Facilities Programs	Medium/High
HM	Purchase and install grounding systems at select critical facilities protect critical systems and improve the facility's ability to survive a lightning strike.	SS	S&IP	Small	2, 3, 5	n/a	Yes	President / Village Board	3-5 years	Village / USDA – RD Critical Facilities Programs	Medium/High
HM	Create a volunteer network to check on Village residents before and after natural hazard events.	EC, EH, EQ, F, SS, SWS, T	E&A	Medium	2	n/a	n/a	President / Village Board	3-5 years	Village	Low/High
LM	Develop and implement a community outreach program, with seminars and informational materials, to educate residents about risks to life and property associated with natural hazards and the proactive actions that at they can take to reduce their risk	EC, EH, EQ, F, SS, SWS, T	E&A	Large	1, 2	n/a	n/a	President / Village Board	3-5 years	Village	Low/High
LM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the lines.	F, SS	S&IP	Medium	2, 3, 5	Yes	Yes	President / Village Board	3-5 years	Village	Medium/High
HM	Clean brush and debris from drainage ditches in the Village to maximize carrying capacity and reduce drainage problems	F, SS	S&IP	Medium	2, 3, 5	Yes	Yes	President / Village Board	3-5 years	Village	Low/Medium

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the budgetary constraints experienced by a village of this size (less than 200 individuals). The Village struggles to provide even the most critical of services to its residents. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

Priority

HM	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the most frequent hazards
LM	Mitigation action with the potential to reduce impacts from the most frequent hazards
HL	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the less frequent hazards
LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-5
Broughton Hazard Mitigation Actions
(Sheet 3 of 3)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure: New	Reduce Effects of Hazard(s) on Buildings & Infrastructure: Existing	Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
HL	Develop a drought emergency plan that includes a water conservation ordinance and secure a purchase agreement with the Saline Valley Conservancy District to provide an alternative/secondary drinking water supply to the Village.	DR	LP&R	Large	2, 4	n/a	n/a	President / Village Board	3-5 years	Village	Low/Medium
LM	Conduct discussion with IDOT and the County Highway Engineer regarding flooding along Illinois Route 142 north and south of the Village. Heavy rain events cause overtopping of the road, cutting off the main egress routes in and out of the Village.	F, SS	E&A	Large	2	n/a	Yes	President / Village Board	1 year	Village	Low/Medium
HM	Review the revised Flood Insurance Rate Maps (FIRMs) when they become available. Update the flood ordinance to reflect the revised FIRMs and present both for adoption. *	F	LP&R	Small	1, 2, 4 6, 7	Yes	Yes	President / Village Board	1-5 years	Village	Low/Medium
HM	Make the most recent Flood Insurance Rate Maps available to assist the public in considering where to construct new buildings. *	F	LP&R	Small	1, 2, 6, 7	Yes	Yes	President / Village Board	1-5 years	Village	Low/Medium
LM	Make City officials aware of the most recent Flood Insurance Rate Maps and issues related to construction in a floodplain. *	F	LP&R	Small	1, 2, 6, 7	Yes	Yes	President / Village Board	1-5 years	Village	Low/Medium

* Mitigation action to ensure continued compliance with NFIP.

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the budgetary constraints experienced by a village of this size (less than 200 individuals). The Village struggles to provide even the most critical of services to its residents. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

Priority

HM	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the most frequent hazards
LM	Mitigation action with the potential to reduce impacts from the most frequent hazards
HL	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the less frequent hazards
LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-6
Crook Township Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Replace/upsize select roadway culverts as needed to increase carrying capacity and alleviate recurring drainage/flooding problems.	F, SS, SWS	S&IP	Medium	2, 3, 5	n/a	Yes	Road Commissioner / Crook Township	1-5 years	Township / County / IDOT Local Roads	Medium/High
HM	Clean debris/obstructions out of culverts to maximize carrying capacity and reduce/prevent drainage problems.	F, SS, SWS	S&IP	Medium	2, 3, 5	n/a	Yes	Road Commissioner / Crook Township	1-5 years	Township	Low/Medium
HM	Clean brush and debris out of diches to alleviate recurring drainage problems within the Township including, but not limited to the unincorporated area of Thackeray and south of the Coal Mine.	F, SS, SWS	S&IP	Medium	2, 3, 5	n/a	Yes	Road Commissioner / Crook Township	1-5 years	Township	Low/Medium
HM	Remove trees along critical access routes to address downed limbs and trees blocking the roadways during natural hazard events.	SS	S&IP	Medium	2, 3, 5	n/a	Yes	Road Commissioner / Crook Township	1-5 years	Township	Low/High
HM	Install snow fences or landscape (living snow fences) along select roads to maintain access and ease hazardous driving conditions.	SWS	S&IP	Medium	2, 3, 5	n/a	Yes	Road Commissioner / Crook Township	1-5 years	Township / IDOT Local Roads	Medium/Medium

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to budgetary constraints experienced by small, rural townships. The Township works hard to maintain critical services to its residents. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

Priority	
HM	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the most frequent hazards
LM	Mitigation action with the potential to reduce impacts from the most frequent hazards
HL	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the less frequent hazards
LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:			
DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:			
E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-7
Dahlgren Hazard Mitigation Actions
(Sheet 1 of 2)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Purchase and install a storm warning sirens.	SS, T	E&A	Large	2	n/a	n/a	President / Village Board	3 years	Village / USDA – RD Critical Facilities Programs	Medium/High
HM	Purchase and install emergency backup generator(s) at sewer lift station locations to increase system resilience and maintain operations during extended power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	President / Village Board	1-3 years	Village / USDA – RD Community Facilities Programs	Medium/High
HM	Purchase a portable emergency backup generator for use at the sewer lift stations to maintain operations during prolonged power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	President / Village Board	1-3 years	Village / USDA – RD Community Facilities Programs	Medium/High
HM	Install electrical hookups (pigtails) at the sewer lift stations for use with portable emergency backup generators to maintain operations during prolonged power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	President / Village Board	1-3 years	Village / USDA – RD Critical Facilities Programs	Medium/High
LM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the lines.	F, SS	S&IP	Medium	2, 3, 5	Yes	Yes	President / Village Board	3-5 years	Village	Medium/High

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the budgetary constraints experienced by a village of this size (less than. 550 individuals). The Village works hard to maintain critical services to its residents but it's an effort. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

Priority

HM	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the most frequent hazards
LM	Mitigation action with the potential to reduce impacts from the most frequent hazards
HL	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the less frequent hazards
LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-7
Dahlgren Hazard Mitigation Actions
(Sheet 2 of 2)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Purchase and install an emergency backup generator at Village Hall to provide uninterrupted power and maintain continuity of government and operations during power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	President / Village Board	1-3 years	Village / USDA – RD Community Facilities Programs	Medium/High
HM	Purchase and install emergency backup generator at the water booster station to increase system resilience and maintain operations during extended power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	President / Village Board	1-3 years	Village / USDA – RD Community Facilities Programs	Medium/High
HM	Design and a construct community safe room equipped with emergency backup generators and HVAC units that can also serve as a warming/cooling center for area residents.	EC, EH, SS, T	S&IP	Medium	2	Yes	n/a	President / Village Board	3-5 years	Village / FEMA Pre-Disaster Mitigation / USDA – RD Community Facilities Programs	High/High
LM	Construct a new water tower with increased capacity to improve system resilience to drought and aid in fire suppression as necessary during natural hazard events.	DR, EC, EH, F, SS, SWS, T	S&IP	Large	2, 3, 5	Yes	n/a	President / Village Board	1-5 years	Village / USDA – RD Water & Waste Disposal Program	High/Medium

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the budgetary constraints experienced by a village of this size (less than. 550 individuals). The Village works hard to maintain critical services to its residents but it's an effort. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

Priority

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LM	Mitigation action with the potential to reduce impacts from the most frequent hazards
HL	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the less frequent hazards
LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-8
Dahlgren Township Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Purchase and install an automatic emergency backup generator at the Township Building, which can be used as a warming/cooling center, to provide uninterrupted power and maintain continuity of operations during power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	Supervisor / Dahlgren Township	1-3 years	Township / USDA – RD Community Facilities Programs	Medium/High

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to budgetary constraints experienced by small, rural townships. The Township works hard to maintain critical services to its residents. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

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LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-9
Hamilton County Community Unit School District #10 Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Retrofit a current space within each school building in the County and/or design and construct a new structure on school grounds to serve as a community safe room for use by faculty and students.	SS, T	S&IP	Large	2	Yes	Yes	Superintendent / Hamilton County Board of Education	5 years	Board of Education / FEMA Pre-Disaster Mitigation / USDA – RD Community Facilities Programs	High/High
HM	Identify and install “hardening” materials (i.e., shatter-proof glass, hail resistant shingles/doors, etc.) at each school in the County to increase infrastructure resilience to natural hazards.	EQ, SS, T	S&IP	Large	2, 3, 5	n/a	Yes	Superintendent / Hamilton County Board of Education	2-4 years	Board of Education / FEMA Pre-Disaster Mitigation	Medium/Medium
HM	Purchase and install emergency backup generators at each school building currently without a backup power supply to provide uninterrupted power to critical systems and maintain continuity of operations during extended power outages	EH, F, SS, SWS, T	S&IP	Large	2, 3, 5	n/a	Yes	Superintendent / Hamilton County Board of Education	5 years	Board of Education / USDA – RD Community Facilities Programs	Medium/High
LM	Purchase and install lightning detection equipment at all County school buildings and outdoor activity areas to provide advanced warning of dangerous weather conditions.	SS	S&IP	Medium	2	n/a	n/a	Superintendent / Hamilton County Board of Education	2 years	Hamilton County Board of Education	Medium/Medium

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the budgetary constraints experienced by small, rural school districts. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

Priority

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HL	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the less frequent hazards
LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-10
Hamilton County Water District Hazard Mitigation Actions
(Sheet 1 of 2)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure: New	Reduce Effects of Hazard(s) on Buildings & Infrastructure: Existing	Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
LM	Secure a Memorandum of Agreement with the City of McLeansboro to interconnect water systems to provide Hamilton Memorial Hospital additional capacity in the event the area is impacted by a natural hazard and improve system resilience. Hamilton Memorial Hospital is the only hospital for two counties.	DR, EC, EH, F, SS, SWS, T	LP&R	Medium	2, 3, 5	n/a	Yes	General Manager Hamilton County Water District Board / Mayor City Council	1 year	Hamilton County Water District	Low/Medium
HM	Construct drinking water interconnection with the City of McLeansboro to provide Hamilton Memorial Hospital additional capacity in the event the area is impacted by a natural hazard and improve system resilience. Hamilton Memorial Hospital is the only hospital for two counties.	DR, EC, EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	General Manager Hamilton County Water District Board / Mayor City Council	1-2 years	Hamilton County Water District / IEPA State Revolving Loan Fund / Clean Water Initiative	High/High
HM	Install new Burke tank (50,000-gallon elevated tank) to increase capacity and improve system resilience to drought and aid in fire suppression as necessary during natural hazard events.	DR, EC, EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	Yes	n/a	General Manager Hamilton County Water District Board	2 years	Hamilton County Water District / IEPA State Revolving Loan Fund / Clean Water Initiative	Medium/Medium

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the budgetary constraints experienced by small, rural water districts. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

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Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-10
Hamilton County Water District Hazard Mitigation Actions
(Sheet 2 of 2)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Construct drinking water interconnection with Saline Valley Conservancy District to improve system resilience and establish a separate, auxiliary water source for use in the event a natural hazard event impacts Rend Lake.	DR, EC, EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	General Manager Hamilton County Water District Board	3 years	Hamilton County Water District / IEPA State Revolving Loan Fund / Clean Water Initiative	High/High
HM	Purchase and install										
HM	Construct community safe room at District Office in McLeansboro for employee use..	SS, T	S&IP	Small	2	n/a	n/a	General Manager Hamilton County Water District Board	2-5 years	Hamilton County Water District / FEMA Pre-Disaster Mitigation	High/Medium

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to the budgetary constraints experienced by small, rural water districts. Additional funding is necessary if implementation is to be achieved within the time frames specified.

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Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-11
McLeansboro Hazard Mitigation Actions
(Sheet 1 of 4)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
LM	Conduct a feasibility study to determine the appropriateness of constructing an alternate access route across the Evansville Western Railway rail line that bisects the northern portion of the City in order to maintain access to vital services in the event of a train breakdown or derailment. Currently there are only three streets that have at-grade crossings of the rail line and all three crossings are within 2 blocks of each other.	EQ, F, SS, SWS, T	E&A	Medium	2	n/a	n/a	Director / Streets Department	1-3 years	City	Low/Medium
HL	Seismically retrofit the brick bridges on Main Street and Market Street over Rhine Creek.	EQ	S&IP	Medium	2, 3, 5	n/a	Yes	Director / Streets Department	1-3 years	City / IDOT Local Roads / FEMA Pre-Disaster Mitigation	High/Medium
LM	Conduct hydrologic/hydraulic analysis to determine the cause of and identify design solutions to address recurring drainage problems in Hiatt's Addition.	F, SS	E&A	Small	2, 3, 5	n/a	Yes	Mayor / City Council	1-3 years	City / IDOT Local Roads	Medium/Medium
HM	Construct the identified design solutions to address recurring drainage problems in Hiatt's Addition.	F, SS	S&IP	Small	2, 3, 5	n/a	Yes	Mayor / City Council	3-5 years	City / IDOT Local Roads / USDA – RD Community Facilities Programs	High/Medium

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Acronyms

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Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-11
McLeansboro Hazard Mitigation Actions
(Sheet 2 of 4)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Purchase and install an automatic emergency backup generator at the wastewater treatment plant to increase system resilience and maintain operations during extended power outages.	EH, F, SS, SWS, T	S&IP	Large	2, 3, 5	n/a	Yes	Mayor / City Council	1-2 years	City / USDA – RD Community Facilities Programs	Medium/High
LM	Secure a Memorandum of Agreement with the Hamilton County Water District to interconnect water systems to provide Hamilton Memorial Hospital additional capacity in the event the area is impacted by a natural hazard and improve system resilience. Hamilton Memorial Hospital is the only hospital for two counties.	DR, EC, EH, F, SS, SWS, T	LP&R	Medium	2, 3, 5	n/a	Yes	Mayor City Council / General Manager Hamilton County Water District Board	1 year	City	Low/Medium
HM	Construct drinking water interconnection with the Hamilton County Water District to provide Hamilton Memorial Hospital additional capacity in the event the area is impacted by a natural hazard and improve system resilience. Hamilton Memorial Hospital is the only hospital for two counties.	DR, EC, EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	Mayor City Council / General Manager Hamilton County Water District Board	1-2 years	City / IEPA State Revolving Loan Fund / Clean Water Initiative	High/High
HL	Seismically retrofit the Lake McLeansboro Dam to harden it against earthquake damage.	EQ	S&IP	Medium	2, 3, 5	n/a	Yes	Mayor / City Council	1-5 years	City / FEMA High Hazard Dam Rehabilitation Grant Program	High/Medium

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Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-11
McLeansboro Hazard Mitigation Actions
(Sheet 3 of 4)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Purchase and install an emergency backup generator at City Hall to provide uninterrupted power and maintain continuity of government and operations during power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	Mayor / City Council	1-2 years	City / USDA – RD Community Facilities Programs	Medium/High
HM	Purchase and install an emergency backup generator at Fire Station to provide uninterrupted power and maintain continuity of operations during power outages.	EH, F, SS, SWS, T	S&IP	Medium	2, 3, 5	n/a	Yes	Mayor City Council / Fire Chief	1-3 years	City / USDA – RD Community Facilities Programs	Medium/High
LM	Conduct discussions with Southern Illinois Power Co-Op regarding the construct of a secondary electric power loop for the City to increase system resilience to extended power outages.	EH, F, SS, SWS, T	E&A	Large	2, 3, 5	Yes	Yes	Mayor / City Council	1-3 years	City	Low/Medium
HM	Design and install water management controls along Rhine Creek to minimize flood impacts on the east side of the City.	F, SS	S&IP	Medium	2, 3, 5	Yes	Yes	Mayor / City Council	1-7 years	City / IDNR	Medium/Medium
HM	Review the updated Flood Insurance Rate Maps (FIRMs) when they become available. Update the flood ordinance to reflect the revised FIRMs and present both for adoption. *	F	LP&R	Medium	1, 2, 4 6, 7	Yes	Yes	Mayor / City Council	1-5 years	City	Low/High

* Mitigation action to ensure continued compliance with NFIP.

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Acronyms

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Hazard(s) to be Mitigated:			
DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:			
E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-11
McLeansboro Hazard Mitigation Actions
(Sheet 4 of 4)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
HM	Make the most recent Flood Insurance Rate Maps available to assist the public in considering where to construct new buildings. *	F	LP&R	Medium	1, 2, 6, 7	Yes	Yes	Mayor / City Council	1-5 years	City	Low/Medium
LM	Make City officials aware of the most recent Flood Insurance Rate Maps and issues related to construction in a floodplain. *	F	LP&R	Medium	1, 2, 6, 7	Yes	Yes	Mayor / City Council	1-5 years	City	Low/Medium

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Acronyms

Priority

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- LM Mitigation action with the potential to reduce impacts from the most frequent hazards
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Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-12
McLeansboro Township Hazard Mitigation Actions
(Sheet 1 of 2)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure: New	Reduce Effects of Hazard(s) on Buildings & Infrastructure: Existing	Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
LM	Conduct discussions with the County and City of McLeansboro about retrofitting an existing public building and/or constructing a new standalone structure to serve as a community safer room for township residents.	EC, EH, SS, T	E&A	Small	2	n/a	n/a	Supervisor / McLeansboro Township	2 years	Township	Low/Medium
HM	Partner with the County and City of McLeansboro to retrofit an existing public building and/or construct a new standalone structure to serve as a community safe room equipped with emergency backup generator and HVAC units that can also serve as a warming/cooling center for township residents.	EC, EH, SS, T	S&IP	Small	2	Yes	Yes	Supervisor / McLeansboro Township	2-5 years	Township / FEMA Pre-Disaster Mitigation / USDA – RD Community Facilities Programs	High/High
LM	Identify locations that can be used as warming/cooling centers within the township. Secure agreements with and formally designate identified locations that can be used as warming/cooling centers by township residents.	EC, EH	LP&R	Medium	2	n/a	n/a	Supervisor / McLeansboro Township	1-3 years	Township	Low/Medium
HM	Purchase and install emergency backup generators at designated warming/cooling centers to provide uninterrupted power and maintain operations during power outages.	EC, EH	S&IP	Medium	2, 3, 5	n/a	Yes	Supervisor / McLeansboro Township	1-5 years	Township / USDA – RD Community Facilities Programs	Medium/High
HM	Install curb and gutter along Golf Course Rd. to direct the flow of stormwater runoff to drainage structures in an effort to alleviate erosion of the back slope.	F, SS	S&IP	Small	3, 5	n/a	Yes	Supervisor / McLeansboro Township	2-5 years	Township / County / IDOT Local Roads	Medium/Medium

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Acronyms

Priority

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LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-12
McLeansboro Township Hazard Mitigation Actions
(Sheet 2 of 2)

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
						New	Existing				
LM	Install solar-powered warning signs with flashing lights at railroad grade crossings not equipped with gates and signals to alert individuals of impending rail traffic during natural hazard events.	F, SS, SWS, T	E&A	Small	2	n/a	n/a	Supervisor / McLeansboro Township	2-5 years	Township / IDOT Local Roads	Low/High
HM	Replace structures as needed to address scour and erosion damage to piers/abutments caused by heavy rain events and to increase the capacity of the structures to reduce the likelihood of future damage.	F, SS	S&IP	Small	2, 3, 5	n/a	Yes	Supervisor / McLeansboro Township	5-10	Township / County / IDOT Local Roads	High/High
HM	Install erosion control measures along the slopes/abutments of select structures to protect the road and shoulder from erosion and the structure from scour.	F, SS	S&IP	Small	2, 3, 5	n/a	Yes	Supervisor / McLeansboro Township	5-10	Township / County / IDOT Local Roads	Medium/High

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to budgetary constraints experienced by small, rural townships. The Township works hard to maintain critical services to its residents. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

Priority

HM	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the most frequent hazards
LM	Mitigation action with the potential to reduce impacts from the most frequent hazards
HL	Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the less frequent hazards
LL	Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	MS	Mine Subsidence
EC	Extreme Cold	SS	Severe Storm
EH	Excessive Heat	SWS	Severe Winter Storm
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

E&A	Education & Awareness	NSP	Natural Systems Protection
LP&R	Local Plans & Regulations	S&IP	Structure & Infrastructure Projects

Figure MIT-13
South Crouch Township Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Size of Population Affected	Goal(s) Met	Reduce Effects of Hazard(s) on Buildings & Infrastructure: New	Reduce Effects of Hazard(s) on Buildings & Infrastructure: Existing	Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)†	Cost/Benefit Analysis
HM	Repair/replace select roadway culverts as needed to improve bridge resilience, increase carrying capacity and alleviate recurring drainage/flooding problems.	F, SS, SWS	S&IP	Medium	2, 3, 5	n/a	Yes	Supervisor / South Crouch Township	5 years	Township / County / IDOT Local Roads	Medium/High
HM	Replace low-water crossings with bridges in floodprone areas within the Township to eliminate road closures.	F, SS	S&IP	Small	2, 3, 5	n/a	Yes	Supervisor / McLeansboro Township	5 years	Township / County / IDOT Local Roads	High/High

† Identifies the most likely funding source to be pursued for the activity/project described. However, if funding is unavailable through the most likely or other suggested sources, then implementation of medium to large-scale activities/projects is unlikely due to budgetary constraints experienced by small, rural townships. The Township works hard to maintain critical services to its residents. Additional funding is necessary if implementation is to be achieved within the time frames specified.

Acronyms

Priority

- HM Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the most frequent hazards
- LM Mitigation action with the potential to reduce impacts from the most frequent hazards
- HL Mitigation action with the potential to virtually eliminate or significantly reduce impacts from the less frequent hazards
- LL Mitigation action with the potential to reduce impacts from the less frequent hazards

Hazard(s) to be Mitigated:

- DF Dam Failure
- DR Drought
- EC Extreme Cold
- EH Excessive Heat
- EQ Earthquake
- F Flood
- MS Mine Subsidence
- SS Severe Storm
- SWS Severe Winter Storm
- T Tornado

Type of Mitigation Activity:

- E&A Education & Awareness
- LP&R Local Plans & Regulations
- NSP Natural Systems Protection
- S&IP Structure & Infrastructure Projects

5.0 PLAN MAINTENANCE

5.0 PLAN MAINTENANCE

This section focuses on the Federal Emergency Management Agency (FEMA) requirements for maintaining and updating the Plan once it has been approved by FEMA and adopted by the participating jurisdictions. These requirements include:

- establishing the method and schedule for monitoring, evaluating and updating the Plan;
- describing how the mitigation strategy will be incorporated into existing planning processes; and
- detailing how continued public input will be obtained.

These requirements ensure that the Plan remains an effective and relevant document. The following provides a detailed discussion of each requirement.

5.1 MONITORING, EVALUATING & UPDATING THE PLAN

Outlined below is a method and schedule for monitoring, evaluating and updating the Plan. This method allows the participating jurisdictions to review and adjust the planning process as needed, make necessary changes and updates to the Plan and track the implementation and results of the mitigation actions that have been undertaken.

5.1.1 Monitoring and Evaluating the Plan

The Plan will be monitored and evaluated by a Plan Maintenance Subcommittee on an annual basis. The Plan Maintenance Subcommittee will be composed of key members from the Planning Committee, including representatives from all of the participating jurisdictions. The Subcommittee will be chaired by the Hamilton County Emergency Management Agency (EMA). All meetings held by the Subcommittee will be open to the public. The information gathered at each Subcommittee meeting will be documented and provided to all participating jurisdictions for their review and use in the Plan update.

The Hamilton County EMA will be responsible for monitoring the status of the mitigation actions identified in the Plan and providing the Illinois Emergency Management Agency (IEMA) with an annual progress report. It will be the responsibility of each participating jurisdiction to provide a progress report on the status of their mitigation actions at each Subcommittee meeting.

Monitoring & Evaluating

- A Plan Maintenance Subcommittee will be formed to monitor and evaluate the Plan.
- The ***Plan will be monitored and evaluated*** on an ***annual basis***.
- Each participating jurisdiction will be responsible for providing an annual progress report on the status of their mitigation actions.
- ***New mitigation actions can be added*** by participating jurisdictions ***during the annual evaluation.***

The Plan Maintenance Subcommittee will also evaluate the Plan on an annual basis to determine the effectiveness of the planning process and identify any implemented mitigation actions. In addition, the Subcommittee will decide whether any changes need to be made. As part of the evaluation of the planning process, the Subcommittee will review the goals to determine whether they are still relevant or if new goals need to be added; assess whether other natural hazards need to be addressed or included in the Plan; and review any new hazard data that may affect the Risk Assessment portion of the Plan. The Subcommittee will also evaluate whether other County departments should be invited to participate.

In terms of evaluating the effectiveness of the mitigation actions that have been implemented, the Subcommittee will assess whether a project is on time, in line with the budget and moving ahead as planned; whether the project achieved the goals outlined and had the intended result; and whether losses were avoided as a result of the project. In addition, each of the participating jurisdictions will be given an opportunity to add new mitigation actions to the Plan and modify or discontinue mitigation actions already identified. In some cases a project may need to be removed from the list of mitigation actions because of unforeseen problems with implementation.

5.1.2 Updating the Plan

The Plan must be updated within five years of the Plan approval date indicated on the signed FEMA final approval letter. (This date can be found in Section 6, Plan Adoption.) This ensures that all the participating jurisdictions will remain eligible to receive federal grant money to implement those mitigation actions identified in this Plan.

The Hamilton County EMA, with assistance from the Plan Maintenance Subcommittee, will be responsible for updating the Plan. The update will incorporate all of the information gathered and changes proposed at the previous annual monitoring and evaluation meetings. In addition, any jurisdictions that did not take part in the previous planning process may do so at this time. It will be the responsibility of these jurisdictions to provide all of the information needed to be integrated into the Plan update.

Updating the Plan

- The Hamilton County EMA, with assistance from the Plan Maintenance Subcommittee, will be responsible for updating the Plan.
- The Plan ***must be updated within 5 years of the Plan approval date indicated on the signed FEMA final approval letter***.
- Any jurisdictions that did not take part in the previous planning process who now wish to participate may do so.
- Once the Plan update has received FEMA/IEMA approval, each participating jurisdiction ***must re-adopt the Plan to remain eligible to receive federal monies.***

A public forum will be held to present the Plan update to the public for review and comment. The comments received at the public forum will be reviewed and incorporated into the Plan update. The Plan update will then be submitted to IEMA and FEMA for review and approval. ***Once the Plan update has received state and federal approval, FEMA requires that each of the participating jurisdictions re-adopt the Plan to remain eligible to receive federal monies to implement identified mitigation actions.***

5.2 INCORPORATING THE MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS

As part of the planning process, the Planning Committee identified current plans, policies/ordinances and maps that supplement or help support mitigation planning efforts. **Figure PP-3** identifies the existing planning mechanism available by jurisdiction. It will be the responsibility of each participating jurisdiction to incorporate, where applicable, the mitigation strategy and other information contained in the Plan into the planning mechanisms identified for their jurisdiction.

Adoption of this Plan will trigger each participating jurisdiction to review and, where appropriate, integrate the Plan into other available planning mechanisms. The Plan Maintenance Subcommittee's annual review will help maintain awareness of the Plan among the participating jurisdictions and encourage them to actively integrate it into their day-to-day operations and planning mechanisms. Any time a mitigation action is slated for implementation by a participating jurisdiction, it will be integrated into their capital improvement plan/budget.

Currently Hamilton County and all the participating jurisdictions have limited capabilities to integrate the mitigation strategy and other information contained in the Plan into existing planning mechanisms. Two of the three municipalities are very small in size (less than 550 residents) and do not have the financial resources or trained personnel to develop planning mechanisms such as comprehensive plans. None of the participants have building codes and only McLeansboro and the Hamilton County Water District have comprehensive plans in place. While the Southeastern Illinois Regional Planning and Development Commission is available to assist participating jurisdictions with planning and community development, a general reluctance by the participants to implement such policies may hinder implementation.

5.3 Continued Public Involvement

The County and participating jurisdictions understand the importance of continued public involvement and will seek public input on the Plan throughout the plan maintenance process. A copy of the approved Plan will be maintained and available for review at the Hamilton County EMA Office. Individuals will be encouraged to provide feedback and submit comments for the next Plan update to the Hamilton County EMA.

The comments received will be compiled and presented at the annual Plan Maintenance Subcommittee meetings where members will consider them for incorporation into the next Plan update. All meetings held by the Plan Maintenance Subcommittee will be noticed and open to the public. A separate public forum will be held prior to the Plan update submittal to provide the public an opportunity to comment on the proposed revision to the Plan.

6.0 PLAN ADOPTION

6.0 PLAN ADOPTION

The final step in the planning process is the adoption of the approved Plan by each participating jurisdiction. Each jurisdiction must formally adopt the Plan to remain eligible for federal grant monies to implement mitigation actions identified in this Plan.

6.1 PLAN ADOPTION PROCESS

Before the Plan could be adopted by the participating jurisdictions, it was made available for public review and comment through a public forum and comment period. Comments received were incorporated into the draft Plan and the Plan was then submitted to the Illinois Emergency Management Agency (IEMA) and the Federal Emergency Management Agency (FEMA) for their review and approval.

Upon review and approval by IEMA and FEMA, the Plan was presented to the County and participating jurisdictions for adoption. ***Each participating jurisdiction was required to formally adopt*** the Plan to become eligible to receive federal grant monies to implement the mitigation actions identified in this Plan. Any jurisdiction that chose not to adopt the Plan did not affect the eligibility of those who did.

Figure PA-1 identifies the participating jurisdictions and the date each formally adopted the Plan. Signed copies of the adoption resolutions are located in **Appendix N**. FEMA signed the final approval letter on (date) which began the five-year approval period and set the an expiration date of (date) for the Plan.

Figure PA-1 Plan Adoption Dates	
Participating Jurisdiction	**Plan Adoption Date**
Hamilton County	
Broughton, Village of	
Dahlgren, Village of	
McLeansboro, City of	
Hamilton County CUSD #10	
Hamilton County Water District	
Crook Township	
Dahlgren Township	
McLeansboro Township	
South Crouch Township	

Planning Committee Meeting Attendance Sheets

Appendix A

Attendance Sheet

Hamilton County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

November 6, 2019

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Zachary Krug	American Environmental Corp	Specialist
2.	Jackie Parmley	South Crouch Township	Supervisor
3.	Mathew Bryson	Hamilton Co Sheriffs Office	Deputy
4.	Mollie Sivok	Broughton	Clerk
5.	Sue Wilkerson	Village of Dahlgren / Dahlgren Fire Dist	Clerk
6.	Steve Wilkerson	Village of Dahlgren	mayor
7.	Mike Kearns	Hamilton Memorial Hospital	Safety officer
8.	David Harmon	Hamilton County Water Dist.	Water Operator
9.	Lynn Braden	State Farm Insurance	Agent
10.	Christina Epperson	Hamilton Co Unit 10 Preschool	Principal
11.	Sharon Wilson	Crook Township	Supervisor
12.	Robert Wilson	Hamilton Co. Fair	Pres.
13.	Robert Drake	Hamilton Co Water / McLeansboro Twp.	Chairman / Highway Commissioner
14.	Fred Vallowe	City of McL	cityclerk@mcleansboro.net
15.	Jeff Fetcho	Ham Co. CUSD #10	fetchoj@unit10.com
16.	Shannon McFarland	South Flanigan	Road Comm.

Appendix A

Attendance Sheet

Hamilton County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

November 6, 2019

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Justin Webb	McLeansboro Police Dep.	Patrolman
2.	Dorothy Smith	ETSB	Chairman
3.	Jim Morris	McLeansboro Fire Dept	Asst. Chief
4.	John N. Taylor	Hamilton Co. EMA	EMA Director
5.	Mary A. [illegible]	Ham Co. Clerk	Clerk
6.	Richard Woods	McL Township ~~Clerk~~	Clerk
7.	JEFF BERNARD	WAYNE FIRE PROT. DIST. # 1	LT.
8.	Andrea Bostwick	American Environmental	Sr. Project Manager
9.	Sarah Hall	Hamilton Co Treasurer	Treasurer
10.	Gil Rodriguez	Hamilton Memorial Nursing Center	Mgmt Dir
11.	Clydus Gray	McLeansboro Township	Supervisor
12.	Justin Hood	Hamilton Co. State's Attorney Office	State's Attny
13.	Aaron Perryman	Hamilton Co. Highway / Dahlgren Twp	Technician / Clerk
14.			
15.			
16.			

Attendance Sheet

Hamilton County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

November 6, 2019

	Name (Please Print)	*Representing (Jurisdiction/Organization)*	*Title*
1.	Clint Hopfinger	Supervisor of Assessments	
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			

Attendance Sheet

Hamilton County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

March 4, 2020

	Name (Please Print)	*Representing (Jurisdiction/Organization)*	*Title*
1.	[illegible]	City of McLeansboro	Deputy Clerk
2.	Jackie Parmley	South Crouch Township	Supervisor
3.	Dustin Parmley	South Crouch Township	Trustee
4.	Mike Kerans	Hamilton Memorial Hospital	safety officer
5.	Lynn Braden	State Farm Insurance	Agent
6.	Sharon Wilson	Crook Township	Supervisor
7.	Chase Partain	MPD	Patrolman
8.	Justin Webb	Mcleansboro Police Dept.	Patrolman
9.	Andrea Bostwick	American Environmental	EMS Manager
10.			
11.			
12.			
13.			
14.			
15.			
16.			

Attendance Sheet

Hamilton County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

March 4, 2020

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Colton Flannigan	Hamilton Co. State's Attorney	Assistant State's Attorney
2.	Zachary Krug	American Environmental Corp	Specialist
3.	John Taylor	Hamilton Co EMA	EMA Director
4.	Clint Ragan	Unit #10 School	Board - Sec
5.	Dale E Biggerstaff	Hamilton County Water District	General Manager
6.	Sue Wilkerson	Village of Dahlgren/Dahlgren Fire	Village Clerk
7.	Robert Drake	Mcleansboro Twp. Ham Co. WATer	Highway comm. ChAirmAN
8.	Jim Morris	McLeansboro Fire Dept.	Fire Chief
9.	Gilbert Rodriguez	Hamilton Memorial Nursing	Maintenance Dir
10.	Dorothy Smith	911	911
11.	LISA ESSARY	Village of Broughton	Water clerk
12.	LAURA Alley	Village of Broughton	trustee
13.	Ron Smith	Twigg Township	Suppervisor
14.	Clydene Gray	McLeansboro Township	Supervisor
15.	Robert W [illegible]	Crouch Township	
16.	Aaron M. Perryman	Ham. Co. Hwy / Dahlgren Twp	Technician / Clerk

Planning Committee Meeting Minutes

Appendix B

Meeting Minutes

Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee

November 6, 2019
6 P.M.
Laborers' International Union Hall
109 West Market Street, McLeansboro

Committee Members

Broughton, Village of
Crook Township
Dahlgren, Village of
Dahlgren Township
Hamilton County Offices:
- 911
- Assessments
- Clerk & Recorder
- EMA
- Highway Department
- Sheriff's Office
- State's Attorney
- Treasurer

Hamilton County CUSD #10
Hamilton County Fair Board
Hamilton Memorial Hospital District
Hamilton County Health Care Center
Hamilton County Water District
McLeansboro, City of
McLeansboro Volunteer Fire Department
McLeansboro Township
South Crouch Township
South Flannigan Township
State Farm Insurance
Wayne Fire Protection District #1
American Environmental Corp.

Welcome and Introductions

John Nathan Taylor, Chairman of the Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee, welcomed attendees. He indicated that the purpose of this Committee is to develop the Hamilton County Natural Hazards Mitigation Plan.

Handout materials were distributed to each member, including a Citizen Questionnaire. The questionnaire will help gauge residents and committee member understanding of the natural hazards that impact the County and also identifies communication preferences.

What is a Natural Hazards Mitigation Plan?

Andrea Bostwick, American Environmental Corporation (AEC) explained that a Natural Hazards mitigation plan details the natural hazard events that have previously impacted the County and identifies activities and projects that reduce the risk to people and property from these hazards before an event occurs. The natural hazards include floods; tornadoes; severe summer storms (including thunderstorms, hail and lightning events); severe winter storms (including ice and snow storms); extreme heat; drought; earthquakes and dam failures.

Why Should We Develop Our Natural Hazards Mitigation Plan?

Andrea, described why mitigation planning is needed and how participating jurisdictions can benefit. In addition, she detailed the NHMP process.

Since the early 1990s damages caused by weather extremes have risen substantially. In 2018 the United States experienced $90.7 billion in severe storm damages from fourteen (14) severe weather and natural hazard events. The losses experienced in 2018 were the 4th highest only behind 2017, 2015, and 2012. Consequently, the Federal Emergency Management Agency (FEMA) is encouraging counties throughout the United States to prepare and update natural hazard mitigation plans because what they found is that for every dollar spent on mitigation, $6 dollars can be reaped in savings.

Updating this plan provides several major benefits, including:

1.) Specific projects and recommendations will be developed through the planning process to help each participating jurisdiction reduce damages. By including these projects in this Plan, the participating jurisdictions will have an opportunity to receive state and federal funds to complete the projects.

2.) Verifiable information about the natural hazards that occur in Hamilton County will be gathered to help participants in municipal and county meetings make decisions about how to better protect citizens and property from storm damages.

3.) When the next federally-declared natural disaster occurs, Hamilton County and all impacted municipalities who participate in the planning process will receive the full amount of money that they are eligible for from FEMA. Hamilton County has been a part of six (6) federal disaster declarations since 1989.

The Planning Process

The goal of the Committee meetings is to develop a Plan to meet state and federal criteria so that it can be approved by the Illinois Emergency Management Agency (IEMA) and FEMA. Andrea explained that the schedule for this Plan development has been compressed and accelerated due to changes in the grant funding mechanisms. So instead of conducting five meetings, a three meeting process has been developed that will satisfy FEMA's criteria and still provide a draft plan to IEMA by May 1, 2020. Specific activities for the Committee meetings include:

1st Committee meeting	Orientation to the Planning Process Review Critical Facilities & Existing Planning Documents Complete the Severe Weather Shelter Survey Discuss the Risk Assessment Approve Mission Statement & Goals
2nd Committee meeting	Identify completed Mitigation Projects Discuss Additional Mitigation Projects and Activities Review Mitigation Strategy Committee discusses approval/adoption of the Plan
3rd Committee meeting (Public Forum)	Present the Plan for public review Committee helps answering questions from the public

Information Needed from the Committee

Andrea explained that as part of the Plan development process, AEC would need information from each of the participating jurisdictions to help meet the state and federal criteria. Zachary Krug, AEC, distributed the following forms to each participating jurisdiction to review and complete:

Critical Facilities. Completed lists of Critical Facilities will be used to identify facilities vulnerable to natural hazards and will be provided to IEMA and FEMA as a separate supplement. Copies of the Plan made available to the public will not include these lists for security reasons.

List of Existing Planning Documents. This list identifies planning documents (Land Use Plans, Flood Ordinances, and related documents) a jurisdiction already has in place.

Shelter Surveys. Identifies locations designated as severe weather shelters.

Contact Information. Committee members should provide contact information about themselves to help AEC staff during this planning process.

Andrea asked participants to return the completed forms by the next meeting and to let her know if anyone would like electronic copies of the forms.

Severe Weather Events

Committee members were asked to share their memories of severe weather events that have occurred in the County including any damages to critical infrastructure and facilities. Flooding, severe thunderstorms and lightning strikes were mentioned. Other hazard events related include:

- Committee Members talked about the damages of the 1925 Tri-County Tornado that passed through the County.
- Members discussed earthquakes that occurred in 1968 and 2003. The 2003 earthquake caused cracking and settling around the County.
- A tornado caused damage in the County in April 1996.
- An Ice Storm on March 18, 2016 downed power lines and the water towers ito be on back-up power for three days.
- A tree was downed across a road in Dahlgren in May of 2016.
- Water mains were washed out in Dahlgren in February 2018.
- Pavement buckling was experienced on North City Road on August 14-15, 2019.

Andrea asked participants to identify any hazard events that have impacted their jurisdiction by completing the forms titled "***Hazard Event Questionnaire and Critical Facilities Damage Questionnaire.***" The information provided will help supplement the information included in the risk assessment. Participants were also asked if they have any photographs of storm damage they would be willing to provide for inclusion in the Plan.

Andrea then asked the Committee about whether any instances of mine subsidence or landslides had occurred in the County. The Committee Member from Dahlgren indicated that natural gas and water lines have been damaged by mine subsidence. Andrea asked the Committee if they would like to include mine subsidence and/or landslides in the Plan and after a brief discussion the Committee decided that mine subsidence should be included.

Risk Assessment

Andrea began the risk assessment presentation by noting that there have been six (6) federally-declared disasters in Hamilton County since 1989. Approximately 380 natural hazard events have been verified over approximately 50 years in Hamilton County. There have been a minimum of 6 injuries recorded from 3 natural hazard events. A minimum of $5.7 million in property damages and $3.5 million in crop damages have resulted from approximately 59 documented natural hazard events verified in Hamilton County. The actual damage amounts are actually much higher based on several facts:

1.) damage descriptions for many of the flood and thunderstorms event did not include dollar amounts;
2.) damages to roads from heat and freeze/thaws conditions were not included; and
3.) crop damage figures were unavailable for a majority of the events.

The frequency, magnitude and property damages for each category of natural hazard were described.

Severe Storms

Severe storms are the most frequently occurring natural hazard in Hamilton County with 153 events verified since 1981. Five of the six federal disaster declarations include severe storms. Approximately $1.4 million in property damages have resulted from 37 severe storm events. At least 1 injuries can be attributed to a 1991 lightning strike event.

The highest wind speed recorded in the County, not associated with a tornado, is 104 knots (120 mph) on April 19, 2011 near Walpole. The largest hail recorded in the County is 1.75 inches in near Dahlgren on May 26, 2004 and McLeansboro on May 27, 2017.

Severe Winter Storms

At least 115 verified severe winter storms (snow, ice, or extreme cold) have occurred since 1950. Approximately $100,000 in damages resulted from the January 26, 2009 severe winter storm event. No injuries or fatalities were recorded for any of the severe winter storm events.

Between 2000 and 2009 at least 19 severe winter storms took place. There has been 21 new events in the current decade. The record maximum 24-hour snowfall in the County is 11.0 inches at the McLeansboro COOP Station on March 26 & 27, 1947. The coldest recorded temperature is -23°F at McLeansboro COOP Station on January 18, 1930.

Floods
Four of the six federal disaster declarations for Hamilton County are related to flooding. There have been a least 31 verified flood events in Hamilton County, 10 riverine/shallow flood events since 1999 and 21 flash food events since 1996. Approximately $575,000 in property damages resulted from ten of the flood events and $40,000 in crop damages was recorded for the April 1996 flash flood event. No injuries or fatalities were recorded for any of the flood events.

Excessive Heat
There have been 47 *recorded* excessive heat events reported in Hamilton County since 1997. No injuries or fatalities were recorded for any of the excessive heat events.

The hottest temperature recorded in Hamilton County was 113°F at the McLeansboro COOP Station on July 13 & 14, 1936.

Drought
Ten major droughts have occurred during the last four decades – 1983, 1988, 1998, 1999, 2002, 2005, 2007, 2010, 2011 and 2012. The 2007 drought caused an estimated $3.45 million in crop damages. Corn yield reductions were most severe for the 2012 drought when there was a 74.3% reduction in corn yields. Soybean yield reductions were most severe for the 1983 drought when there was a 50% reduction in soybean yields.

Year	Corn	Soybeans
1983	65.7%	50.0%
1988	25.9%	12.5%
1998	1.9%	13.5%
1999	------	15.6%
2002	50.0%	31.7%
2005	17.3%	2.2%
2007	21.4%	39.0%
2010	12.3%	13.7%
2011	12.5%	11.3%
2012	74.3%	14.3%

Tornadoes
Since 1950, 11 tornadoes have been verified in Hamilton County. Three of the six federal disaster declarations for Hamilton County include tornados. A minimum of $3.6 million in property damages has resulted from 8 tornadoes and $10,000 in crop damage was recorded for the June 2015 tornado event. Three of the tornadoes have recorded property damages of at least $250,000 per event. Five injuries can be attributed to two separate tornado events in the County.

The average tornado in Hamilton County is approximately 3.77 miles long and 120 yards wide. The average area covered by a tornado in Hamilton County is 0.25 square miles.

The highest recorded F-Scale rating for a tornado in the County since 1950 is an F4 which occurred on June 2, 1990. The longest and widest recorded tornado in the County was an F3 tornado that occurred on April 19, 1996 and was 400 yards wide and 13 miles long in Hamilton County alone.

Earthquakes
In the previous 200 years, thirteen (13) earthquakes have originated in Hamilton County while multiple earthquakes have originated in adjacent counties. The strongest earthquake felt in the Central U.S. during the 20th Centruy occurred in Hamilton County on November 9, 1968 near Dale with a magnitude of 5.4 and an estimated intensity of VII. The earthquake was felt over all or parts of 23 states and southern Ontario Canada. No injuries or fatalities were reported in the County as a result of any of the events. While no property damages were available, structural damage, such as downed chimneys, cracked foundations, overturned headstones, and collapsed parapets were reported as a result of the 1968 earthquake. While no fault zones or systems are located in Hamilton County, there a multiple geologic structures. There are also three known fault systems located in the immediate region: the Wabash Valley, the Cottage Grove and the Rough Creek-Shawneetown.

Dams
There are 13 classified (permitted) dams located in Hamilton County, according to the U.S. Army Corp of Engineers. Two (2) of these dams are publicly-owned, the McLeansboro Lake Dam and the Dolan Lake Dam, while the 11 remaining dams are privately-owned. Four dams have a “high” hazard classification rating (including both publically-owned dams) which indicates it has a high potential to cause loss of life and property damage in the event of a dam failure. One dam has a hazard classification of “significant” The remaining 8 dams have a hazard classification of “low” or “undetermined”. There are no known dam failures recorded in the County.

Risk Priority Index Exercise

Following the risk assessment, Andrea led the Committee through an exercise that will help calculate the Risk Priority Index for the hazards that have the potential to impact the City. She explained that the Risk Priority Index is a quantitative means of providing guidance for ranking the hazards. This ranking can assist participants in determining which hazards present the highest risks and therefore which ones to focus on when formulating mitigation projects and activities. The findings will be presented at the next meeting.

Mitigation

Mitigation actions include activities and projects that reduce the long-term risk to people and property from the natural hazards discussed in the risk assessment. The purpose of the next meeting is to develop a list of mitigation projects for each participating jurisdiction.

The form titled **“Hazard Mitigation Projects”** was distributed and Andrea indicated this form should be used to submit projects and activities for the Plan. To help the jurisdictions think about and assemble their lists, a 2-page list of potential mitigation projects was included in the handout material along with mitigation project lists from jurisdictions in other counties and excerpts from a FEMA publication on mitigation ideas. A 1-page list of required projects for NFIP-participating jurisdictions was also handed out. These examples can be used to help Committee members when they prepare their list.

She emphasized that submitting a project does not obligate any jurisdiction to complete the project. FEMA is trying to stimulate mitigation to reduce the extraordinary amount of money being expended on storm damages.

Mitigation projects can include studies, structural projects, and information/education activities. She provided advice for completing the mitigation project list including providing a detailed description of the project, the jurisdiction responsible for the project and the time frame to complete the project.

Committee members were encouraged to contact Andrea if questions arise before they return to the next Committee meeting.

Mission Statement & Goals

Zak asked Committee members to review the draft mission statement and goals provided in the meeting materials. Both are necessary to satisfy required elements of the Plan. Zak asked if any revisions need to be made or if additional goals need to be added.

The draft mission statement was reviewed and no revisions were made to the wording.

Zak indicated that the mitigation goals are intended to reduce long-term vulnerabilities to natural hazards and that each action included in the Plan should be aimed at one or more of the goals developed by the committee. These goals were drafted in such a way that they covered all the mitigation projects and activities that were submitted.

The goals were reviewed and no revisions were made to the wording.

The mission statement and goals will be added to the Plan.

Community Participation

Zak stressed the importance of attending each committee meeting and indicated that member participation helps the County meet its 25% match for this grant in addition to assuring that member jurisdictions are eligible for IEMA/FEMA funds. He indicated that tag-teaming and designating substitute representatives is permissible when other obligations arise. Zak pointed out that a designated substitute representative does not have be an official or employee of the jurisdiction.

Providing the public with opportunities to have input is an important part of the planning process. Zak requested that each jurisdiction consider making the **"Frequently Asked Questions"** handout in the meeting packet available for public review within your jurisdiction as well as the **"Citizen Questionnaire"** passed out at the beginning of the meeting.

What Happens Next?

The mitigation project tables will be the main topic of the next committee meeting. Andrea also indicated that the project prioritization methodology would be discussed.

The second meeting of the Committee was scheduled for:

> **Wednesday, February 12, 2020**
> **6 P.M.**
> **Laborers' International Union Hall**
> **109 West Market Street, McLeansboro**

With no further questions the meeting was adjourned.

Meeting Minutes

Hamilton County's Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee

March 4, 2020
6:00 p.m.
Laborers' International Union Hall
109 West Market St, McLeansboro

Committee Members

Broughton, Village of
Crook Township
Dahlgren, Village of
Dahlgren Township
Hamilton County Offices:
- 911
- EMA
- Highway Department
- State's Attorney

Hamilton County CUSD #10
Hamilton County Fair Board
Hamilton County Water District
Hamilton County Water District
Hamilton Memorial Hospital District
Hamilton Memorial Health Care Center
McLeansboro, City of
McLeansboro Township
McLeansboro Volunteer Fire Dept
South Crouch Township
State Farm Insurance
Twigg Township
American Environmental Corp.

Welcome

John Nathan Taylor, the Hamilton County EMA Director, welcomed attendees. He indicated that the purpose of this Committee is to develop the Hamilton County's Natural Hazards Mitigation Plan.

Handout materials, including the draft mitigation project tables, were distributed to each Committee member.

Andrea Bostwick, American Environment Corp. (AEC), provided a brief recap to reorient Committee Members as to what has been accomplished. She noted that the Committee has accomplished all of its objectives up to this point and is on schedule.

Critical Facilities Vulnerability

Andrea discussed critical facilities vulnerability and asked the Committee Members to complete a three question survey to help identify:

1.) What each jurisdiction's greatest vulnerabilities are and why; and
2.) Each jurisdiction's most vulnerable assets.

She also asked each participating jurisdiction to provide a list of permanent backup generators associated with critical infrastructure. Andrea explained this information would be used as part of the vulnerability analyses.

Risk Priority Index Exercise Results

Andrea then presented the results of the Risk Priority Index Exercise which was conducted at the November 6, 2019 meeting. She provided the Committee with a brief recap on what the Risk Priority Index is and how it can help participants determine which hazards present the highest risk and therefore which ones to focus on when formulating mitigation projects and activities.

Based on the Committee's responses, thunderstorms with damaging winds scored the highest, followed by heavy rain, tornadoes and floods. The hazards that scored the lowest included lightning, dam failures, and landslides.

Mitigation Actions Prioritization Methodology

The Mitigation Actions Prioritization Methodology outlines the approach used to classify each mitigation action identified by the participating jurisdictions and is a required element of the Plan's mitigation strategy. As part of the Plan development process, a methodology needs to be selected.

Andrea explained that mitigation actions can be prioritized in a number of ways and provided information on two different methodologies. The Committee asked questions and after discussing the pros and cons of both options, the Committee chose the methodology based on two key factors:

1) Frequency of hazard—severe storms occur more frequently than earthquakes.
2) Degree of mitigation—some projects will *significantly reduce* damages while other projects only have the potential to reduce damages.

This methodology helps objectively identify which projects and activities have a greater likelihood to significantly reduce the long-term vulnerabilities associated with the most frequently-occurring natural hazards.

Andrea acknowledged that while this methodology does not take cost or politics into consideration, these factors may affect the order in which projects are implemented. She also noted that it is important to keep in mind that implementing all of the mitigation projects is desirable regardless of which prioritization category they fall under.

Mitigation Projects

Andrea reminded the Committee Members that mitigation actions are those projects and activities that reduce the long-term risk to people and property from the natural hazards that impact the County. She then described how the lists of mitigation actions provided by each jurisdiction, the Mitigation Actions Prioritization Methodology, the goals and other information were used to complete the Mitigation Actions Tables handout.

Andrea using a frequently requested project – a community safe room – to walk the Committee through how a typical project is prioritized and entered into the mitigation action tables. She described how each column in the Mitigation Action Table would be completed for this example project.

Andrea explained that the information in the Mitigation Action Tables handout was prepared by AEC. Andrea thanked the Committee Members for assembling their lists of mitigation projects and activities. The participants did a wonderful job preparing their lists. Committee members were then asked to review the Action Tables containing the descriptions of the mitigation projects and activities. Andrea moved throughout the room to discuss questions with each member. Some additional mitigation projects were provided and will be added to these tables. Andrea advised Committee Members who wished to add additional to provide them to her as soon as possible.

Participants were reminded that this is a list of projects and activities they would like to see accomplished if the money becomes available. Also, for a jurisdiction to be eligible for a project, it must be on its list.

Since this is a mitigation plan, some projects were either removed or not included if they were now consider mitigation. Projects associated emergency preparedness/response, recovery, and maintenance will not be included in the Plan.

Public Forum and Adoption

The final Committee meeting will be conducted as an open-house style public forum to present the draft Plan for review and comment. A paper copy of the draft Plan will be available for review at the meeting and posted online on the County's website. There will be a one-week public comment period following the public forum.

Unless otherwise specified, Committee members will receive an electronic copy of the draft plan to make available for public comment.

Once the comment period is over any comments received will be incorporated into the Plan and submit it to IEMA/FEMA. Following IEMA and FEMA review, any edits requested will be made and then FEMA will issue an Approval Pending Adoption (APA) letter. At this point an email will be issued to all the participating jurisdictions with a copy of a model adoption resolution attached asking them to formally adopt the Plan by resolution and provide a copy of the signed resolution to Andrea or Mr. Taylor.

Plan Maintenance and Update

Zak then described the Plan maintenance and update commitments that are detailed in the Plan. A subgroup of the Planning Committee will meet annually, under the direction of the Hamilton County EMA, to report on the progress of their projects, make any additions or edits to their project lists, evaluate the effectiveness of the Plan and provide information on any events that have occurred since the Committee met previously. The information gathered at these annual meetings will be provided to IEMA and will make the five year Plan update process easier.

Every five years, the Plan must be reviewed, revised and resubmitted to IEMA/FEMA to remain eligible for mitigation project funds. At the five year update, any jurisdiction that did not take part in the previous update but who now wished to become part of the Plan may do so. Any new jurisdiction must supply the same information that all of the current jurisdictions supplied.

What Happens Next?

The public forum will be held on:

> **Thursday, April 23rd, 2020**
> **Laborers' International Union Hall**
> **109 West Market Street**
> **6 P.M. – 8 P.M.**

Public Comment

With no additional questions or comments raised, Mr. Taylor adjourned the meeting.

After conversations between AEC and the Hamilton County EMA, the public forum scheduled for Thursday, April 23rd was cancelled due to the COVID-19 outbreak and Executive Orders 2020-10, 2020-18 and 2020-32 which extends the stay-at-home order and prohibits any gathering of more than ten people through Sunday, May 31st. Given the May 31st Plan submission deadline and the extension of the stay-at-home order, IEMA and FEMA agreed to allow the County to place the draft Plan online for review and comment and conduct the Public Forum via teleconference. The Plan will be made available on the County's website from May 13 through May 20, 2020. The Public Forum will be held on May 13 at 4:30 P.M. The Committee members and public were notified of the change.

CITIZEN QUESTIONNAIRE

APPENDIX C

QUESTIONNAIRE

Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Plan

You can help protect lives and property from natural hazard events in the County by taking a few moments to complete this questionnaire.

1. Please indicate where you live in the County:

   - ☐ Belle Prairie City
   - ☐ Broughton
   - ☐ Dahlgren
   - ☐ Dale
   - ☐ Macedonia
   - ☐ McLeansboro
   - ☐ Unincorporated Hamilton County
   - ☐ Other (please specify): ______________________________

2. Please place a check mark next to each of the natural hazards listed below that you have experienced in the County. (Please check all that apply.)

   - ☐ Severe Summer Storms (thunderstorms, hail and/or lightning strikes)
   - ☐ Floods
   - ☐ Severe Winter Storms (snow, sleet, ice and/or extreme cold)
   - ☐ Excessive Heat
   - ☐ Tornadoes
   - ☐ Drought
   - ☐ Earthquakes
   - ☐ Land/Mine Subsidence
   - ☐ Landslides
   - ☐ Other (please specify): ______________________________

3. Which of the natural hazards above have you encountered most frequently?

   ____

   ____

4. Rank the natural hazards listed below in order from 1 to 9 based on which hazard ***you feel*** poses the greatest threat. (1 = greatest threat and 9 = least threat).
   <u>Each number should only be used once.</u>

   - _____ Severe Summer Storms
   - _____ Floods
   - _____ Severe Winter Storms
   - _____ Excessive Heat
   - _____ Tornadoes
   - _____ Drought
   - _____ Earthquakes
   - _____ Land/Mine Subsidence
   - _____ Landslides

5. What types of mitigation projects or activities are most needed in the County? (***Please check the five*** you feel are most important.)

- ☐ Public information fact sheets and brochures describing actions residents can take to protect themselves and their property against natural hazard impacts
- ☐ Floodplain Ordinances
- ☐ Building Codes and Enforcement
- ☐ Sirens or other Alert Systems
- ☐ Flood or Drainage Protection (If selected, please check the type(s) of flood or drainage activity that is needed below.)
  - ☐ Culvert and drainage ditch maintenance
  - ☐ Retention pond construction
  - ☐ Dam or levee construction/maintenance
  - ☐ Hydraulic studies to determine cause of drainage problems
- ☐ Maintain power during storms by burying power lines, trimming trees and/or purchasing a back-up generator
- ☐ Tornado Safe Shelters
- ☐ Maintain roadway passage during snow storms and heavy rains
- ☐ Provide sufficient water supply during drought
- ☐ Identify residents with special needs in order to provide assistance during a natural hazard event
- ☐ Retrofit critical infrastructure (public water supplies, schools, sewage treatment facilities, bridges, hospitals and other important services) to reduce potential damages
- ☐ Other (please specify): ______________________________

6. What are the most effective ways ***for you*** to receive information about how to make your household and property safer from natural disasters? (Please check all that apply.)

- ☐ Newspapers
- ☐ Television
- ☐ Radio
- ☐ Internet
- ☐ Schools
- ☐ Social Media (Facebook, Twitter, etc.)
- ☐ Mail
- ☐ Fact Sheet/Brochure
- ☐ Extension Service
- ☐ Public Workshops/Meetings
- ☐ Fire Department/Law Enforcement
- ☐ Public Health Department
- ☐ Municipal/County Government
- ☐ Other (please specify): ______________________________

Thank you for your time in assisting with the development of the County's Hazards Mitigation Plan.

Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee

FREQUENTLY ASKED QUESTIONS FACT SHEET

APPENDIX D

Frequently Asked Questions

Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Plan

1) **What is the Hamilton County Natural Hazards Mitigation Plan?**
The Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Plan evaluates damage to life and property from natural hazards in the County and identifies projects and activities that can reduce these damages. The Plan is considered to be multi-jurisdictional because it includes municipalities and other jurisdictions (fire protection districts, schools, hospitals, etc.) who want to participate.

2) **What is hazard mitigation?**
Hazard mitigation is any action taken to ***reduce*** the long-term risk to life and property from a natural hazard.

3) **Why is this Plan being developed?**
The Plan fulfills federal planning requirements of Section 104 of the Disaster Mitigation Act of 2000 and the Stafford Act. Developing this Plan fulfills federal requirements that provide these benefits:
   - Funding ***following*** declared disasters.
   - Funding for mitigation projects and activities ***before*** disasters occur.
   - Increased awareness about natural hazards and closer cooperation among the various organizations and political jurisdictions involved in emergency planning and response.

4) **Who is developing this Plan?**
The Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee is developing the Plan with assistance from technical experts in emergency planning, environmental matters, and infrastructure. The Committee includes members from education, emergency services, insurance, municipal, township and county government, health care, and law enforcement.

5) **How can I participate?**
You are invited to attend public meetings of the Hamilton County Natural Hazards Mitigation Planning Committee. In addition, you are encouraged to provide photographs, other documentation, and anecdotal information about damages you experienced from natural hazards in Hamilton County. Surveys will be available at participating municipalities and through Hamilton County to help gather specific information from residents. All of this information will be used to develop the Plan. The draft Plan will be presented at a public forum for further public input.

More information can be obtained by contacting:

John Nathan Taylor, Director
Hamilton County Emergency Management Agency
100 South Jackson Street
McLeansboro, Illinois 62859
(618) 643-3744
hcema@hamiltonco.us

MEDIA OUTLETS SERVING THE COUNTY

APPENDIX E

Media Outlets Serving Hamilton County

McLeansboro Gazette (weekly)
P.O. Box 256
Mcleansboro, Illinois 62859
618-438-6397
http://hchs-il.com/McLeansboroGazette.htm

PRESS RELEASES AND NEWS ARTICLES PUBLISHED

APPENDIX F

Hamilton County Emergency Management

100 South Jackson Street

McLeansboro IL

Phone 618.643.3744 Fax 618.643.5114 Email hcema@hamiltonco.us

Contact: John Nathan Taylor

Reducing Damages Caused By Severe Weather

McLeansboro, IL (10/17/2019) — Hamilton County will develop its plan to reduce the damages caused by natural hazards such as floods, thunderstorms with damaging winds or hail, snow and ice storms, tornados, drought, and excessive heat, among others. The plan is called a Natural Hazard Mitigation Plan and the process to develop it will be funded through a grant from the Illinois Emergency Management Agency (IEMA).

"The goal of this Plan is to identify projects and activities that will reduce the impacts to residents and property from natural hazard events", said John Nathan Taylor, Hamilton County Emergency Management Agency Director. "This Plan is different from an emergency response plan because it focuses on ways to reduce and prevent damages before they occur", added Taylor.

The Hamilton County Hazard Mitigation Planning Committee will hold its first meeting to update the plan on Wednesday, November 6th, 2019, at the Laborers' International Union Hall, 109 West Market Street, in McLeansboro, beginning at 6:00 P.M. This Committee, comprised of County and municipal representatives as well as technical partners and stakeholders, will meet over the next several months to update the Plan. Meetings of this committee will be conducted as working sessions so that any interested resident can attend and ask questions.

The process to develop this Plan as well as the frequency and damages caused by severe storms and other natural disasters in Hamilton County will be discussed at this first meeting. "The purpose of this meeting is to identify how often severe weather events occur within the County and what kinds of damages have resulted. Based on this information we will begin to develop each participant's list of mitigation activities and projects," said Taylor.

After a draft of the Plan is prepared, a public forum will be held to present the Plan for review and comment. The draft Plan will be revised based on comments from the public and the state and federal government agencies. Following these revisions, the Plan will be presented for adoption at public meetings held by the County and at each of the participating municipalities.

Appendix F

McLeansboro Gazette

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C&S Media, a division of Reppert Publications

Publishing News From McLeansboro and Hamilton County Weekly

Trick-or-Treat with Kiwanis

MCLEANSBORO - During the City-Wide Trick-or-Treat celebrations of Halloween night, the Kiwanis Club of Hamilton County invites the community to bring their little trick-or-treaters to Edgar Satterfield Kiwanis Park on Thursday, October 31st. The event will begin at six o'clock that evening.

Be sure to dress your best and get there fast; the first 225 kids will receive a filled Halloween bucket from the McLeansboro Kiwanis Club!

See you soon, wishing you a Happy Halloween, Hamilton County!

Questions Raised About the New Ambulance Service

City Council Looks at Cutting Costs, Applying for Grants

By Tyler Bourland
McLeansboro Gazette

The City Council of McLeansboro recently discussed looking into alternative means of paying for expenditures. One such way is by the means of grants.

During Aldermen reports at the October 8 regular meeting of the City Council, City Alderman Dale Biggerstaff discussed how applying for grants would be a way to lower monthly and yearly expenditures for McLeansboro.

Biggerstaff mentioned ... spending a lot on City improvements. Later in the meeting, he elaborated, "Grants are great when you get them." He then added that its the "waiting for the money to actually show up" that is the challenge. The City did not discuss grants any further.

Zoning Administrator Pat Stevens expressed that Unit 10 has shown interest in a building program. Such program would allow Jr./Sr. High students in Hamilton County to earn course credit via firsthand construction experience. Students are currently a part of such ... dry" and there is no funding available for roads at this time.

The engineer for Shawnee Professional Services, the company overseeing the two projects concerning the water mains and the water tower, provided oversight with recommendations for the award of Contract C. As of late, the anticipated project cost has been exceeded and is now projected at $2.7 million.

Shawnee Services recommends cutting back on parts of the project. The group also explained a "highly-recommended" ... ly approved the engineer's recommendation. The City's water projects will be finished by Fall 2020 at the latest.

Shawnee Services did not have much to provide the Council in the presentation of the Preliminary Engineering Report. "I have been in contact with Senator Fowler for grants to lower repair costs."

Shawnee Services moved on to the tenth item on the agenda, "Discussion and/or action on recommendations from the smoke test of the sanitary water mains." The amount for their services while serving on this not-for-profit corporation and what ration? What will be the term of each person appointed?

3. Is someone going to be hired as an employee or director of this not-for-profit corporation and if so, how much money will be required for that position? Who will have the authority to hire such a person and to establish the pay rate per year?

4. Since the ambulance of the for-profit corporation will be donated to the not-for-profit corporation, where will these vehicles and how many of them will be housed? Will Mr. Mike Harre offer to supply space from his building where the ambulances are currently housed, and if so, how much rent will be requested- medics Staff: who will train and hire additional people on a voluntary basis to serve as ambulance volunteers? Will a specially-licensed state trainer be provided, or will someone with a license to train personnel be available? Who pays for that, and who makes the decision to pay the director or appointed board? If volunteers are not able to be secured and this not-for-profit would be forced to secure paid full-time ambulance personnel, one can immediately see how the costs for such personnel would rise well beyond the $200,00.00 the County of Hamilton would provide. In this case, would the County of Hamilton Board increase the $200,000 amount? If so, how much will it cost to continue in this not-for-profit venture?

Reducing Damages from Severe Weather

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"The goal of this Plan is to identify projects and activities that will reduce the impacts to residents and property from natural hazard events", said John Nathan Taylor, Hamilton County Emergency Management Agency Director. "This Plan is different from an emergency response plan because it focuses on ways to reduce and prevent damages before they occur", added Taylor.

The Hamilton County Hazard Mitigation Planning Committee will hold

Continued on Page 2

...ket Street, the amount of $5,061.16 was approved by the City Council.

The City Council acknowledged a TIF application interest from Harold and Phyllis Vanover at 110 West Market Street, but decided to table this open session.

Following, Tyler Wellen was approved to be hired by the City as a laborer for the Water Department.

The City also formally recognized the employment of John Nathan Tay- for the December 7, 20... City Christmas Parad... at 6:00 p.m. was also ap... proved. The specifics ... such will be revealed at ... later time.

The City also dis... cussed an ordinance tha... would authorize the issu...

Building Plans for Hamilto...

By Tyler Bourland
McLeansboro Gazette

A flood of change has rushed over the County of Hamilton Board as of late. For the Board, that water has been inviting and appears to provide extreme potential for taxpayers.

Currently, the County houses its highway trucks at Dave's Towing, a business that has become a centerstone of sorts for the County's road operations.

At the October 17 Special Meeting of the County Board, held in the Law Library of the Hamilton County Courthouse, the County Board explained that replacement of current buildings for the Highway Department is projected at $360,000.

This figure is not one taken lightly, a gesture easily noticed as the dollar amount was mentioned at the County meeting.

However, a recent price drop in a local property sale seems to have lifted the corners of the Board members mouths.

As a proposition was discussed for the purchase of the Kermit Webb building, frowns quickly turned into smiles, as the Board listened to the current price tag of the property.

"$160,000." With the current road building falling down, the County is in a desperate moment to find adequate housing for the County's machinery, especially with Winter on its way. The timely purchase of the Kermit Webb building gives them such housing...and so much more.

Board member Miller explained that the fuel tanks from FS would simply have to be moved, and all other factors would be just as easily transportable.

Member Chad Ma... proposed a key fob syste... being set up at the gate t... the facility, so the Coun... ty would always kno... exactly who was comin... and going. May expresse... that it is a way of keepin... people honest and to pro... tect the investments of th... County and its taxpayers.

It was also mentione... that the Sheriff's Depart... ment could also store ve... hicles there, as well. State... Attorney Justin Hood ex... pressed that it is a facilit... "good for multi-use".

The building is described as having fou... bays, permitting County mechanics to properl... work on County vehicles. "Its on an 8-inch thick concrete slab," noted Membe... Miller. He explained thi... is especially good in th... Winter.

The proposal of the...

McLeansboro Natives Gi... to Their Hometown

McLeansboro native Carl Mauck, excelled on the MTHS and SIU football teams before entering a 13-year NFL playing career and 21 years as an NFL offensive line coach. However, his contributions go beyond the football

Giving Back *Continued from Page 1*

Pictured (LEFT TO RIGHT): Tim Mauck, Dr. Walter Mauck, Carl Mauck, Fr. George Mauck.

Father George Mauck, established a scholarship in memory of their parents. Walter Mauck, Sr. was a WWII veteran and employed at the McLeansboro Post Office. Aurelia was an administrative secretary for McLeansboro School District for over 20 years.

The Walter and Aurelia Mauck Scholarship was established to provide financial assistance to a Hamilton County student attending SIUC. Preference is given to students who plan to enter theology, medical arts, or education. A minimum 3.25 GPA must be maintained to qualify for renewal of the scholarship. The Mauck family's devotion to their hometown is demonstrated through the establishment of this scholarship.

Students interested in applying will find the scholarship application available online at https://siu.academicworks.com/opportunities/17593. Deadline to apply is December 1, 2019. For questions: 618-453-4628 or www.scholarships.siu.edu.

Reducing Damages from Severe Weather Continued from Page 1

its first meeting to update the plan on Wednesday, November 6th, 2019, at the Laborers' International Union Hall, 109 West Market Street, in McLeansboro, beginning at 6:00 P.M. This Committee, comprised of County and municipal representatives as well as technical partners and stakeholders, will meet over the next several months to update the Plan. Meetings of this committee will be conducted as working sessions so that any interested resident can attend and ask questions.

The process to develop this Plan as well as the frequency and damages caused by severe storms and other natural disasters in Hamilton County will be discussed at this first meeting. "The purpose of this meeting is to identify how often severe weather events occur within the County and what kinds of damages have resulted. Based on this information we will begin to develop each participant's list of mitigation activities and projects," said Taylor.

After a draft of the Plan is prepared, a public forum will be held to present the Plan for review and comment. The draft Plan will be revised based on comments from the public and the state and federal government agencies. Following these revisions, the Plan will be presented for adoption at public meetings held by the County and at each of the participating municipalities.

Hamilton County Retired Teachers Attend Convention

The Illinois Retired Teachers Association (IRTA) held its biennial convention on October 14-15 in Springfield, Illinois. Attending from the Hamilton County Retired Teachers Association were Doris Heaton, Diane Kunkel, and Ann Johnson. Doris Heaton, HCRTA president, was re-elected as IRTA State Secretary. Ann Johnson and Diane Kunkel served as HCRTA delegates.

Illinois Supreme Court Chief Justice Lloyd Karmeier opened the convention with the keynote address. Karmeier is known for his candid thoughts on the American justice system, its importance in democracy, and its responsibility to ensure that protections are available to all, equally. In 2015 he authored the opinion after the Illinois Supreme Court unanimously overturned the State's attempt to diminish educator pension and health benefits.

The IRTA Delegate Assembly elected officers for the 2020-2021 biennium. The officers who will begin their positions on January 1, 2020 are: President, John Flaherty, Coal Valley; Vice President, Bill Funkhouser, Godfrey; Secretary, Doris Heaton, Hamilton County; and Treasurer, Don Ostrom, Mascoutah.

Continued on Page 4

Bernadine's Happenings

Appendix F

TN where

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C&R Media, a division of Reppert Publications
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Community Cleans up Brush at Viaduct

Members of Ten Mile Church, the McLeansboro Volunteer Fire Department, the McLeansboro Police Department, and the Hamilton County Sheriff's Department all pitched in time on the morning of Saturday, October 20 to clean growth and debris from the McLeansboro viaduct, located on West Randolph Street. (LEFT) A smoky haze from machinery fills the air as Assistant Fire Chief Jim Morris spots a leaning tree, while Chief of Police John Nathan Taylor works through it with a chainsaw. (RIGHT) The viaduct after two brush piles had been removed and taken away. (PHOTO CRED. TYLER BOURLAND)

Memorial Stolen from Cemetery

By Tyler Bourland
McLeansboro Gazette

PIOPOLIS- A red tractor memorial originally placed at the grave of Maurice "Morris" Kirsch was recently stolen around Wednesday of last week. Anyone with knowledge of the whereabouts of said memorial are asked to provide details to the proper authorities.

The memorial was made by loved ones to be laid at Kirsch's grave. "I hope your consciousness leads you to bring it back," says one concerned family member. The incident has been reported to the Hamilton County Sheriff's Department.

The family asks that the tractor be returned undamaged to the grave. "They could bring it back anonymously, no questions asked."

Investigation is pending.

Brown Appears in HamCo Court

By Tyler Bourland
McLeansboro Gazette

Kendell Brown, 24, of McLeansboro was recently on the Hamilton County Courthouse lawn on October 10, 2019 for multiple offenses, including Criminal Damage to State Supported Property.

Brown's bond first appearance was on October 16 and his bond date was October 17.

Brown will appear in court again on November 7, 2019 at 10:30 a.m. for a preliminary hearing. Judge Vaughan will preside.

IECC Searches for New Chancellor

Illinois Eastern Community College District #529 Board of Trustees Chairman G. Andrew Fischer is announcing an invitation for applications for the position of Chancellor of the District.

The Chancellor succeeds Terry Bruce, who has served over twenty-three years as the Chief Executive Officer of the District. IECC is searching for a leader who can build on our history, while inspiring and championing a collective vision for the future. Responsibilities include working with the Board of Trustees; articulating and promoting a vision and values; leading strategic, collaborative efforts to expand and enhance educational opportunities and services for our students and communities; serving as a highly visible advocate for the District; inspiring employees to ensure academic excellence; providing fiscally astute leadership; and participating in the legislative process.

Founded in 1969, IECC is regulated by the Illinois Community College Board, accredited by the Higher Learning Commission, governed by an elected Board of Trustees, and led by the Chancellor. IECC is a multi-college district serving its mission through Frontier Community College in Fairfield, Lincoln Trail College in Robinson, Olney Central College in Olney, Wabash Valley College in Mt. Carmel, and the District Office in Olney.

IECC serves over 1,600 degree or certificate seeking students and has a total headcount of over 26,000 including workforce education training, dual credit, and community education students. The community includes over 3,000 square miles, 12 counties, and 108,000 people in southeastern Illinois.

Informational Meeting Announced for Discussion of 'New Illinois'

The Movement to Split the State of Illinois

G.H. Merritt

(Carmi, IL – Oct. 28, 2019)—On Saturday, November16, from 1:00 PM – 3:00 PM, New Illinois, Inc. will hold an informational meeting in Floral Hall at the White County Fairgrounds, 201 Fairground Road, Carmi, IL.

Speakers will include:

- Illinois State Rep. Darren Bailey, co-sponsor of the resolution to create the 51st state
- G. H. Merritt, co-founder and chairman of New Illinois
- Paul Preston, president of New California (via Skype)
- Paul Durr, Chairman, New Illinois St. Clair County Committee
- Josh West, New Illinois White County Committee

Paul Preston, co-founder and president of New California, will discuss the history and progress of the state split movement in California. New California has been in operation since 2016. Preston will be sharing ideas and strategies with supporters of a state split in Illinois.

"The United States Constitution gives us the RIGHT to representative state government. But Illinois is a corrupt, failed state. Illinois gives power to favored people, groups and cities—which means it's not fulfilling its responsibilities to the rest of its citizens. And now this corruption has created a financial disaster.

The United States Constitution also gives us the RIGHT to pursue a split from Illinois to form a new state. Article IV, Section 3 provides us with the process."

There is no cost to attend. There are no reservations; seating is on a first come basis. RSVPs help us to plan, however, and can be sent via NewIllinoisState@gmail.com, the New Illinois Facebook page, or (847) 845-9293.

About New Illinois

Incorporated in 2018 and active throughout the State, New Illinois is a nonprofit organization with the mission of educating Illinoisans about their rights, under the U.S. Constitution, 1) to representative government and 2) to pursue a state split. New Illinois envisions a NEW State free from a tyrannical form of government, where residents will be able to experience a government representing their Constitutional Rights.

For more information about this topic or to schedule an interview, please call the New Illinois office.

Student Success Highlighted at 2019 Upward Bound Banquet

INA, Ill. (Oct. 29, 2019) – The Upward Bound program at Rend Lake College recognized all of its students' accomplishments at the annual Upward Bound Banquet, held RLC's James "Hummer" Waugh Gymnasium.

This year's event praised dozens of local students for their involvement in the academic year program, as well as the summer program. The academic year program focuses on achievement in the classroom, team building, and goal setting activities. The summer features an intensive program in which students are enrolled in college classes, take part in a one-week residential component and are rewarded at the end of their summer with a trip to a major city where they are treated to a variety of cultural and educational activities, as well a visit to a local university. Some students also take part in trips throughout the year and others enroll in RLC credit courses.

During the awards aspect of the banquet, students received certificates for participation in the Upward Bound program and the summer program during the 2018-19 year, for earning straight As, for perfect attendance, for receiving RLC college credit, and many others.

The RLC Upward Bound program is a federally funded college preparatory program designed to provide academic support, personal and career counseling, and cultural and social enrichment to high school participants who have the academic ability to be successful in college. Services are provided at no cost to the student.

Continued on Page 2

Upward Bound 2018-19 School Year participants from Hamilton County Senior High School. From left: Chloe Greenwood, Kristin Gibson, Brianna Johnson, Kyliee Waggoner, Austin Alverth, Lilli Malone, Emilie Green and Shelby Taylor. (PHOTO CRED. REND LAKE COLLEGE)

Appendix F

4-H Recognizes Achievement in Budding Leaders

The 2019 Hamilton County 4-H Achievement night was held on Monday, October 28 in the courthouse basement. All 4-H members were recognized for their achievements over the past year. Paula Hatfield welcomed members, parents and guest as the evening began. The 4-H Club leaders were recognized for years of service as follows:

Barbwire Gang
Dianna Robinson 7 yrs.
Lauren Taylor 1 yr.

County Line Crew
Chris Maxwell 10 yrs.
Glenna Maxwell 10 yrs.

Funny Farmers
Audera Willis 2 yrs.

Pioneer Country Kids & Clovers
Michele Lueke 15 yrs.

Piopolis Busy Bees
Jewell Wilson 42 yrs.
Deanna Erwin 28 yrs.
Ethan Erwin 2 yrs.

The leaders are often helped by older members, that we call Junior Leaders:

Barbwire Gang
Courtney Lynn
Danielle Lynn

County Line Crew
Leslie Davis
Maddi Maxwell
Elaine Miller
Kate Miller
Madison Miller
Camryn Parker

Piopolis Busy Bees
Levi Erwin
Drew Rawls

A couple of years ago, a new opportunity became available for older teens to serve in a leadership role. We are fortunate to have several teens that have stepped up to take on this challenge. These members help with the weekly gardening and cooking classes. The classes would not be possible without their help. These Teen Teachers were recognized: Courtney Lynn, Danielle Lynn, Maddi Maxwell, Elaine Miller, Kate Miller, Camryn Parker, and Ava Winternheimer.

Cloverbuds being recognized were Lainey Davis, Emma Hood, Brinkley Sutton, Karli Wellen and Kelci Wellen. Serenity Smith and Cecelia Lueke were recognized as first year members.

Recognition and awards have been an important part of 4-H. From the earliest days of 4-H, we have known that the wise use of recognition helps motivate youth. Recognition encourages young people and increases their interest in the opportunities that are available to them.

The Illinois 4-H program offers many EXPERIENCES for its members. This area offers recognition for members who are involved in diverse 4-H experiences in club, county, multi-county, state, national, and international levels. Applications are divided into four dimensions Participation, Community Service, Leadership, and Project Learning. Based on the number of the member's experiences, they will achieve one of 5 levels: Bronze, Silver, Gold, Diamond or Emerald.

To achieve Bronze Clover Award a member must complete one experience in each of the four dimensions. Bronze Award winners were Caden Dean and Cambri Dean.

To receive a Silver Clover Award a member must complete 2 experiences in each of the four dimensions: at least 2 of those experiences must be at the county level or beyond.

Those receiving the Silver Clover Award were: Londynn Browning, Aydan Hood, Cecelia Lueke, Madison Miller, Serenity Smith, Nash Sutton, Talan Sutton, Jenna Wilson, and Laynna Wilson

In order for a member to receive the Gold Clover Award he or she must complete 4 experiences in each of the four dimensions: at least 2 of those experiences must be beyond the county level.

Those receiving Gold Clover Award were: Samuel Clark, Emilee Cox, Sarah Darnell, Hayden Davis, Leslie Davis, Levi Erwin, Maddie Karcher, Caroline Lueke, Samuel Lueke, Courtney Lynn, Danielle Lynn, Maddi Maxwell, Elaine Miller, Kate Miller, Camryn Parker, Caitlyn Richards, Drew Rawls, Lily Rawls, Shiloh Willis, and Ava Winternheimer.

If a member reaches Diamond or Emerald status on the Individual Experience Application they can compete on a state level. These members will submit their applications for state recognition.

To be considered for the Diamond Clover Award a member must complete 6 or more experiences in one dimension: at least 4 of those experiences must be beyond the county level.

Elaine Miller will apply for the Diamond Clover Award at the state level.

To be considered for the Emerald Clover Award a member must complete 8 or more experiences in one dimension; at least 4 of those must be beyond the county level plus at least 2 must be at the state or National level.

Those to apply for the Emerald Clover Award at the state level are: Sarah Darnell, Courtney Lynn, Danielle Lynn, Maddi Maxwell, Kate Miller, Camryn Parker, Caitlyn Richards, Shiloh Willis, and Ava Winternheimer

4-H Members who EXCEL in their work can compete for county and state honors in specific award areas. There are several different EXCEL Awards. Members can complete the Illinois 4-H State Award application in one or more of these 5 areas: Communications, Community Service, Leadership, Personal Growth, and Project Mastery.

This year's award winners were: Communications, Elaine Miller; Community Service, Kate Miller; Leadership, Maddi Maxwell; Personal Growth, Courtney Lynn, Project Mastery, Camryn Parker.

These youth may also apply on the state level in these areas and could possibly win a $1,000 College Scholarship, or a National Congress Trip, or other national travel opportunities.

Each year an award is presented to an Outstanding Junior High Member. This member must have been in the 7th or 8th grade and demonstrate outstanding 4-H member skills. This year we are fortunate to have a 4 year member of Barbwire Gang. She has been very helpful with the garden and cooking classes and attends most county events. Ava Winternheimer was this year's recipient of the Outstanding Junior High School Member Award and $25.

Each year an award is presented to an Outstanding High School member. This member must have been in high school and demonstrate outstanding 4-H member skills. This year we are fortunate to have a 9 year member of County Line Crew 4-H Club, She has been very helpful over the years with cooking and gardening classes and has done very well with her projects. This year's recipient of the Outstanding High School Member Award and $25 is Camryn Parker.

Victory Awards are presented to the following age groups 8-9 year olds, 10-11 year olds, 12-14 year olds and 15-18 year olds. One boy and one girl winner is chosen from each 4-H club. The winner of this award has done the best job filling out his/her records and is an outstanding 4-H member in his/her club. Congratulations to these 4-H members: (8-9 Year Olds) Hayden Davis and Cecelia Lueke; (10-11 Year Olds) Aydan Hood, Caden Dean, Shiloh Willis, Laynna Wilson, and Nash Sutton; (12-14 Year Olds) Ava Winternheimer, Sarah Darnell, Caitlyn Richards, Jenna Wilson, and Drew Rawls; (15-18 Year Olds) Courtney Lynn, Maddi Maxwell, Samuel Lueke, and Levi Erwin.

After the outstanding 4-H members are chosen from each club, one outstanding overall winner is chosen in each age group. The Outstanding Victory Award winners are: (8-9 Year Olds) Cecelia Lueke; (10-11 Year Olds)
Shiloh Willis and Aydan Hood; (12-14 Year Olds)
Ava Winternheimer and Drew Rawls; (15-19 Year Olds) Maddi Maxwell and Samuel Lueke.

Each year Hamilton County is well represented at the Illinois State Fair. This year these 15 members displayed very nice projects and proudly represented Hamilton County.

Receiving Recognition Award: Londynn Browning, Sarah Darnell, Hayden Davis, Aydan Hood, Maddie Karcher, Caroline Lueke, Danielle Lynn, Andrew Rawls, Lily Rawls, Caitlyn Richards, and Shiloh Willis.

Receiving Reserve Champion: Ava Winternheimer.

Receiving Outstanding & Reserve Champion: Emilee Cox.

Receiving Outstanding & Champion: Courtney Lynn.

Received Outstanding, Champion & Inspire: Camryn Parker.

Each year an award is presented to the 4-H secretary and the 4-H treasurer who has done the best job keeping their clubs' secretary and treasurers books. This years' secretary award goes to two individuals who have done a wonderful job of keeping Pioneer Country Kids book: Cecelia Lueke and Kelci Wellen.

This years' best treasurer's book award is presented to Madison Miller of the County Line Crew.

This year everyone who filled out records will receive a t-shirt. These shirts were possible because of a donation from Consolidated Grain and Barge.

Barbwire Gang
Emilee Cox
Aydan Hood
Emma Hood
Courtney Lynn
Danielle Lynn
Ava Winternheimer

County Line Crew
Sarah Darnell
Leslie Davis
Caden Dean
Cambri Dean
Maddi Maxwell
Elaine Miller
Kate Miller
Madison Miller
Camryn Parker

Funny Farmers
Londynn Browning
Hayden Davis
Lainey Davis
Serenity Smith
Shiloh Willis

Pioneer Country Kids
Samuel Clark
Maddie Karcher
Caroline Lueke
Cecelia Lueke
Samuel Lueke
Caitlyn Richards

Piopolis Busy Bees
Levi Erwin
Drew Rawls
Lily Rawls
Brinkley Sutton
Nash Sutton
Talan Sutton
Jenna Wilson
Laynna Wilson

Each year the Hamilton County Extension Foundation presents two $50.00 Scholarships to outstanding Hamilton County 4-H members. This is awarded to help pay for him/her to go to the Illini Summer Academies which is held during the summer. These 4-H'ers will meet other 4-H members from all over Illinois. They will attend workshops of their choice and participate in fun activities. This year's winners are Caitlyn Richards and Ava Winternheimer.

Hamilton County will award a $50.00 scholarship and one alternate to help participants offset the cost of the 2019 Teen Leadership Conference: Ava Winternheimer and Alternate Caitlyn Richards.

Each year an Outstanding 4-H member is selected to represent Hamilton County for Citizenship Washington Focus: Sarah Darnell and Alternate Caitlyn Richards. This trip will take place in July 2019.

The 4-H Premier LCP Award is sponsored for older 4-H members in Illinois. The purpose of the award is to reward members exhibiting outstanding leadership, citizenship, cooperation, and professionalism during the past 4-H program year. Danielle Lynn.

4-H members who are now 19 years old and have aged out of 4-H: Our 4-H alumnus this year is Elaine Miller.

During National 4-H Week, Hamilton County 4-H Clubs put up window displays to promote 4-H. This year we only had 2 displays.

1st Place -$20– Barbwire Gang

2nd Place -$15– Piopolis Busy Bees

This year youth had the opportunity to make posters promoting 4-H during National 4-H Week. We had three youth participate: 1st place – Shiloh Willis, 2nd Place – Courtney Lynn, 3rd Place – Ava Winternheimer.

Each 4-H Club may choose to make a scrapbook of their 4-H Club's activities. These scrapbooks are judged. This year's outstanding scrapbook was prepared by the Funny Farmers 4-H Club.

Each year 4-H Clubs, that have meetings or themes where they study another country, may apply for Intercultural Awards. This year each of these clubs took part in International Night in conjunction with the Hamilton County HCE: Barbwire Gang, County Line Crew, Funny Farmers, Pioneer Country Kids & Clovers, and Piopolis Busy Bees.

This past March, Hamilton County held its first Spaghetti Dinner and Auction Fundraiser. All youth in the county sold tickets which made the event a huge success. These individuals were very active and sold the most tickets:

1st place / $25
Caitlyn Richards (15)
2nd place / $15
Danielle Lynn (13)
3rd Place / $10
Maddi Maxwell (8)
3rd Place / $10
Ava Winternheimer (8)

This past June, Hamilton County held its thirteenth annual Dinner Fundraiser –changing this year from pork chops to pulled pork barbecue. All youth in the county sold tickets which also made this event a huge success. These individuals were very active and sold the most tickets.

1st place / $25.00
Laynna Wilson (32)
2nd place / $15.00
Courtney Lynn (25)
3rd Place / $10.00
Caitlyn Richards (13).

Each year 4-H members can fill out records to showcase their projects work. Members scoring the highest in each project area are recognized as well as members who continue to excel in their project work: Animal Science, Madison Miller; Community Involvement and Global Awareness, Shiloh Willis; Environment/Natural Resources, Camryn Parker; Food & Nutrition/Health, Hayden Davis, Danielle Lynn; Home & Family, Levi Erwin, Courtney Lynn; Engineering & Technology, Laynna Wilson; Personal Development, Shiloh Willis, Camryn Parker, Caitlyn Richards, and Danielle Lynn.

This year trophies were awarded to individuals who score the highest on records in each project. The Trophy Winners were: Food & Nutrition, Hayden Davis; Geology, Camryn Parker; Intercultural, Shiloh Willis; Visual Arts, Shiloh Willis.

2019 Club of the Year Award was presented to Barbwire Gang led by Dianna Robinson and Lauren Taylor.

Class of 2019 inductee into the 4-H Hall of Fame

This year's Hamilton County recipient has been an icon of 4-H and livestock in Hamilton County for almost 50 years. He began his career as a 4-H member and later became very influential with the livestock industry in southern Illinois, Kentucky and Tennessee. He has helped with several judging contests, judging workshops and served as livestock judge in many 4-H, county and state livestock shows. He has helped countless 4-H members select their show animals and later watched them have great success with their animal. He is always willing to talk with younger exhibitors and make sure they have a positive experience. Congratulations to Jeff Rister.

Friend of 4-H Award is given annually to an individual, organization or business that has supported 4-H throughout the past year.

This year's recipient continues to support the 4-H mission, by allowing 4-H to use the corner of Randolph and Jackson streets to hold the Farmers Market. He also donates ice whenever it is needed for different events. He can be seen through the community setting up tents, tables and chairs and filling coolers with ice. It is refreshing to have an individual in the community that supports 4-H without hesitation. Congratulations to this year's Friend of 4-H Roger Swartz.

Each year a 4-H Alumnus is recognized for his or her dedicated support of 4-H.

This year's recipient is 98 years old and still keeps 4-H in her life! From 1954 to 1978, she served as the 4-H Youth Advisor in Hamilton County. She once took 38 youth to Washington DC – Citizenship Short Course, and was the only chaperone for all 38 youth. She is greatly admired by her former 4-H members and leaders. She is the recipient of both the Distinguished Service Award and NAE 4-H/FFA Woman of the Year Award. She still attends 4-H events held at Heritage Woods and continues to be supportive of Hamilton County 4-H. Congratulations to this year's 4-H Alumni, Hazel Clark.

The evening concluded with members, leaders, parents and guests enjoying finger type foods and congratulating each other for their accomplishments. If you see any of these people in the community congratulate them on an amazing 4-H year! If you have a child between the ages of kindergarten to nineteen we would love to have them join our 4-H family. For more information contact the University of Illinois Extension office at 643-3416 or stop by the office in the courthouse basement.

Reducing Damages from Severe Weather

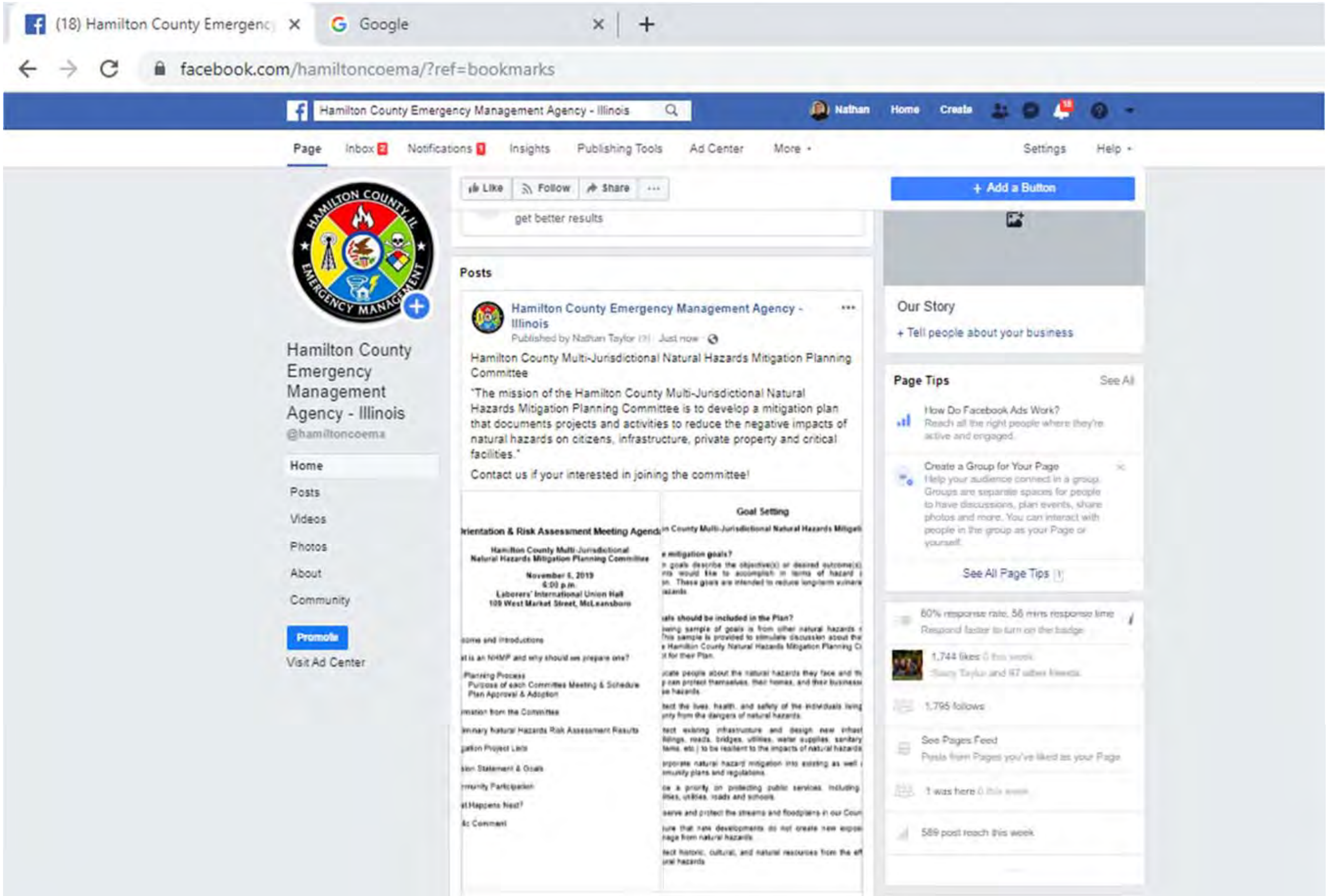
McLeansboro, IL (10/17/2019) — Hamilton County will develop its plan to reduce the damages caused by natural hazards such as floods, thunderstorms with damaging winds or hail, snow and ice storms, tornados, drought, and excessive heat, among others. The plan is called a Natural Hazard Mitigation Plan and the process to develop it will be funded through a grant from the Illinois Emergency Management Agency (IEMA).

"The goal of this Plan is to identify projects and activities that will reduce the impacts to residents and property from natural hazard events", said John Nathan Taylor, Hamilton County Emergency Management Agency Director. "This Plan is different from an emergency response plan because it focuses on ways to reduce and prevent damages before they occur", added Taylor.

The Hamilton County Hazard Mitigation Planning Committee will hold its first meeting to update the plan on Wednesday, November 6th, 2019, at the Laborers' International Union Hall, 109 West Market Street, in McLeansboro, beginning at 6:00 P.M. This Committee, comprised of County and municipal representatives as well as technical partners and stakeholders, will meet over the next several months to update the Plan. Meetings of this committee will be conducted as working sessions so that any interested resident can attend and ask questions.

The process to develop this Plan as well as the frequency and damages caused by severe storms and other natural disasters in Hamilton County will be discussed at this first meeting. "The purpose of this meeting is to identify how often severe weather events occur within the County and what kinds of damages have resulted. Based on this information we will begin to develop each participant's list of mitigation activities and projects," said Taylor.

After a draft of the Plan is prepared, a public forum will be held to present the Plan for review and comment. The draft Plan will be revised based on comments from the public and the state and federal government agencies. Following these revisions, the Plan will be presented for adoption at public meetings held by the County and at each of the participating municipalities.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Published by Nathan Taylor · Just now
Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee
"The mission of the Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee is to develop a mitigation plan that documents projects and activities to reduce the negative impacts of natural hazards on citizens, infrastructure, private property and critical facilities."
Contact us if your interested in joining the committee!
Goal Setting
Orientation & Risk Assessment Meeting Agenda
Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee
November 6, 2019
6:00 p.m.
Laborers' International Union Hall
109 West Market Street, McLeansboro
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Hamilton Co. Natural Hazard Planning Committee held its first meeting. The committee discussed hazards that face our communities and how we could be better prepared to face those issues. Thank you to all who attended and their commitment to the communities they represent.
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Appendix F

Hamilton County Emergency Management

100 South Jackson Street

McLeansboro IL

Phone 618.643.3744 - Fax 618.643.5114 - Email hcema@hamiltonco.us

FOR IMMEDIATE RELEASE

Contact: John Nathan Taylor
(618)- 643-3744

Projects to Reduce Damages Caused By Natural Disasters

McLeansboro, IL (February 24, 2020)— Projects to prevent injuries and fatalities while maintaining vital services for Hamilton County residents during severe storms will be the main topic of discussion at the Hamilton County Natural Hazards Mitigation Planning Committee meeting on Wednesday, March 4, 2020 at 6:00 P.M. The meeting will be held at the Laborers' International Union Hall, 109 West Market Street, in McLeansboro, and is open to the public.

This Committee began work in November 2019 to develop the County's Plan. This Natural Hazards Mitigation Plan will identify projects and activities to protect Hamilton County residents and property from storms and other natural disasters. Unlike all other emergency plans, this Plan is aimed at identifying projects and activities that can be taken before these disasters occur.

"Severe storms frequently damage buildings, crops, roads, and other critical infrastructure in this area. Consequently we are seeking to identify preventative steps that can reduce the dollar damages as well as protecting public health before severe weather strikes," according to John Nathan Taylor, Hamilton County Emergency Management Agency Director.

The municipalities of Broughton, Dahlgren and McLeansboro, in addition to the County, and Crook Township, Dahlgren Township, McLeansboro Township, South Crouch Township, South Flannigan Township, Hamilton Memorial Hospital, Hamilton County CUSD #10 and the Hamilton County Water District have been participating in the planning process.

Building storm shelters, resolving drainage problems, providing back-up power supplies, retrofitting water supplies and other critical facilities to better withstand natural disasters are a few of the more frequently encountered mitigation projects in Illinois. Developing public information materials and conducting drainage studies are examples of other activities that might also be included in the Natural Hazards Mitigation Plan.

"A public forum will be conducted later this Spring for interested persons to review the Plan and ask questions of Committee Members. A public comment period will be established to accommodate interested persons who are unable to attend the forum. We want to make sure that anybody who is interested has an opportunity to review and comment on the draft Plan," added Taylor.

Interested persons can submit questions and comments to the Committee members or directly to the Hamilton County Emergency Management Agency.

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REMINDER!

The 2nd meeting of the Hamilton County Hazard Mitigation Planning Committee is this Wednesday, March 4th at 6pm. The meeting will be held at the Laborers' 1197 Union Hall at 109 West Market St. McLeansboro. There has been great participation so far and we want to keep it going! Even if your organization wasn't represented at the 1st meeting it is not to late to start!. If you can't participate, send someone in your place! We look forward to seeing you!

5 Shares

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Hamilton County Emergency Management Agency - Illinois
February 12 at 6:19 AM ·

Attention Hamilton County Natural Hazard Mitigation Committee Members!

The meeting scheduled for tonight has been POSTPONED till March 4th, 2020 at 6pm. The meeting will still be held on that date at the Laborers' Local 1197 Union Hall.

Committee members should also receive a phone call or email notifying them of the change.

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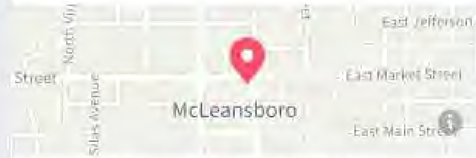

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100 South Jackson Street

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FOR IMMEDIATE RELEASE

CONTACT: John Nathan Taylor
618-643-3744

Hamilton County's Plan to Reduce Severe Weather Damages Ready for Public Review

May 4, 2020—The Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Plan outlining projects and activities to reduce damages caused by severe weather and other natural hazards will be available for public review and comment from May 13 through May 20, 2020. The Plan, along with a summary sheet and a comment survey, can be viewed on the Emergency Management page of the Hamilton County Website. If you are unable to access the Plan via the website, please contact John Nathan Taylor, Emergency Management Agency (EMA) Director at (618) 643-3744 to view a paper copy of the Plan. The comment period will remain open through Wednesday, May 20, 2020. Public comments will be used to make any revisions needed before this Plan is submitted to the Illinois Emergency Management Agency and FEMA.

A public forum will also be conducted on May 13th at 4:30 P.M. Due to the COVID-19 crisis which prohibits any gatherings of more than ten people, the public forum will be conducted via teleconference. Persons interested in participating in the public forum should contact John Nathan Taylor, EMA Director at (618) 643-3744 or hcema@hamiltonco.us. Individuals can still review this Plan and comment without participating in the public forum.

"This Plan describes how the County and the participating jurisdictions have been impacted by severe weather and other natural hazards and identifies specific mitigation actions that can be taken to reduce damages to life and health, infrastructure, and property before events occur," according to John Nathan Taylor, Hamilton County EMA Coordinator.

The Hamilton County Natural Hazards Mitigation Planning Committee prepared this draft Plan with technical assistance from state and federal agencies as well as a consultant specializing in emergency management planning. The Committee is comprised of representatives from various County departments in addition to Broughton, Dahlgren, McLeansboro, Hamilton County CUSD, Hamilton County Water District, Crook Township, Dahlgren Township, McLeansboro Township and South Crouch Township. The Committee began meeting last fall to prepare this Plan.

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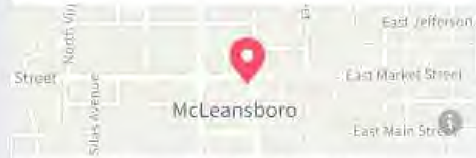

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Public Forum – Planning Process Summary Handout

Appendix G

HAMILTON COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN PUBLIC FORUM TELECONFERENCE

MAY 13, 2020
4:30 P.M.

Each year natural hazards (i.e., severe thunderstorms, tornadoes, severe winter storms, flooding, etc.) cause damage to property and threaten the lives and health of Hamilton County residents. Since 1989, Hamilton County has been a part of six federally-declared disasters and experienced at least $9.6 million in verified property and crop damage within the County.

In the last 10 years alone (2010-2019), there have been 33 excessive heat events, 22 severe winter storms, 19 heavy rain events, 18 thunderstorms with damaging winds, seven severe storms with hail one inch in diameter or greater, seven extreme cold events, seven riverine flood events, six flash flood events, four verified lightning strikes with damages, three droughts, two tornadoes and two earthquakes that have originated in the County. While natural hazards cannot be avoided, their impacts can be reduced through effective hazard mitigation planning.

What is hazard mitigation planning?

Hazard mitigation planning is the process of determining how to reduce or eliminate property damage and loss of life from natural hazards. This process helps the County and participating municipalities reduce their risk by identifying vulnerabilities and developing mitigation actions to lessen and sometimes even eliminate the effects of a hazard. The results of this process are documented in a natural hazards mitigation plan.

Why prepare a natural hazards mitigation plan?

By preparing and adopting a natural hazards mitigation plan, participating jurisdictions become eligible to apply for and receive federal hazard mitigation funds to implement mitigation actions identified in the Plan. These funds, made available through the Disaster Mitigation Act of 2000, can help provide local government entities with the opportunity to complete mitigation projects that would not otherwise be financially possible.

Who participated in the development of the Hamilton County Multi-Jurisdiction Natural Hazards Mitigation Plan?

Recognizing the benefits that could be gained from preparing a natural hazards mitigation plan, Hamilton County invited all the local government entities within the County to participate. The following jurisdictions chose to participate in the Plan development:

- Broughton, Village of
- Crook Township
- Dahlgren, Village of
- Dahlgren Township
- Hamilton County CUSD #10
- Hamilton County Water District
- McLeansboro, City of
- McLeansboro Township
- South Crouch Township

HAMILTON COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

How was the Plan developed?

The Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Plan was developed through the Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee. The Planning Committee included representatives from each participating jurisdiction, as well as emergency services (fire and law enforcement), healthcare, insurance, and utilities. The Planning Committee met three times between November 2019 and May 2020.

Which natural hazards are included in the Plan?

After reviewing the risk assessment, the Planning Committee chose to include the following natural hazards in the Plan:

- severe storms (thunderstorms, hail, lighting & heavy rain)
- severe winter storms (snow, ice & extreme cold)
- excessive heat
- floods
- tornadoes
- earthquakes
- droughts
- mine subsidience
- dam failures

What is included in the Plan?

The Plan is divided into sections that cover the planning process; the risk assessment; the mitigation strategy, including lists of mitigation actions identified for each participating jurisdiction; and plan maintenance and adoption. Much of the Plan is devoted to the risk assessment and mitigation strategy.

This risk assessment identifies the natural hazards that pose a threat to the County and includes a profile of each natural hazard which describes the location and severity of past occurrences, reported damages to public health and property, and the likelihood of future occurrences. It also provides a vulnerability assessment that estimates the potential impacts each natural hazard would have on the health and safety of the residents of Hamilton County as well as the buildings, critical facilities and infrastructure in the County.

What happens next?

Any comments received during the public comment period will be incorporated into the draft Plan before it is submitted to the Illinois Emergency Management Agency (IEMA) and the Federal Emergency Management Agency (FEMA) for review. Once IEMA and FEMA have reviewed and approved the Plan, it will be presented to the County and each participating jurisdiction for formal adoption. After adopting the Plan, each participating jurisdiction can apply for federal mitigation funds and begin implementation of the mitigation actions identified in the Plan.

PUBLIC FORUM – PLAN COMMENT SURVEY

APPENDIX H

Hamilton County Natural Hazard Mitigation Plan Comment Survey

The Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Plan evaluates damage to life and property from natural hazards that occur in the County. This Plan also identifies projects and activities submitted by the County and each participating jurisdiction that will help reduce these damages. This comment survey should be used to provide feedback on the draft Plan.

* 1. What comments, concerns or questions do you have regarding the draft Plan?

2. If you would like a follow-up to your comment, please provide your contact information below:

Name

Address

City/Town

State/Province

ZIP/Postal Code

Email Address

Phone Number

DONE

0 of 2 answered

HAZARD MITIGATION PLANNING MEMO SENT ADJACENT COUNTIES

APPENDIX I

Hamilton County Emergency Management

100 South Jackson Street
McLeansboro IL
Phone 618.643.3744 - Fax 618.643.5114 - Email hcema@hamiltonco.us

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To: Franklin County EMA, Ryan M. Buckingham (ryan.buckingham@franklincountyema.com)

Gallantin County EMA, Steve J. Galt (gallatincountyema@gmail.com)

Jefferson County EMA, Steve Lueker (Slueker@jeffil.us)

Saline County EMA, Allan Ninness (ema@salinecounty.illinois.gov)

Wayne County EMA, Jeff Jake (waynecoema@frontier.com)

White County EMA, Patrick Scates (whitecountyilema@gmail.com)

From: John Nathan Taylor, Hamilton County Emergency Management Agency Director

Subject: Hazard Mitigation Plan

Date: 4/30/2020

The purpose of this memorandum is to let you know that Hamilton County is developing its countywide Natural Hazards Mitigation Plan. Since we share common boundaries, you are invited to review this draft Plan and provide comments during the public comment period which runs from May 13th through May 20th, 2020. The Plan along with a summary sheet and a comment survey can be viewed on the Emergency Management page of the Hamilton County Website.

The public forum has been re-scheduled for **Wednesday, May 13th at 4:30 p.m**. Due to the COVID-19 crisis, the public forum will be conducted via teleconference. You will receive a separate email invitation with the phone number and access code for the teleconference in the next couple of days.

If you have any questions, you can reach my office at 618-643-3744 or hcema@hamiltonco.us

American Environmental Corp., an emergency management and environmental consulting firm experienced in preparing these plans, is leading our planning process. If you have specific questions about the Plan, please contact Zachary Krug, our planning consultant at (217) 585-9517 Ext. 8 or zkrug@aecspfld.com

HAZARD EVENT RISK ASSESSMENT TABLES

APPENDIX J

Table 1
Severe Storms – Thunderstorms with Damaging Winds Reported in Hamilton County
1981 – 2019
(Sheet 1 of 6)

Date(s)	Start Time	Location(s)	Maximum Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
7/20/1981	5:00 p.m.	McLeansboro	n/a	n/a	n/a	n/a	n/a	
6/8/1982	10:28 a.m.	Dahlgren	52 kts	n/a	n/a	n/a	n/a	
6/8/1982	11:16 a.m.	McLeansboro^	n/a	n/a	n/a	n/a	n/a	
3/15/1984	8:22 p.m.	McLeansboro^	n/a	n/a	n/a	$2,500	n/a	powerful winds blew down power lines and trees
1/7/1989	4:55 p.m.	McLeansboro	n/a	n/a	n/a	n/a	n/a	***This event is part of a federally-declared disaster (Declaration #819)***
4/3/1989	3:30 p.m.	McLeansboro	n/a	n/a	n/a	n/a	n/a	strong winds blew down several large trees
6/16/1991	10:15 p.m.	McLeansboro	n/a	n/a	n/a	n/a	$250	winds blew down trees
7/2/1991	11:00 a.m.	McLeansboro	n/a	n/a	n/a	$25,000	n/a	- winds downed trees and limbs, mainly on the northern side of the City - a parked tractor-semitrailer was blown over and destroyed a car - a large tree limb fell on the bed of a pickup truck - winds damaged a mobile home's skirting
4/15/1994	6:33 a.m.	McLeansboro	n/a	n/a	n/a	$50	n/a	trees were blown down
4/27/1994	3:05 a.m.	McLeansboro	n/a	n/a	n/a	$5,000	n/a	numerous trees were blown down
5/17/1995	10:34 p.m.	McLeansboro	n/a	n/a	n/a	n/a	n/a	
5/17/1995	11:24 p.m.	McLeansboro	n/a	n/a	n/a	$10,000	n/a	
6/7/1995	3:45 p.m.	Dale	52 kts	n/a	n/a	n/a	n/a	
4/19/1996	8:11 p.m.	McLeansboro^	n/a	n/a	n/a	$10,000	n/a	- a fallen tree blocked a state highway - sheds were blown away
Subtotal:				**0**	**0**	**$52,550**	**$250**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Table 1
Severe Storms – Thunderstorms with Damaging Winds Reported in Hamilton County
1981 – 2019
(Sheet 2 of 6)

Date(s)	Start Time	Location(s)	Maximum Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
4/21/1996	6:18 p.m.	Piopolis^	n/a	n/a	n/a	$50,000	n/a	- several homes were damaged - a hog shed was blown over
10/22/1996	1:15 p.m.	Bungay^	50 kts	n/a	n/a	n/a	n/a	a couple trees were blown down
7/14/1997	4:30 p.m.	Dahlgren	52 kts	n/a	n/a	$8,000	n/a	eight large trees were blown down blocking roads
2/27/1999	3:10 p.m.	Dale^	n/a	n/a	n/a	$20,000	n/a	a barn was blown down
10/24/2001	2:50 p.m.	countywide	52 kts	n/a	n/a	$50,000	n/a	*McLeansboro* - numerous trees and power lines were blown down - some trees hit houses, blocked roads, and fell on power lines *Blairsville* - light poles were downed by wind *Bungay Area* - a home under construction was destroyed, and sheds were destroyed
4/21/2002	3:16 p.m.	McLeansboro^	50 kts	n/a	n/a	n/a	n/a	large tree limbs were blown down
6/10/2003	7:47 a.m.	Dolan Lake^	52 kts	n/a	n/a	n/a	n/a	
6/10/2003	6:15 p.m.	McLeansboro Piopolis Belle Prairie City	50 kts	n/a	n/a	n/a	n/a	- trees and limbs were blown down *McLeansboro* - a few power poles were blown down
Subtotal:				**0**	**0**	**$128,000**	**$0**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Table 1 **Severe Storms – Thunderstorms with Damaging Winds Reported in Hamilton County** **1981 – 2019** **(Sheet 3 of 6)**								
Date(s)	**Start Time**	**Location(s)**	**Maximum Magnitude (Knots)**	**Injuries**	**Fatalities**	**Property Damage**	**Crop Damage**	**Description**
7/9/2003	1:00 p.m.	McLeansboro	52 kts	n/a	n/a	$3,000	n/a	- trees and large branches were blown onto streets and side walks - one tree fell onto a storage shed
5/27/2004	8:15 p.m.	Macedonia^	50 kts	n/a	n/a	n/a	n/a	
5/30/2004	6:15 p.m.	countywide	52 kts	n/a	n/a	$50,000	n/a	*McLeansboro* - the whole City was without power after numerous trees fell - several trees landed on houses, causing severe damage to at least one house
7/5/2004	10:20 a.m.	Delafield	50 kts	n/a	n/a	$3,000	n/a	trees and power lines were blown down along IL Rte. 142
4/22/2005	1:34 p.m.	Macedonia^	50 kts	n/a	n/a	$2,000	n/a	small trees were blown down, and tree limbs landed on power lines on IL Rte. 14
6/8/2005	5:50 p.m.	McLeansboro Dale^	54 kts	n/a	n/a	$10,000	n/a	*Event Description Provided Below*
McLeansboro - a building under construction was partially blown down; the roof supports of the 40 x 60-foot building fell onto a tractor used by the construction company - a large tree was blown down into power lines - tree limbs were also blown down *Dale Area* - a tree fell on a vacant house, causing extensive damage to the roof and walls								
3/9/2006	7:37 p.m.	McLeansboro	61 kts	n/a	n/a	$75,000	n/a	*Event Description Provided Below*
- several buildings at the courthouse square downtown were damaged; large section of roof was lifted off one of the buildings and deposited on the sidewalks - adjacent structures received less significant roof damage - several power lines were down, and a window was broken - a food store lost part of its roof on the southwest side of the City - a newspaper building sustained some roof damage and a broken window, allowing rainwater to enter the building								
Subtotal:				**0**	**0**	**$143,000**	**$0**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Table 1
Severe Storms – Thunderstorms with Damaging Winds Reported in Hamilton County
1981 – 2019
(Sheet 4 of 6)

Date(s)	Start Time	Location(s)	Maximum Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
4/2/2006	5:45 p.m.	Dale^	50 kts	n/a	n/a	n/a	n/a	several trees were blown down
6/22/2006	4:25 p.m.	McLeansboro	50 kts	n/a	n/a	n/a	n/a	trees were downed by wind
7/21/2006	11:55 a.m.	countywide	52 kts	n/a	n/a	$30,000	n/a	*Event Description Provided Below*
- many trees and large limbs were blown down across the county *McLeansboro* - a very large tree fell across the middle of a mobile home, narrowly missing the residents inside the home; the trailer was destroyed - the communications antennas at the police and fire departments were blown down - downed trees and powerlines knocked out power to an 8-block area in the City								
10/18/2007	2:40 a.m.	Dale^ McLeansboro^	50 kts	n/a	n/a	$6,000	n/a	downed trees blocked IL Rte. 142 South
1/29/2008	4:18 p.m.	Dahlgren	61 kts	n/a	n/a	$6,000	n/a	a garage roof was blown off
6/9/2008	5:51 p.m.	Broughton^	50 kts	n/a	n/a	$2,000	n/a	a couple of trees were blown down by wind
12/27/2008	6:30 p.m.	Piopolis^ McLeansboro McLeansboro^	50 kts	n/a	n/a	$10,000	n/a	- some trees and limbs were down on roadways - power lines were down and arcing
5/8/2009	12:30 p.m.	Walpole^	52 kts	n/a	n/a	$3,000	n/a	***This event was part of a federally-declared disaster (Declaration #1850)*** a few trees were downed
8/12/2010	10:25 a.m.	Dahlgren	52 kts	n/a	n/a	$80,000	n/a	*Event Description Provided Below*
- numerous large tree limbs 4-inches or more in diameter were blown down throughout the Village - several large mature trees were downed - utility crews estimated 23 trees were downed - 1 garage was slightly damaged by a falling tree - IL Rte. 142 was blocked for a short time due to a fallen tree								
Subtotal:				**0**	**0**	**$137,000**	**$0**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Table 1
Severe Storms – Thunderstorms with Damaging Winds Reported in Hamilton County
1981 – 2019
(Sheet 5 of 6)

Date(s)	Start Time	Location(s)	Maximum Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
4/19/2011	8:10 p.m.	Walpole Broughton^ Dale^	104 kts	n/a	n/a	n/a	n/a	***This event was part of a federally-declared disaster (Declaration #1991)*** - numerous homes were damaged - dozens of barns, sheds, and other structures were damaged or destroyed - many hundreds of trees were uprooted - power lines were blown down
9/7/2012	7:15 p.m.	McLeansboro^	52 kts	n/a	n/a	$5,000	n/a	several trees were blown down, blocking IL Rte. 142
6/4/2014	3:00 p.m.	Piopolis^	70 kts	n/a	n/a	$20,000	n/a	a grain bin was blown over
10/13/2014	3:30 p.m.	McLeansboro^	52 kts	n/a	n/a	$3,000	n/a	power lines were blown down
6/25/2015	9:00 p.m.	McLeansboro	56 kts	n/a	n/a	$10,000	n/a	several trees and power lines were blown down
4/26/2016	3:50 p.m.	McLeansboro^	52 kts	n/a	n/a	$2,000	n/a	tree limbs were blown down on IL Rte. 242
5/7/2016	5:17 p.m.	Belle Prairie City^	53 kts	n/a	n/a	n/a	n/a	
5/11/2016	3:18 p.m.	Dahlgren	52 kts	n/a	n/a	$3,000	n/a	2 trees were blown down
6/25/2016	4:02 p.m.	McLeansboro	61 kts	n/a	n/a	$25,000	n/a	*Event Description Provided Below*
- numerous trees were blown down in the City - some branches up to 14-inches were broken off, and larger trees up to 1.5-feet in diameter were knocked down - a large tree landed on a house - tree limbs landed on a trailer and a carport - power lines were damaged, and roads were blocked								
7/13/2016	4:07 p.m.	Dahlgren^	52 kts	n/a	n/a	$6,000	n/a	a tree was snapped at the base and landed on a garage
Subtotal:				**0**	**0**	**$74,000**	**$0**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Table 1
Severe Storms – Thunderstorms with Damaging Winds Reported in Hamilton County
1981 – 2019
(Sheet 6 of 6)

Date(s)	Start Time	Location(s)	Maximum Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
7/13/2016	4:02 p.m.	Dahlgren^	52 kts	n/a	n/a	$6,000	n/a	a tree was snapped at the base and landed on a garage
7/13/2016	4:12 p.m.	McLeansboro	65 kts	n/a	n/a	$30,000	n/a	- damage was mainly on the northern area of the City along and north of Hwy 14 - a few trees and dozens of limbs were blown down, along with a few power lines - shingles were blown off at least a couple of houses just west of the City
5/31/2018	9:30 a.m.	Dale	56 kts	n/a	n/a	$10,000	n/a	trees were blown down, making IL Rte. 142 impassable
5/31/2018	9:35 a.m.	Belle Prairie City^	50 kts	n/a	n/a	n/a	n/a	
6/26/2018	8:30 a.m.	Broughton	52 kts	n/a	n/a	$1,000	n/a	a tree was blown down
6/21/2019	1:44 p.m.	Belle Prairie City^	51 kts	n/a	n/a	n/a	n/a	
7/17/2019	7:29 p.m.	McLeansboro^	56 kts	n/a	n/a	$5,000	n/a	several trees were blown down along Hwy 242 at County Rd. 1650 North
Subtotal:				**0**	**0**	**$52,000**	**$0**	
GRAND TOTAL:				**0**	**0**	**$586,550**	**$250**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

Table 2
Severe Storms – Hail Events Reported in Hamilton County
2001 – 2019
(Sheet 1 of 2)

Date(s)	Start Time	Location(s)	Magnitude (Diameter)	Injuries	Fatalities	Property Damage	Crop Damage	Description
8/18/2001	7:30 p.m.	McLeansboro	1.00 in.	n/a	n/a	n/a	n/a	
4/24/2002	2:45 p.m.	Dahlgren	1.75 in.	n/a	n/a	$750,000	n/a	***This event was part of a federally-declared disaster (Declaration #1416)*** hundreds of homes and vehicles were damaged
4/24/2002	3:20 p.m.	McLeansboro	1.00 in.	n/a	n/a	n/a	n/a	***This event was part of a federally-declared disaster (Declaration #1416)***
11/10/2002	2:24 p.m.	McLeansboro	1.00 in.	n/a	n/a	n/a	n/a	
5/26/2004	9:06 a.m.	Dahlgren^ Piopolis	1.75 in.	n/a	n/a	n/a	n/a	
3/11/2006	3:30 a.m.	Piopolis^ Belle Prairie City^	1.75 in.	n/a	n/a	n/a	n/a	
3/11/2006	11:00 p.m.	McLeansboro	1.00 in.	n/a	n/a	n/a	n/a	
4/7/2006	1:56 p.m.	Dahlgren	1.00 in.	n/a	n/a	n/a	n/a	
9/27/2006	3:22 p.m.	McLeansboro	1.00 in.	n/a	n/a	n/a	n/a	
9/27/2006	3:40 p.m.	McLeansboro	1.25 in.	n/a	n/a	n/a	n/a	
4/3/2007	2:45 p.m.	Dahlgren	1.00 in.	n/a	n/a	n/a	n/a	
3/2/2012	12:00 p.m.	McLeansboro	1.00 in.	n/a	n/a	n/a	n/a	
2/20/2014	5:35 p.m.	McLeansboro	1.00 in.	n/a	n/a	$100,000	n/a	some homes on the south side of the City had damage from wind-blown hail; holes were poked in shutters and siding
Subtotal:				**0**	**0**	**$850,000**	**$0**	

^ Hail event verified in the vicinity of this location(s).

Table 2
Severe Storms – Hail Events Reported in Hamilton County
2001 – 2019
(Sheet 2 of 2)

Date(s)	Start Time	Location(s)	Magnitude (Diameter)	Injuries	Fatalities	Property Damage	Crop Damage	Description
4/26/2016	3:02 p.m.	Bell Prairie City	1.00 in.	n/a	n/a	n/a	n/a	
4/5/2017	2:22 p.m.	McLeansboro	1.25 in.	n/a	n/a	n/a	n/a	
5/27/2017	1:53 p.m.	McLeansboro	1.75 in.	n/a	n/a	n/a	n/a	
5/31/2018	6:55 p.m.	Broughton^	1.25 in.	n/a	n/a	n/a	n/a	
8/6/2019	2:24 p.m.	Piopolis^	1.75 in.	n/a	n/a	n/a	n/a	hail reported at IL Rte. 242 and County Rd. 20
Subtotal:				**0**	**0**	**$0**	**$0**	
GRAND TOTAL:				**0**	**0**	**$850,000**	**$0**	

^ Hail event verified in the vicinity of this location(s).

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

Table 3
Severe Storms – Lightning Events Reported in Hamilton County
2014 - 2019

Date(s)	Start Time	Location(s)	Injuries	Fatalities	Property Damage	Crop Damage	Description
5/2014	n/a	McLeansboro	n/a	n/a	$9,000	n/a	Hamilton County Water District Superintendent reported that lightning struck the Burke Tank Booster Station damaging electronics and pumps
4/2017	n/a	McLeansboro	n/a	n/a	$40,000	n/a	Hamilton County EMA Director reported that lightning struck the county courthouse damaging phone, computer, 911, and radio systems
6/2019	n/a	McLeansboro	n/a	n/a	$18,000	n/a	Hamilton County Water District Superintendent reported that lightning struck the booster pump station for drinking water #5 damaging electronics and pumps
6/23/2019	n/a	Broughton	n/a	n/a	$4,020	n/a	The Village Clerk reported that lightning struck the community hall damaging the electrical system throughout
Subtotal:			**0**	**0**	**$71,020**	**0**	

Source: Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee Member responses to Critical Facilities Damage Questionnaire.

Table 4 **Severe Storms – Heavy Rain Events Reported in Hamilton County** **1990 – 2019** **(Sheet 1 of 8)**								
Date(s)	**Start Time**	**Location(s)**	**Maximum Magnitude (inches)**	**Injuries**	**Fatalities**	**Property Damage**	**Crop Damage**	**Description**
1/20/1990	n/a	McLeansboro	2.67 in.	n/a	n/a	n/a	n/a	
2/15/1990	n/a	McLeansboro	1.99 in.	n/a	n/a	n/a	n/a	
4/29/1990	n/a	McLeansboro	1.54 in.	n/a	n/a	n/a	n/a	
5/26/1990	n/a	McLeansboro	2.66 in.	n/a	n/a	n/a	n/a	***This event was part of a federally-declared disaster (Declaration #871)***
9/22/1990	n/a	McLeansboro	1.54 in.	n/a	n/a	n/a	n/a	
10/4/1990	n/a	McLeansboro	2.98 in.	n/a	n/a	n/a	n/a	
11/22/1990	n/a	McLeansboro	1.74 in.	n/a	n/a	n/a	n/a	
12/30/1990	n/a	McLeansboro	1.91 in.	n/a	n/a	n/a	n/a	
6/1/1991	5:00 p.m.	McLeansboro	1.77 in.	n/a	n/a	n/a	n/a	
7/2/1991	12:30 p.m.	McLeansboro	1.80 in.	n/a	n/a	n/a	n/a	
10/26/1991 thru 10/27/1991	2:30 a.m.	McLeansboro	2.46 in.	n/a	n/a	n/a	n/a	
11/19/1991 thru 11/20/1991	1:00 a.m.	McLeansboro	4.34 in.	n/a	n/a	n/a	n/a	
7/2/1992 thru 7/3/1992	8:00 p.m.	McLeansboro	1.88 in.	n/a	n/a	n/a	n/a	
9/6/1992	4:30 p.m.	McLeansboro	2.08 in.	n/a	n/a	n/a	n/a	
11/11/1992 thru 11/12/1992	5:30 a.m.	McLeansboro	3.06 in.	n/a	n/a	n/a	n/a	
1/4/1993	5:30 a.m.	McLeansboro	2.48 in.	n/a	n/a	n/a	n/a	
SUBTOTAL:				**0**	**0**	**$0**	**$0**	

Table 4
Severe Storms – Heavy Rain Events Reported in Hamilton County
1990 – 2019
(Sheet 2 of 8)

Date(s)	Start Time	Location(s)	Maximum Magnitude (inches)	Injuries	Fatalities	Property Damage	Crop Damage	Description
4/8/1993 thru 4/9/1993	4:00 a.m.	McLeansboro	1.68 in.	n/a	n/a	n/a	n/a	
9/2/1993 thru 9/3/1993	2:00 p.m.	McLeansboro	1.51 in.	n/a	n/a	n/a	n/a	
9/14/1993 thru 9/15/1993	5:30 p.m.	McLeansboro	1.54 in.	n/a	n/a	n/a	n/a	
9/22/1993 thru 9/23/1993	11:30 a.m.	McLeansboro	2.88 in.	n/a	n/a	n/a	n/a	
11/12/1993 thru 11/14/1993	4:00 p.m.	McLeansboro	6.53 in.	n/a	n/a	n/a	n/a	COOP observer noted low area flooding of fields and roads
11/16/1993	5:30 p.m.	McLeansboro	1.65 in.	n/a	n/a	n/a	n/a	COOP observer noted low area flooding of fields and roads
4/9/1994 thru 4/10/1994	2:00 p.m.	McLeansboro	2.02 in.	n/a	n/a	n/a	n/a	
6/26/1994	12:00 a.m.	McLeansboro	3.65 in.	n/a	n/a	n/a	n/a	
11/3/1994 thru 11/5/1994	7:30 p.m.	McLeansboro	4.71 in.	n/a	n/a	n/a	n/a	
SUBTOTAL:				**0**	**0**	**$0**	**$0**	

Table 4
Severe Storms – Heavy Rain Events Reported in Hamilton County
1990 – 2019
(Sheet 3 of 8)

Date(s)	Start Time	Location(s)	Maximum Magnitude (inches)	Injuries	Fatalities	Property Damage	Crop Damage	Description
3/6/1995 thru 3/7/1995	8:30 p.m.	McLeansboro	1.93 in.	n/a	n/a	n/a	n/a	
5/16/1995 thru 5/18/1995	1:00 a.m.	McLeansboro	6.11 in.	n/a	n/a	n/a	n/a	
6/2/1995	2:30 a.m.	McLeansboro	1.72 in.	n/a	n/a	n/a	n/a	
11/10/1995 thru 11/11/1995	4:30 p.m.	McLeansboro	3.03 in.	n/a	n/a	n/a	n/a	
12/17/1995 thru 12/19/1995	10:30 p.m.	McLeansboro	2.49 in.	n/a	n/a	n/a	n/a	
4/21/1996 thru 4/22/1996	7:00 p.m.	McLeansboro	2.85 in.	n/a	n/a	n/a	n/a	
4/28/1996	4:00 a.m.	McLeansboro	7.69 in.	n/a	n/a	n/a	n/a	***This event was part of a federally-declared disaster (Declaration #1112)***
5/7/1996 thru 5/8/1996	11:00 p.m.	McLeansboro	1.64 in.	n/a	n/a	n/a	n/a	***This event was part of a federally-declared disaster (Declaration #1112)***
6/6/1996 thru 6/7/1996	2:00 a.m.	McLeansboro	2.67 in.	n/a	n/a	n/a	n/a	
7/7/1996	4:00 p.m.	McLeansboro	1.61 in.	n/a	n/a	n/a	n/a	
SUBTOTAL:				**0**	**0**	**$0**	**$0**	

Table 4
Severe Storms – Heavy Rain Events Reported in Hamilton County
1990 – 2019
(Sheet 4 of 8)

Date(s)	Start Time	Location(s)	Maximum Magnitude (inches)	Injuries	Fatalities	Property Damage	Crop Damage	Description
7/19/1996 thru 7/20/1996	7:30 p.m.	McLeansboro	3.13 in.	n/a	n/a	n/a	n/a	
9/15/1996 thru 9/16/1996	4:00 p.m.	McLeansboro	1.91 in.	n/a	n/a	n/a	n/a	
9/20/1996 thru 9/21/1996	8:30 p.m.	McLeansboro	1.53 in.	n/a	n/a	n/a	n/a	
11/6/1996 thru 11/7/1996	7:00 p.m.	McLeansboro	2.04 in.	n/a	n/a	n/a	n/a	
11/24/1996 thru 11/26/1996	9:30 a.m.	McLeansboro	1.83 in.	n/a	n/a	n/a	n/a	
5/30/1997 thru 5/31/1997	7:30 p.m.	McLeansboro	1.91 in.	n/a	n/a	n/a	n/a	
6/13/1997	3:00 a.m.	McLeansboro	1.99 in.	n/a	n/a	n/a	n/a	
7/14/1997	5:00 p.m.	McLeansboro	1.51 in.	n/a	n/a	n/a	n/a	
8/19/1997	8:30 a.m.	McLeansboro	1.55 in.	n/a	n/a	n/a	n/a	
3/19/1998 thru 3/21/1998	6:00 p.m.	McLeansboro	1.94 in.	n/a	n/a	n/a	n/a	
SUBTOTAL:				**0**	**0**	**$0**	**$0**	

Table 4
Severe Storms – Heavy Rain Events Reported in Hamilton County
1990 – 2019
(Sheet 5 of 8)

Date(s)	Start Time	Location(s)	Maximum Magnitude (inches)	Injuries	Fatalities	Property Damage	Crop Damage	Description
4/15/1998 thru 4/16/1998	7:30 p.m.	McLeansboro	4.46 in.	n/a	n/a	n/a	n/a	
5/21/1998 thru 5/22/1998	4:00 p.m.	McLeansboro	2.76 in.	n/a	n/a	n/a	n/a	
10/5/1998 thru 10/7/1998	8:30 p.m.	McLeansboro	3.61 in.	n/a	n/a	n/a	n/a	
12/21/1998	12:30 p.m.	McLeansboro	1.75 in.	n/a	n/a	n/a	n/a	
1/21/1999 thru 1/22/1999	5:00 p.m.	McLeansboro	2.90 in.	n/a	n/a	n/a	n/a	
1/31/1999	12:00 a.m.	McLeansboro	1.98 in.	n/a	n/a	n/a	n/a	
4/3/1999 thru 4/4/1999	3:00 a.m.	McLeansboro	2.18 in.	n/a	n/a	n/a	n/a	
6/26/1999	12:00 p.m.	McLeansboro	2.18 in.	n/a	n/a	n/a	n/a	
7/20/1999	3:30 p.m.	McLeansboro	1.64 in.	n/a	n/a	n/a	n/a	
10/8/1999 thru 10/9/1999	2:00 a.m.	McLeansboro	3.97 in.	n/a	n/a	n/a	n/a	
12/9/1999 thru 12/10/1999	12:00 p.m.	McLeansboro	2.10 in.	n/a	n/a	n/a	n/a	
SUBTOTAL:				**0**	**0**	**$0**	**$0**	

Table 4
Severe Storms – Heavy Rain Events Reported in Hamilton County
1990 – 2019
(Sheet 6 of 8)

Date(s)	Start Time	Location(s)	Maximum Magnitude (inches)	Injuries	Fatalities	Property Damage	Crop Damage	Description
1/2/2000 thru 1/3/2000	3:00 p.m.	McLeansboro	2.04 in	n/a	n/a	n/a	n/a	
2/17/2000 thru 2/18/2000	4:00 p.m.	McLeansboro	1.61 in.	n/a	n/a	n/a	n/a	
6/16/2000 thru 6/18/2000	7:00 p.m.	McLeansboro	5.55 in.	n/a	n/a	n/a	n/a	
6/24/2000	3:00 a.m.	McLeansboro	3.14 in.	n/a	n/a	n/a	n/a	
9/25/2000	3:00 a.m.	McLeansboro	1.63 in.	n/a	n/a	n/a	n/a	
8/18/2001	n/a	McLeansboro	2.25 in.	n/a	n/a	n/a	n/a	
11/29/2001 thru 11/30/2001	n/a	McLeansboro	2.21 in.					
12/16/2001	n/a	McLeansboro	2.50 in.	n/a	n/a	n/a	n/a	
3/9/2002	n/a	McLeansboro	1.66 in.	n/a	n/a	n/a	n/a	
3/16/2002	n/a	McLeansboro	1.63 in.	n/a	n/a	n/a	n/a	
3/20/2002	n/a	McLeansboro	1.85 in.	n/a	n/a	n/a	n/a	
11/11/2004	10:30 a.m.	Dale	2.00 in.	n/a	n/a	n/a	n/a	
3/9/2006	n/a	countywide	4.00 in.	n/a	n/a	n/a	n/a	rain fell during the afternoon hours leading to flash flooding
7/21/2006	n/a	McLeansboro	3.50 in.	n/a	n/a	n/a	n/a	heavy rain led to flash flooding
4/27/2011	4:00 p.m.	Dahlgren	1.78 in.	n/a	n/a	n/a	n/a	***This event was part of a federally-declared disaster (Declaration #1991)***
7/7/2011	8:40 p.m.	McLeansboro	1.75 in.	n/a	n/a	n/a	n/a	
SUBTOTAL:				**0**	**0**	**$0**	**$0**	

Table 4 Severe Storms – Heavy Rain Events Reported in Hamilton County 1990 – 2019 (Sheet 7 of 8)								
Date(s)	**Start Time**	**Location(s)**	**Maximum Magnitude (inches)**	**Injuries**	**Fatalities**	**Property Damage**	**Crop Damage**	**Description**
9/25/2011	11:45 a.m.	Dale^	n/a	n/a	n/a	n/a	n/a	
7/20/2013	5:15 p.m.	McLeansboro	1.00 in.	n/a	n/a	n/a	n/a	a thunderstorm produced 1-inch of rain in ten minutes
6/4/2014	n/a	McLeansboro	1.20 in.	n/a	n/a	n/a	n/a	rain fell in 20 minutes resulting in rapid flash flooding
12/25/2015 thru 12/29/2015	n/a	countywide	6.00 in.	n/a	n/a	n/a	n/a	rain fell over 4 days resulting in flash flooding
8/15/2016	n/a	countywide	2.50 in.	n/a	n/a	n/a	n/a	
2/21/2018	n/a	McLeansboro	1.85 in.	n/a	n/a	n/a	n/a	
2/25/2018	n/a	McLeansboro	4.23 in.	n/a	n/a	n/a	n/a	
3/28/2018 thru 3/30/2018	n/a	McLeansboro	4.19 in.	n/a	n/a	n/a	n/a	
7/15/2018	n/a	McLeansboro	1.61 in.	n/a	n/a	n/a	n/a	
9/8/2018 thru 9/9/2018	n/a	countywide	7.21 in.	n/a	n/a	n/a	n/a	rain fell over a 48-hour period resulting in flash flooding
9/25/2018	n/a	McLeansboro	1.98 in.	n/a	n/a	n/a	n/a	
11/1/2018	n/a	McLeansboro	1.51 in.	n/a	n/a	n/a	n/a	
12/15/2018	n/a	McLeansboro	1.74 in.	n/a	n/a	n/a	n/a	
SUBTOTAL:				**0**	**0**	**$0**	**$0**	

^ Heavy rain event verified in the vicinity of this location(s).

Table 4
Severe Storms – Heavy Rain Events Reported in Hamilton County
1990 – 2019
(Sheet 8 of 8)

Date(s)	Start Time	Location(s)	Maximum Magnitude (inches)	Injuries	Fatalities	Property Damage	Crop Damage	Description
5/22/2019	n/a	McLeansboro	1.53 in.	n/a	n/a	n/a	n/a	
5/30/2019	n/a	McLeansboro	1.52 in.	n/a	n/a	n/a	n/a	
6/22/2019	n/a	McLeansboro	1.66 in.	n/a	n/a	n/a	n/a	
10/26/2019	n/a	McLeansboro	1.65 in.	n/a	n/a	n/a	n/a	
SUBTOTAL:				**0**	**0**	**$0**	**$0**	
Grand Total:				**0**	**0**	**$0**	**$0**	

^ Heavy rain event verified in the vicinity of this location(s).

Source: NOAA, National Environmental Satellite, Data & Information Service, National Centers for Environmental Information, Cooperative Observation Forms.
NOAA, National Environmental Satellite, Data & Information Service, National Centers for Environmental Information, Storm Events Database.

Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 1 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
12/6/1950 thru 12/7/1950	n/a	Heavy Snow	7.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
1/6/1951 thru 1/7/1951	1:30 p.m.	Heavy Snow	5.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
1/18/1956 thru 1/19/1956	5:30 p.m.	Heavy Snow	6.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
3/18/1958	4:30 a.m.	Heavy Snow	5.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
3/2/1960 thru 3/3/1960	2:30 a.m.	Heavy Snow	5.3 in.					COOP (McLeansboro)	n/a	n/a	n/a	
3/8/1960 thru 3/9/1960	5:00 p.m.	Heavy Snow	6.8 in.					COOP (McLeansboro)	n/a	n/a	n/a	
2/2/1961	10:00 a.m.	Winter Storm	3.5 in.			X		COOP (McLeansboro)	n/a	n/a	n/a	
12/22/1963 thru 12/23/1963	10:30 p.m.	Heavy Snow	5.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 2 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
1/11/1964 thru 1/12/1964	7:30 p.m.	Heavy Snow	5.5 in.					COOP (McLeansboro)	n/a	n/a	n/a	
2/24/1965	5:30 a.m.	Winter Storm	5.0 in.	X				COOP (McLeansboro)	n/a	n/a	n/a	COOP observer noted drifting snow up to 5-feet on roads
2/1/1966	1:30 a.m.	Winter Storm	7.5 in.			X		COOP (McLeansboro)	n/a	n/a	n/a	
3/6/1967	12:00 a.m.	Heavy Snow	5.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
1/12/1968 thru 1/13/1968	4:00 p.m.	Heavy Snow	6.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
2/28/1969	3:30 a.m.	Heavy Snow	6.5 in.					COOP (McLeansboro)	n/a	n/a	n/a	
12/30/1969	7:00 a.m.	Winter Storm	4.5 in.	X		X		COOP (McLeansboro)	n/a	n/a	n/a	
2/13/1970 thru 2/14/1970	8:30 p.m.	Winter Storm	5.0 in.	X				COOP (McLeansboro)	n/a	n/a	n/a	
3/16/1970 thru 3/17/1970	11:00 p.m.	Heavy Snow	6.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
2/12/1971	2:30 a.m.	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	COOP observer noted drifting snow
Subtotal:									**0**	**0**	**$0**	

1 An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

2 Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
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Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 3 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
12/15/1973	n/a	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
12/19/1973	n/a	Heavy Snow	5.25 in.					COOP (McLeansboro)	n/a	n/a	n/a	
12/1/1974	n/a	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
3/9/1975	7:00 p.m.	Heavy Snow	6.5 in.					COOP (McLeansboro)	n/a	n/a	n/a	
11/26/1975	1:30 p.m.	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
12/29/1976 thru 12/30/1976	8:00 p.m.	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
1/9/1977	3:00 a.m.	Heavy Snow	6.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	COOP observer noted snow drifts up to 2-feet
11/27/1977	1:00 a.m.	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
1/16/1978 thru 1/17/1978	2:00 a.m.	Heavy Snow	11.5 in.					COOP (McLeansboro)	n/a	n/a	n/a	COOP observer noted snow drifts up to 3-feet
3/2/1978 thru 3/3/1978	8:30 a.m.	Heavy Snow	4.5 in.					COOP (McLeansboro)	n/a	n/a	n/a	
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

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Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 4 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
1/4/1979 thru 1/6/1979	11:00 p.m.	Heavy Snow	6.6 in.					COOP (McLeansboro)	n/a	n/a	n/a	COOP observer noted drifting snow on the 7th
1/26/1979 thru 1/27/1979	2:30 a.m.	Heavy Snow	5.2 in.					COOP (McLeansboro)	n/a	n/a	n/a	
2/8/1979	12:00 p.m.	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
2/25/1979 thru 2/26/1979	12:00 a.m.	Winter Storm	7.0 in.	X	X			COOP (McLeansboro)	n/a	n/a	n/a	COOP observer noted that electricity was out for 3 or more days in many areas beginning at 7 a.m. on the 25th
1/30/1980	1:30 a.m.	Heavy Snow	4.5 in.					COOP (McLeansboro)	n/a	n/a	n/a	
3/1/1980	3:30 a.m.	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	COOP observer noted drifting snow
11/26/1980 thru 11/27/1980	8:00 p.m.	Heavy Snow	6.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
2/3/1982	9:00 a.m.	Heavy Snow	6.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
Subtotal:									**0**	**0**	**$0**	

1 An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

2 Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 5 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
2/26/1984 thru 2/28/1984	2:30 p.m.	Heavy Snow	14.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	COOP observer noted drifting snow
3/21/1984	5:30 a.m.	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
12/5/1984 thru 12/6/1984	8:30 a.m.	Heavy Snow	5.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	COOP observer noted drifting snow
1/3/1985 thru 1/4/1985	7:00 p.m.	Heavy Snow	5.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
1/9/1987	9:30 a.m.	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
12/27/1988 thru 12/28/1988	5:00 p.m.	Heavy Snow	6.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
12/7/1989 thru 12/8/1989	9:30 p.m.	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
12/14/1989 thru 12/15/1989	2:30 p.m.	Heavy Snow	7.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

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Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 6 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
1/28/1990 thru 1/29/1990	8:30 p.m.	Heavy Snow	6.1 in.					COOP (McLeansboro)	n/a	n/a	n/a	
3/23/1990 thru 3/24/1990	7:00 p.m.	Winter Storm	5.0 in.	X	X			COOP (McLeansboro)	n/a	n/a	n/a	
12/22/1990 thru 12/24/1990	5:00 p.m.	Winter Storm	3.5 in.	X	0.53 in.			COOP (McLeansboro)	n/a	n/a	n/a	
12/27/1990	5:00 a.m.	Heavy Snow	8.8 in.					COOP (McLeansboro)	n/a	n/a	n/a	
2/15/1993	11:00 a.m.	Heavy Snow	8.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
2/25/1993 thru 2/26/1993	n/a	Heavy Snow	10.5 in.					COOP (McLeansboro)	n/a	n/a	n/a	
1/16/1994 thru 1/17/1994	2:00 p.m.	Heavy Snow	4.0 in.	X	X			COOP (McLeansboro)	n/a	n/a	n/a	
1/2/1996 thru 1/3/1996	3:00 a.m.	Heavy Snow	5.5 in.				25 mph gusts	COOP (McLeansboro) SED	n/a	n/a	n/a	most schools cancelled classes
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5 Severe Winter Storm Events Reported in Hamilton County 1950 – 2019 (Sheet 7 of 16)													
Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
1/5/1996 thru 1/6/1996	4:00 p.m.	Winter Storm	5.0 in.				X	COOP (McLeansboro) SED	n/a	n/a	n/a	strong gusty winds piled the dry, powdery snow into waist-high drifts in some spots; this contributed to dozens of auto accidents
2/15/1996	10:30 p.m.	Heavy Snow	4.0 in.					COOP (McLeansboro)	n/a	n/a	n/a	
12/15/1996 thru 12/16/1996	4:00 p.m.	Winter Storm	7.0 in.	X		X		COOP (McLeansboro) SED	n/a	n/a	n/a	- many schools were closed - numerous vehicles slid off roads
1/8/1997 thru 1/9/1997	9:00 p.m.	Winter Storm	6.0 in.					COOP (McLeansboro) SED	n/a	n/a	n/a	most schools closed due to the storm
1/15/1997	4:00 a.m.	Ice Storm	1.0 in.		0.5 in.			COOP (McLeansboro) SED	n/a	n/a	n/a	the freezing rain virtually shut down most areas, closing schools, government offices, and health facilities
12/21/1998	12:00 a.m.	Winter Storm	X	X	X			COOP (McLeansboro) SED	n/a	n/a	n/a	numerous accidents were reported across the area
1/1/1999 thru 1/2/1999	5:00 p.m.	Ice Storm	1.5 in.		1.0 in.			COOP (McLeansboro) SED	n/a	n/a	n/a	- dozens of vehicle accidents were reported - roads were extremely difficult to navigate
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5 Severe Winter Storm Events Reported in Hamilton County 1950 – 2019 (Sheet 8 of 16)													
Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
1/8/1999	6:00 a.m.	Ice Storm	0.6 in.	X	0.25 in.			COOP (McLeansboro) SED	n/a	n/a	n/a	many schools cancelled classes
3/13/1999 thru 3/14/1999	10:00 p.m.	Heavy Snow	9.0 in.					COOP (McLeansboro) SED	n/a	n/a	n/a	- numerous accidents occurred on area roadways - many schools cancelled classes
3/11/2000	5:00 a.m.	Heavy Snow	4.5 in.					COOP (McLeansboro)	n/a	n/a	n/a	
12/13/2000	3:30 a.m.	Winter Storm	13.5 in.	X	0.50 in.	X		COOP (McLeansboro)	n/a	n/a	n/a	- numerous accidents occurred across the area - many schools were closed for up to a week following the storm - ice on trees and power lines contributed to scattered power outages
12/4/2002	7:00 a.m.	Winter Storm	8.0 in.	X	0.25 in.			SED	n/a	n/a	n/a	- numerous vehicle accidents occurred - schools were closed for the remainder of the week in many counties
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 9 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
12/23/2002 thru 12/24/2002	8:00 p.m.	Winter Storm	6.0 in.		0.25 in.	4.0 in.		SED	n/a	n/a	n/a	- numerous vehicle accidents were reported - ice glazed trees, wires, and fences
2/16/2003	1:00 a.m.	Winter Storm				2.0 in.		SED	n/a	n/a	n/a	- most schools and businesses were closed - many vehicle accidents were reported
2/23/2003 thru 2/24/2003	6:00 p.m.	Heavy Snow	5.0 in.					SED	n/a	n/a	n/a	
1/25/2004	7:00 a.m.	Ice Storm			0.5 in.		X	SED	n/a	n/a	n/a	- numerous accidents were reported - scattered power outages occurred as brisk winds downed ice-laden trees and power lines - most schools were closed for at least a day
1/27/2004	1:00 a.m.	Winter Storm	2.0 in.	X				SED	n/a	n/a	n/a	secondary roads were reportedly very slick
1/29/2004	3:00 p.m.	Winter Storm	3.0 in.		X			SED	n/a	n/a	n/a	roads were reportedly very slick and hazardous
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 10 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
2/5/2004	4:00 a.m.	Heavy Snow	5.0 in.					SED	n/a	n/a	n/a	multiple vehicle accidents were reported across the area
12/22/2004 thru 12/23/2004	1:00 a.m.	Winter Storm	20.0 in.				35 mph gusts	SED	n/a	n/a	n/a	- roads were extremely difficult to navigate - numerous abandoned vehicles and jack-knifed semis blocked portions of highways - significant blowing and drifting snow up to 5-ft
12/8/2005	4:00 p.m.	Winter Storm	4-5 in.	X				SED	n/a	n/a	n/a	roadways were snow-covered and very slippery
2/13/2007	2:00 p.m.	Winter Storm	2.0 in.	X		X	X	SED	n/a	n/a	n/a	*Event Description Provided Below*
- strong winds produced blowing snow and reduced visibility to half a mile or less - schools were closed - roadways were very slick and hazardous - a number of community events were cancelled - a larger than usual number of vehicle accidents occurred; law enforcement reported most of the incidents were slide-offs or minor wrecks												
2/11/2008 thru 2/12/2008	11:00 a.m.	Winter Storm	X		1.0 in.	X		SED	n/a	n/a	n/a	*Event Description Provided Below*
- numerous trees and power lines were brought down, knocking out power to many homes; power outages lasted up to a week - schools were closed for a week across the area - trees and tree limbs fell across roads, complicating recovery efforts - a number of houses and other structurers were damaged by falling trees												
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 11 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
2/21/2008 thru 2/22/2008	6:00 a.m.	Winter Storm		X	0.50 in.	X		SED	n/a	n/a	n/a	- many schools and businesses were closed - vehicle accidents and property damage were reported across the area
3/3/2008 thru 3/4/2008	6:00 p.m.	Winter Storm		X	0.50 in.	X		SED	n/a	n/a	n/a	numerous downed tree limbs and power outages were reported across the area
12/16/2008 thru 12/17/2008	12:00 p.m.	Winter Storm		X	X			SED	n/a	n/a	n/a	secondary roads were extremely hazardous, and schools were cancelled
12/23/2008	8:00 a.m.	Winter Storm		0.10 in.				SED	n/a	n/a	n/a	numerous accidents and school closings were reported throughout the area
1/26/2009 thru 1/28/2009	9:00 p.m.	Winter Storm	10.0 in.		1.5 in.	X		SED	n/a	n/a	$100,000	*Event Description Provided Below*
This event was part of a federally-declared disaster (Declaration # 1826) - widespread power outages occurred; with power not being restored up to a week in some areas - numerous roads were closed by fallen trees and limbs - blocked roads complicated efforts to restore power and aid storm victims - numerous motorists were stranded in snow and sleet - ambulances had trouble reaching people who called for help - roof collapses due to the weight of snow, sleet and ice accumulations were reported												
Subtotal:									**0**	**0**	**$100,000**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 12 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
1/29/2010 thru 1/30/2010	6:00 p.m.	Heavy Snow	6.0 in.				X	SED	n/a	n/a	n/a	*Event Description Provided Below*
- blowing and drifting snow - roads were snow-covered and very slippery - numerous accidents were reported, mainly vehicles sliding off roads - visibility was reduced to around ½-mile in the snow												
2/14/2010 thru 2/16/2010	7:00 p.m.	Heavy Snow	7.0 in.				X	SED	n/a	n/a	n/a	- numerous vehicle accidents occurred on the snow-covered and slippery roads - blowing and drifting snow
12/12/2010	5:00 a.m.	Winter Storm	4.0 in.				30 mph	SED	n/a	n/a	n/a	*Event Description Provided Below*
- roads became snow-covered and slippery, resulting in numerous accidents - strong winds caused blowing and drifting snow with reduced visibility - schools were closed the following day in some areas												
1/20/2011	5:00 a.m.	Heavy Snow	4.5 in.					SED	n/a	n/a	n/a	roads were snow covered and icy with numerous vehicle accidents being reported
12/26/2012	2:00 a.m.	Winter Storm	5.0 in.				35 mph gusts	SED	n/a	n/a	n/a	- visibility dropped to ¼ - ½ mile for several hours in heavy snow - some drifting snow was reported from 2 - 3 feet - road conditions were snow-covered and hazardous
Subtotal:									**0**	**0**	**$0**	

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[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 13 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
12/28/2012 thru 12/29/2012	5:00 p.m.	Heavy Snow	7.0 in.					SED	n/a	n/a	n/a	roads were snow-covered and hazardous
1/13/2013	11:00 a.m.	Winter Storm		X		X		SED	n/a	n/a	n/a	icing occurred on elevated objects
12/5/2013 thru 12/6/2013	10:00 a.m.	Winter Storm	7.0 in.	0.25 in.		0.50 in.		SED	n/a	n/a	n/a	roads became very slick and hazardous with numerous accidents being reported
1/5/2014	11:00 a.m.	Winter Storm	4.0 in.	X		X	X	SED	n/a	n/a	n/a	- roads were reported to be snow-packed and slick - gusty winds caused blowing and drifting snow, which resulted in low visibilities
2/4/2014	12:00 p.m.	Winter Storm	4.0 in.		0.10 in.	X		SED	n/a	n/a	n/a	roads were slick and hazardous
3/2/2014	5:00 a.m.	Winter Storm	4.0 in.	0.25 in.		1.0 in.	30 mph gusts	SED	n/a	n/a	n/a	the messy winter mix created dangerous travel conditions
2/16/2015	2:00 a.m.	Heavy Snow	6.0 in.					SED	n/a	n/a	n/a	many schools were closed for several days
2/20/2015 thru 2/21/2015	4:00 p.m.	Winter Storm		X	0.25 in.	0.50 in.		SED	n/a	n/a	n/a	- roads were ice-covered and very slippery; causing dangerous travel conditions - power outages were reported across the area
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 14 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
3/4/2015	9:00 a.m.	Winter Storm	8.0 in.	X	0.10 in.	X	25 mph gusts	SED	n/a	n/a	n/a	- schools were closed for several days in most of the area - roads were icy and dangerous
												-
2/14/2016	9:00 a.m.	Winter Storm	1-3 in.	X				SED	n/a	n/a	n/a	visibility was reduced to about ¼ mile
1/11/2018 thru 1/12/2018	10:00 p.m.	Winter Storm	4.0 in.	X		1.0 in.	35 mph gusts	SED	n/a	n/a	n/a	dangerous travel conditions resulting in some vehicle accidents across the area
2/6/2018 thru 2/7/2018	7:00 p.m.	Winter Storm		X	X	X		SED	n/a	n/a	n/a	- slick roads and motor vehicle accidents were common during the early morning hours - trees, power lines and elevated surfaces accumulated ice
1/11/2019 thru 1/12/2019	5:00 p.m.	Winter Storm	6.0 in.			X		SED	n/a	n/a	n/a	snow-covered roads led to numerous accidents
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5
Severe Winter Storm Events Reported in Hamilton County
1950 – 2019
(Sheet 15 of 16)

Date(s)	Start Time	Event Type	Magnitude (Maximum)					Data Source[2]	Injuries	Fatalities	Property Damages	Description
			Snow	Freezing Rain[1]	Ice[1]	Sleet[1]	Strong Winds[1]					
1/19/2019	2:00 p.m.	Winter Storm	8.0 in.	X			50 mph gusts	SED	n/a	n/a	n/a	- travel impacts were very high due to the combination of high snowfall rates and strong wind gusts - numerous accidents, and some roads were closed for a while during the heart of the event - drifting snow
2/15/2019	3:00 p.m.	Winter Storm	2.0 in.	X		X		SED	n/a	n/a	n/a	numerous accidents were reported due to slippery roads
3/3/2019	12:00 a.m.	Winter Storm	2.0 in.			X		SED	n/a	n/a	n/a	
Subtotal:									**0**	**0**	**$0**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 5 Severe Winter Storm Events Reported in Hamilton County 1950 – 2019 (Sheet 16 of 16)													
Date(s)	**Start Time**	**Event Type**	**Magnitude (Maximum)**					**Data Source[2]**	**Injuries**	**Fatalities**	**Property Damages**	**Description**
			Snow	**Freezing Rain[1]**	**Ice[1]**	**Sleet[1]**	**Strong Winds[1]**					
11/11/2019	1:00 p.m.	Winter Storm	3 in.	X		X		SED	n/a	n/a	n/a	- flash freeze conditions were observed on area roadways as gusty northwest winds accompanied temperature drops into the 20s - many area roads became slick and hazardous resulting in numerous accidents and slide-offs
Subtotal:									**0**	**0**	**$0**	
GRAND TOTAL:									**0**	**0**	**$100,000**	

[1] An "X" in the freezing rain, ice, sleet and/or strong winds columns indicates the presences of that particular type of weather condition during a severe winter storm event.

[2] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Sources: Climate Atlas of Illinois.
Illinois State Water Survey.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, COOP Data / Record of Climatological Observations.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

Table 6 Extreme Cold Events Reported in Hamilton County 1996 – 2019 (Sheet 1 of 2)										
Date(s)	**Start Time**	**Event Type**	**Magnitude (Temperature °F)**			**Data Source[1]**	**Injuries**	**Fatalities**	**Property Damages**	**Impacts/Event Description**
			Low (Min)	**High (Max)**	**Wind Chill (Max)**					
2/2/1996 thru 2/5/1996	1:00 a.m.	Extreme Cold/ Wind Chill	-8°F	18°F	-40°F	COOP (McLeansboro) SED	n/a	n/a	n/a	
1/10/1997 thru 1/11/1997	10:00 a.m.	Extreme Cold/ Wind Chill	-6°F	29°F	-30°F	COOP (McLeansboro) SED	n/a	n/a	n/a	
12/12/2000 thru 12/31/2000	12:01 a.m.	Extreme Cold/ Wind Chill	-5°F	40°F	n/a	COOP (McLeansboro) SED	n/a	n/a	n/a	
1/1/2001 thru 1/4/2001	12:01 a.m.	Extreme Cold/ Wind Chill	-2°F	29°F	n/a	COOP (McLeansboro) SED	n/a	n/a	n/a	
1/23/2003	4:00 a.m.	Extreme Cold/ Wind Chill	-6°F	n/a	-15°F	SED	n/a	n/a	n/a	
12/23/2004 thru 12/25/2004	12:00 a.m.	Extreme Cold/ Wind Chill	-11°F	n/a	n/a	SED	n/a	n/a	n/a	
1/15/2009	3:00 a.m.	Extreme Cold/ Wind Chill	n/a	n/a	-15°F	SED	n/a	n/a	n/a	
1/5/2014 thru 1/7/2014	11:00 p.m.	Extreme Cold/ Wind Chill	n/a	n/a	-25°F	SED	n/a	n/a	n/a	
Subtotal:							**0**	**0**	**$0**	

[1] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database and the Midwestern Regional Climate Center.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 6
Extreme Cold Events Reported in Hamilton County
1996 – 2019
(Sheet 2 of 2)

Date(s)	Start Time	Event Type	Magnitude (Temperature °F)			Data Source[1]	Injuries	Fatalities	Property Damages	Impacts/Event Description
			Low (Min)	High (Max)	Wind Chill (Max)					
1/23/2014	4:00 a.m.	Extreme Cold/ Wind Chill	n/a	n/a	-15°F	SED	n/a	n/a	n/a	
1/8/2015	12:00 a.m.	Extreme Cold/ Wind Chill	4°F	n/a	-10°F	SED	n/a	n/a	n/a	
2/19/2015	2:00 a.m.	Extreme Cold/ Wind Chill	-12°F	n/a	-24°F	SED	n/a	n/a	n/a	
1/1/2018	1:00 a.m.	Extreme Cold/ Wind Chill	n/a	n/a	-19°F	SED	n/a	n/a	n/a	
1/16/2018	2:00 a.m.	Extreme Cold/ Wind Chill	n/a	n/a	-15°F	SED	n/a	n/a	n/a	
1/30/2019	4:00 a.m.	Extreme Cold/ Wind Chill	n/a	n/a	-20°F	SED	n/a	n/a	n/a	
Subtotal:							**0**	**0**	**$0**	
GRAND TOTAL:							**0**	**0**	**$0**	

[1] Observation Location information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database and the Midwestern Regional Climate Center.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Centers for Environmental Information, Cooperative Observation Forms.
NOAA, National Environmental Satellite, Data & Information Service, National Centers for Environmental Information, Storm Events Database.

Table 7
Excessive Heat Events Reported in Hamilton County
1997 - 2019
(Sheet 1 of 6)

Date(s)	Start Time	Magnitude (Temperature °F)			Data Source[1]	Injuries	Fatalities	Property Damages	Crop Damages	Impacts/Event Description
		Day (Max)	Night (Min)	Heat Index (Max)						
7/2/1997	12:00 a.m.	92°F	73°F	110°F	COOP (McLeansboro) SED	n/a	n/a	n/a	n/a	
7/25/1997 thru 7/28/1997	11:00 a.m.	102°F	67°F	115°F	COOP (McLeansboro) SED	n/a	n/a	n/a	n/a	- area hospitals reported at least a half dozen cases of dehydration or other heat-related illnesses - an increase in the number of disabled vehicles was reported
6/22/1998 thru 6/29/1998	9:00 a.m.	95°F	71°F	110°F	COOP (McLeansboro) SED	n/a	n/a	n/a	n/a	
7/18/1999 thru 7/31/1999	1:00 p.m.	102°F	66°F	115°F	COOP (McLeansboro) SED	n/a	n/a	n/a	n/a	
7/7/2001 thru 7/9/2001	3:00 p.m.	96°F	55°F	112°F	COOP (McLeansboro) SED	n/a	n/a	n/a	n/a	
8/3/2002 thru 8/5/2002	8:00 a.m.	100°F	n/a	105°F	SED	n/a	n/a	n/a	n/a	
7/21/2005 thru 7/26/2005	11:00 a.m.	97°F	77°F	110°F	SED	n/a	n/a	n/a	n/a	
Subtotal:						**0**	**0**	**$0**	**$0**	

[1] Information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 7 Excessive Heat Events Reported in Hamilton County 1997 - 2019 (Sheet 2 of 6)										
Date(s)	Start Time	Magnitude (Temperature °F)			Data Source[1]	Injuries	Fatalities	Property Damages	Crop Damages	Impacts/Event Description
		Day (Max)	Night (Min)	Heat Index (Max)						
8/19/2005 thru 8/20/2005	10:00 a.m.	n/a	n/a	105°F	SED	n/a	n/a	n/a	n/a	
7/19/2006	1:00 p.m.	n/a	n/a	110°F	SED	n/a	n/a	n/a	n/a	
7/31/2006 thru 8/2/2006	12:00 p.m.	n/a	n/a	115°F	SED	n/a	n/a	n/a	n/a	
8/7/2007 thru 8/9/2007	12:00 p.m.	n/a	n/a	110°F	SED	n/a	n/a	n/a	n/a	
8/15/2007	12:00 p.m.	n/a	n/a	105°F	SED	n/a	n/a	n/a	n/a	
8/5/2008	1:00 p.m.	n/a	n/a	105°F	SED	n/a	n/a	n/a	n/a	
6/19/2009	12:00 p.m.	99°F	n/a	105°F	SED	n/a	n/a	n/a	n/a	
6/22/2009	12:00 p.m.	97°F	n/a	110°F	SED	n/a	n/a	n/a	n/a	
6/18/2010 thru 6/22/2010	12:00 p.m.	95°F	n/a	105°F	SED	n/a	n/a	n/a	n/a	
7/14/2010 thru 7/15/2010	11:00 a.m.	97°F	n/a	109°F	SED	n/a	n/a	n/a	n/a	
Subtotal:						**0**	**0**	**$0**	**$0**	

[1] Information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:

COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 7 Excessive Heat Events Reported in Hamilton County 1997 - 2019 (Sheet 3 of 6)										
Date(s)	**Start Time**	**Magnitude (Temperature °F)**			**Data Source[1]**	**Injuries**	**Fatalities**	**Property Damages**	**Crop Damages**	**Impacts/Event Description**
		Day (Max)	**Night (Min)**	**Heat Index (Max)**						
7/22/2010 thru 7/24/2010	11:00 a.m.	95°F	n/a	110°F	SED	n/a	n/a	n/a	n/a	
8/3/2010 thru 8/4/2010	10:00 a.m.	n/a	n/a	118°F	SED	n/a	n/a	n/a	n/a	
8/9/2010 thru 8/15/2010	10:00 a.m.	n/a	n/a	105°F	SED	n/a	n/a	n/a	n/a	
7/3/2011	11:00 a.m.	97°F	n/a	105°F	SED	n/a	n/a	n/a	n/a	
7/10/2011 thru 7/12/2011	11:00 a.m.	99°F	81°F	117°F	SED	n/a	n/a	n/a	n/a	
7/19/2011 thru 7/24/2011	11:00 a.m.	n/a	n/a	110°F	SED	n/a	n/a	n/a	n/a	
7/27/2011 thru 7/29/2011	12:00 a.m.	97°F	n/a	110°F	SED	n/a	n/a	n/a	n/a	
Subtotal:						**0**	**0**	**$0**	**$0**	

[1] Information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 7 Excessive Heat Events Reported in Hamilton County 1997 - 2019 (Sheet 4 of 6)										
Date(s)	**Start Time**	**Magnitude (Temperature °F)**			**Data Source[1]**	**Injuries**	**Fatalities**	**Property Damages**	**Crop Damages**	**Impacts/Event Description**
		Day (Max)	**Night (Min)**	**Heat Index (Max)**						
7/31/2011 thru 8/3/2011	12:00 a.m.	97°F	n/a	110°F	SED	n/a	n/a	n/a	n/a	
8/6/2011 thru 8/7/2011	11:00 a.m.	n/a	n/a	110°F	SED	n/a	n/a	n/a	n/a	
6/29/2012 thru 7/8/2012	12:00 a.m.	106°F	n/a	114°F	SED	n/a	n/a	n/a	n/a	
7/18/2012 thru 7/19/2012	10:00 a.m.	103°F	n/a	105°F	SED	n/a	n/a	n/a	n/a	
7/23/2012 thru 7/25/2012	10:00 a.m.	106°F	n/a	n/a	SED	n/a	n/a	n/a	n/a	
8/31/2013	12:00 p.m.	99°F	n/a	110°F	SED	n/a	n/a	n/a	n/a	
8/21/2014 thru 8/27/2014	11:00 a.m.	n/a	n/a	115°F	SED	n/a	n/a	n/a	n/a	
Subtotal:						**0**	**0**	**$0**	**$0**	

[1] Information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 7
Excessive Heat Events Reported in Hamilton County
1997 - 2019
(Sheet 5 of 6)

Date(s)	Start Time	Magnitude (Temperature °F)			Data Source[1]	Injuries	Fatalities	Property Damages	Crop Damages	Impacts/Event Description
		Day (Max)	Night (Min)	Heat Index (Max)						
9/5/2014	12:00 p.m.	n/a	n/a	105°F	SED	n/a	n/a	n/a	n/a	
7/13/2015	12:00 p.m.	n/a	n/a	110°F	SED	n/a	n/a	n/a	n/a	
7/18/2015	12:00 p.m.	n/a	n/a	110°F	SED	n/a	n/a	n/a	n/a	
7/28/2015 thru 7/29/2015	12:00 p.m.	n/a	n/a	114°F	SED	n/a	n/a	n/a	n/a	
6/16/2016	11:00 a.m.	97°F	n/a	110°F	SED	n/a	n/a	n/a	n/a	
6/23/2016	11:00 a.m.	n/a	n/a	105°F	SED	n/a	n/a	n/a	n/a	
7/18/2016 thru 7/24/2016	12:00 p.m.	n/a	n/a	105°F	SED	n/a	n/a	n/a	n/a	
8/5/2016	12:00 p.m.	95°F	n/a	114°F	SED	n/a	n/a	n/a	n/a	
7/19/2017 thru 7/22/2017	12:00 p.m.	97°F	75°F	115°F	SED	n/a	n/a	n/a	n/a	
7/26/2017	10:00 a.m.	97°F	n/a	111°F	SED	n/a	n/a	n/a	n/a	
8/21/2017	11:00 a.m.	n/a	n/a	105°F	SED	n/a	n/a	n/a	n/a	
6/16/2018 thru 6/18/2018	11:00 a.m.	97°F	n/a	105°F	SED	n/a	n/a	n/a	n/a	
Subtotal:						**0**	**0**	**$0**	**$0**	

[1] Information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Table 7
Excessive Heat Events Reported in Hamilton County
1997 - 2019
(Sheet 6 of 6)

Date(s)	Start Time	Magnitude (Temperature °F)			Data Source[1]	Injuries	Fatalities	Property Damages	Crop Damages	Impacts/Event Description
		Day (Max)	Night (Min)	Heat Index (Max)						
6/29/2018 thru 7/5/2018	11:00 a.m.	97°F	n/a	110°F	SED	n/a	n/a	n/a	n/a	
7/14/2018	10:00 a.m.	n/a	n/a	115°F	SED	n/a	n/a	n/a	n/a	
7/10/2019	11:00 a.m.	96°F	n/a	110°F	SED	n/a	n/a	n/a	n/a	
7/18/2019	11:00 a.m.	94°F	n/a	105°F	SED	n/a	n/a	n/a	n/a	
8/12/2019	10:00 a.m.	90°F	n/a	112°F	SED	n/a	n/a	n/a	n/a	
Subtotal:						**0**	**0**	**$0**	**$0**	
GRAND TOTAL:						**0**	**0**	**$0**	**$0**	

[1] Information obtained from National Weather Service's (NWS's) COOP Observation Station records as well as other officially-designated sources identified in NOAA's Storm Events Database.

Acronyms:
COOP NWS COOP Observation Station Records SED NOAA's Storm Events Database

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Centers for Environmental Information, Cooperative Observation Forms.
NOAA, National Environmental Satellite, Data & Information Service, National Centers for Environmental Information, Storm Events Database.

Table 8
General Flood Events Reported in Hamilton County
1999 - 2019
(Sheet 1 of 2)

Date(s)	Start Time	Location(s) Impacted	Magnitude - Impacts			Injuries	Fatalities	Property Damages	Crop Damages	Event Description
			Home[2]	Business[2]	Infra-structure[2]					
4/3/1999	1:00 p.m.	Dahlgren	n/a	n/a	X	n/a	n/a	n/a	n/a	thunderstorms produced around 2-inches of rain in a 2-hour period resulting in street flooding in some communities
12/17/2001 thru 12/18/2001	4:00 a.m.	countywide	n/a	n/a	X	n/a	n/a	n/a	n/a	numerous roads were flooded including IL Rte. 142; which was closed south of McLeansboro
3/18/2008 thru 3/21/2008	7:00 a.m.	countywide	n/a	n/a	X	n/a	n/a	$340,000	n/a	- IL Rte. 142 was closed near Broughton - IL Rte. 242 was closed about 7 miles south of McLeansboro - numerous smaller county roads were closed - some damage occurred to roads
4/24/2011 thru 5/10/2011	12:00 a.m.	countywide	n/a	X	X	n/a	n/a	$30,000	n/a	***This event was part of a federally-declared disaster (Declaration #1991)*** - a disaster proclamation was issued by the governor due to the damage from flooding and severe storms - the National Guard was deployed to assist with sandbagging and other operations - numerous roads were flooded and closed across the area, including some major state roads - about 50,000 acres of farmland was flooded in the County
12/21/2013 thru 12/22/2013	6:00 p.m.	southern portion of the county	n/a	n/a	X	n/a	n/a	n/a	n/a	IL Rte. 142 was closed due to flooding near Broughton
Subtotal:						**0**	**0**	**$370,000**	**$0**	

[1] An "X" in the columns of Home, Business and Infrastructure indicates impacts occurred to those structure/infrastructure types during a general flood event. A detailed description of the type and magnitude of the impacts are included in the Event Description column if available.

Table 8
General Flood Events Reported in Hamilton County
1999 - 2019
(Sheet 2 of 2)

Date(s)	Start Time	Location(s) Impacted	Magnitude - Impacts			Injuries	Fatalities	Property Damages	Crop Damages	Event Description
			Home[2]	Business[2]	Infra-structure[2]					
8/17/2014	2:00 a.m.	western portion of the county	n/a	n/a	X	n/a	n/a	n/a	n/a	- several secondary roads were impassable due to flooding - portions of IL Rte. 14 were flooded west of McLeansboro to the Franklin County line - portion of IL Rte. 242 flooded near McLeansboro
12/28/2015 thru 12/29/2015	12:00 p.m.	southern portion of the county	n/a	n/a	X	n/a	n/a	n/a	n/a	- widespread flooding of low-lying farm ground was reported - IL Rte. 142 was closed, as well as County Rd. 500N
8/13/2016	10:15 a.m.	northern portion of the county	n/a	n/a	X	n/a	n/a	n/a	n/a	2 to 4 inches of water covered IL Rte. 242
8/15/2016 thru 8/16/2016	7:22 p.m.	southern portion of the county	n/a	n/a	X	n/a	n/a	n/a	n/a	County Rd. 500N was closed about 3 miles east of IL Rte. 142
9/16/2016	8:50 p.m.	southern portion of the county	n/a	n/a	X	n/a	n/a	n/a	n/a	the intersection of IL Rte. 142 and County Rd. 700N was covered with 3 inches of water
Subtotal:						**0**	**0**	**$0**	**$0**	
GRAND TOTAL:						**0**	**0**	**$370,000**	**$0**	

[1] An "X" in the columns of Home, Business and Infrastructure indicates impacts occurred to those structure/infrastructure types during a general flood event. A detailed description of the type and magnitude of the impacts are included in the Event Description column if available.

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Centers for Environmental Information, Storm Data.
NOAA, National Environmental Satellite, Data & Information Service, National Centers for Environmental Information, Storm Events Database.

Table 9
Flash Flood Events Reported in Hamilton County
1996 - 2019
(Sheet 1 of 5)

Date(s)	Start Time	Location(s) Impacted	Magnitude (Impacts)			Injuries	Fatalities	Property Damages	Crop Damages	Magnitude/Description
			Home[1]	Business[1]	Infra-structure[1]					
4/28/1996	8:30 p.m.	countywide	X	n/a	X	n/a	n/a	$100,000	$40,000	***This event was part of a federally-declared disaster (Declaration #1112)*** - several highways were closed by high water, including IL Rte. 142 north and south of McLeansboro - most of the damage to private property was caused by flooded basements
5/5/1996	3:00 p.m.	McLeansboro	n/a	n/a	X	n/a	n/a	n/a	n/a	***This event was part of a federally-declared disaster (Declaration #1112)*** rainfall rates from 1 to 2 inches per hour caused flooding of roads
5/8/1996	1:30 a.m.	Walpole	n/a	n/a	n/a	n/a	n/a	n/a	n/a	***This event was part of a federally-declared disaster (Declaration #1112)*** slow-moving thunderstorms dumped over an inch of rain in 30-minutes across southern parts of the county
4/15/1998 thru 4/16/1998	10:20 p.m.	McLeansboro	X	n/a	X	n/a	n/a	$10,000	n/a	- thunderstorms with very heavy rain flooded numerous roads, including IL Rtes. 142, 242, and a viaduct along IL Rte. 14 in McLeansboro - IL Rte. 142 was closed near Broughton for several hours - several residents had to be rescued from their homes by emergency personnel because of flooding
Subtotal:						**0**	**0**	**$110,000**	**$40,000**	

[1] An "X" in the columns of Home, Business and Infrastructure indicates impacts occurred to those structure/infrastructure types during a general flood event. A detailed description of the type and magnitude of the impacts are included in the Event Description column if available.

Table 9
Flash Flood Events Reported in Hamilton County
1996 – 2019
(Sheet 2 of 5)

Date(s)	Start Time	Location(s) Impacted	Magnitude (Impacts)			Injuries	Fatalities	Property Damages	Crop Damages	Magnitude/Description
			Home[1]	Business[1]	Infra-structure[1]					
1/21/1999 thru 1/22/1999	11:30 p.m.	countywide	n/a	n/a	X	n/a	n/a	n/a	n/a	
1/31/1999	7:45 a.m.	countywide	n/a	n/a	X	n/a	n/a	n/a	n/a	water was across several roads throughout the area
6/17/2000	3:30 a.m.	McLeansboro	n/a	n/a	X	n/a	n/a	n/a	n/a	water was reported on some roadways
6/18/2000	1:15 a.m.	McLeansboro	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
5/1/2004	6:25 a.m.	McLeansboro^ Dale	n/a	n/a	X	n/a	n/a	n/a	n/a	road flooding occurred about a mile north of Dale
5/25/2004	5:15 p.m.	countywide	n/a	n/a	X	n/a	n/a	n/a	n/a	- major creek and road flooding were reported - water was over IL Rte. 142 between McLeansboro and Broughton - most of the flooded roads were secondary roads affected by creeks - a particularly dangerous location was west of Dale, where significant creek flooding continued throughout the night, causing secondary roads to be closed - flooding of Hogg and Contrary Creeks prompted some of the road closures
8/28/2004	3:40 p.m.	McLeansboro	n/a	n/a	X	n/a	n/a	n/a	n/a	- flooded streets were reported in downtown McLeansboro - a couple of feet of water covered IL Rte. 14
Subtotal:						**0**	**0**	**$0**	**$0**	

[1] An “X” in the columns of Home, Business and Infrastructure indicates impacts occurred to those structure/infrastructure types during a general flood event. A detailed description of the type and magnitude of the impacts are included in the Event Description column if available.

^ Flash flood event verified in the vicinity of this location(s).

Table 9
Flash Flood Events Reported in Hamilton County
1996 - 2019
(Sheet 3 of 5)

Date(s)	Start Time	Location(s) Impacted	Magnitude (Impacts)			Injuries	Fatalities	Property Damages	Crop Damages	Magnitude/Description
			Home[1]	Business[1]	Infra-structure[1]					
3/9/2006	12:00 p.m.	countywide	n/a	n/a	X	n/a	n/a	$30,000	n/a	- some local roads were washed out due to excessive rainfall - a pickup truck drove through a washout 5-feet wide and 3 to 4 feet deep, causing a broken fender and possible damage to the frame - road crews bladed off corn stalks that washed onto the roads and piled as high as 3-feet
3/12/2006	3:00 a.m.	northern portion of the county	n/a	n/a	X	n/a	n/a	n/a	n/a	parts of IL Rte. 242 were flooded from McLeansboro north
7/21/2006	12:30 p.m.	countywide	n/a	n/a	X	n/a	n/a	n/a	n/a	floodwaters in McLeansboro made some streets impassable to small vehicles
5/8/2009	12:00 p.m.	countywide	n/a	n/a	X	n/a	n/a	$10,000	n/a	***This event was part of a federally-declared disaster (Declaration #1850)*** - widespread flash flooding of many roads occurred from McLeansboro south - a vehicle was stranded in floodwaters under the viaduct on IL Rte. 14 in McLeansboro; the occupants were on top of the roof of their car until rescue personnel pushed the car to safety - another vehicle was stuck in floodwaters near a bridge in the southeast part of the county
Subtotal:						**0**	**0**	**$40,000**	**$0**	

[1] An "X" in the columns of Home, Business and Infrastructure indicates impacts occurred to those structure/infrastructure types during a general flood event. A detailed description of the type and magnitude of the impacts are included in the Event Description column if available.

Table 9 Flash Flood Events Reported in Hamilton County 1996 - 2019 (Sheet 4 of 5)										
Date(s)	**Start Time**	**Location(s) Impacted**	**Magnitude (Impacts)**			**Injuries**	**Fatalities**	**Property Damages**	**Crop Damages**	**Magnitude/Description**
			Home[1]	**Business[1]**	**Infra-structure[1]**					
6/4/2014	2:50 p.m.	eastern portion of the county	n/a	n/a	X	n/a	n/a	n/a	n/a	ponding and over wash was reported on nearly all streets at low spots and creek culverts in Dahlgren
8/15/2016	5:17 a.m.	countywide	n/a	n/a	X	n/a	n/a	$4,000	n/a	- several people were rescued from a flooded vehicle on rural road four miles southwest of McLeansboro - just north of Dale, a large amount of water was crossing IL Rte. 142 and County Rd. 700N - there were also large amounts of water crossing IL Rte. 242 north of McLeansboro near County Rd. 1800N
4/30/2017	5:05 a.m.	southern portion of the county	X	n/a	X	n/a	n/a	$99,000	n/a	- the community of Broughton was isolated by high water - IL Rte. 142 was closed from south of Dale to the Saline County line - numerous secondary roads were covered by water - a couple of homes received minor flood damage in the McLeansboro area - the Hamilton County EMA Director identified $93,000 in damage to roads in the County
2/24/2018	6:33 p.m.	countywide	n/a	n/a	X	n/a	n/a	n/a	n/a	two water rescues were conducted on flooded roads
Subtotal:						**0**	**0**	**$103,000**	**$0**	

[1] An "X" in the columns of Home, Business and Infrastructure indicates impacts occurred to those structure/infrastructure types during a general flood event. A detailed description of the type and magnitude of the impacts are included in the Event Description column if available.

Table 9
Flash Flood Events Reported in Hamilton County
1996 - 2019
(Sheet 5 of 5)

Date(s)	Start Time	Location(s) Impacted	Magnitude (Impacts)			Injuries	Fatalities	Property Damages	Crop Damages	Magnitude/Description
			Home[1]	Business[1]	Infra-structure[1]					
9/8/2018	11:38 a.m.	northern portion of the county	n/a	n/a	X	n/a	n/a	$40,000	n/a	- water was over IL Rte. 242 in several places between McLeansboro and I-64 - several cars were stranded in floodwater
9/25/2018	7:55 a.m.	northern portion of the county	n/a	n/a	X	n/a	n/a	$5,000	n/a	- IL Rte. 242 was flooded just north of McLeansboro - one car was in the ditch with water levels rising on IL Rte. 242 - water was reported over county roads
Subtotal:						**0**	**0**	**$45,000**	**$0**	
GRAND TOTAL:						**0**	**0**	**$298,000**	**$40,000**	

[1] An "X" in the columns of Home, Business and Infrastructure indicates impacts occurred to those structure/infrastructure types during a general flood event. A detailed description of the type and magnitude of the impacts are included in the Event Description column if available.

Sources: Hamilton County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee Member responses to Natural Hazard Events Questionnaire.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, COOP Data / Record of Climatological Observations.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

Table 10
Tornadoes Reported in Hamilton County
1950 – 2019
(Sheet 1 of 3)

Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
12/18/1957	5:35 p.m.	Dahlgren	F3	2.5	150	3	n/a	$250,000	n/a	
12/18/1957	6:00 p.m.	Bungay	F3	2.8	10	4*	n/a	$250,000*	n/a	*Touchdown/Liftoff-Three Counties* tornado touchdown in Hamilton County 1 mile southwest of Bungay and traveled northeast into White County before lifting off in Edwards County 5miles northwest of Grayville - total length: 19.8 miles
3/25/1964	3:40 p.m.	Dahlgren^ Belle Prairie City^	F2	11.5	50	2	n/a	$25,000	n/a	*Belle Prairie Rd. & IL Rte. 142* - one house and several substantial outbuildings were destroyed - large trees were uprooted - other major buildings were badly damaged, outbuildings destroyed, and cards damaged by debris - two ladies suffered facial cuts from glass when the home was destroyed
3/30/1982	9:15 p.m.	Aden^	F1	0.1	10	n/a	n/a	$150,000	n/a	a house and a barn were destroyed
Subtotal:						**9***	**0**	**$675,000***	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Hamilton County.

^ Tornado touchdown verified in the vicinity of this location(s).

* The 4 injuries and $250,000 in property damages sustained as a result the December 18, 1957 tornado that touched down at 6:00 p.m. in Hamilton County represents losses sustained in three counties. A detailed breakdown by county was not available.

Table 10
Tornadoes Reported in Hamilton County
1950 – 2019
(Sheet 2 of 3)

Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
1/7/1989	4:55 p.m.	Bungay[^]	F2	1.6	100	n/a	n/a	n/a	n/a	***This event was part of a federally-declared disaster (Declaration #819)*** *Touchdown/Liftoff - Multiple Counties* tornado touchdown in northeast Hamilton County 2.7 miles northeast of Bungay and traveled northeast passing through extreme northwest White County and extreme southwest Wayne County before entering Edwards County and lifting off near Bellmont - total length: 27.0 miles
5/9/1990	7:30 p.m.	McLeansboro[^]	F2	0.5	50	n/a	n/a	$25,000	n/a	a mobile home was destroyed and other minor damage to power lines and structures was reported
6/2/1990	5:20 p.m.	Aden[^]	F4	2.6	300	n/a	n/a	n/a	n/a	***This event was part of a federally-declared disaster (Declaration #871)***
10/3/1990	8:32 p.m.	Cornersville[^] Walpole[^]	F1	3.0	50	n/a	n/a	$250,000	n/a	***This event was part of a federally-declared disaster (Declaration #871)*** heavy damage occurred to several farm homes and farm buildings along the County border
Subtotal:						**0**	**0**	**$275,000**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Hamilton County.

[^] Tornado touchdown verified in the vicinity of this location(s).

Table 10
Tornadoes Reported in Hamilton County
1950 – 2019
(Sheet 3 of 3)

Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
4/19/1996	8:18 p.m.	Delafield^ Piopolis Belle Prairie City^ Aden^	F3	13	400	n/a	n/a	$2,800,000	n/a	*Event Description Provided Below*
<u>Touchdown/Liftoff -Three Counties</u> tornado touched down in southeast Jefferson County and traveled northeast through Hamilton County before lifting off in southern Wayne County near I-64 - total length: 17.0 miles						- the tornado destroyed 3 homes and caused moderate to severe damage to 50 others - about 45 barns and outbuildings were damaged or destroyed, along with 60 to 70 grain bins - Piopolis was nearly devastated				
4/19/2011	8:19 p.m.	Dale^ Dolan Lake	EF1	3.36	150	n/a	n/a	$150,000	n/a	***This event was part of a federally-declared disaster (Declaration #1991)*** hundreds of trees were uprooted, and a small grain bin was destroyed
6/19/2015	4:30 p.m.	Macedonia^	EF0	0.49	50	n/a	n/a	$2,000	$10,000	- several tree limbs were broken - corn stalks were flattened - a play set was blown over
Subtotal:						**0**	**0**	**$2,952,000**	**$10,000**	
GRAND TOTAL:						**9***	**0**	**$3,902,000***	**$10,000**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Hamilton County.

^ Tornado touchdown verified in the vicinity of this location(s).

* The 4 injuries and $250,000 in property damages sustained as a result the December 18, 1957 tornado that touched down at 6:00 p.m. in Hamilton County represents losses sustained in three counties. A detailed breakdown by county was not available.

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Centers for Environmental Information, Storm Data.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.
NOAA, National Weather Service, Storm Prediction Center, SVRGIS, Tornadoes (1950-2017) Database.

Table 11
Drought Events Reported in Hamilton County
1980 – 2019
(Sheet 1 of 2)

Year	Date Range	Magnitude (Drought Intensity Category)					Percent Crop Yield Reduction from Previous Year		Designated USDA Primary Natural Disaster Area	Crop Damages	Impacts/Event Description
		D0	D1	D2	D3	D4	Corn	Soybeans			
1983	n/a						65.7%	50%	No	n/a	All 102 counties in Illinois were proclaimed state disaster areas because of high temperatures and insufficient precipitation beginning in mid-June
1988	June 1988 thru September 1989						25.9%	12.3%	No	n/a	Approximately half of all Illinois counties were impacted by drought conditions
1998	September 1998						1.9%	13.5%	No	n/a	
1999	August 1999 thru December 1999						---	15.6%	No	n/a	
2002	July 2002 thru October 2002	X	X	X			50%	31.7%	No	n/a	
2005	May 2005 thru August 2005	X	X				17.3%	2.2%	Yes	n/a	93 Illinois counties, including Hamilton, were designated as agricultural disaster areas due to drought
Subtotal:										**$0**	

[1] An "X" in a Drought Intensity Category column indicates that level of drought was reached by at least a portion of the County during the event.

Acronyms:

US Drought Monitor – Drought Intensity Categories			
D0	abnormally dry	D3	extreme drought
D1	moderate drought	D4	exceptional drought
D2	severe drought		

Table 11
Drought Events Reported in Hamilton County
1980 – 2019
(Sheet 2 of 2)

Year	Date Range	Magnitude (Drought Intensity Category)					Percent Crop Yield Reduction from Previous Year		Designated USDA Primary Natural Disaster Area	Crop Damages	Impacts/Event Description
		D0	D1	D2	D3	D4	Corn	Soybeans			
2007	June 2007 thru October 2007	X	X	X			21.4%	39.0%	No	$3,450,000	
2010	August 2010 thru October 2010	X	X				12.3%	13.7%	No		
2011	January 2011 thru September 2011	X	X				12.5%	11.3%	Yes	n/a	44 Illinois counties, including Hamilton, were designated as agricultural disaster areas due to drought
2012	May 2012 thru January 2013	X	X	X	X	X	74.3%	14.3%	Yes	n/a	66 counties in Illinois, including Hamilton County, were designated as primary natural disaster areas due to damage and losses caused by drought and extreme heat
Subtotal:										**$3,450,000**	
GRAND TOTAL:										**$3,450,000**	

[1] An "X" in a Drought Intensity Category column indicates that level of drought was reached by at least a portion of the County during the event.

Acronyms:

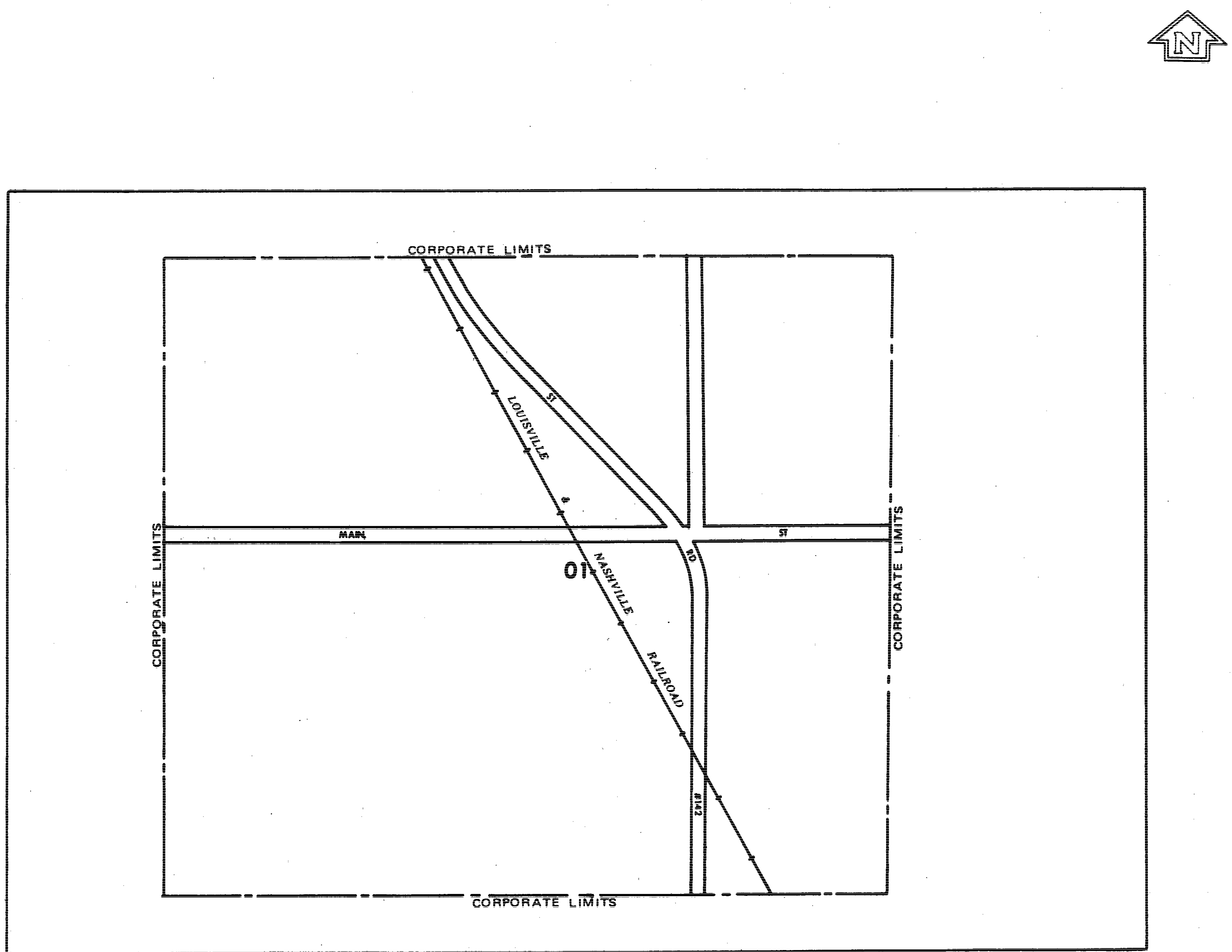
US Drought Monitor – Drought Intensity Categories

D0	abnormally dry	D3	extreme drought
D1	moderate drought	D4	exceptional drought
D2	severe drought		

Sources: Illinois State Water Survey, Illinois State Climatologist.
National Drought Mitigation Center, United States Drought Monitor.
NOAA, National Environmental Satellite, Data & Information Service, National Centers for Environmental Information, Storm Events Database.

FIRMs for Participating Jurisdictions

Appendix K



KEY TO MAP

ZONE DESIGNATIONS*

ZONE C

ZONE A

ZONE C

Base Flood Elevation Line with elevation in feet	~~~513~~~
Base Flood Elevation where uniform within zone	(EL 987)
Elevation Reference Mark	RM7 x
River Mile	• M1.5

*EXPLANATION OF ZONE DESIGNATIONS

A flood insurance map displays the zone designations for a community according to areas of designated flood hazards. The zone designations used by FEMA are

ZONE	EXPLANATION
A	Areas of 100-year flood base flood elevations and flood hazard factors not determined
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet, average depths of inundation are shown, but no flood hazard factors are determined
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet, base flood elevations are shown, but no flood hazard factors are determined
A1-A30	Areas of 100-year flood, base flood elevations and flood hazard factors determined
A99	Areas of 100-year flood to be protected by flood protection system under construction, base flood elevations and flood hazard factors not determined
B	Areas between limits of the 100-year flood and 500-year flood, or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile, or areas protected by levees from the base flood (Medium shading)
C	Areas of minimal flooding (No shading)
D	Areas of undetermined, but possible flood hazards
V	Areas of 100-year coastal flood with velocity (wave action), base flood elevations and flood hazard factors not determined
V1-V30	Areas of 100-year coastal flood with velocity (wave action), base flood elevations and flood hazard factors determined

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only, it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

To determine if flood insurance is available in this community contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

INITIAL IDENTIFICATION: MARCH 1, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS: JUNE 11, 1976

FLOOD INSURANCE RATE MAP EFFECTIVE: SEPTEMBER 4, 1985

FLOOD INSURANCE RATE MAP REVISIONS:

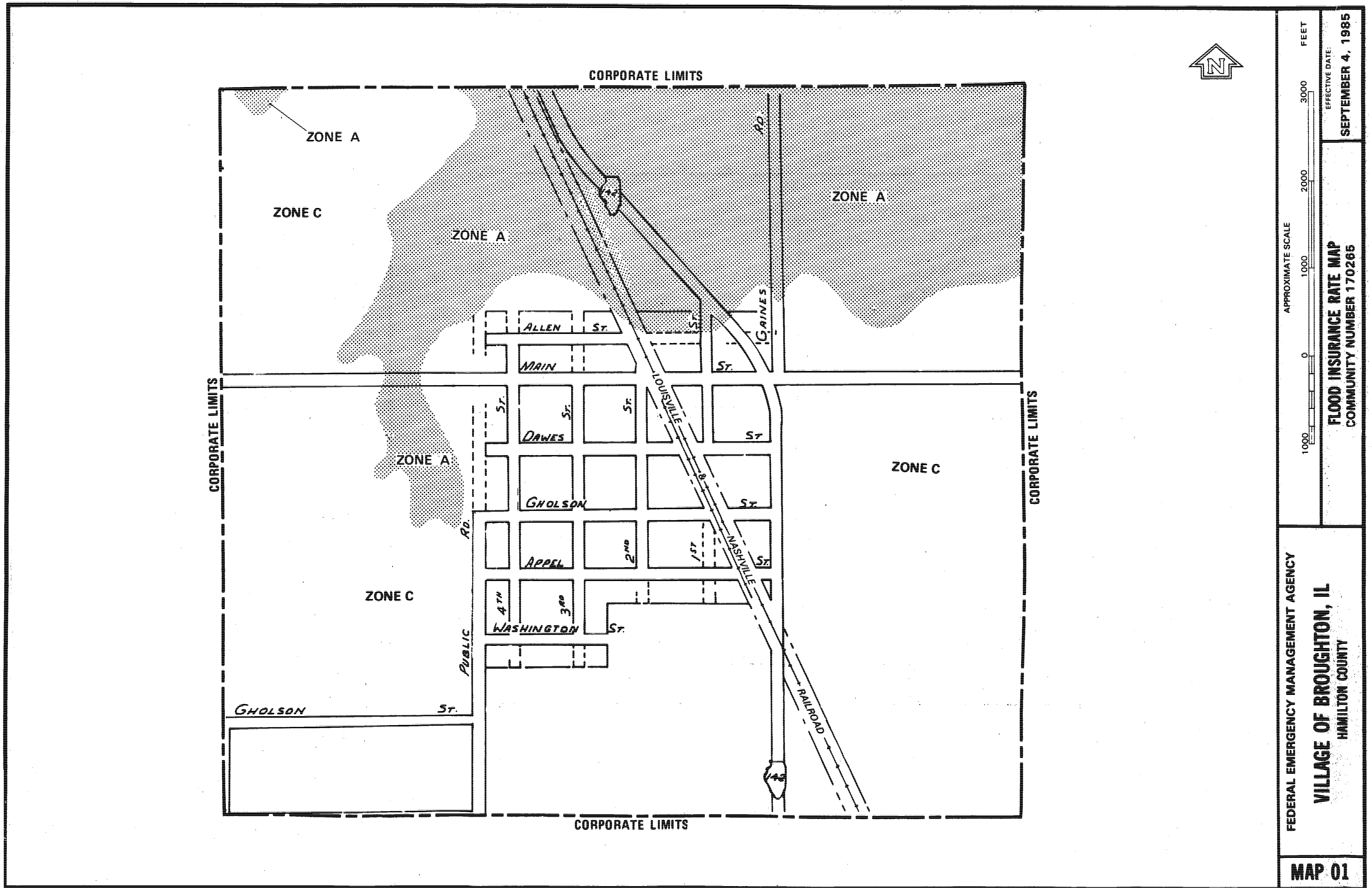
FEDERAL EMERGENCY MANAGEMENT AGENCY

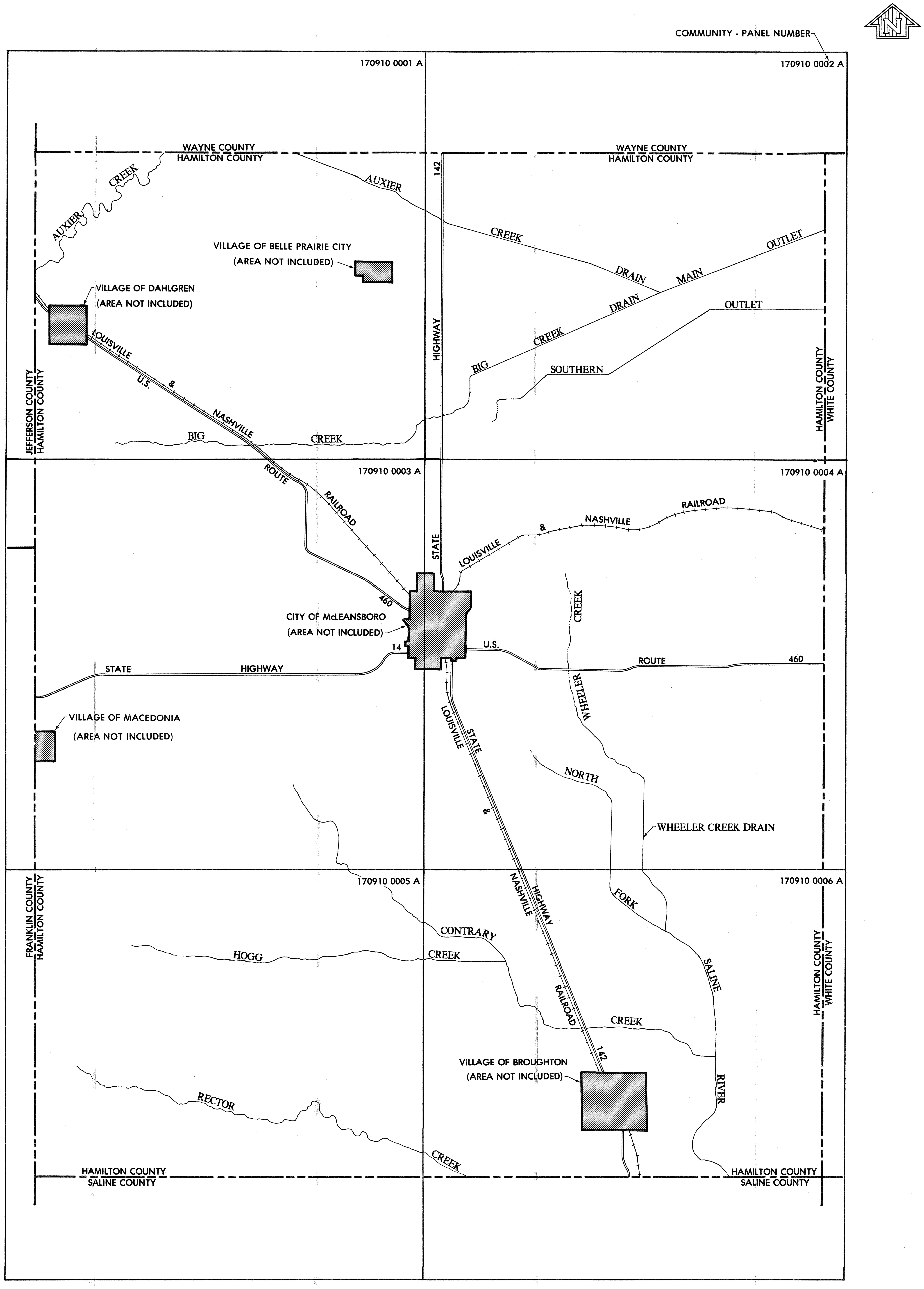
FIRM

FLOOD INSURANCE RATE MAP 01
MAP INDEX
VILLAGE OF BROUGHTON, IL

HAMILTON COUNTY

COMMUNITY NUMBER 170265 B


CORPORATE LIMITS
ZONE A
ZONE C
ZONE A
ZONE A
ZONE A
ZONE C
ZONE C
ALLEN ST.
MAIN ST.
DAWES ST
GHOLSON ST.
APPEL ST.
WASHINGTON ST.
GAINES RD.
PUBLIC RD.
4TH ST.
3RD ST.
2ND ST.
1ST ST.
LOUISVILLE & NASHVILLE RAILROAD
GHOLSON ST.
142
APPROXIMATE SCALE
1000 0 1000 2000 3000 FEET
EFFECTIVE DATE:
SEPTEMBER 4, 1985
FLOOD INSURANCE RATE MAP
COMMUNITY NUMBER 170265
FEDERAL EMERGENCY MANAGEMENT AGENCY
VILLAGE OF BROUGHTON, IL
HAMILTON COUNTY
MAP 01



KEY TO SYMBOLS

SPECIAL FLOOD HAZARD AREA — ZONE A

Note: These maps may not include all Special Flood Hazard Areas in the community. After a more detailed study, the Special Flood Hazard Areas shown on these maps may be modified, and other areas added.

"TO DETERMINE IF FLOOD INSURANCE IS AVAILABLE IN THIS COMMUNITY, CONTACT YOUR INSURANCE AGENT, OR CALL THE NATIONAL FLOOD INSURANCE PROGRAM, AT (800) 638-6620, OR (800) 424-8872."

INITIAL IDENTIFICATION DATE:
JANUARY 2, 1981

NATIONAL FLOOD INSURANCE PROGRAM

FHBM

FLOOD HAZARD BOUNDARY MAP

HAMILTON COUNTY, ILLINOIS

UNINCORPORATED AREA

MAP INDEX

PANELS PRINTED: 1, 2, 3, 4, 5, 6

CONVERTED BY LETTER
EFFECTIVE 2/1/90

COMMUNITY-PANEL NUMBERS
170910 0001-0006

EFFECTIVE DATE:
JANUARY 2, 1981

federal emergency management agency
federal insurance administration

KEY TO SYMBOLS

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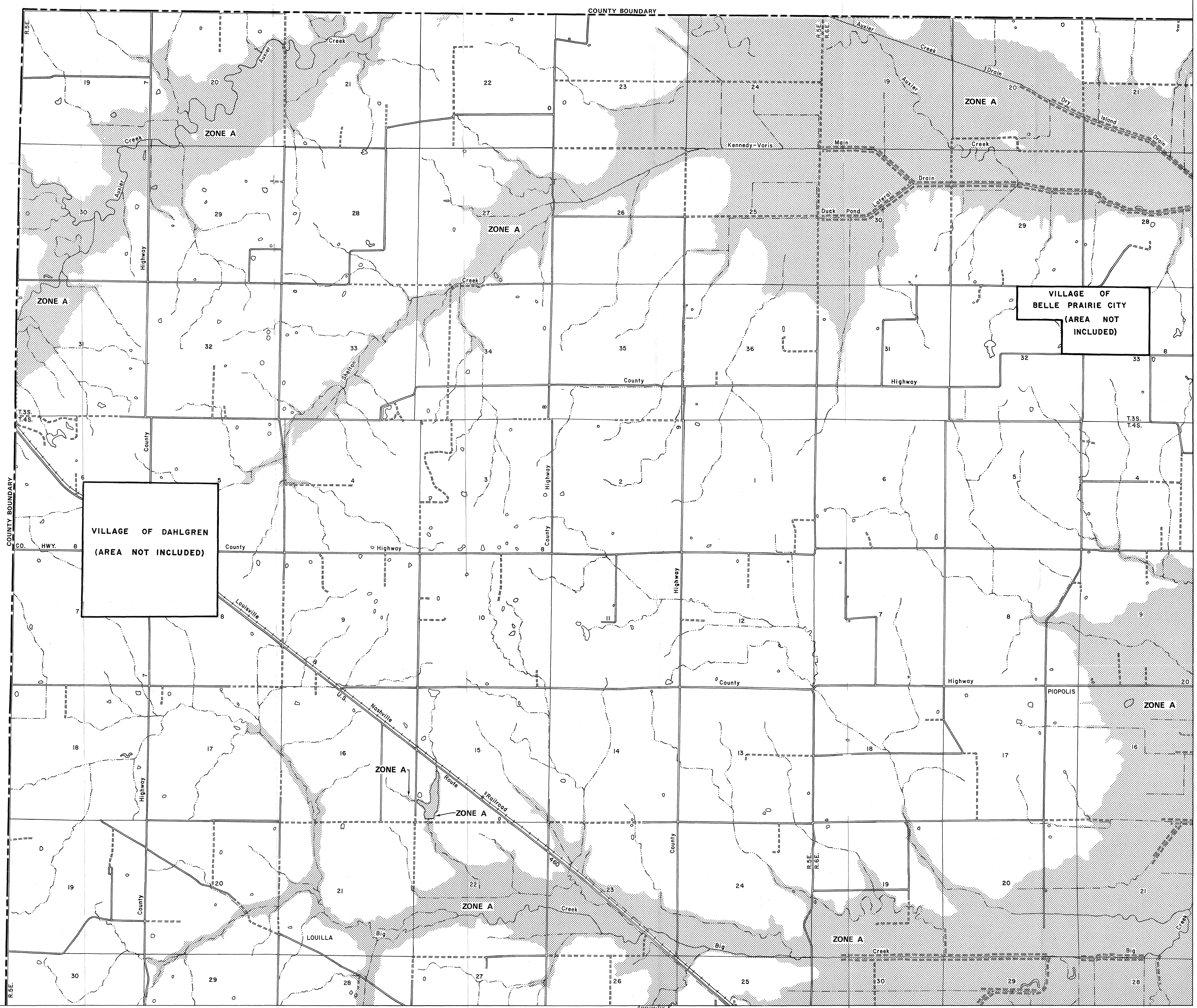
APPROXIMATE SCALE IN FEET:
2000 0 2000



NATIONAL FLOOD INSURANCE PROGRAM

FBHM

FLOOD HAZARD BOUNDARY MAP

HAMILTON COUNTY, ILLINOIS

UNINCORPORATED AREA

PANEL 1 OF 6

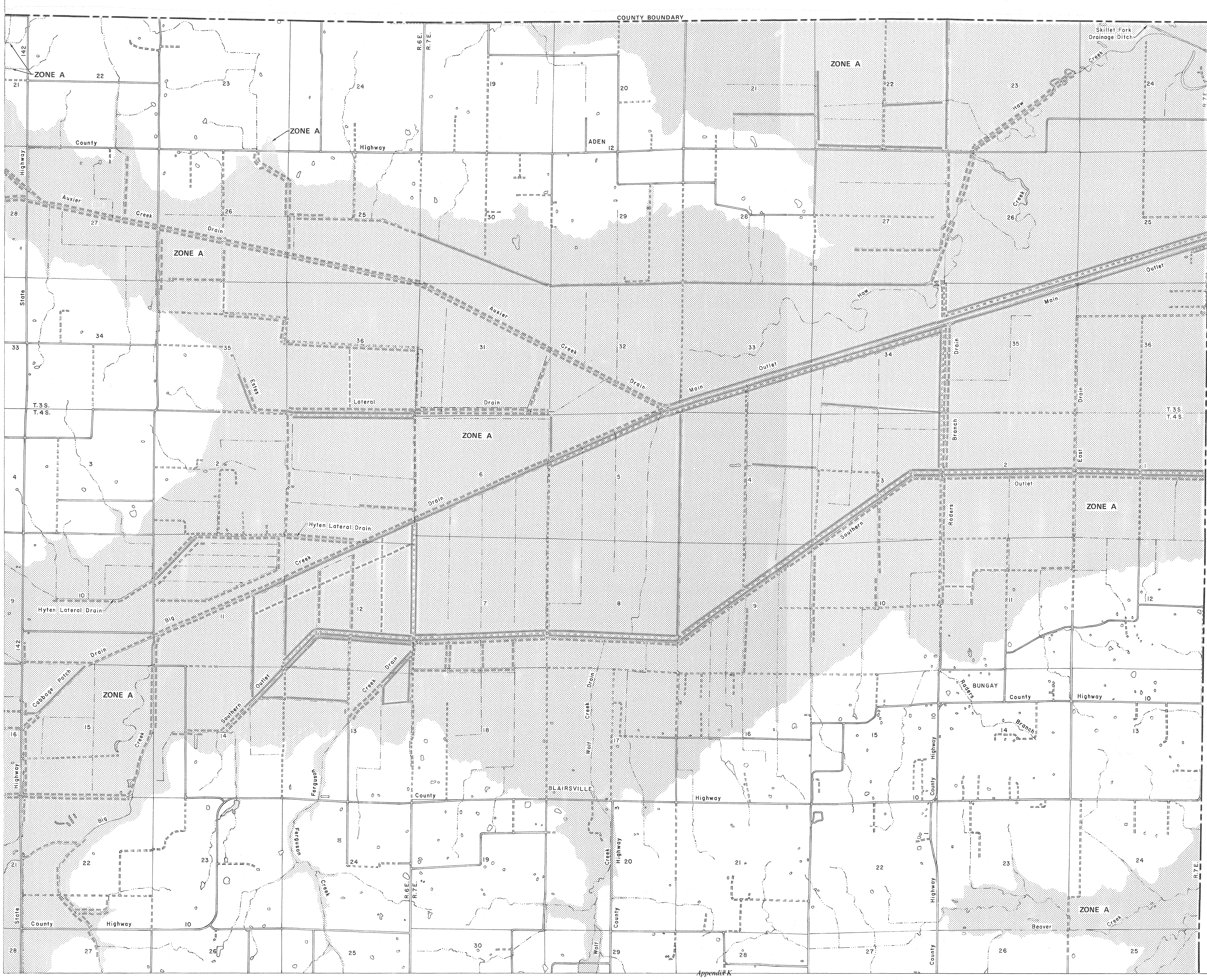
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONVERTED BY LETTER
EFFECTIVE 2/1/90

COMMUNITY-PANEL NUMBER
170910 0001 A

EFFECTIVE DATE:
JANUARY 2, 1981

federal emergency management agency
federal insurance administration



Appendix K

KEY TO SYMBOLS

SPECIAL FLOOD HAZARD AREA — ZONE A

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APPROXIMATE SCALE IN FEET

2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FHBM

FLOOD HAZARD BOUNDARY MAP

HAMILTON COUNTY, ILLINOIS

UNINCORPORATED AREA

PANEL 2 OF 6

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONVERTED BY LETTER
EFFECTIVE 2/1/90

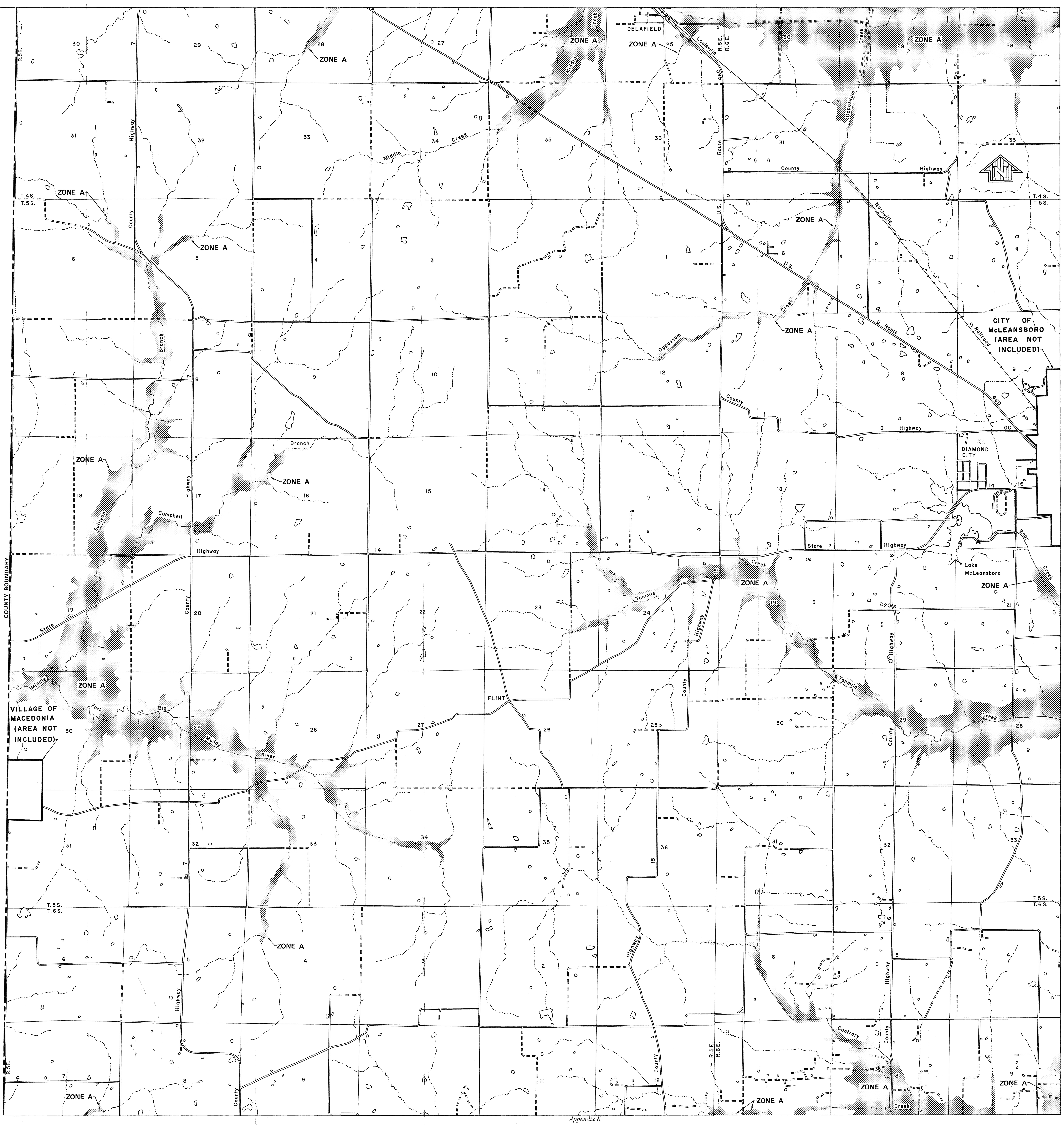
COMMUNITY-PANEL NUMBER

170910 0002 A

EFFECTIVE DATE:

JANUARY 2, 1981

federal emergency management agency
federal insurance administration



KEY TO SYMBOLS

SPECIAL FLOOD HAZARD AREA — ZONE A

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APPROXIMATE SCALE IN FEET:

2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FHBM

FLOOD HAZARD BOUNDARY MAP

HAMILTON COUNTY, ILLINOIS

UNINCORPORATED AREA

PANEL 3 OF 6

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONVERTED BY LETTER
EFFECTIVE 2/1/90

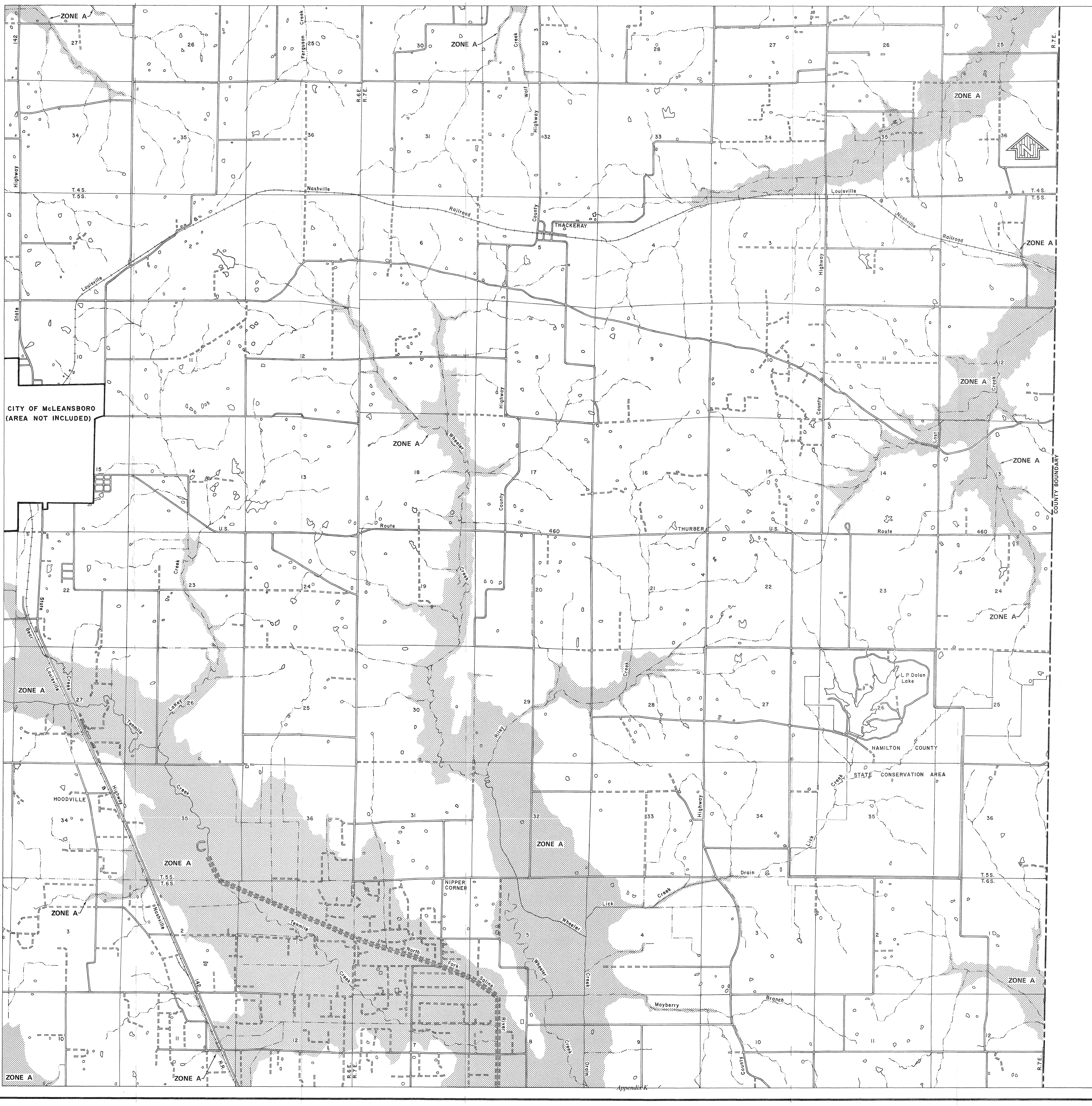
COMMUNITY-PANEL NUMBER

170910 0003 A

EFFECTIVE DATE:

JANUARY 2, 1981

federal emergency management agency
federal insurance administration



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APPROXIMATE SCALE IN FEET
2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FHBM

FLOOD HAZARD BOUNDARY MAP

HAMILTON COUNTY, ILLINOIS
UNINCORPORATED AREA

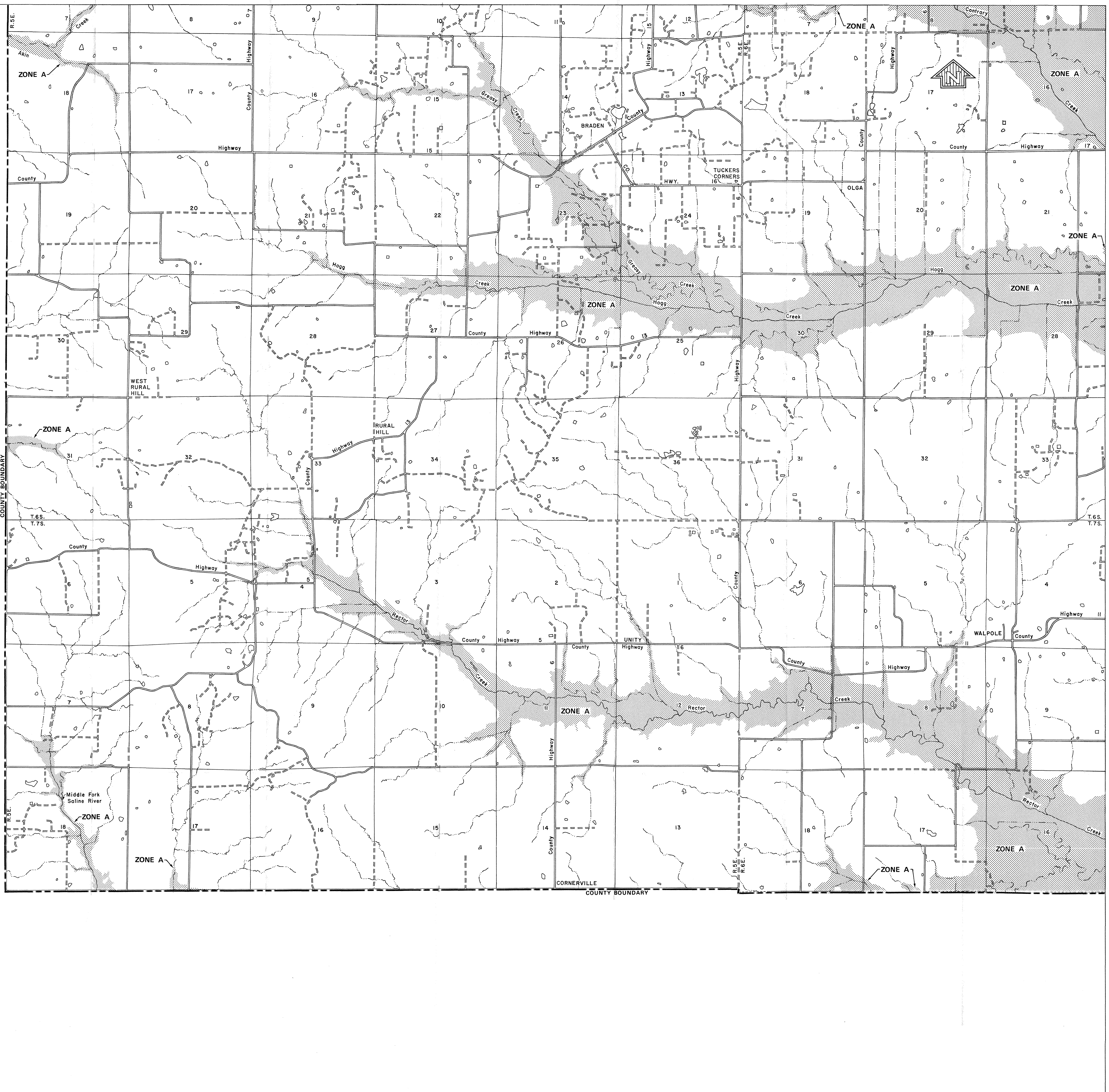
PANEL 4 OF 6
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONVERTED BY LETTER
EFFECTIVE 2/1/90

COMMUNITY-PANEL NUMBER
170910 0004 A

EFFECTIVE DATE:
JANUARY 2, 1981

federal emergency management agency
federal insurance administration



KEY TO SYMBOLS

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APPROXIMATE SCALE IN FEET:

2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FHBM

FLOOD HAZARD BOUNDARY MAP

HAMILTON COUNTY, ILLINOIS

UNINCORPORATED AREA

PANEL 5 OF 6

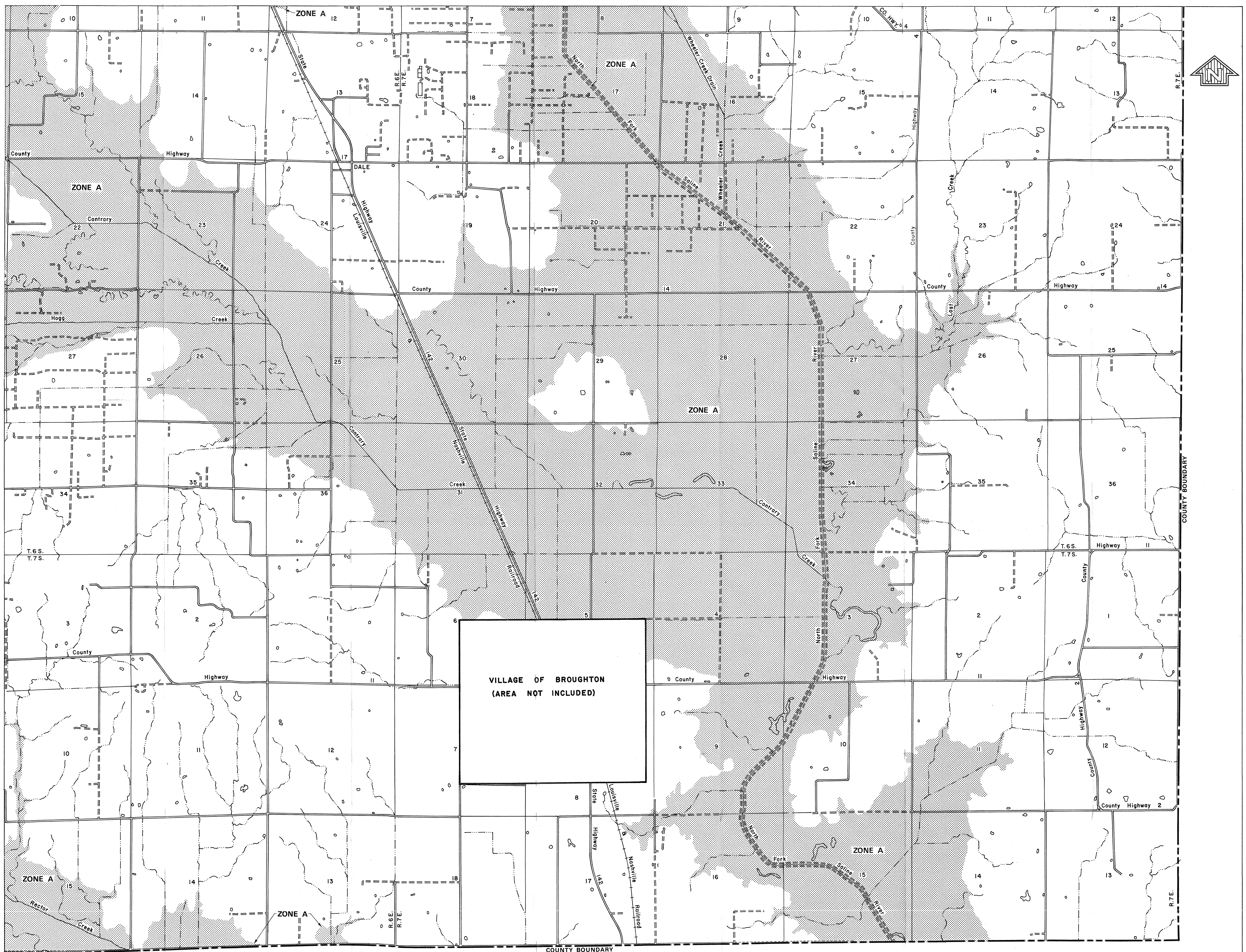
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONVERTED BY LETTER
EFFECTIVE 2/1/90

COMMUNITY-PANEL NUMBER
170910 0005 A

EFFECTIVE DATE:
JANUARY 2, 1981

federal emergency management agency
federal insurance administration



KEY TO SYMBOLS

SPECIAL FLOOD HAZARD AREA — ZONE A

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APPROXIMATE SCALE IN FEET:

2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FHBM

FLOOD HAZARD BOUNDARY MAP

HAMILTON COUNTY, ILLINOIS

UNINCORPORATED AREA

PANEL 6 OF 6

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONVERTED BY LETTER
EFFECTIVE 2/1/90

COMMUNITY-PANEL NUMBER
170910 0006 A

EFFECTIVE DATE:
JANUARY 2, 1981

federal emergency management agency
federal insurance administration

DIRECTORY OF COAL MINES FOR THE COUNTY

APPENDIX L

DIRECTORY OF COAL MINES IN ILLINOIS

Hamilton County

This directory accompanies the Illinois Coal Mines map or maps for this County.

August 2019

ILLINOIS
Illinois State Geological Survey
PRAIRIE RESEARCH INSTITUTE

Prairie Research Institute
Illinois State Geological Survey
615 East Peabody Drive
Champaign, Illinois 61820
(217) 333-4747
http//:www.isgs.illinois.edu

INTRODUCTION

Coal has been mined in 76 counties. More than 7,400 coal mines have operated since commercial mining began in Illinois circa 1810. Our maps of known mines for each county may help the public to identify mined areas. This accompanying coal mine directory provides basic information about the coal mines. Please note, however, that the accuracy and completeness of the maps and directories vary depending on the availability and quality of source material. Little or no information is available for many mines, especially the older ones, because mining activity was not regulated or documented until the late 1800's. Even then, reporting requirements were minimal.

The coal mine maps are maps compiled by the Illinois State Geological Survey (ISGS) of known mines: underground and surface coal mines as well as underground industrial mineral mines. Buffer regions for industrial mineral underground mines were incorporated into the maps due to limited information regarding these mines. The size of the buffer region is dependent on the uncertainty or inaccuracy of the mine location based on the quality of the source material. For more information regarding industrial mineral mines please contact the ISGS Industrial Minerals Section.

In cooperation with the Illinois State Geological Survey, the Office of Mines and Minerals (a division of the Department of Natural Resources) is in search of old underground mine maps of Illinois. Many of the undocumented maps are believed to be in libraries, historical societies and personal files of old mine employees. The Department asks that anyone who knows of one of these maps, please contact the Department at (618) 650-3197 or by emailing rgibson@siue.edu. A map specialist will come to your location, if you wish. Otherwise maps can be mailed, or you may stop by one of our offices in Edwardsville, Springfield, Ottawa, or Benton. These maps will be checked against existing inventory. If they are found to be a new discovery, they will be electronically imaged and returned to the owner (if requested).

MINE MAPS

The mined areas are shown on county base maps at a scale of 1:100,000.

Three types of mine information are shown on the maps: an index number that identifies the mine in the directory, a symbol that marks the 'location' of the mine, and an outline of the mined area if that is known. The location is almost always the site of the main mine opening or, in the case of surface mines, the location of the tipple (coal washing and storage facility). The type of symbol indicates whether the opening is a shaft, drift, or slope and whether the mine is active or abandoned. Another symbol represents a mine with an uncertain type of portal and/or uncertain location. When the exact location is unknown, the symbol is placed in the center of the section or quarter section in which the mine was reported to exist. If a mine cannot be located within a section, it is not shown on the map, but is listed in the directory.

The boundaries of the mined areas are also shown for most of the mines; however, for some mines the only information available is the location of the main opening. There are three types of coal-mined areas: underground, surface, and indefinite--which are shaded with different patterns. The underground mines also show large blocks of unmined coal within the mine, when that information is available. The indefinite areas, which have been plotted from sketchy or incomplete information, usually are underground workings, although the directory should be consulted to determine the specific mine type.

For most counties, one map shows all known mines. However, in Gallatin, Saline, Vermilion, and Williamson Counties, several seams have been extensively mined. For the sake of readability, separate maps have been produced for the mines in each seam. Mines in the Herrin Coal are shown on one map, those in the Springfield Coal are shown on another, and the mines in all other coals are shown on a third map. In Vermilion County, the mines that operated in the Herrin and the Danville Coals are presented on separate maps.

Quadrangle maps at 1:24,000 scale have been completed for select areas and contain more detailed outlines with directories that contain more detailed coal mine information. The maps and directories are available as downloadable PDF files or can be purchased. Please visit the ISGS web site for more information.

MINE DIRECTORIES

Each county directory is keyed to the mine map by the mine index number; the directory provides basic information about the coal mines shown on the map. The data have been compiled from a variety of sources such as the annual Coal Report of the Illinois Office of Mines and Minerals and field notes taken by ISGS geologists. The information presented in the table is described below. A blank in any column indicates that information is not available for that item. Again, we welcome any additional information that you may have.

<u>ISGS Index</u> Each mine in the state is identified with a unique number; this number is shown on the map and is the link between the map and the directory. The number is permanently assigned to a mine regardless of changes in the mine name, ownership, or operator.

<u>Company Name</u> A mine may have been operated by more than one company or the operating company may have changed its name. Separate entries in the directory show each name and the years of operation under the name. In many instances, names have been abbreviated to fit within the space available.

<u>Mine Name and Mine Number</u> An entry is included for each name and/or number the mine operated under, even if the company name remained the same. Many companies use the same name for all their mines, but differentiate them by number. Again, abbreviations have been used where necessary.

Mine Type   Underground mines are either "shaft," "slope," or "drift" which refers to the type of opening used to remove the coal from the mine. In shaft mines the coal is removed through a vertical shaft. Slope designates mines in which the coal is removed via a sloping incline from the ground surface to the mining level. In slope mines, miners and equipment may use either the slope or a vertical shaft to get into the mine. A drift mine is an underground mine that is excavated where the coal outcrops in the side of a bluff or the highwall of a surface mine. The mine type for surface mines is "strip" because these mines are more commonly called "strip mines."

Method   This refers to the pattern by which the coal was removed. Most underground mines in Illinois have used a type of room and pillar pattern, the areas where the coal is removed are the 'rooms' with 'pillars' of coal left in place to support the roof. In some mines, the pillars were later pulled to extract additional coal. The abbreviations are listed below and most are illustrated in Figure 1.

RP	Room & Pillar; specific type unknown
RPB	Room & Pillar Basic; irregular panels, typical of old mines
MRP	Modified Room & Pillar; a somewhat more regular pattern than Room & Pillar Basic
RPP	Room and Pillar Panel; similar to Modified Room & Pillar
BRP	Blind Room and Pillar; every 6th or 7th room is left unmined to provide additional support
CRP	Checkerboard Room and Pillar; evenly spaced large pillars
LW	Longwall; all coal is removed
	Old longwall mines were backfilled with rock to provide support
	Modern longwall mines allow roof to collapse behind as mining progresses
HER	High Extraction Retreat; a form of Room & Pillar mining that extracts most of the coal

Years Operated   Years that the mine operated; these dates may include periods when the mine was idle or not in full operation. Dates of mining from different sources are sometimes contradictory. The conventions that we have used to indicate where we were uncertain of dates are as follows. If we know the full range of dates that a mine operated under a specific name, those are given (1928-1934). If we know when a mine last operated, but not when it began, we use a dash and end date (-1934). If we know that a mine operated in a particular year, but not when it opened or closed, we just give the year we know (1920). To avoid confusion with the previous case, if a mine opened and closed in the same year, the year is repeated (1926-1926). In cases where a mine operated under different names, but we don't know when the name change occurred, the full range of dates is given for all names (John Smith Sr. Mine 1913-1944, Bill Smith Mine 1913-1944). A blank indicates that we have no information on the dates that the mine operated.

Coal Seam Mined The seam name is that used by the Illinois State Geological Survey. Figure 2 shows these coal seams in a stratigraphic column and provides a cross-reference to other names commonly used for these coals. If a mine has operated in more than one seam, there are separate entries in the table for each seam mined.

Location The location given is the site of the main portal or, for surface mines, the tipple. For small surface mines, the pit and the tipple are assumed to be the same. The location is based on the Public Land Survey System of townships and sections. Townships are identified by a township (north-south) and range (east-west) designation such as T14N-R6E. Townships are subdivided into approximately 36 one-square-mile sections, which are numbered from 1 to 36.

ORDERING INFORMATION

A 1:100,000 scale color plot with the directory is available at a cost of $12.50. This can be ordered by contacting the Information Office at (217) 244-2414 or sales@prairie.illinois.edu.

ACCURACY OF MAP

The maps and digital files used for this study were compiled from data obtained from a variety of sources and have varying degrees of completeness and accuracy. They present reasonable interpretations of the geology of the area and are based on available data. These data were compiled and digitized at a scale of 1:62,500, except for areas where quadrangle studies have been completed and the data was compiled at 1:24,000 or better. Locations of some features may be offset by 500 feet or more due to errors in the original source maps, the compilation process, digitizing, or a combination of these factors. These data are not intended for use in site-specific screening or decision-making. Data included in this map are suitable for use at a scale of 1:100,000.

DISCLAIMER

The Illinois State Geological Survey and the University of Illinois make no guarantee, expressed or implied, regarding the correctness of the interpretations presented in this data set and accept no liability for the consequences of decisions made by others on the basis of the information presented here.

DIRECTORY OF COAL MINES FOR HAMILTON COUNTY, ILLINOIS (August 2019)

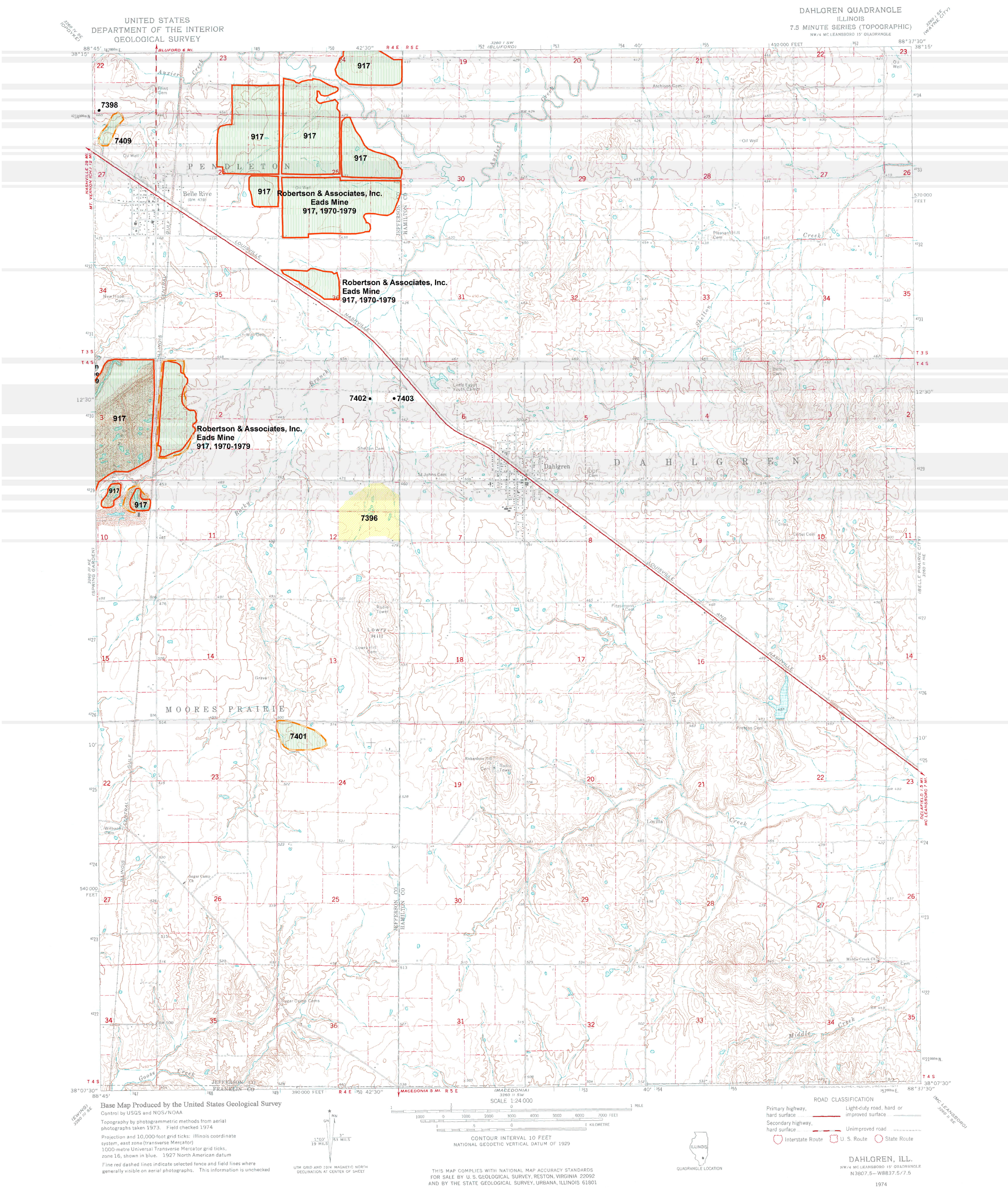
ISGS INDEX	COMPANY NAME	MINE NAME	MINE NO.	MINE TYPE	METHOD	YEARS OPERATED	SEAM MINED	COUNTY	LOCATION TWP	RGE	SEC
917	EADS COAL CO.	EADS		STRIP		1970-1974	OPDYKE	JEFFERSON	4S	4E	9
917	ROBERTSON & ASSOCIATES	EADS		STRIP		1974-1979	OPDYKE	JEFFERSON	4S	4E	9
938	INLAND STEEL C C	INLAND	2	SHAFT	HER	1979-1986	SPRINGFIELD	HAMILTON	5S	6E	25
938	CONSOLIDATION C C	WHEELER CREEK		SHAFT		1986-1989	SPRINGFIELD	HAMILTON	5S	6E	25
1001	KERR-MCGEE COAL CORP.	GALATIA		SHAFT	RPP	1983-1988	HERRIN	SALINE	8S	6E	5
1001	KERR-MCGEE COAL CORP.	GALATIA		SHAFT	RPP	1983-1988	SPRINGFIELD	SALINE	8S	6E	5
1001	KERR-MCGEE COAL CORP.	GALATIA		SHAFT	LW	1988-1995	HERRIN	SALINE	8S	6E	5
1001	KERR-MCGEE COAL CORP.	GALATIA		SHAFT	LW	1988-1997	SPRINGFIELD	SALINE	8S	6E	5
1001	AMERICAN COAL CO.	GALATIA		SHAFT	LW	1998-2006	SPRINGFIELD	SALINE	8S	6E	5
1001	AMERICAN COAL CO.	GALATIA		SHAFT	LW	2004-2006	HERRIN	SALINE	8S	6E	5
1001	AMERICAN COAL CO.	NEW ERA		SHAFT	LW	2006-2017	HERRIN	SALINE	8S	6E	5
1001	AMERICAN COAL CO.	GALATIA NORTH		SHAFT	LW	2006-2008	SPRINGFIELD	SALINE	8S	6E	5
1052	HAMILTON COUNTY COAL, LLC	HAMILTON COUNTY	1		LW		HERRIN	HAMILTON	4S	5E	14
1052	WHITE OAK RESOURCES LLC.	WHITE OAK	1		LW	2013-	HERRIN	HAMILTON	4S	5E	14
7127							WOMAC	HAMILTON	5S	6E	12
7128				SLOPE	UG		WOMAC	HAMILTON	5S	7E	15
7129				STRIP	STR		WOMAC	HAMILTON	5S	7E	18
7130				STRIP	STR		WOMAC	HAMILTON	5S	7E	24
7131	HARPER (JOHN C.)	HARPER		STRIP	STR	1889-1905	WOMAC	HAMILTON	5S	5E	23
7132	HARPER (WILLIAM)	HARPER		STRIP	STR	1895-1897	WOMAC	HAMILTON	5S	5E	26
7133				STRIP	STR		WOMAC	HAMILTON	5S	5E	25
7134				STRIP	STR		WOMAC	HAMILTON	5S	5E	18
7135	small abandoned strip pit			STRIP	STR		WOMAC	HAMILTON	5S	5E	11
7136	old abandoned strip mine			STRIP	STR		WOMAC	HAMILTON	5S	5E	26

7.5-MINUTE QUADRANGLE SERIES MAPS & DIRECTORIES OF COAL MINES IN THE COUNTY

APPENDIX M

COAL MINES IN ILLINOIS
DAHLGREN QUADRANGLE
FRANKLIN, HAMILTON, & JEFFERSON COUNTIES

This map accompanies the Coal Mines Directory for the DAHLGREN Quadrangle. Consult the directory for a complete explanation of the information shown on this map.



Mining Method

- Room & Pillar (RP)
- Room & Pillar Basic (RPB)
- Modified Room & Pillar (MRP)
- Room & Pillar Panel (RPP)
- Blind Room & Pillar (BRP)
- Checkerboard Room & Pillar (CRP)
- High Extraction Retreat (HER)
- Longwall (LW)
- Underground, Method Unknown
- Strip Mine
- Auger Mine
- General Area of Mining

Other Areas Depicted

- Non-Coal Mines

Source of Mine Outline

- Final Mine Map
- Not Final Mine Map
- Undated Mine Map
- Incomplete Mine Map
- Secondary Source Map

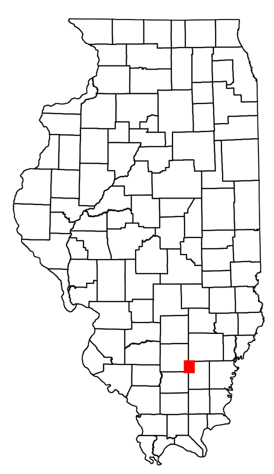
Tipple, Shaft, Slope, Drift Locations

- Strip Mine Tipple - Active
- Strip Mine Tipple - Abandoned
- Mine Shaft - Active
- Mine Shaft - Abandoned
- Mine Slope - Active
- Mine Slope - Abandoned
- Mine Drift - Active
- Mine Drift - Abandoned
- Air Shaft
- Uncertain Location
- Uncertain Type of Opening

Other Points Depicted

- Non-Coal Mines

Location



Mine Annotation
(space permiting)
Company
Mine Name
ISGS Index No., Years of Operation

Disclaimer
Please check the Coal Section at the Illinois State Geological Survey's web site at http://www.isgs.illinois.edu for the most up-to-date version of these products.

Note that each quadrangle scale mined-out area map requires the use of the associated text directory for full explanation of map features and mine attributes. Also note that some quadrangles have multiple seams of mining and therefore more than one map may be available for a particular quadrangle. Please take care to check for multiple maps, as extensive mining may exist in the other seams.

The maps and digital files used for these studies were compiled from data obtained from a variety of public and private sources and have varying degrees of completeness and accuracy. This compilation map presents reasonable interpretation of the geology of the area and is based on available data. Locations of some mine features may be offset by 500 feet or more due to errors in the original source maps, the compilation process, digitizing, or a combination of these factors. These data are not intended for use in site-specific screening or decision-making. Use of these documents does not eliminate the need for detailed studies to fully understand the geology of a specific site. The Illinois State Geological Survey, Prairie Research Institute, or the University of Illinois make no guarantee, expressed or implied, regarding the correctness of the interpretations presented in this data set and accept no liability for the consequences of decisions made by others on the basis of the information presented here.

These maps were designed for use at 1:24,000. Enlarging the map may reduce accuracy, as the original scale of the source maps used to compile the outlines shown varies from 1:400 to 1:150,000, and some mine locations are known only from text descriptions. See the accompanying mine directory for the original scale of the source map used for a specific mine to check accuracy of a given portion of the map. Areas with no mines shown may still be undermined; see the unlocated mines list at the back of each mine directory.

The image of the U.S.G.S. topographic base map was projected from the original UTM to Lambert Conformal Conic.

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Mine Outlines Compiled by
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February 15, 2011 Updated June 2016

DIRECTORY OF COAL MINES IN ILLINOIS
7.5-MINUTE QUADRANGLE SERIES
DAHLGREN QUADRANGLE
JEFFERSON & HAMILTON COUNTIES

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2011

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Cover photo Track-mounted duckbill loading machine at a Peabody Coal Company mine, ca. 1915.

DISCLAIMER: The accuracy and completeness of mine maps and directories vary with the availability of reliable information. Maps and other information used to compile this mine map and directory were obtained from a variety of sources and the accuracy of some of the original information cannot be verified. Consequently, the Illinois State Geological Survey (ISGS) cannot guarantee the mine maps are free of errors and disclaims any responsibility for damages that may result from actions or decisions based on them.

The ISGS updates the maps and directories periodically, and welcomes any new information or corrections. Please contact the Coal Section of the ISGS at the address shown on the title page of this directory, or telephone (217) 244-4610.

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INTRODUCTION

Coal has been mined in 76 counties of Illinois. More than 7,400 coal mines have operated since commercial mining began in Illinois about 1810; fewer than 30 are currently active. To detail the extent and location of coal mining in Illinois, the Illinois State Geological Survey (ISGS) has compiled maps and directories of known coal mines. The ISGS offers maps at a scale of 1:100,000 and accompanying directories for each county in which coal mining is known to have occurred. Maps at a scale of 1:24,000 and accompanying directories, such as this, are available for selected quadrangles. Contact the ISGS for a list of these quadrangles.

These larger scale maps show the approximate positions of mines in relation to surface features such as roads and water bodies, and indicate the mining method used and the accuracy of the mine boundaries. The maps are useful for locating mine boundaries relative to specific properties and for assessing the potential for subsidence in an area. Mine boundaries compiled from final mine surveys are generally shown within 200 feet of their true position. As a result of poor cartographic quality and inaccuracies in the original mine surveys, boundaries of some older mines may be mislocated on the map by 500 feet or more. Original mine maps should be consulted in situations that require precise delineation of mine boundaries or internal workings of mined areas.

This directory serves as a key to the accompanying mine map and provides basic information on the coal mines in the quadrangle. The directory is composed of two parts. Part I explains the symbols and patterns used on the accompanying map and the summary data presented for each mine. Part II numerically lists the mines in the quadrangle and summarizes the geology and production history of each mine. Total production for the mine, not the portion in the quadrangle, is given.

MINING IN THE DAHLGREN QUADRANGLE

The Opdyke Coal was close to the surface in the Dahlgren Quadrangle, usually less than 40 feet deep. Although the coal was thin, rarely reaching 4 feet thick, it was economic to mine by stripping off the overburden. Mining ceased in 1979, when the Eads Mine (mine index 917) closed.

PART I EXPLANATION OF MAP AND MINE SUMMARY SHEET

INTERPRETING THE MAP

The map accompanying this directory shows the location of coal mines known to be present in the quadrangle. The map, corresponding to a U.S. Geological Survey (USGS) 7.5-minute quadrangle, covers an area bounded by lines of latitude and longitude 7.5-minutes apart. In Illinois, a quadrangle is approximately 6.5 miles east to west and 8.5 miles north to south, an area of about 56 square miles. The ISGS generally offers one map of mines per quadrangle. In some areas where extensive mining occurred in two or more overlapping seams, separate maps are compiled for mines in each seam to maintain readability of the map.

Mine Type and Mining Method
The mine type is indicated on the map by pattern color: green represents surface mines; red and yellow represent underground mines. The red patterns are used for areas of underground mining that are documented by a primary or secondary source map. A yellow pattern is used for cases where no map of the mine workings is available, but a general area of mining can be inferred from property maps or production figures. The patterns indicate the main mining methods used in underground mines. The methods are (1) room and pillar and (2) high extraction. The method used gives some indication of the amount and pattern of coal extraction within each mined area, and has some influence on the timing and type of subsidence that can occur over a mine.

The following discussion and illustrations of mining methods are based on Guither et al. (1984).

In room-and-pillar mines, coal is removed from haulage-ways (entries) and selected areas called rooms. Pillars of unmined coal are left between the rooms to support the roof. Depending on the size of rooms and pillars, the amount of coal removed from the production areas will range from 40% to 70%.

Room and Pillar - mining is divided into six categories:

- room-and-pillar basic (RPB, fig. 1A), an early method that did not follow a preset mining plan and therefore resulted in very irregular designs;
- modified room and pillar (MRP, fig. 1B);
- room-and-pillar panel (RPP, fig. 1C);
- blind room and pillar (BRP, fig. 1D);
- checkerboard room and pillar (CRP, fig. 1E);
- room and pillar (RP), a classification used when the specific type of room-and-pillar mining is unknown.

Blind and checkerboard are the most common types of room-and-pillar mining used in Illinois today. The knowledge of room-and-pillar mining methods gives a trained engineer information on the nature of subsidence that may occur. A more extensive discussion of subsidence can be found in Bauer et al. (1993).

High-extraction These mining methods are subdivided into high-extraction retreat (HER, Fig 1F) and longwall (LW, Fig 1G, 1H). In these methods, much of the coal is removed within well defined areas of the mine. Subsidence of the surface above these areas occurs within weeks. Once the subsidence activity ceases, the potential for further movement over these areas is low; however, subsidence may continue for several years after mining.

High-extraction retreat mining is a form of room-and-pillar mining that extracts most of the coal. Rooms and pillars are developed in the panels, and the pillars are then systematically removed (fig. 1F).

In early (pre-1960) longwall mines, mining advanced in multiple directions from a central shaft (fig. 1G). Large pillars of coal were left around the shaft, but all coal was removed beyond these pillars. Miners placed rock and wooden props and cribs in the mined-out areas to support the mine roof. The overlying rock gradually settled onto these supports, thus producing subsidence at the surface. In post-1959 longwall mines, room-and-pillar methods have been used to develop the main entries of the mine and panel areas. Modern longwall methods extract 100 percent of the coal in the panel areas (fig. 1H).

SOURCE MAPS

Mine outlines depicted on the map are, whenever possible, based on maps made from original mine surveys. The process of compiling and digitizing the quadrangle map may produce errors of less than 200 feet in the location of mine boundaries. Larger errors of 500 feet or more are possible for mines that have incomplete or inaccurate source maps.

Because of the extreme complexity of some mine maps, detailed features of mined areas have been omitted. The digitized mine boundary includes the exterior boundary of all rooms or entries that were at least 80 feet wide or protruded 500 feet from the main mining area. Unmined areas between mines are shown if they are at least 80 feet wide; unmined blocks of coal within mines are shown if they are at least 400 feet on each side. Original source maps should be consulted when precise information on mine boundaries or interior features is needed.

The mine summary sheet lists the source maps used to determine each mine outline. The completeness of map sources is indicated on the map by a line symbol at the mine boundary. Source maps are organized in five categories.

Final mine map The mine outline was digitized from an original map made from mine surveys conducted within a few months after production ceased. The date of the map and the last reported production are listed on the summary sheet.

Not a final map The mine is currently active or the mine outline was made from a map based on mine surveys conducted more than few months before production ceased. This implies the actual mined-out area is probably larger than the outline on the map. The mine summary sheet indicated the dates of source maps and the last reported production, as well as the approximate tonnage mined between these two dates (if the mine is abandoned). The summary sheet also lists the approximate acreage mined since the date of the map and, in some cases, indicates the area where additional mining may have taken place. This latter information is determined by locating on the map the active faces relative to probable boundaries of the mine property.

Undated map The source map was undated, so it may or may not be based on a final mine survey. When sufficient data are available, the probable acreage of the mined area is estimated from reported production, average seam thickness and a recovery rate comparable to other mines in the area. This information is listed in the summary sheet for the mine.

Incomplete map The source map did not show the entire mine. The summary sheet indicates the missing part of the mine map and the acreage of the unmapped area, which is estimated from the amount of coal known to have been produced from the mine.

Secondary source map The original mine map was not found so the outline shown was determined from secondary sources (e.g., outlines from small-scale regional maps published in other reports). The summary sheet describes the secondary sources.

POINTS AND LABELS

The locations of all known mine openings (shafts, slopes, and drifts) and surface mine tipples are plotted on the map. Tipples are areas where coal was cleaned, stockpiled, and loaded for shipping.

Only openings or tipples are plotted for mines without source maps. If the precise locations of these features are unknown, a special symbol is used to indicate the approximate location of the mine.

Each mine on the map is labeled with the names of the mine and operating company, ISGS mine index number, and years of operation (if known) if space permits. A seam designation is given on maps where more than one seam was mined. For a mine that operated under more than one name, only the most recent name is generally given. When a mine changed names or ownership shortly before closing, an earlier name is listed. All company and mine names are listed on the mine summary sheet in the directory, under the production history segment.

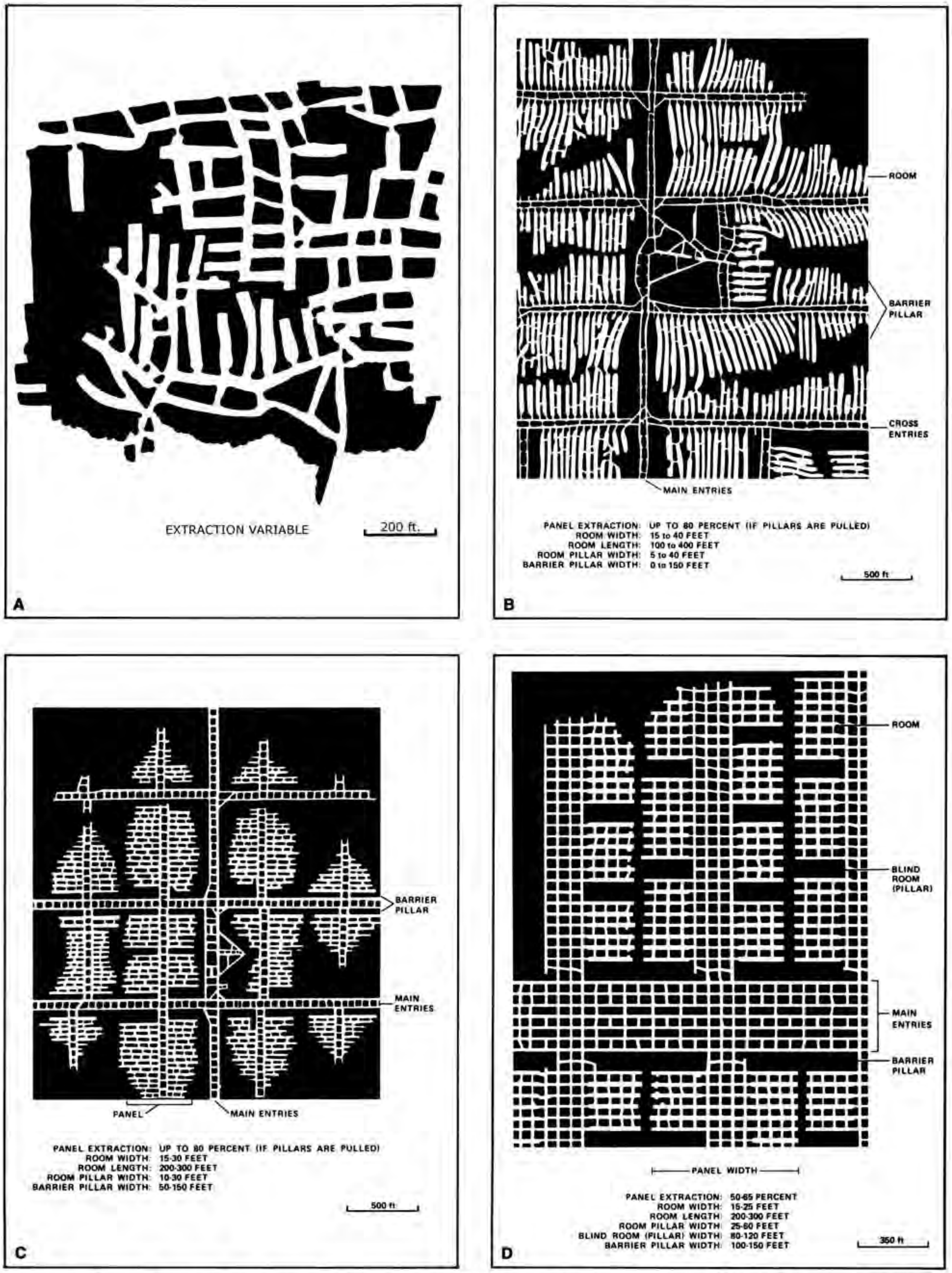


Figure 1 Mining methods: (A) room-and-pillar basic (RPB), (B) modified room and pillar (MRP), (C) room-and-pillar panel (RPP), (D) blind room and pillar (BRP).

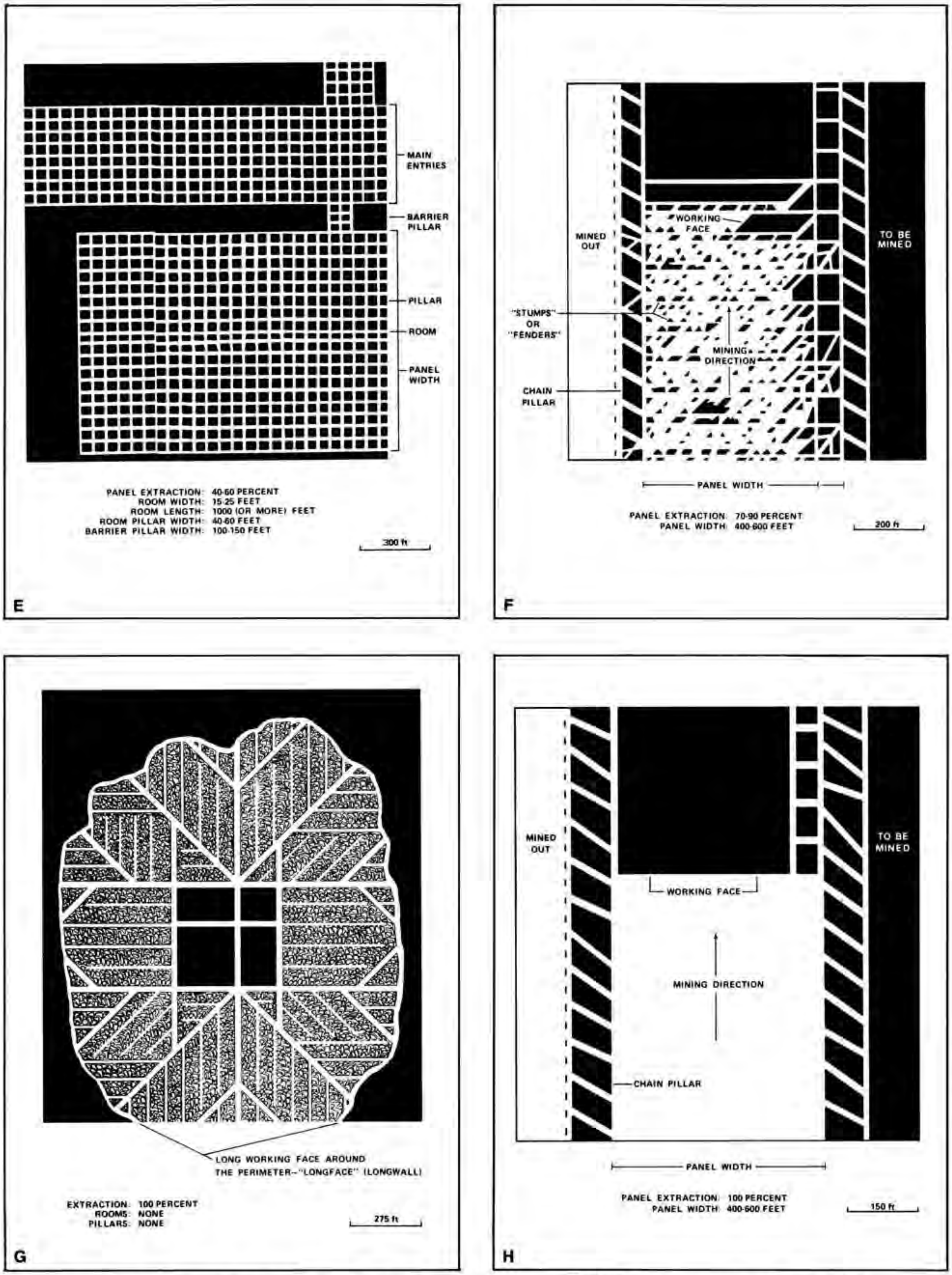


Figure 1 *(cont.)* Mining methods: (E) checkerboard room and pillar (CRP), (F) high extraction retreat (HER), (G) early (pre-1960) longwall, (H) post-1959 longwall

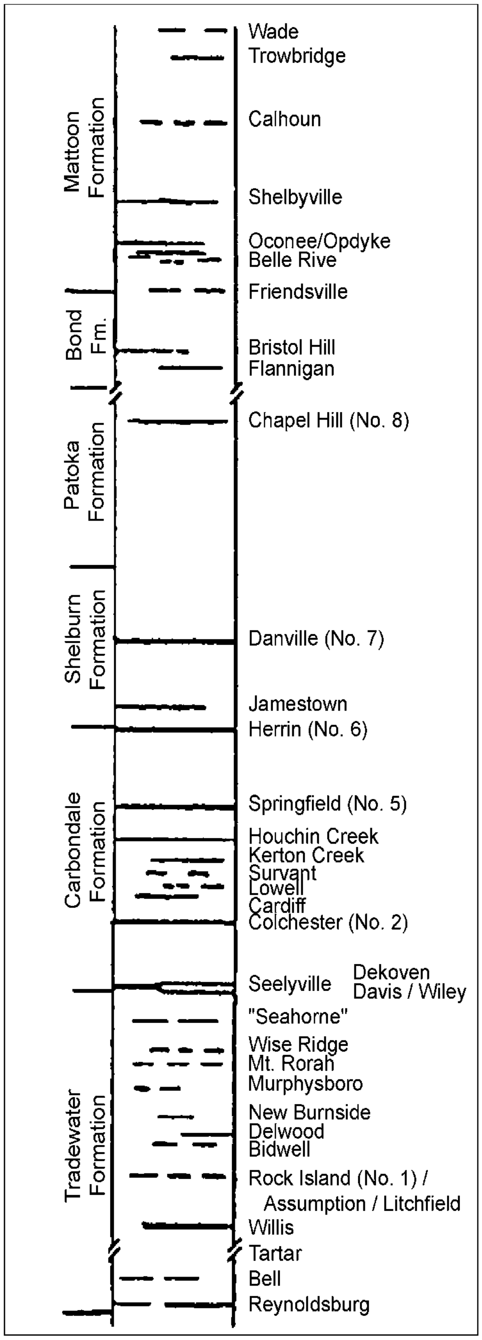


Figure 2 Generalized stratigraphic section, showing approximate vertical relations of coals in Illinois.

INTERPRETING A MINE SUMMARY SHEET

The mine summary sheet is arranged numerically by mine index number. Index numbers are shown on the map and in the mine listing. The mine summary sheet provides the following information (if available).

Company and mine name The last company or owner of the mine is used, unless no production was recorded for the last owner. In that case, the penultimate owner is listed. Mines often have no specific name; in these cases, the company name is also used as the mine name.

Type *Underground* denotes a subsurface mine in which the coal was reached through a shaft, slope, or a drift entry. *Surface* denotes a surface, open pit or strip mine.

Total mined-out acreage shown The total acreage of the mined area mapped, including any acreage mined on adjacent quadrangles, is calculated from the digitized outline of the mine. The acreage of large barrier pillars depicted on the map is excluded from the mined-out acreage. Small pillars not digitized are included in the acreage calculation. If the mine outline is not based on a final mine map, the acreage is followed by an estimate of additional acres that may have been mined. The estimate is determined from reported mine production, approximate thickness of the coal, and recovery rates calculated from nearby mines that used similar mining methods.

SHAFT, SLOPE, DRIFT OR TIPPLE LOCATIONS

Shaft, slope, drift, or tipple locations Locations of all known former entry points to underground mines or the location of coal cleaning, tipple, and shipping equipment used by the mine's facility are listed. The location is described in terms of county, township and range (Twp-Rge), section, and location within the section by quarters. NE SW NW, for instance, would describe the location in the northeast quarter of the southwest quarter of the northwest quarter. When sections are irregular in size, the quarters remain the same size and are oriented (or "registered") from the southeast corner of the section. Approximate footage from the section lines (FEL = from east line, FNL = from north line, for example) is given when that information is known; this indicates a surveyed location and is not derived from maps. Entry points are also plotted on the map and coded for the type of entry or tipple. A mine opening may have had many purposes during the life of the mine. Old hoist shafts are often later used for air and escape shafts; this information is included in the directory when known. The tipple for underground mines was generally located near the main shaft or slope. At surface mines, coal was sometimes hauled to a central tipple several miles from the mine pit.

GEOLOGY

Seam(s) mined The name of the coal seam(s) mined is listed, if known. If multiple seams were mined, they are all listed, although the mined-out area for each seam may be shown on separate maps. Figure 2 shows the stratigraphic section of the coal-bearing interval in Illinois, and the vertical relations among the coals.

Depth The depth to the top of the seam in the vicinity of the shaft is listed, if known. The depth is determined from notes made by geologists who visited the mine during its operation or from drill hole data in ISGS files. Depth generally varies little over the extent of a mine; however, reported depths for an individual mine may vary. Depth for surface-mined coals varies, and is usually represented as a range.

Thickness The approximate thickness of the mined seam is shown, if known. Thickness also comes from notes of geologists who visited the mine during its operation or from borehole data in ISGS files. Minimum, maximum, and average thicknesses are given when this information is available.

Mining method The principal mining method used at the mine (figs. 1A-H) is listed. See the mining methods section at the beginning of this directory for a discussion of this parameter.

Geologic problems reported Any known geologic problems, such as faults, water seepage, floor heaving, and unstable roof, encountered in the mine are reported. This information is from notes made by ISGS geologists who visited the mine, or from reports by mine inspectors published by the Illinois Department of Mines and Minerals, or from the source map(s). Geologic problems are not reported for active mines.

PRODUCTION HISTORY

Production history Tons of coal produced from the mine by each mine owner are totaled. When the source map used for the mine outline is not a final mine map, the tonnage produced since the date of the map is identified. For mines that extend into adjacent quadrangles, the tonnage reported includes areas mined in adjacent quadrangles.

SOURCE OF DATA

Source map This section lists information about the map(s) used to compile the mine outline and the locations of tipples and mine openings. In some cases more than one source map was used. For example, a map drawn before the mine closed may provide better information on original areas of the mine than a later map. When more than one map was used, the bibliography section explains what information was taken from each source.

Date The date of the most recent mine survey listed on the source map is reported.

Original scale The original scale of the source map is listed. Many maps are photo-reductions and are no longer at their original scale. The original scale gives some indication of the level of detail of the mine outline and the accuracy of the mine boundary relative to surface features. Generally, the larger the scale, the greater the accuracy and detail of the mine map. Mine outlines taken from source maps at scales smaller than 1:24,000 may be highly generalized and may well be inaccurately located with respect to surface features.

Digitized scale The scale of the digitized map is reported. The scale may be different from that of the original source map. In many cases the digitized map was made from a photo-reduction of the original source map, or the source map was not in a condition suitable for digitizing and the mine boundaries were transferred to another base map.

Map type Source maps are classified into five categories to indicate the probable completeness of the map. See discussion of source maps in the previous section.

Annotated bibliography Sources that provide information about the mine are listed, with the data taken from each source. Some commonly used sources are described below. Full bibliographic references are given for all other sources. Unless otherwise noted, all sources are available for public inspection at the ISGS.

Coal Reports Published since 1881, these reports contain tabular data on mine ownership, production, employment, and accidents. Some volumes include short descriptions made by mine inspectors of physical features and conditions in selected mines.

Directory of Illinois Coal Mines This source is a compilation of basic data about Illinois coal mines, originally gathered by ISGS staff in the early 1950s. Sources used for this directory are undocumented, but they are primarily Illinois Department of Mines and Minerals annual reports, ISGS mine notes, and coal company officials.

ENR Document 85/01, Guither, H. D., J. K. Hines, and R. A. Bauer, 1985 The Economic Effect of Underground Mining Upon Land Used for Illinois Agriculture: Illinois Department of Energy and Natural Resources Document 85/01, 185 p.

Microfilm map The U.S. Bureau of Mines maintains a microfilm archive of mine maps. A microfilm file for Illinois is available for public viewing at the ISGS.

Mine notes ISGS geologists have visited mines or contacted mine officials throughout the state since the early 1900s. Notes made during these visits range from brief descriptions of the mine location to long narratives (including sketches) of mining conditions and geology.

Federal Land Bank of St. Louis, Preliminary Reports on Subsidence Investigations Mining engineers working for the Federal Land Bank of St. Louis mapped areas of subsidence due to coal mining in the early 1930s. These reports often include county maps of mine properties with mined-out areas including shaft locations, as well as subsidence areas.

REFERENCES

Bauer, R. A., B. A. Trent, and P. B. Dumontelle, 1993, Mine Subsidence in Illinois: Facts for the Homeowner Considering Insurance, Illinois State Geological Survey, Environmental Geology Note 144, 16p.

Guither, H. D., J. K. Hines, and R. A. Bauer, 1985, The Economic Effects of Underground Mining Upon Land Used for Illinois Agriculture, Illinois Department of Energy and Natural Resources Document 85/01, 185p.

Worthen, A. H., and H. Engelman, 1868, Volume III, Geology and Paleontology, Geological Survey of Illinois, Journal Company Book Print, Springfield, Illinois, 574p.

PART II DIRECTORY OF MINES IN THE DAHLGREN QUADRANGLE

MINE SUMMARY SHEETS

A summary sheet on the geology and production history of each mine in the Dahlgren Quadrangle is provided. These summary sheets are arranged numerically by mine index number. Consult Part I for a complete explanation of the data listed in the summary sheet.

Mine Index 917
Robertson & Associates, Inc., Eads Mine

Type: Surface Total mined-out acreage shown: 2,622 Production indicates approximately 130 acres were mined after the map date.

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Tipple	Jefferson	4S 4E	9	NE SW NE

GEOLOGY

		Thickness (ft)			Mining
Seam(s) Mined	Depth (ft)	Min	Max	Avg	Method
Opdyke	20-40			1.5-2.1	Surface

Geologic Problems Reported: An asymmetrical anticline in the coal was visible in the floor of a pit visited in 1977. One side climbed steeply while the other side was a gentle climb. According to mine personnel, this was a fairly common feature, with no preferred orientation. The coal often thickened (up to 4 feet) in these features, which were up to 6 feet high. There were no apparent faults or slickenslides in the coal, although the overlying shale showed slickensides. Pyrite and calcite were present on vertical fracture facings.

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)
Eads Coal Company	Eads	1970-1974	3,087,531
Robertson & Associates, Inc.	Eads	1974-1978	1,891,380
Robertson & Associates, Inc.	Eads	1978-1979	257,046 *
			5,235,957

* Production after map date

Last reported production: 1979

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
ISGS map library, 4103.J41 i5.1-12	7-17-1978	1:12000	1:12000	Not final
NAIP digital ortho-photo quadrangle	2015	1:6000	1:6000	Secondary source

Annotated Bibliography (data source, brief description of information)

Coal Reports - Production, ownership, years of operation.
Directory of Illinois Coal Mines (Jefferson County) - Mine names, mine index, ownership, years of operation.
Mine notes (Jefferson County) - Mine type, mine location, seam, depth, thickness.
Company map, ISGS map library, 4103.J41 i5.1-12 - Mine location, mine outline, mining method.
National Agriculture Imagery Program map, digital ortho-photo quadrangle map - Mine outline.

OTHER MINES SHOWN ON DAHLGREN QUADRANGLE

Mine Index 7396 NE 12-T4S-R4E, several small surface mines, 8-15 feet deep, 1.0-1.5 feet thick
source: ISGS map library, 4103.J41 i5.1-12, map of Eads Mine (mine index 917), aerial photographs, and ISGS field notes (from F. T. Thwaites in 1930, L. C. McCabe & H. R. Wanless in 1932, J. Lester in 1938, F. E. Williams in 1949, and F. N. Murray & E. Christian in 1967).

Note: The pits were likely very small, and of the 110 acres shown on the accompanying map, only a small percent may actually be mined. One of the small surface mines operated in 1932 (when the Coal Reports did not list mines producing less than 1,000 tons per year). The mine was reported as Dahlgren Coal Company, operated by L. L. Tedder. This is one of more than 6 mines in the vicinity, all of which were probably quite small in area and very low in total production.

Mine Index 7398 SW SW SE 22-T3S-R4E, surface, worked before 1935, 1.5 feet thick   source: ISGS field notes (J. Lester, 9-1-1938)

Mine Index 7401, Bowen Coal Bank & other surface mines N ½ NW 24-T4S-R4E, 10-14 feet deep, 1.3-2.0 feet thick   source: ISGS field notes (F. E. Williams, 1949; F. N. Murray, 1967) and A. H. Worthen & H. Engelmann (1868)

Mine Index 7402 NE SW NE 1-T4S-R4E, surface   source: ISGS field notes (F. E. Williams, 8-1949)

Mine Index 7403 NE SE NE 1-T4S-R4E, surface   source: ISGS field notes (F. E. Williams, 8-1949)

Mine Index 7409 NE 27-T3S-R4E   source: ISGS map library, 4103.J41 i5.1-11 (map for Federal Land Bank Report)

MINES WHOSE LOCATIONS ARE NOT KNOWN, DAHLGREN QUADRANGLE

The locations of the following mines are unknown, but the production tonnage, operating names, and nearest town were reported in the Annual Coal Reports. The operators listed below mined in or near the Dahlgren Quadrangle. The information shown is similar to that presented on the summary sheets in the previous pages of this directory. The first item is the name the mine operated under as listed in the Coal Report, then the years the mine reported. If no physical data are available, the next item listed is the total tons produced by the mine. If physical data are available, the order of presentation is as follows: type of opening for the mine (drift, slope or shaft), depth of coal in feet, and thickness of coal in feet.

The total tons mined by these unlocated mines is 3,458 (2,338 surface mined and 1,120 mined by uncertain method), which would represent less than 5 acres, depending on the recovery factor, mining method, and numerous other factors. (Note: 1 square mile = 640 acres)

DAHLGREN

McGinnis (Thomas D.), 1889-1891, Opdyke, 25, 2.67, RP	1,120 tons
Yates (J. R.), 1903-1905, surface, –, 8-10, 2.0	1,714 tons
Perry (Hillary) & Spencer (Vernon), 1934-1934, surface	70 tons
Perry (Hillary), 1935-1935	514 tons
	584 tons

MOORE'S POINT

Burkhead (Florida), 1889-1890	40 tons

INDEX OF MINES IN THE DAHLGREN QUADRANGLE

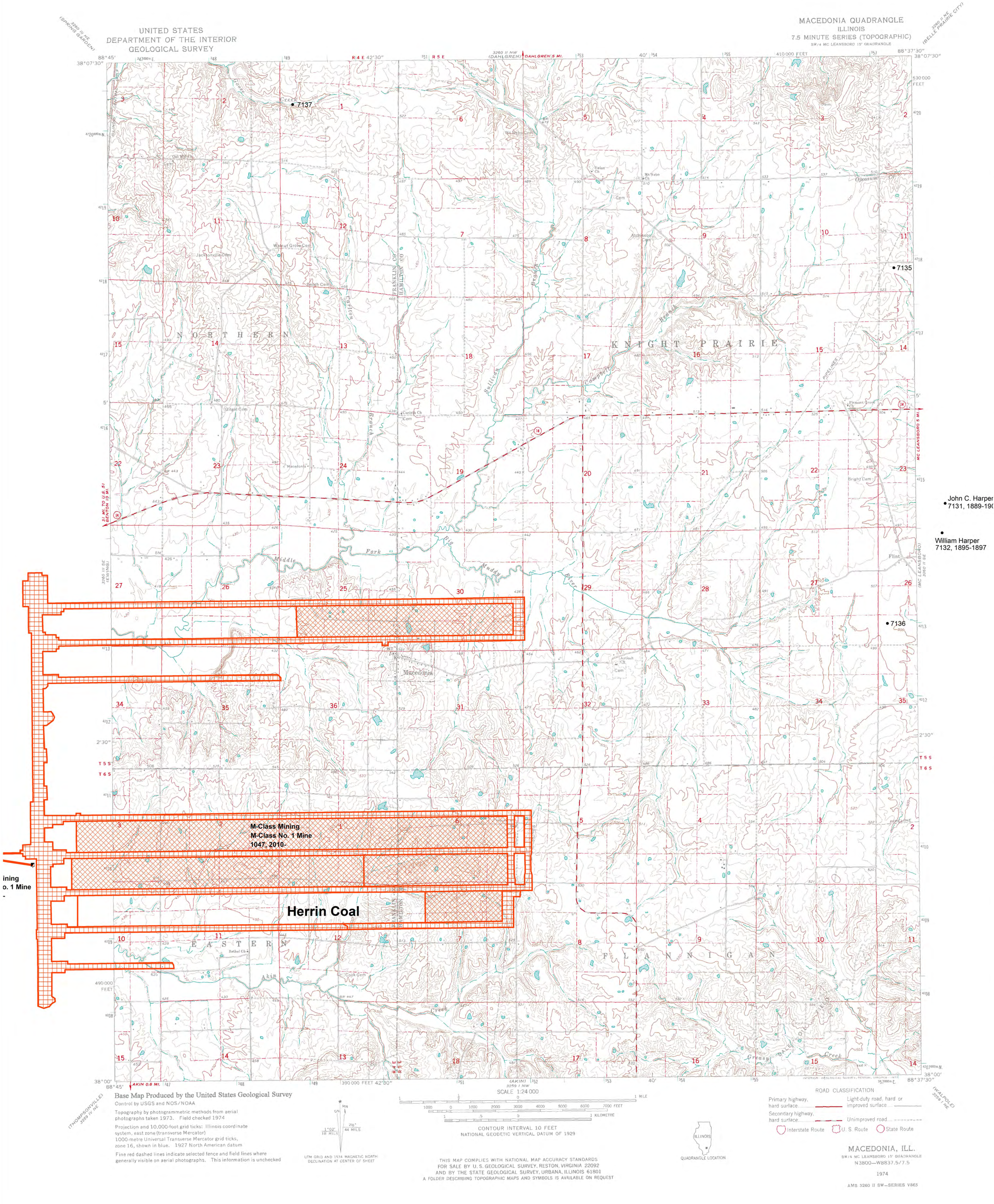
Bowen Coal Bank 10
Burkhead (Florida) 10
Dahlgren Coal Company 10
Eads Coal Company 9
McGinnis (Thomas D.) 10
Perry (Hillary) 10
Perry (Hillary) & Spencer (Vernon) 10
Robertson & Associates, Inc. 9
Spencer (Perry & Spencer) 10
Tedder (L. L.) 10
Yates (J. R.) 10

Coal Mines in Illinois
Macedonia Quadrangle

Hamilton & Franklin Counties, Illinois

Herrin & Womac Coals

This map accompanies the Coal Mines Directory for the Macedonia Quadrangle. Consult the directory for a complete explanation of the information shown on this map.



Mining Method

- Room & Pillar (RP)
- Room & Pillar Basic (RPB)
- Modified Room & Pillar (MRP)
- Room & Pillar Panel (RPP)
- Blind Room & Pillar (BRP)
- Checkerboard Room & Pillar (CRP)
- High Extraction Retreat (HER)
- Longwall (LW)
- Underground, Method Unknown
- Strip Mine
- Auger Mine
- General Area of Mining

Other Areas Depicted

- Non-Coal Mines

Source of Mine Outline

- Final Mine Map
- Not Final Mine Map
- Undated Mine Map
- Incomplete Mine Map
- Secondary Source Map

Tipple, Shaft, Slope, Drift Locations

- Strip Mine Tipple - Active
- Strip Mine Tipple - Abandoned
- Mine Shaft - Active
- Mine Shaft - Abandoned
- Mine Slope - Active
- Mine Slope - Abandoned
- Mine Drift - Active
- Mine Drift - Abandoned
- Air Shaft
- Uncertain Location
- Uncertain Type of Opening

Other Points Depicted

- Non-Coal Mines

Location

Mine Annotation
(space permiting)
Company
Mine Name
ISGS Index No., Years of Operation

Disclaimer
Please check the Coal Section at the Illinois State Geological Survey's web site at http://www.isgs.illinois.edu for the most up-to-date version of these products.

Note that each quadrangle scale mined-out area map requires the use of the associated text directory for full explanation of map features and mine attributes. Also note that some quadrangles have multiple seams of mining and therefore more than one map may be available for a particular quadrangle. Please take care to check for multiple maps, as extensive mining may exist in the other seams.

The maps and digital files used for these studies were compiled from data obtained from a variety of public and private sources and have varying degrees of completeness and accuracy. This compilation map presents reasonable interpretation of the geology of the area and is based on available data. Locations of some mine features may be offset by 500 feet or more due to errors in the original source maps, the compilation process, digitizing, or a combination of these factors. These data are not intended for use in site-specific screening or decision-making. Use of these documents does not eliminate the need for detailed studies to fully understand the geology of a specific site. The Illinois State Geological Survey, Prairie Research Institute, or the University of Illinois make no guarantee, expressed or implied, regarding the correctness of the interpretations presented in this data set and accept no liability for the consequences of decisions made by others on the basis of the information presented here.

These maps were designed for use at 1:24,000. Enlarging the map may reduce accuracy, as the original scale of the source maps used to compile the outlines shown varies from 1:400 to 1:150,000, and some mine locations are known only from text descriptions. See the accompanying mine directory for the original scale of the source map used for a specific mine to check accuracy of a given portion of the map. Areas with no mines shown may still be undermined; see the unlocated mines list at the back of each mine directory.

The image of the U.S.G.S. topographic base map was projected from the original UTM to Lambert Conformal Conic.

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE

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Mine Outlines Compiled by
Jennifer M. Obrad

2008; revised 2012; updated 2016

DIRECTORY OF COAL MINES IN ILLINOIS
7.5-MINUTE QUADRANGLE SERIES
MACEDONIA QUADRANGLE
HAMILTON & FRANKLIN COUNTIES

Jennifer M. Obrad

Department of Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
2008

DIRECTORY OF COAL MINES IN ILLINOIS
7.5-MINUTE QUADRANGLE SERIES
MACEDONIA QUADRANGLE
HAMILTON & FRANKLIN COUNTIES

2008

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Cover photo Track-mounted duckbill loading machine at a Peabody Coal Company mine, ca. 1915.

DISCLAIMER: The accuracy and completeness of mine maps and directories vary with the availability of reliable information. Maps and other information used to compile this mine map and directory were obtained from a variety of sources and the accuracy of some of the original information cannot be verified. Consequently, the Illinois State Geological Survey (ISGS) cannot guarantee the mine maps are free of errors and disclaims any responsibility for damages that may result from actions or decisions based on them.

The ISGS updates the maps and directories periodically, and welcomes any new information or corrections. Please contact the Coal Section of the ISGS at the address shown on the title page of this directory, or telephone (217) 244-4610.

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INTRODUCTION

Coal has been mined in 76 counties of Illinois. More than 7,400 coal mines have operated since commercial mining began in Illinois about 1810; fewer than 30 are currently active. To detail the extent and location of coal mining in Illinois, the Illinois State Geological Survey (ISGS) has compiled maps and directories of known coal mines. The ISGS offers maps at a scale of 1:100,000 and accompanying directories for each county in which coal mining is known to have occurred. Maps at a scale of 1:24,000 and accompanying directories, such as this, are available for selected quadrangles. Contact the ISGS for a list of these quadrangles.

These larger scale maps show the approximate positions of mines in relation to surface features such as roads and water bodies, and indicate the mining method used and the accuracy of the mine boundaries. The maps are useful for locating mine boundaries relative to specific properties and for assessing the potential for subsidence in an area. Mine boundaries compiled from final mine surveys are generally shown within 200 feet of their true position. As a result of poor cartographic quality and inaccuracies in the original mine surveys, boundaries of some older mines may be mislocated on the map by 500 feet or more. Original mine maps should be consulted in situations that require precise delineation of mine boundaries or internal workings of mined areas.

This directory serves as a key to the accompanying mine map and provides basic information on the coal mines in the quadrangle. The directory is composed of two parts. Part I explains the symbols and patterns used on the accompanying map and the summary data presented for each mine. Part II numerically lists the mines in the quadrangle and summarizes the geology and production history of each mine. Total production for the mine, not the portion in the quadrangle, is given.

MINING IN THE MACEDONIA QUADRANGLE

The oldest mines known on this quadrangle are known from early field notes in this area. The mines were small in size and shallow. The coal seam mined was the Womac Coal, which at the time was known as the Macoupin Coal. Recent mining has begun mining the Herrin Coal. The M-Class No. 1 Mine (mine index 1047) opened in 2010 and is mining using the longwall method.

PART I EXPLANATION OF MAP AND MINE SUMMARY SHEET

INTERPRETING THE MAP

The map accompanying this directory shows the location of coal mines known to be present in the quadrangle. The map, corresponding to a U.S. Geological Survey (USGS) 7.5-minute quadrangle, covers an area bounded by lines of latitude and longitude 7.5-minutes apart. In Illinois, a quadrangle is approximately 6.5 miles east to west and 8.5 miles north to south, an area of about 56 square miles. The ISGS generally offers one map of mines per quadrangle. In some areas where extensive mining occurred in two or more overlapping seams, separate maps are compiled for mines in each seam to maintain readability of the map.

Mine Type and Mining Method
The mine type is indicated on the map by pattern color: green represents surface mines; red and yellow represent underground mines. The red patterns are used for areas of underground mining that are documented by a primary or secondary source map. A yellow pattern is used for cases where no map of the mine workings is available, but a general area of mining can be inferred from property maps or production figures. The patterns indicate the main mining methods used in underground mines. The methods are (1) room and pillar and (2) high extraction. The method used gives some indication of the amount and pattern of coal extraction within each mined area, and has some influence on the timing and type of subsidence that can occur over a mine.

The following discussion and illustrations of mining methods are based on Guither et al. (1984).

In room-and-pillar mines, coal is removed from haulage-ways (entries) and selected areas called rooms. Pillars of unmined coal are left between the rooms to support the roof. Depending on the size of rooms and pillars, the amount of coal removed from the production areas will range from 40% to 70%.

Room and Pillar - mining is divided into six categories:
- room-and-pillar basic (RPB, fig. 1A), an early method that did not follow a preset mining plan and therefore resulted in very irregular designs;
- modified room and pillar (MRP, fig. 1B);
- room-and-pillar panel (RPP, fig. 1C);
- blind room and pillar (BRP, fig. 1D);
- checkerboard room and pillar (CRP, fig. 1E);
- room and pillar (RP), a classification used when the specific type of room-and-pillar mining is unknown.

Blind and checkerboard are the most common types of room-and-pillar mining used in Illinois today. The knowledge of room-and-pillar mining methods gives a trained engineer information on the nature of subsidence that may occur. A more extensive discussion of subsidence can be found in Bauer et al. (1993).

High-extraction   These mining methods are subdivided into high-extraction retreat (HER, Fig 1F) and longwall (LW, Fig 1G, 1H). In these methods, much of the coal is removed within well defined areas of the mine. Subsidence of the surface above these areas occurs within weeks. Once the subsidence activity ceases, the potential for further movement over these areas is low; however, subsidence may continue for several years after mining.

High-extraction retreat mining is a form of room-and-pillar mining that extracts most of the coal. Rooms and pillars are developed in the panels, and the pillars are then systematically removed (fig. 1F).

In early (pre-1960) longwall mines, mining advanced in multiple directions from a central shaft (fig. 1G). Large pillars of coal were left around the shaft, but all coal was removed beyond these pillars. Miners placed rock and wooden props and cribs in the mined-out areas to support the mine roof. The overlying rock gradually settled onto these supports, thus producing subsidence at the surface. In post-1959 longwall mines, room-and-pillar methods have been used to develop the main entries of the mine and panel areas. Modern longwall methods extract 100 percent of the coal in the panel areas (fig. 1H).

SOURCE MAPS

Mine outlines depicted on the map are, whenever possible, based on maps made from original mine surveys. The process of compiling and digitizing the quadrangle map may produce errors of less than 200 feet in the location of mine boundaries. Larger errors of 500 feet or more are possible for mines that have incomplete or inaccurate source maps.

Because of the extreme complexity of some mine maps, detailed features of mined areas have been omitted. The digitized mine boundary includes the exterior boundary of all rooms or entries that were at least 80 feet wide or protruded 500 feet from the main mining area. Unmined areas between mines are shown if they are at least 80 feet wide; unmined blocks of coal within mines are shown if they are at least 400 feet on each side. Original source maps should be consulted when precise information on mine boundaries or interior features is needed.

The mine summary sheet lists the source maps used to determine each mine outline. The completeness of map sources is indicated on the map by a line symbol at the mine boundary. Source maps are organized in five categories.

Final mine map The mine outline was digitized from an original map made from mine surveys conducted within a few months after production ceased. The date of the map and the last reported production are listed on the summary sheet.

Not a final map The mine is currently active or the mine outline was made from a map based on mine surveys conducted more than few months before production ceased. This implies the actual mined-out area is probably larger than the outline on the map. The mine summary sheet indicated the dates of source maps and the last reported production, as well as the approximate tonnage mined between these two dates (if the mine is abandoned). The summary sheet also lists the approximate acreage mined since the date of the map and, in some cases, indicates the area where additional mining may have taken place. This latter information is determined by locating on the map the active faces relative to probable boundaries of the mine property.

Undated map The source map was undated, so it may or may not be based on a final mine survey. When sufficient data are available, the probable acreage of the mined area is estimated from reported production, average seam thickness and a recovery rate comparable to other mines in the area. This information is listed in the summary sheet for the mine.

Incomplete map The source map did not show the entire mine. The summary sheet indicates the missing part of the mine map and the acreage of the unmapped area, which is estimated from the amount of coal known to have been produced from the mine.

Secondary source map The original mine map was not found so the outline shown was determined from secondary sources (e.g., outlines from small-scale regional maps published in other reports). The summary sheet describes the secondary sources.

POINTS AND LABELS

The locations of all known mine openings (shafts, slopes, and drifts) and surface mine tipples are plotted on the map. Tipples are areas where coal was cleaned, stockpiled, and loaded for shipping.

Only openings or tipples are plotted for mines without source maps. If the precise locations of these features are unknown, a special symbol is used to indicate the approximate location of the mine.

Each mine on the map is labeled with the names of the mine and operating company, ISGS mine index number, and years of operation (if known) if space permits. A seam designation is given on maps where more than one seam was mined. For a mine that operated under more than one name, only the most recent name is generally given. When a mine changed names or ownership shortly before closing, an earlier name is listed. All company and mine names are listed on the mine summary sheet in the directory, under the production history segment.

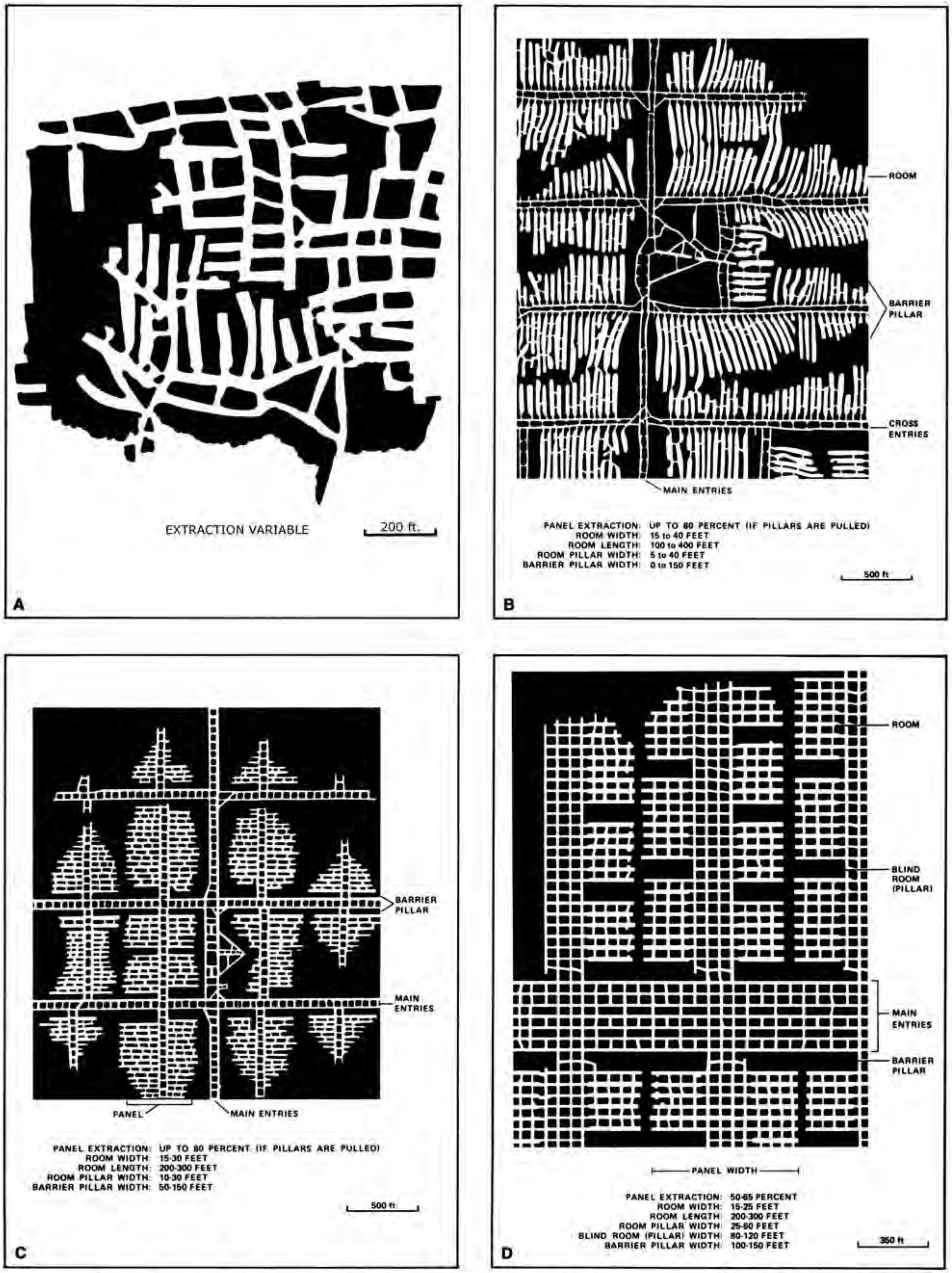


Figure 1 Mining methods: (A) room-and-pillar basic (RPB), (B) modified room and pillar (MRP), (C) room-and-pillar panel (RPP), (D) blind room and pillar (BRP).

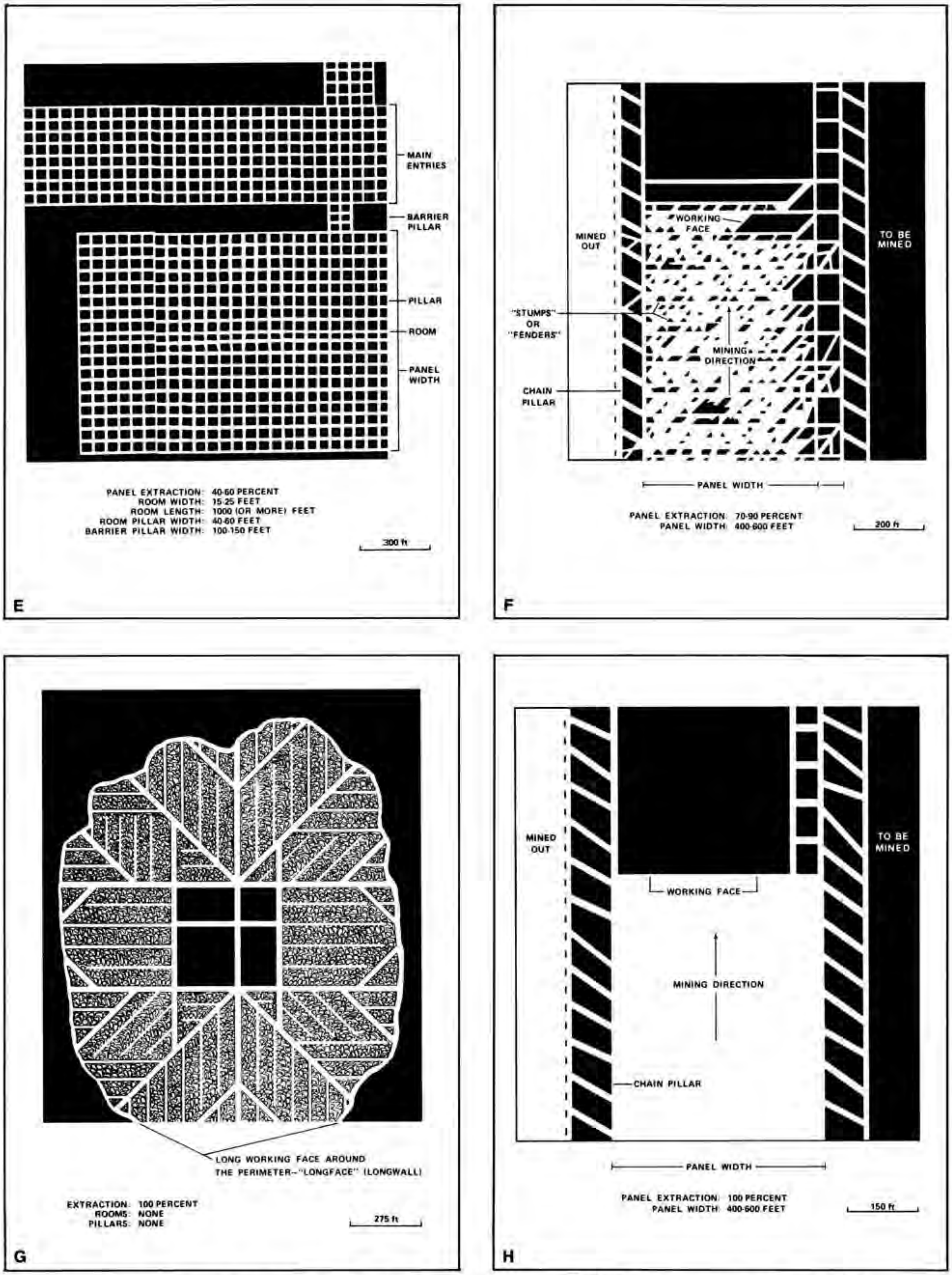


Figure 1 *(cont.)* Mining methods: (E) checkerboard room and pillar (CRP), (F) high extraction retreat (HER), (G) early (pre-1960) longwall, (H) post-1959 longwall

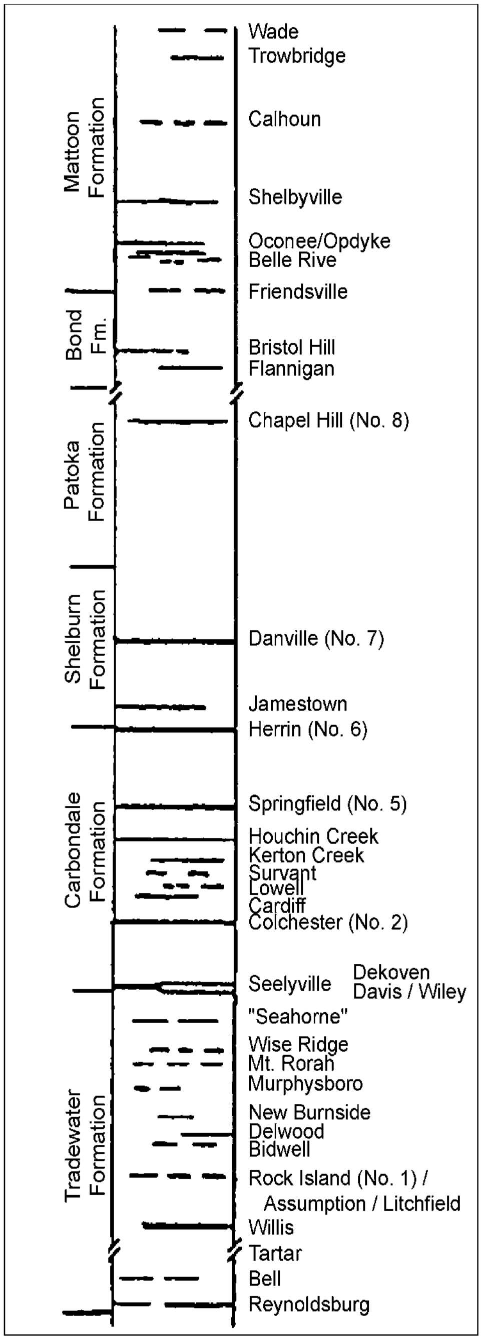


Figure 2 Generalized stratigraphic section, showing approximate vertical relations of coals in Illinois.

INTERPRETING A MINE SUMMARY SHEET

The mine summary sheet is arranged numerically by mine index number. Index numbers are shown on the map and in the mine listing. The mine summary sheet provides the following information (if available).

Company and mine name The last company or owner of the mine is used, unless no production was recorded for the last owner. In that case, the penultimate owner is listed. Mines often have no specific name; in these cases, the company name is also used as the mine name.

Type *Underground* denotes a subsurface mine in which the coal was reached through a shaft, slope, or a drift entry. *Surface* denotes a surface, open pit or strip mine.

Total mined-out acreage shown The total acreage of the mined area mapped, including any acreage mined on adjacent quadrangles, is calculated from the digitized outline of the mine. The acreage of large barrier pillars depicted on the map is excluded from the mined-out acreage. Small pillars not digitized are included in the acreage calculation. If the mine outline is not based on a final mine map, the acreage is followed by an estimate of additional acres that may have been mined. The estimate is determined from reported mine production, approximate thickness of the coal, and recovery rates calculated from nearby mines that used similar mining methods.

SHAFT, SLOPE, DRIFT OR TIPPLE LOCATIONS

Shaft, slope, drift, or tipple locations Locations of all known former entry points to underground mines or the location of coal cleaning, tipple, and shipping equipment used by the mine's facility are listed. The location is described in terms of county, township and range (Twp-Rge), section, and location within the section by quarters. NE SW NW, for instance, would describe the location in the northeast quarter of the southwest quarter of the northwest quarter. When sections are irregular in size, the quarters remain the same size and are oriented (or "registered") from the southeast corner of the section. Approximate footage from the section lines (FEL = from east line, FNL = from north line, for example) is given when that information is known; this indicates a surveyed location and is not derived from maps. Entry points are also plotted on the map and coded for the type of entry or tipple. A mine opening may have had many purposes during the life of the mine. Old hoist shafts are often later used for air and escape shafts; this information is included in the directory when known. The tipple for underground mines was generally located near the main shaft or slope. At surface mines, coal was sometimes hauled to a central tipple several miles from the mine pit.

GEOLOGY

Seam(s) mined The name of the coal seam(s) mined is listed, if known. If multiple seams were mined, they are all listed, although the mined-out area for each seam may be shown on separate maps. Figure 2 shows the stratigraphic section of the coal-bearing interval in Illinois, and the vertical relations among the coals.

Depth The depth to the top of the seam in the vicinity of the shaft is listed, if known. The depth is determined from notes made by geologists who visited the mine during its operation or from drill hole data in ISGS files. Depth generally varies little over the extent of a mine; however, reported depths for an individual mine may vary. Depth for surface-mined coals varies, and is usually represented as a range.

Thickness The approximate thickness of the mined seam is shown, if known. Thickness also comes from notes of geologists who visited the mine during its operation or from borehole data in ISGS files. Minimum, maximum, and average thicknesses are given when this information is available.

Mining method The principal mining method used at the mine (figs. 1A-H) is listed. See the mining methods section at the beginning of this directory for a discussion of this parameter.

Geologic problems reported Any known geologic problems, such as faults, water seepage, floor heaving, and unstable roof, encountered in the mine are reported. This information is from notes made by ISGS geologists who visited the mine, or from reports by mine inspectors published by the Illinois Department of Mines and Minerals, or from the source map(s). Geologic problems are not reported for active mines.

PRODUCTION HISTORY

Production history Tons of coal produced from the mine by each mine owner are totaled. When the source map used for the mine outline is not a final mine map, the tonnage produced since the date of the map is identified. For mines that extend into adjacent quadrangles, the tonnage reported includes areas mined in adjacent quadrangles.

SOURCE OF DATA

Source map This section lists information about the map(s) used to compile the mine outline and the locations of tipples and mine openings. In some cases more than one source map was used. For example, a map drawn before the mine closed may provide better information on original areas of the mine than a later map. When more than one map was used, the bibliography section explains what information was taken from each source.

Date The date of the most recent mine survey listed on the source map is reported.

Original scale The original scale of the source map is listed. Many maps are photo-reductions and are no longer at their original scale. The original scale gives some indication of the level of detail of the mine outline and the accuracy of the mine boundary relative to surface features. Generally, the larger the scale, the greater the accuracy and detail of the mine map. Mine outlines taken from source maps at scales smaller than 1:24,000 may be highly generalized and may well be inaccurately located with respect to surface features.

Digitized scale The scale of the digitized map is reported. The scale may be different from that of the original source map. In many cases the digitized map was made from a photo-reduction of the original source map, or the source map was not in a condition suitable for digitizing and the mine boundaries were transferred to another base map.

Map type Source maps are classified into five categories to indicate the probable completeness of the map. See discussion of source maps in the previous section.

Annotated bibliography Sources that provide information about the mine are listed, with the data taken from each source. Some commonly used sources are described below. Full bibliographic references are given for all other sources. Unless otherwise noted, all sources are available for public inspection at the ISGS.

Coal Reports Published since 1881, these reports contain tabular data on mine ownership, production, employment, and accidents. Some volumes include short descriptions made by mine inspectors of physical features and conditions in selected mines.

Directory of Illinois Coal Mines This source is a compilation of basic data about Illinois coal mines, originally gathered by ISGS staff in the early 1950s. Sources used for this directory are undocumented, but they are primarily Illinois Department of Mines and Minerals annual reports, ISGS mine notes, and coal company officials.

ENR Document 85/01, Guither, H. D., J. K. Hines, and R. A. Bauer, 1985 The Economic Effect of Underground Mining Upon Land Used for Illinois Agriculture: Illinois Department of Energy and Natural Resources Document 85/01, 185 p.

Microfilm map The U.S. Bureau of Mines maintains a microfilm archive of mine maps. A microfilm file for Illinois is available for public viewing at the ISGS.

Mine notes   ISGS geologists have visited mines or contacted mine officials throughout the state since the early 1900s. Notes made during these visits range from brief descriptions of the mine location to long narratives (including sketches) of mining conditions and geology.

Federal Land Bank of St. Louis, Preliminary Reports on Subsidence Investigations Mining engineers working for the Federal Land Bank of St. Louis mapped areas of subsidence due to coal mining in the early 1930s. These reports often include county maps of mine properties with mined-out areas including shaft locations, as well as subsidence areas.

REFERENCES

Bauer, R. A., B. A. Trent, and P. B. Dumontelle, 1993, Mine Subsidence in Illinois: Facts for the Homeowner Considering Insurance, Illinois State Geological Survey, Environmental Geology Note 144, 16p.

Guither, H. D., J. K. Hines, and R. A. Bauer, 1985, The Economic Effects of Underground Mining Upon Land Used for Illinois Agriculture, Illinois Department of Energy and Natural Resources Document 85/01, 185p.

PART II DIRECTORY OF MINES IN THE MACEDONIA QUADRANGLE

MINE SUMMARY SHEETS

A summary sheet on the geology and production history of each mine in the Macedonia Quadrangle is provided. These summary sheets are arranged numerically by mine index number. Consult Part I for a complete explanation of the data listed in the summary sheet.

Mine Index 1047
M-Class Mining, M-Class No. 1 Mine

Type: Underground Total mined-out acreage shown: 2,778

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Main slope	Franklin	6S 4E	4	NE SE SE

GEOLOGY

		Thickness (ft)			Mining
Seam(s) Mined	Depth (ft)	Min	Max	Avg	Method
Herrin	730			6.0	LW

Geologic Problems Reported:

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)
M-Class Mining	M-Class No. 1	2010- *	32,052,985 *
			32,052,985

* Production includes tonnage through 2015, the latest available Coal Report.

Last reported production:

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
Company map, Coal Section files	2014	1:6000	1:6000	Not final

Annotated Bibliography (data source, brief description of information)

Coal Reports - Production, ownership, years of operation, seam, depth, thickness.
Directory of Illinois Coal Mines (Franklin County) - Mine names, mine index, ownership, years of operation.
Company map, Coal Section files - Slope location, mine outline, mining method.

Mine Index 7135

Type: Surface   Total mined-out acreage shown: None

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Pit	Hamilton	5S 5E	11	NE SW SW

GEOLOGY

Seam(s) Mined	Depth (ft)	Thickness (ft) Min	Max	Avg	Mining Method
Womac	8				Surface

Geologic Problems Reported:

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)

Last reported production:

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
ISGS field notes (H. R. Wanless)	7-18-1932	(text only)	1:24000 *	Secondary source

* The mine location was plotted on a 1:24000 USGS topographic map from the mine location description and digitized.

Annotated Bibliography (data source, brief description of information)

ISGS field notes (Hamilton County) - Mine type, mine location, seam, depth.

Mine Index 7136

Type: Surface   Total mined-out acreage shown: None

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Pit	Hamilton	5S 5E	26	NW SW SW

GEOLOGY

Seam(s) Mined	Depth (ft)	Thickness (ft) Min	Max	Avg	Mining Method
Womac	1				Surface

Geologic Problems Reported:

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)

Last reported production:

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
ISGS field notes (J. L. Lester)	8-13-1938	(text only)	1:24000 *	Secondary source

* The mine location was plotted on a 1:24000 USGS topographic map from the mine location description and digitized.

Annotated Bibliography (data source, brief description of information)

ISGS field notes (Hamilton County) - Mine type, mine location, seam.

Mine Index 7137

Type: Surface   Total mined-out acreage shown: None

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Pit	Franklin	5S 4E	1	SW NW

GEOLOGY

Seam(s) Mined	Depth (ft)	Thickness (ft) Min	Max	Avg	Mining Method
Womac				2.0	Surface

Geologic Problems Reported:

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)

Last reported production:

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
ISGS field notes (H. R. Wanless)	7-12-1932	(text only)	1:24000 *	Secondary source

* The mine location was plotted on a 1:24000 USGS topographic map from the mine location description and digitized.

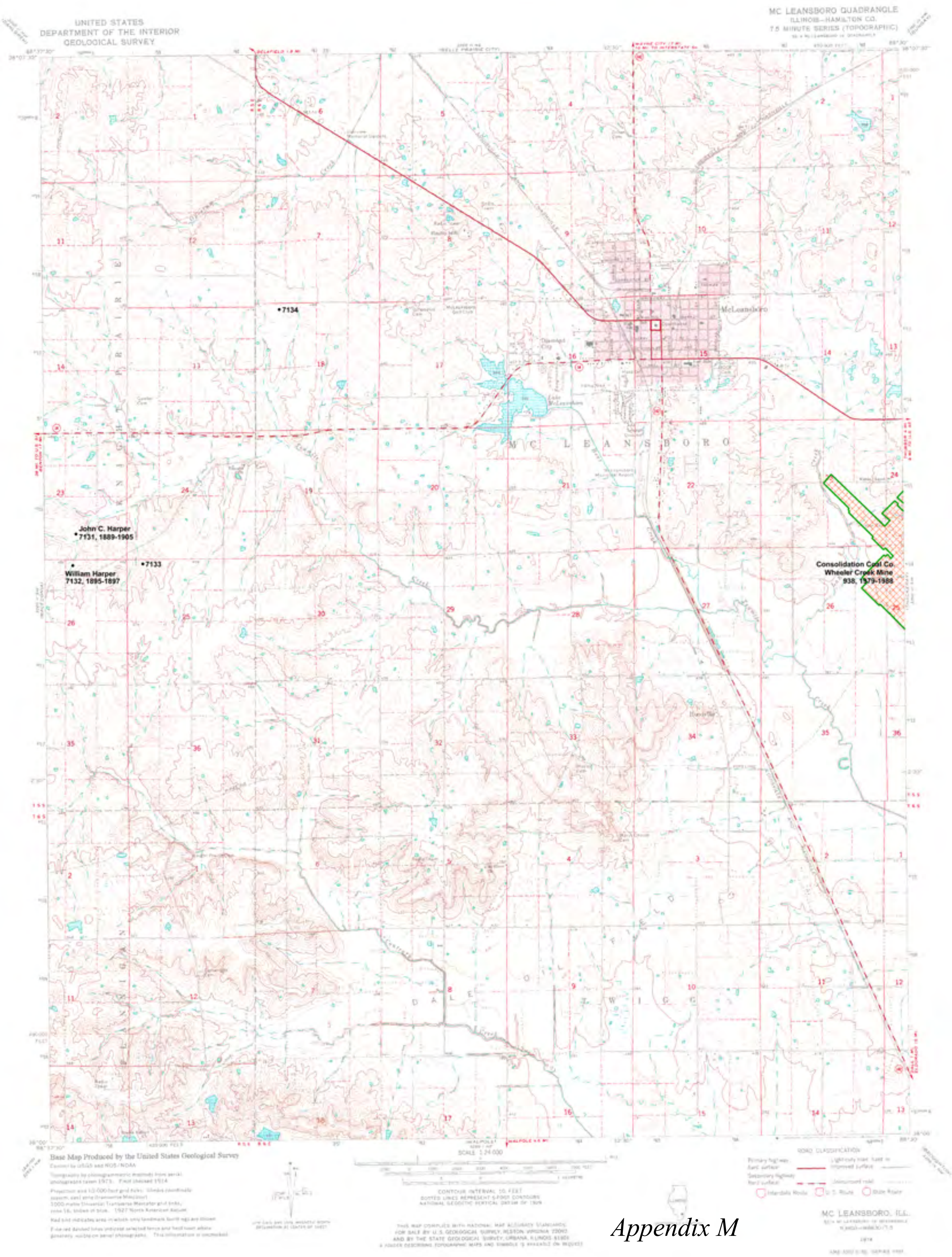
Annotated Bibliography (data source, brief description of information)

ISGS field notes (Franklin County) - Mine type, mine location, seam, thickness.

INDEX OF MINES IN THE MACEDONIA QUADRANGLE

M-Class Mining 9

Funding for this project was supplied by the Illinois Department of Transportation.



Coal Mines in Illinois
McLeansboro Quadrangle

Hamilton County, Illinois

This map accompanies the Coal Mines Directory for the McLeansboro Quadrangle. Consult the directory for a complete explanation of the information shown on this map.

Mining Method

- Room & Pillar (RP)
- Room & Pillar Basic (RPB)
- Modified Room & Pillar (MRP)
- Room & Pillar Panel (RPP)
- Blind Room & Pillar (BRP)
- Checkerboard Room & Pillar (CRP)
- High Extraction Retreat (HER)
- Longwall (LW)
- Underground, Method Unknown
- Strip Mine
- Auger Mine
- General Area of Mining

Source of Mine Outline

- Final Mine Map
- Not Final Mine Map
- Undated Mine Map
- Incomplete Mine Map
- Secondary Source Map

Tipple, Shaft, Slope, Drift Locations

- Strip Mine Tipple - Active
- Strip Mine Tipple - Abandoned
- Mine Shaft - Active
- Mine Shaft - Abandoned
- Mine Slope - Active
- Mine Slope - Abandoned
- Mine Drift - Active
- Mine Drift - Abandoned
- Air Shaft
- Uncertain Location
- Uncertain Type of Opening

Mine Annotation
(space permiting)
Company
Mine Name
ISGS Index No., Years of Operation

Location

DISCLAIMER

These data were compiled and digitized from the best source maps available. Locations of some features may be offset by 500 feet of more due to errors in the original source maps, the compilation process, digitizing or a combination of these factors. Documentation of the source materials used is contained in the directory that accompanies this map. It is the user's responsibility to read this documentation and understand the limitations of the data. Though efforts have been made to compile these data accurately, the Illinois State Geological Survey does not guarantee the validity or the accuracy of these data.

The image of the U.S.G.S. McLeansboro Quadrangle used as a basemap was projected from the original UTM to Lambert Conformal Conic.

Illinois State Geological Survey
615 E. Peabody Dr.
Champaign, IL 61820

Mine Outlines Compiled by
Jennifer M. Obrad

January 14, 2008

Appendix M

DIRECTORY OF COAL MINES IN ILLINOIS
7.5-MINUTE QUADRANGLE SERIES
McLEANSBORO QUADRANGLE
HAMILTON COUNTY

Jennifer M. Obrad

Department of Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
2008

DIRECTORY OF COAL MINES IN ILLINOIS
7.5-MINUTE QUADRANGLE SERIES
McLEANSBORO QUADRANGLE
HAMILTON COUNTY

2008

ILLINOIS STATE GEOLOGICAL SURVEY
William Shilts, Chief

Natural Resources Building
615 East Peabody Drive
Champaign, Illinois 61820

Phone 1-217-244-4610
Fax 1-217-333-2830

Cover photo Track-mounted duckbill loading machine at a Peabody Coal Company mine, ca. 1915.

DISCLAIMER: The accuracy and completeness of mine maps and directories vary with the availability of reliable information. Maps and other information used to compile this mine map and directory were obtained from a variety of sources and the accuracy of some of the original information cannot be verified. Consequently, the Illinois State Geological Survey (ISGS) cannot guarantee the mine maps are free of errors and disclaims any responsibility for damages that may result from actions or decisions based on them.

The ISGS updates the maps and directories periodically, and welcomes any new information or corrections. Please contact the Coal Section of the ISGS at the address shown on the title page of this directory, or telephone (217) 244-4610.

Printed by authority of the State of Illinois/2008

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INTRODUCTION

Coal has been mined in 76 counties of Illinois. More than 7,400 coal mines have operated since commercial mining began in Illinois about 1810; fewer than 30 are currently active. To detail the extent and location of coal mining in Illinois, the Illinois State Geological Survey (ISGS) has compiled maps and directories of known coal mines. The ISGS offers maps at a scale of 1:100,000 and accompanying directories for each county in which coal mining is known to have occurred. Maps at a scale of 1:24,000 and accompanying directories, such as this, are available for selected quadrangles. Contact the ISGS for a list of these quadrangles.

These larger scale maps show the approximate positions of mines in relation to surface features such as roads and water bodies, and indicate the mining method used and the accuracy of the mine boundaries. The maps are useful for locating mine boundaries relative to specific properties and for assessing the potential for subsidence in an area. Mine boundaries compiled from final mine surveys are generally shown within 200 feet of their true position. As a result of poor cartographic quality and inaccuracies in the original mine surveys, boundaries of some older mines may be mislocated on the map by 500 feet or more. Original mine maps should be consulted in situations that require precise delineation of mine boundaries or internal workings of mined areas.

This directory serves as a key to the accompanying mine map and provides basic information on the coal mines in the quadrangle. The directory is composed of two parts. Part I explains the symbols and patterns used on the accompanying map and the summary data presented for each mine. Part II numerically lists the mines in the quadrangle and summarizes the geology and production history of each mine. Total production for the mine, not the portion in the quadrangle, is given.

MINING IN THE McLEANSBORO QUADRANGLE

Mining in the McLeansboro Quadrangle began in small mines that mined the Womac Coal, a thin seam of coal that was near the surface in this area. Two of these mines reported production in the late 1800s. Another small mine, according to *History of Gallatin, Saline, Hamilton Franklin & Williamson Counties*, dug coal on Hogg Prairie to supply blacksmiths. This likely took place circa 1850-1860. The only large-scale mining to have taken place in the McLeansboro Quadrangle began in 1979, when Inland Steel Coal Company opened its No. 2 Mine (mine index 938). This mine worked the Springfield Coal seam at a depth of 929 feet. In 1986, the mine became known as the Consolidation Coal Company, Wheeler Creek Mine. This name persisted until the closing of the mine in 1988, which ended all mining in the McLeansboro Quadrangle.

PART I EXPLANATION OF MAP AND MINE SUMMARY SHEET

INTERPRETING THE MAP

The map accompanying this directory shows the location of coal mines known to be present in the quadrangle. The map, corresponding to a U.S. Geological Survey (USGS) 7.5-minute quadrangle, covers an area bounded by lines of latitude and longitude 7.5-minutes apart. In Illinois, a quadrangle is approximately 6.5 miles east to west and 8.5 miles north to south, an area of about 56 square miles. The ISGS generally offers one map of mines per quadrangle. In some areas where extensive mining occurred in two or more overlapping seams, separate maps are compiled for mines in each seam to maintain readability of the map.

Mine Type and Mining Method
The mine type is indicated on the map by pattern color: green represents surface mines; red and yellow represent underground mines. The red patterns are used for areas of underground mining that are documented by a primary or secondary source map. A yellow pattern is used for cases where no map of the mine workings is available, but a general area of mining can be inferred from property maps or production figures. The patterns indicate the main mining methods used in underground mines. The methods are (1) room and pillar and (2) high extraction. The method used gives some indication of the amount and pattern of coal extraction within each mined area, and has some influence on the timing and type of subsidence that can occur over a mine.

The following discussion and illustrations of mining methods are based on Guither et al. (1984).

In room-and-pillar mines, coal is removed from haulage-ways (entries) and selected areas called rooms. Pillars of unmined coal are left between the rooms to support the roof. Depending on the size of rooms and pillars, the amount of coal removed from the production areas will range from 40% to 70%.

Room and Pillar - mining is divided into six categories:

- room-and-pillar basic (RPB, fig. 1A), an early method that did not follow a preset mining plan and therefore resulted in very irregular designs;
- modified room and pillar (MRP, fig. 1B);
- room-and-pillar panel (RPP, fig. 1C);
- blind room and pillar (BRP, fig. 1D);
- checkerboard room and pillar (CRP, fig. 1E);
- room and pillar (RP), a classification used when the specific type of room-and-pillar mining is unknown.

Blind and checkerboard are the most common types of room-and-pillar mining used in Illinois today. The knowledge of room-and-pillar mining methods gives a trained engineer information on the nature of subsidence that may occur. A more extensive discussion of subsidence can be found in Bauer et al. (1993).

High-extraction These mining methods are subdivided into high-extraction retreat (HER, Fig 1F) and longwall (LW, Fig 1G, 1H). In these methods, much of the coal is removed within well defined areas of the mine. Subsidence of the surface above these areas occurs within weeks. Once the subsidence activity ceases, the potential for further movement over these areas is low; however, subsidence may continue for several years after mining.

High-extraction retreat mining is a form of room-and-pillar mining that extracts most of the coal. Rooms and pillars are developed in the panels, and the pillars are then systematically removed (fig. 1F).

In early (pre-1960) longwall mines, mining advanced in multiple directions from a central shaft (fig. 1G). Large pillars of coal were left around the shaft, but all coal was removed beyond these pillars. Miners placed rock and wooden props and cribs in the mined-out areas to support the mine roof. The overlying rock gradually settled onto these supports, thus producing subsidence at the surface. In post-1959 longwall mines, room-and-pillar methods have been used to develop the main entries of the mine and panel areas. Modern longwall methods extract 100 percent of the coal in the panel areas (fig. 1H).

SOURCE MAPS

Mine outlines depicted on the map are, whenever possible, based on maps made from original mine surveys. The process of compiling and digitizing the quadrangle map may produce errors of less than 200 feet in the location of mine boundaries. Larger errors of 500 feet or more are possible for mines that have incomplete or inaccurate source maps.

Because of the extreme complexity of some mine maps, detailed features of mined areas have been omitted. The digitized mine boundary includes the exterior boundary of all rooms or entries that were at least 80 feet wide or protruded 500 feet from the main mining area. Unmined areas between mines are shown if they are at least 80 feet wide; unmined blocks of coal within mines are shown if they are at least 400 feet on each side. Original source maps should be consulted when precise information on mine boundaries or interior features is needed.

The mine summary sheet lists the source maps used to determine each mine outline. The completeness of map sources is indicated on the map by a line symbol at the mine boundary. Source maps are organized in five categories.

Final mine map The mine outline was digitized from an original map made from mine surveys conducted within a few months after production ceased. The date of the map and the last reported production are listed on the summary sheet.

Not a final map The mine is currently active or the mine outline was made from a map based on mine surveys conducted more than few months before production ceased. This implies the actual mined-out area is probably larger than the outline on the map. The mine summary sheet indicated the dates of source maps and the last reported production, as well as the approximate tonnage mined between these two dates (if the mine is abandoned). The summary sheet also lists the approximate acreage mined since the date of the map and, in some cases, indicates the area where additional mining may have taken place. This latter information is determined by locating on the map the active faces relative to probable boundaries of the mine property.

Undated map The source map was undated, so it may or may not be based on a final mine survey. When sufficient data are available, the probable acreage of the mined area is estimated from reported production, average seam thickness and a recovery rate comparable to other mines in the area. This information is listed in the summary sheet for the mine.

Incomplete map The source map did not show the entire mine. The summary sheet indicates the missing part of the mine map and the acreage of the unmapped area, which is estimated from the amount of coal known to have been produced from the mine.

Secondary source map The original mine map was not found so the outline shown was determined from secondary sources (e.g., outlines from small-scale regional maps published in other reports). The summary sheet describes the secondary sources.

POINTS AND LABELS

The locations of all known mine openings (shafts, slopes, and drifts) and surface mine tipples are plotted on the map. Tipples are areas where coal was cleaned, stockpiled, and loaded for shipping.

Only openings or tipples are plotted for mines without source maps. If the precise locations of these features are unknown, a special symbol is used to indicate the approximate location of the mine.

Each mine on the map is labeled with the names of the mine and operating company, ISGS mine index number, and years of operation (if known) if space permits. A seam designation is given on maps where more than one seam was mined. For a mine that operated under more than one name, only the most recent name is generally given. When a mine changed names or ownership shortly before closing, an earlier name is listed. All company and mine names are listed on the mine summary sheet in the directory, under the production history segment.

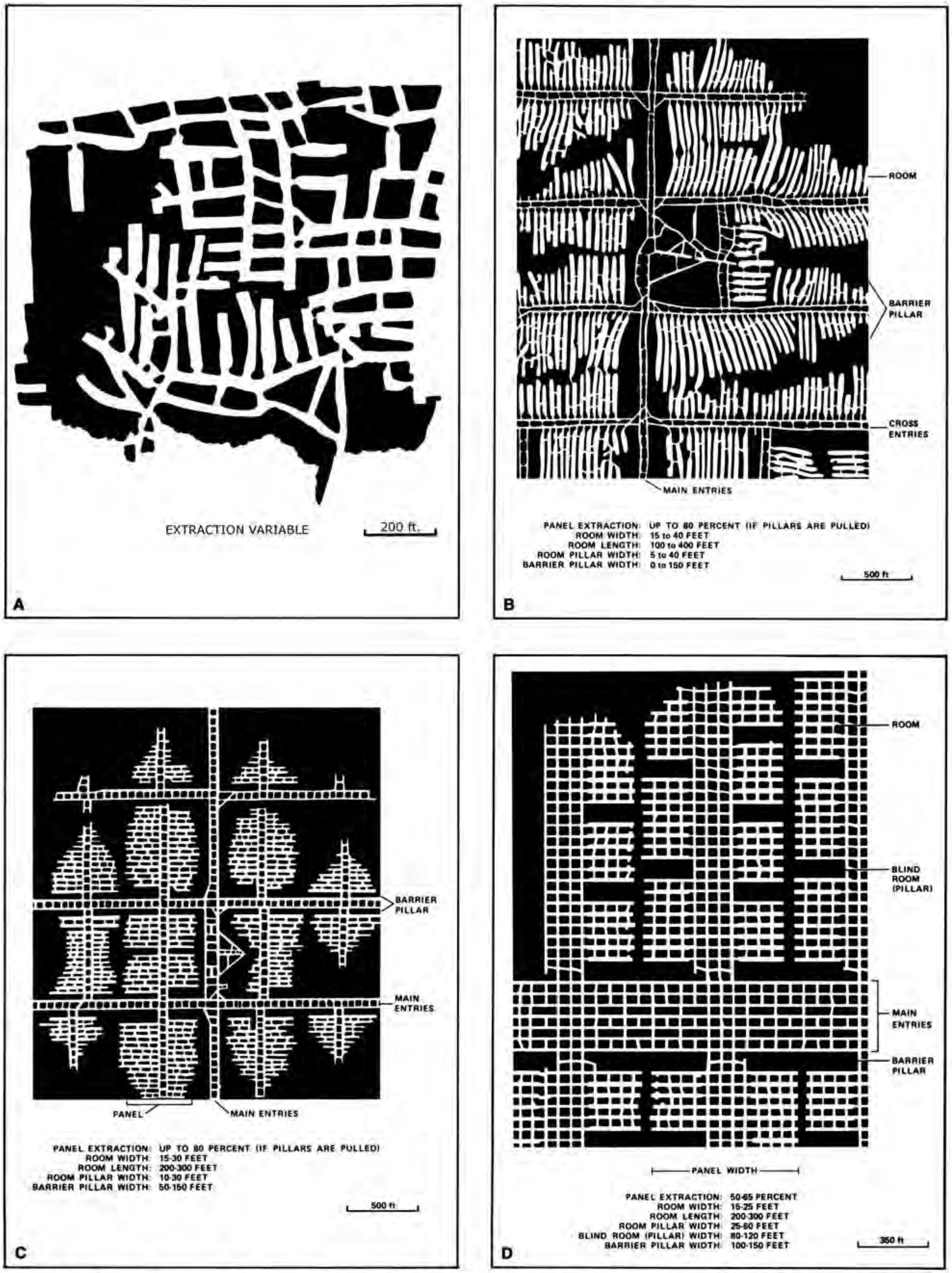


Figure 1 Mining methods: (A) room-and-pillar basic (RPB), (B) modified room and pillar (MRP), (C) room-and-pillar panel (RPP), (D) blind room and pillar (BRP).

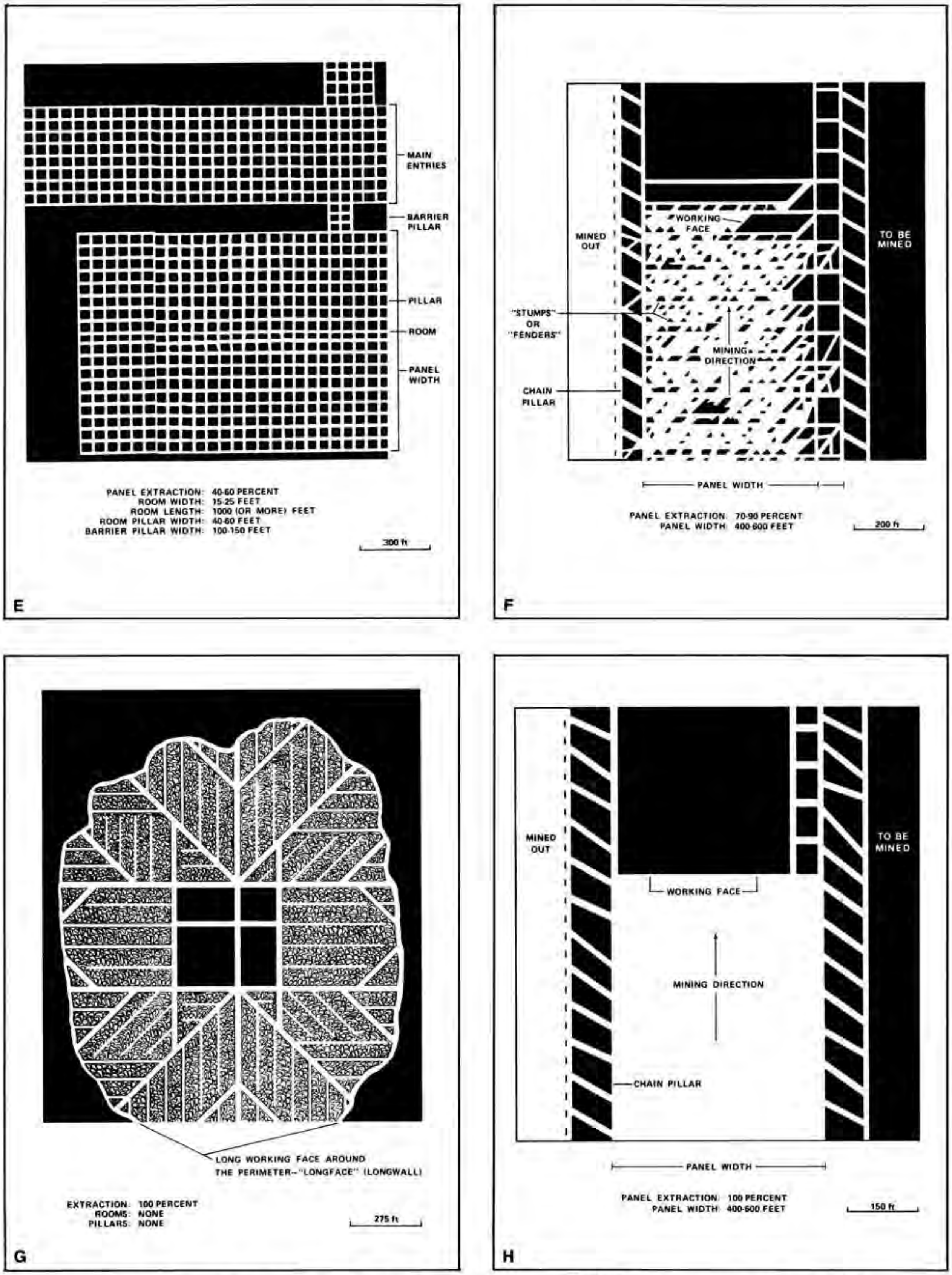


Figure 1 *(cont.)* Mining methods: (E) checkerboard room and pillar (CRP), (F) high extraction retreat (HER), (G) early (pre-1960) longwall, (H) post-1959 longwall

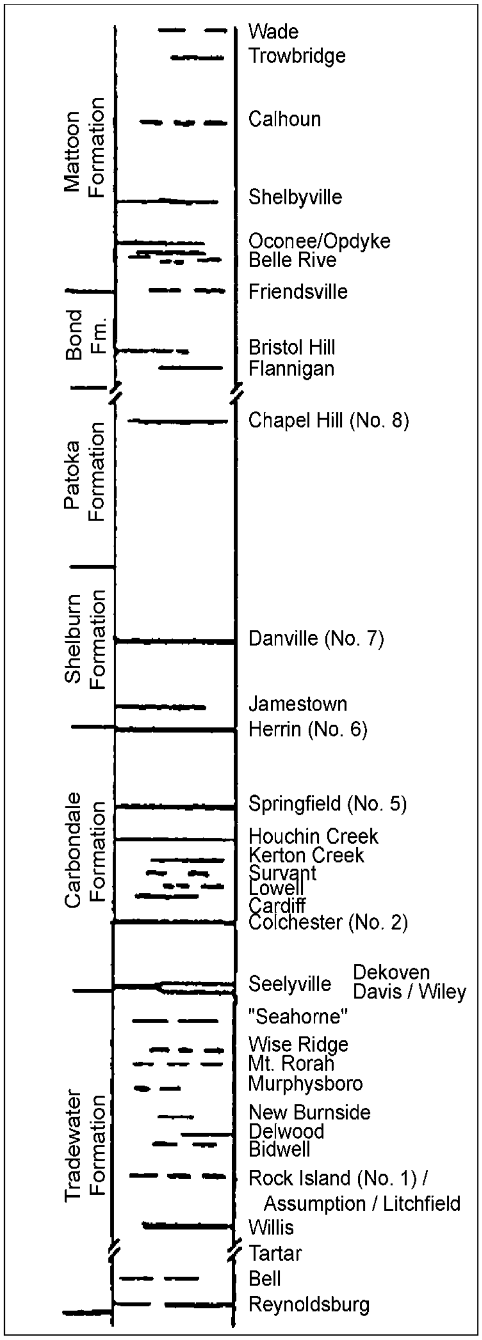


Figure 2 Generalized stratigraphic section, showing approximate vertical relations of coals in Illinois.

INTERPRETING A MINE SUMMARY SHEET

The mine summary sheet is arranged numerically by mine index number. Index numbers are shown on the map and in the mine listing. The mine summary sheet provides the following information (if available).

Company and mine name The last company or owner of the mine is used, unless no production was recorded for the last owner. In that case, the penultimate owner is listed. Mines often have no specific name; in these cases, the company name is also used as the mine name.

Type *Underground* denotes a subsurface mine in which the coal was reached through a shaft, slope, or a drift entry. *Surface* denotes a surface, open pit or strip mine.

Total mined-out acreage shown The total acreage of the mined area mapped, including any acreage mined on adjacent quadrangles, is calculated from the digitized outline of the mine. The acreage of large barrier pillars depicted on the map is excluded from the mined-out acreage. Small pillars not digitized are included in the acreage calculation. If the mine outline is not based on a final mine map, the acreage is followed by an estimate of additional acres that may have been mined. The estimate is determined from reported mine production, approximate thickness of the coal, and recovery rates calculated from nearby mines that used similar mining methods.

SHAFT, SLOPE, DRIFT OR TIPPLE LOCATIONS

Shaft, slope, drift, or tipple locations Locations of all known former entry points to underground mines or the location of coal cleaning, tipple, and shipping equipment used by the mine's facility are listed. The location is described in terms of county, township and range (Twp-Rge), section, and location within the section by quarters. NE SW NW, for instance, would describe the location in the northeast quarter of the southwest quarter of the northwest quarter. When sections are irregular in size, the quarters remain the same size and are oriented (or "registered") from the southeast corner of the section. Approximate footage from the section lines (FEL = from east line, FNL = from north line, for example) is given when that information is known; this indicates a surveyed location and is not derived from maps. Entry points are also plotted on the map and coded for the type of entry or tipple. A mine opening may have had many purposes during the life of the mine. Old hoist shafts are often later used for air and escape shafts; this information is included in the directory when known. The tipple for underground mines was generally located near the main shaft or slope. At surface mines, coal was sometimes hauled to a central tipple several miles from the mine pit.

GEOLOGY

Seam(s) mined The name of the coal seam(s) mined is listed, if known. If multiple seams were mined, they are all listed, although the mined-out area for each seam may be shown on separate maps. Figure 2 shows the stratigraphic section of the coal-bearing interval in Illinois, and the vertical relations among the coals.

Depth The depth to the top of the seam in the vicinity of the shaft is listed, if known. The depth is determined from notes made by geologists who visited the mine during its operation or from drill hole data in ISGS files. Depth generally varies little over the extent of a mine; however, reported depths for an individual mine may vary. Depth for surface-mined coals varies, and is usually represented as a range.

Thickness The approximate thickness of the mined seam is shown, if known. Thickness also comes from notes of geologists who visited the mine during its operation or from borehole data in ISGS files. Minimum, maximum, and average thicknesses are given when this information is available.

Mining method The principal mining method used at the mine (figs. 1A-H) is listed. See the mining methods section at the beginning of this directory for a discussion of this parameter.

Geologic problems reported Any known geologic problems, such as faults, water seepage, floor heaving, and unstable roof, encountered in the mine are reported. This information is from notes made by ISGS geologists who visited the mine, or from reports by mine inspectors published by the Illinois Department of Mines and Minerals, or from the source map(s). Geologic problems are not reported for active mines.

PRODUCTION HISTORY

Production history Tons of coal produced from the mine by each mine owner are totaled. When the source map used for the mine outline is not a final mine map, the tonnage produced since the date of the map is identified. For mines that extend into adjacent quadrangles, the tonnage reported includes areas mined in adjacent quadrangles.

SOURCE OF DATA

Source map This section lists information about the map(s) used to compile the mine outline and the locations of tipples and mine openings. In some cases more than one source map was used. For example, a map drawn before the mine closed may provide better information on original areas of the mine than a later map. When more than one map was used, the bibliography section explains what information was taken from each source.

Date The date of the most recent mine survey listed on the source map is reported.

Original scale The original scale of the source map is listed. Many maps are photo-reductions and are no longer at their original scale. The original scale gives some indication of the level of detail of the mine outline and the accuracy of the mine boundary relative to surface features. Generally, the larger the scale, the greater the accuracy and detail of the mine map. Mine outlines taken from source maps at scales smaller than 1:24,000 may be highly generalized and may well be inaccurately located with respect to surface features.

Digitized scale The scale of the digitized map is reported. The scale may be different from that of the original source map. In many cases the digitized map was made from a photo-reduction of the original source map, or the source map was not in a condition suitable for digitizing and the mine boundaries were transferred to another base map.

Map type Source maps are classified into five categories to indicate the probable completeness of the map. See discussion of source maps in the previous section.

Annotated bibliography Sources that provide information about the mine are listed, with the data taken from each source. Some commonly used sources are described below. Full bibliographic references are given for all other sources. Unless otherwise noted, all sources are available for public inspection at the ISGS.

Coal Reports Published since 1881, these reports contain tabular data on mine ownership, production, employment, and accidents. Some volumes include short descriptions made by mine inspectors of physical features and conditions in selected mines.

Directory of Illinois Coal Mines This source is a compilation of basic data about Illinois coal mines, originally gathered by ISGS staff in the early 1950s. Sources used for this directory are undocumented, but they are primarily Illinois Department of Mines and Minerals annual reports, ISGS mine notes, and coal company officials.

ENR Document 85/01, Guither, H. D., J. K. Hines, and R. A. Bauer, 1985 The Economic Effect of Underground Mining Upon Land Used for Illinois Agriculture: Illinois Department of Energy and Natural Resources Document 85/01, 185 p.

Microfilm map The U.S. Bureau of Mines maintains a microfilm archive of mine maps. A microfilm file for Illinois is available for public viewing at the ISGS.

Mine notes ISGS geologists have visited mines or contacted mine officials throughout the state since the early 1900s. Notes made during these visits range from brief descriptions of the mine location to long narratives (including sketches) of mining conditions and geology.

Federal Land Bank of St. Louis, Preliminary Reports on Subsidence Investigations Mining engineers working for the Federal Land Bank of St. Louis mapped areas of subsidence due to coal mining in the early 1930s. These reports often include county maps of mine properties with mined-out areas including shaft locations, as well as subsidence areas.

REFERENCES

Bauer, R. A., B. A. Trent, and P. B. Dumontelle, 1993, Mine Subsidence in Illinois: Facts for the Homeowner Considering Insurance, Illinois State Geological Survey, Environmental Geology Note 144, 16p.

Guither, H. D., J. K. Hines, and R. A. Bauer, 1985, The Economic Effects of Underground Mining Upon Land Used for Illinois Agriculture, Illinois Department of Energy and Natural Resources Document 85/01, 185p.

History of Gallatin, Saline, Hamilton, Franklin & Williamson Counties, Illinois, 1887, Chicago, Illinois: The Goodspeed Publishing Co, reproduction by Unigraphic Inc., Evansville, Indiana, 1967, 961p.

PART II DIRECTORY OF MINES IN THE McLEANSBORO QUADRANGLE

MINE SUMMARY SHEETS

A summary sheet on the geology and production history of each mine in the McLeansboro Quadrangle is provided. These summary sheets are arranged numerically by mine index number. Consult Part I for a complete explanation of the data listed in the summary sheet.

Mine Index 938
Consolidation Coal Company, Wheeler Creek Mine

Type: Underground Total mined-out acreage shown: 1,605

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Shaft A	Hamilton	5S 7E	30	NW NW NW
Shaft B	Hamilton	5S 6E	25	NE NE NE
Shaft C	Hamilton	5S 6E	25	NE NE NE

GEOLOGY

Seam(s) Mined	Depth (ft)	Thickness (ft) Min	Max	Avg	Mining Method
Springfield	929			6.0	HER

Geologic Problems Reported:

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)
Inland Steel Coal Company	Inland Steel No. 2	1979-1985	4,425,560
Consolidation Coal Company	Wheeler Creek	1986-1988	1,725,270
			6,150,830

Last reported production: 1988

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
Company	12-31-1990	1:12000	1:12000	Final

Annotated Bibliography (data source, brief description of information)

Coal Reports - Production, ownership, years of operation.
Directory of Illinois Coal Mines (Hamilton County) - Mine names, mine index, ownership, years of operation.
ENR Document 85/01 - Mining method.
Mine notes (Hamilton County) - Mine type, shaft location, seam, depth, thickness.
Company map, ISGS map library, 4103.H31 i5.1-1 - Mine outline, mining method.
Company map, Coal Section files, 6-249a - Shaft locations.
Company map, Coal Section files, 6-249c - Shaft locations.

Mine Index 7131
John C. Harper, Harper Mine

Type: Surface Total mined-out acreage shown: None Production indicates approximately 4 acres were mined.

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Pits	Hamilton	5S 5E	23	NW SW SE

GEOLOGY

		Thickness (ft)			Mining
Seam(s) Mined	Depth (ft)	Min	Max	Avg	Method
Womac				1.8	Surface

Geologic Problems Reported:

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)
John C. Harper	Harper	1889-1905	10,794
			10,794

Last reported production: 1905

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
ISGS field notes (H. R. Wanless)	7-18-1932	(text only)	1:24000 *	Secondary source

* The mine location was plotted on a 1:24000 USGS topographic map from the mine location description and digitized.

Annotated Bibliography (data source, brief description of information)

Coal Reports - Production, ownership, years of operation.
Directory of Illinois Coal Mines (Hamilton County) - Mine names, mine index, ownership, years of operation.
ISGS field notes (Hamilton County) - Mine type, pit locations, seam, thickness.

Mine Index 7132
William Harper, Harper Mine

Type: Surface   Total mined-out acreage shown: None   Production indicates less than 1 acre was mined.

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Pit	Hamilton	5S 5E	26	NW NW NE

GEOLOGY

Seam(s) Mined	Depth (ft)	Thickness (ft) Min	Max	Avg	Mining Method
Womac	6			2.0	Surface

Geologic Problems Reported:

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)
William Harper	Harper	1895-1897	550
			550

Last reported production: 1897

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
ISGS field notes (H. R. Wanless)	8-27-1936	(text only)	1:24000 *	Secondary source

* The mine location was plotted on a 1:24000 USGS topographic map from the mine location description and digitized.

Annotated Bibliography (data source, brief description of information)

Coal Reports - Production, ownership, years of operation, depth, thickness.
Directory of Illinois Coal Mines (Hamilton County) - Mine names, mine index, ownership, years of operation.
ISGS field notes (Hamilton County) - Mine type, mine location.

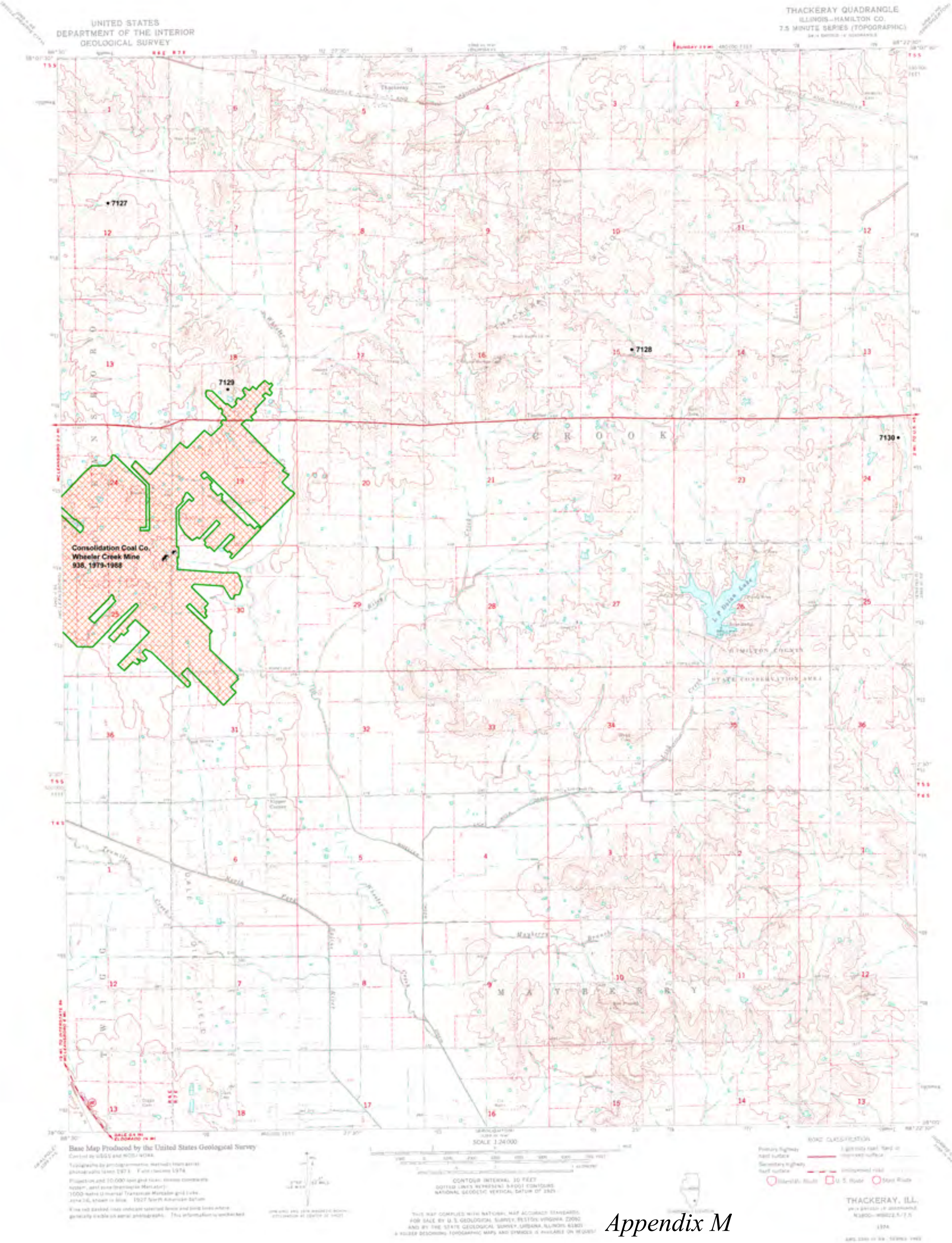
OTHER MINES SHOWN ON McLEANSBORO QUADRANGLE

Mine Index 7133 NE NW NW 25-T5S-R5E, surface mine, Womac Coal   source: ISGS field notes (H. R. Wanless, 8-13-1937)

Mine Index 7134 NE NW NW 18-T5S-R6E, surface mine, Womac Coal   source: ISGS field notes (M. W. Fuller, 7-18-1932; History of Gallatin, Saline, Hamilton, Franklin & Williamson Counties, 1887)

INDEX OF MINES IN THE McLEANSBORO QUADRANGLE

Consolidation Coal Company 9
Harper (John C.) 10
Harper (William) 11
Inland Steel Coal Company 9
Wheeler Creek Mine 9



Coal Mines in Illinois
Thackeray Quadrangle
Hamilton County, Illinois

This map accompanies the Coal Mines Directory for the Thackeray Quadrangle. Consult the directory for a complete explanation of the information shown on this map.

Mining Method
- Room & Pillar (RP)
- Room & Pillar Basic (RPB)
- Modified Room & Pillar (MRP)
- Room & Pillar Panel (RPP)
- Blind Room & Pillar (BRP)
- Checkerboard Room & Pillar (CRP)
- High Extraction Retreat (HER)
- Longwall (LW)
- Underground, Method Unknown
- Strip Mine
- Auger Mine
- General Area of Mining

Source of Mine Outline
- Final Mine Map
- Not Final Mine Map
- Undated Mine Map
- Incomplete Mine Map
- Secondary Source Map

Tipple, Shaft, Slope, Drift Locations
- Strip Mine Tipple - Active
- Strip Mine Tipple - Abandoned
- Mine Shaft - Active
- Mine Shaft - Abandoned
- Mine Slope - Active
- Mine Slope - Abandoned
- Mine Drift - Active
- Mine Drift - Abandoned
- Air Shaft
- Uncertain Location
- Uncertain Type of Opening

Mine Annotation
(space permiting)
Company
Mine Name
ISGS Index No., Years of Operation

Location

DISCLAIMER

These data were compiled and digitized from the best source maps available. Locations of some features may be offset by 500 feet of more due to errors in the original source maps, the compilation process, digitizing or a combination of these factors. Documentation of the source materials used is contained in the directory that accompanies this map. It is the user's responsibility to read this documentation and understand the limitations of the data. Though efforts have been made to compile these data accurately, the Illinois State Geological Survey does not guarantee the validity or the accuracy of these data.

The image of the U.S.G.S. Thackeray Quadrangle used as a basemap was projected from the original UTM to Lambert Conformal Conic.

Illinois State Geological Survey
615 E. Peabody Dr.
Champaign, IL 61820

Mine Outlines Compiled by
Jennifer M. Obrad

January 8, 2008

Appendix M

DIRECTORY OF COAL MINES IN ILLINOIS
7.5-MINUTE QUADRANGLE SERIES
THACKERAY QUADRANGLE
HAMILTON COUNTY

Jennifer M. Obrad

Department of Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
2008

DIRECTORY OF COAL MINES IN ILLINOIS
7.5-MINUTE QUADRANGLE SERIES
THACKERAY QUADRANGLE
HAMILTON COUNTY

2008

ILLINOIS STATE GEOLOGICAL SURVEY
William Shilts, Chief

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Phone 1-217-244-4610
Fax 1-217-333-2830

Cover photo Track-mounted duckbill loading machine at a Peabody Coal Company mine, ca. 1915.

DISCLAIMER: The accuracy and completeness of mine maps and directories vary with the availability of reliable information. Maps and other information used to compile this mine map and directory were obtained from a variety of sources and the accuracy of some of the original information cannot be verified. Consequently, the Illinois State Geological Survey (ISGS) cannot guarantee the mine maps are free of errors and disclaims any responsibility for damages that may result from actions or decisions based on them.

The ISGS updates the maps and directories periodically, and welcomes any new information or corrections. Please contact the Coal Section of the ISGS at the address shown on the title page of this directory, or telephone (217) 244-4610.

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INTRODUCTION

Coal has been mined in 76 counties of Illinois. More than 7,400 coal mines have operated since commercial mining began in Illinois about 1810; fewer than 30 are currently active. To detail the extent and location of coal mining in Illinois, the Illinois State Geological Survey (ISGS) has compiled maps and directories of known coal mines. The ISGS offers maps at a scale of 1:100,000 and accompanying directories for each county in which coal mining is known to have occurred. Maps at a scale of 1:24,000 and accompanying directories, such as this, are available for selected quadrangles. Contact the ISGS for a list of these quadrangles.

These larger scale maps show the approximate positions of mines in relation to surface features such as roads and water bodies, and indicate the mining method used and the accuracy of the mine boundaries. The maps are useful for locating mine boundaries relative to specific properties and for assessing the potential for subsidence in an area. Mine boundaries compiled from final mine surveys are generally shown within 200 feet of their true position. As a result of poor cartographic quality and inaccuracies in the original mine surveys, boundaries of some older mines may be mislocated on the map by 500 feet or more. Original mine maps should be consulted in situations that require precise delineation of mine boundaries or internal workings of mined areas.

This directory serves as a key to the accompanying mine map and provides basic information on the coal mines in the quadrangle. The directory is composed of two parts. Part I explains the symbols and patterns used on the accompanying map and the summary data presented for each mine. Part II numerically lists the mines in the quadrangle and summarizes the geology and production history of each mine. Total production for the mine, not the portion in the quadrangle, is given.

MINING IN THE THACKERAY QUADRANGLE

Mining in the Thackeray Quadrangle began in small mines that mined the Womac Coal, a thin seam of coal that was near the surface in this area. The Womac Coal lies stratigraphically above the Danville Coal in Illinois. These mines appear to have not reported any production, so very little is known about them. The only large-scale mining to have taken place in the Thackeray Quadrangle began in 1979 with the opening of the Inland Steel Coal Company No. 2 Mine (mine index 938). This mine worked the Springfield Coal seam at a depth of 929 feet. In 1986, the mine became known as the Consolidation Coal Company, Wheeler Creek Mine. This name persisted until the closing of the mine in 1988, which ended all mining in the Thackeray Quadrangle.

PART I EXPLANATION OF MAP AND MINE SUMMARY SHEET

INTERPRETING THE MAP

The map accompanying this directory shows the location of coal mines known to be present in the quadrangle. The map, corresponding to a U.S. Geological Survey (USGS) 7.5-minute quadrangle, covers an area bounded by lines of latitude and longitude 7.5-minutes apart. In Illinois, a quadrangle is approximately 6.5 miles east to west and 8.5 miles north to south, an area of about 56 square miles. The ISGS generally offers one map of mines per quadrangle. In some areas where extensive mining occurred in two or more overlapping seams, separate maps are compiled for mines in each seam to maintain readability of the map.

Mine Type and Mining Method
The mine type is indicated on the map by pattern color: green represents surface mines; red and yellow represent underground mines. The red patterns are used for areas of underground mining that are documented by a primary or secondary source map. A yellow pattern is used for cases where no map of the mine workings is available, but a general area of mining can be inferred from property maps or production figures. The patterns indicate the main mining methods used in underground mines. The methods are (1) room and pillar and (2) high extraction. The method used gives some indication of the amount and pattern of coal extraction within each mined area, and has some influence on the timing and type of subsidence that can occur over a mine.

The following discussion and illustrations of mining methods are based on Guither et al. (1984).

In room-and-pillar mines, coal is removed from haulage-ways (entries) and selected areas called rooms. Pillars of unmined coal are left between the rooms to support the roof. Depending on the size of rooms and pillars, the amount of coal removed from the production areas will range from 40% to 70%.

Room and Pillar - mining is divided into six categories:

- room-and-pillar basic (RPB, fig. 1A), an early method that did not follow a preset mining plan and therefore resulted in very irregular designs;
- modified room and pillar (MRP, fig. 1B);
- room-and-pillar panel (RPP, fig. 1C);
- blind room and pillar (BRP, fig. 1D);
- checkerboard room and pillar (CRP, fig. 1E);
- room and pillar (RP), a classification used when the specific type of room-and-pillar mining is unknown.

Blind and checkerboard are the most common types of room-and-pillar mining used in Illinois today. The knowledge of room-and-pillar mining methods gives a trained engineer information on the nature of subsidence that may occur. A more extensive discussion of subsidence can be found in Bauer et al. (1993).

High-extraction These mining methods are subdivided into high-extraction retreat (HER, Fig 1F) and longwall (LW, Fig 1G, 1H). In these methods, much of the coal is removed within well defined areas of the mine. Subsidence of the surface above these areas occurs within weeks. Once the subsidence activity ceases, the potential for further movement over these areas is low; however, subsidence may continue for several years after mining.

High-extraction retreat mining is a form of room-and-pillar mining that extracts most of the coal. Rooms and pillars are developed in the panels, and the pillars are then systematically removed (fig. 1F).

In early (pre-1960) longwall mines, mining advanced in multiple directions from a central shaft (fig. 1G). Large pillars of coal were left around the shaft, but all coal was removed beyond these pillars. Miners placed rock and wooden props and cribs in the mined-out areas to support the mine roof. The overlying rock gradually settled onto these supports, thus producing subsidence at the surface. In post-1959 longwall mines, room-and-pillar methods have been used to develop the main entries of the mine and panel areas. Modern longwall methods extract 100 percent of the coal in the panel areas (fig. 1H).

SOURCE MAPS

Mine outlines depicted on the map are, whenever possible, based on maps made from original mine surveys. The process of compiling and digitizing the quadrangle map may produce errors of less than 200 feet in the location of mine boundaries. Larger errors of 500 feet or more are possible for mines that have incomplete or inaccurate source maps.

Because of the extreme complexity of some mine maps, detailed features of mined areas have been omitted. The digitized mine boundary includes the exterior boundary of all rooms or entries that were at least 80 feet wide or protruded 500 feet from the main mining area. Unmined areas between mines are shown if they are at least 80 feet wide; unmined blocks of coal within mines are shown if they are at least 400 feet on each side. Original source maps should be consulted when precise information on mine boundaries or interior features is needed.

The mine summary sheet lists the source maps used to determine each mine outline. The completeness of map sources is indicated on the map by a line symbol at the mine boundary. Source maps are organized in five categories.

Final mine map The mine outline was digitized from an original map made from mine surveys conducted within a few months after production ceased. The date of the map and the last reported production are listed on the summary sheet.

Not a final map The mine is currently active or the mine outline was made from a map based on mine surveys conducted more than few months before production ceased. This implies the actual mined-out area is probably larger than the outline on the map. The mine summary sheet indicated the dates of source maps and the last reported production, as well as the approximate tonnage mined between these two dates (if the mine is abandoned). The summary sheet also lists the approximate acreage mined since the date of the map and, in some cases, indicates the area where additional mining may have taken place. This latter information is determined by locating on the map the active faces relative to probable boundaries of the mine property.

Undated map The source map was undated, so it may or may not be based on a final mine survey. When sufficient data are available, the probable acreage of the mined area is estimated from reported production, average seam thickness and a recovery rate comparable to other mines in the area. This information is listed in the summary sheet for the mine.

Incomplete map The source map did not show the entire mine. The summary sheet indicates the missing part of the mine map and the acreage of the unmapped area, which is estimated from the amount of coal known to have been produced from the mine.

Secondary source map The original mine map was not found so the outline shown was determined from secondary sources (e.g., outlines from small-scale regional maps published in other reports). The summary sheet describes the secondary sources.

POINTS AND LABELS

The locations of all known mine openings (shafts, slopes, and drifts) and surface mine tipples are plotted on the map. Tipples are areas where coal was cleaned, stockpiled, and loaded for shipping.

Only openings or tipples are plotted for mines without source maps. If the precise locations of these features are unknown, a special symbol is used to indicate the approximate location of the mine.

Each mine on the map is labeled with the names of the mine and operating company, ISGS mine index number, and years of operation (if known) if space permits. A seam designation is given on maps where more than one seam was mined. For a mine that operated under more than one name, only the most recent name is generally given. When a mine changed names or ownership shortly before closing, an earlier name is listed. All company and mine names are listed on the mine summary sheet in the directory, under the production history segment.

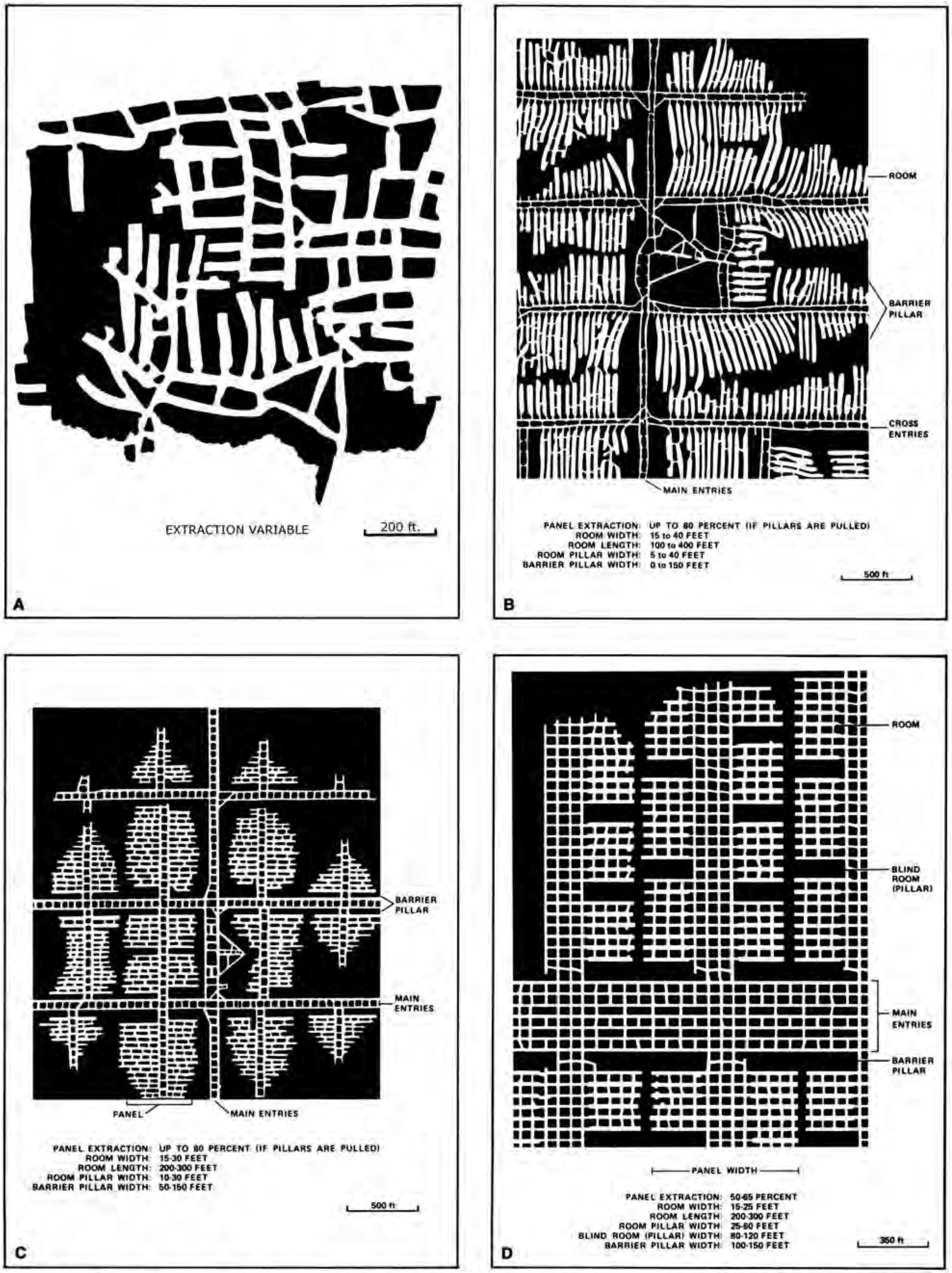

Figure 1 Mining methods: (A) room-and-pillar basic (RPB), (B) modified room and pillar (MRP), (C) room-and-pillar panel (RPP), (D) blind room and pillar (BRP).

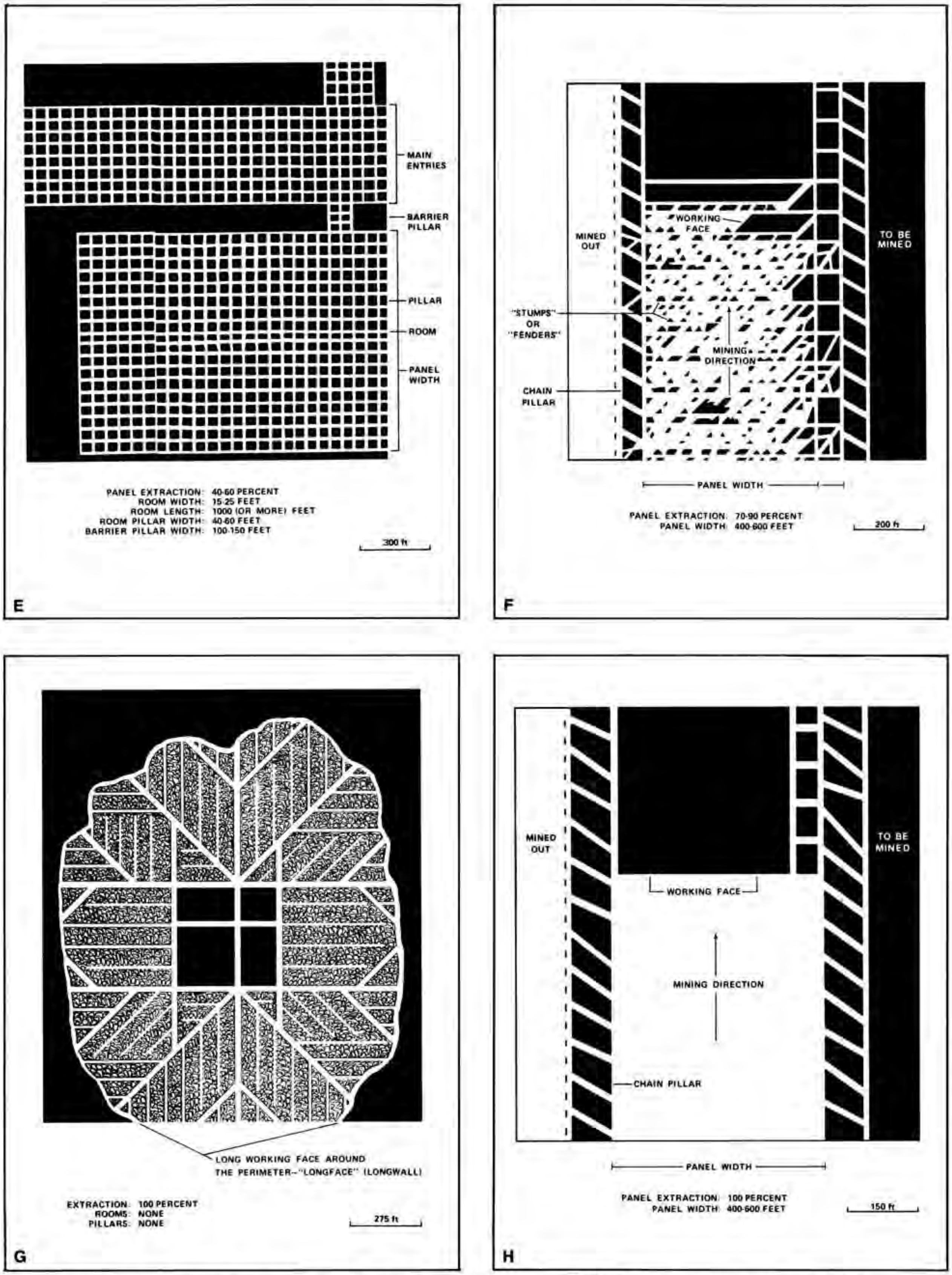

Figure 1 *(cont.)* Mining methods: (E) checkerboard room and pillar (CRP), (F) high extraction retreat (HER), (G) early (pre-1960) longwall, (H) post-1959 longwall

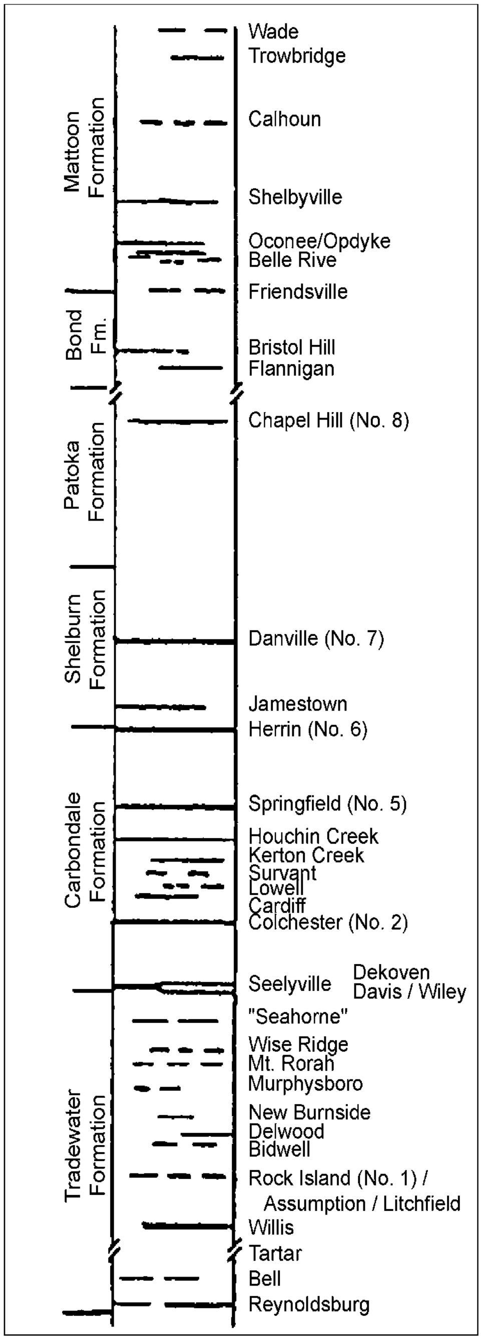

Figure 2 Generalized stratigraphic section, showing approximate vertical relations of coals in Illinois.

INTERPRETING A MINE SUMMARY SHEET

The mine summary sheet is arranged numerically by mine index number. Index numbers are shown on the map and in the mine listing. The mine summary sheet provides the following information (if available).

Company and mine name The last company or owner of the mine is used, unless no production was recorded for the last owner. In that case, the penultimate owner is listed. Mines often have no specific name; in these cases, the company name is also used as the mine name.

Type *Underground* denotes a subsurface mine in which the coal was reached through a shaft, slope, or a drift entry. *Surface* denotes a surface, open pit or strip mine.

Total mined-out acreage shown The total acreage of the mined area mapped, including any acreage mined on adjacent quadrangles, is calculated from the digitized outline of the mine. The acreage of large barrier pillars depicted on the map is excluded from the mined-out acreage. Small pillars not digitized are included in the acreage calculation. If the mine outline is not based on a final mine map, the acreage is followed by an estimate of additional acres that may have been mined. The estimate is determined from reported mine production, approximate thickness of the coal, and recovery rates calculated from nearby mines that used similar mining methods.

SHAFT, SLOPE, DRIFT OR TIPPLE LOCATIONS

Shaft, slope, drift, or tipple locations Locations of all known former entry points to underground mines or the location of coal cleaning, tipple, and shipping equipment used by the mine's facility are listed. The location is described in terms of county, township and range (Twp-Rge), section, and location within the section by quarters. NE SW NW, for instance, would describe the location in the northeast quarter of the southwest quarter of the northwest quarter. When sections are irregular in size, the quarters remain the same size and are oriented (or "registered") from the southeast corner of the section. Approximate footage from the section lines (FEL = from east line, FNL = from north line, for example) is given when that information is known; this indicates a surveyed location and is not derived from maps. Entry points are also plotted on the map and coded for the type of entry or tipple. A mine opening may have had many purposes during the life of the mine. Old hoist shafts are often later used for air and escape shafts; this information is included in the directory when known. The tipple for underground mines was generally located near the main shaft or slope. At surface mines, coal was sometimes hauled to a central tipple several miles from the mine pit.

GEOLOGY

Seam(s) mined The name of the coal seam(s) mined is listed, if known. If multiple seams were mined, they are all listed, although the mined-out area for each seam may be shown on separate maps. Figure 2 shows the stratigraphic section of the coal-bearing interval in Illinois, and the vertical relations among the coals.

Depth The depth to the top of the seam in the vicinity of the shaft is listed, if known. The depth is determined from notes made by geologists who visited the mine during its operation or from drill hole data in ISGS files. Depth generally varies little over the extent of a mine; however, reported depths for an individual mine may vary. Depth for surface-mined coals varies, and is usually represented as a range.

Thickness The approximate thickness of the mined seam is shown, if known. Thickness also comes from notes of geologists who visited the mine during its operation or from borehole data in ISGS files. Minimum, maximum, and average thicknesses are given when this information is available.

Mining method The principal mining method used at the mine (figs. 1A-H) is listed. See the mining methods section at the beginning of this directory for a discussion of this parameter.

Geologic problems reported Any known geologic problems, such as faults, water seepage, floor heaving, and unstable roof, encountered in the mine are reported. This information is from notes made by ISGS geologists who visited the mine, or from reports by mine inspectors published by the Illinois Department of Mines and Minerals, or from the source map(s). Geologic problems are not reported for active mines.

PRODUCTION HISTORY

Production history Tons of coal produced from the mine by each mine owner are totaled. When the source map used for the mine outline is not a final mine map, the tonnage produced since the date of the map is identified. For mines that extend into adjacent quadrangles, the tonnage reported includes areas mined in adjacent quadrangles.

SOURCE OF DATA

Source map This section lists information about the map(s) used to compile the mine outline and the locations of tipples and mine openings. In some cases more than one source map was used. For example, a map drawn before the mine closed may provide better information on original areas of the mine than a later map. When more than one map was used, the bibliography section explains what information was taken from each source.

Date The date of the most recent mine survey listed on the source map is reported.

Original scale The original scale of the source map is listed. Many maps are photo-reductions and are no longer at their original scale. The original scale gives some indication of the level of detail of the mine outline and the accuracy of the mine boundary relative to surface features. Generally, the larger the scale, the greater the accuracy and detail of the mine map. Mine outlines taken from source maps at scales smaller than 1:24,000 may be highly generalized and may well be inaccurately located with respect to surface features.

Digitized scale The scale of the digitized map is reported. The scale may be different from that of the original source map. In many cases the digitized map was made from a photo-reduction of the original source map, or the source map was not in a condition suitable for digitizing and the mine boundaries were transferred to another base map.

Map type Source maps are classified into five categories to indicate the probable completeness of the map. See discussion of source maps in the previous section.

Annotated bibliography Sources that provide information about the mine are listed, with the data taken from each source. Some commonly used sources are described below. Full bibliographic references are given for all other sources. Unless otherwise noted, all sources are available for public inspection at the ISGS.

Coal Reports Published since 1881, these reports contain tabular data on mine ownership, production, employment, and accidents. Some volumes include short descriptions made by mine inspectors of physical features and conditions in selected mines.

Directory of Illinois Coal Mines This source is a compilation of basic data about Illinois coal mines, originally gathered by ISGS staff in the early 1950s. Sources used for this directory are undocumented, but they are primarily Illinois Department of Mines and Minerals annual reports, ISGS mine notes, and coal company officials.

ENR Document 85/01, Guither, H. D., J. K. Hines, and R. A. Bauer, 1985 The Economic Effect of Underground Mining Upon Land Used for Illinois Agriculture: Illinois Department of Energy and Natural Resources Document 85/01, 185 p.

Microfilm map The U.S. Bureau of Mines maintains a microfilm archive of mine maps. A microfilm file for Illinois is available for public viewing at the ISGS.

Mine notes ISGS geologists have visited mines or contacted mine officials throughout the state since the early 1900s. Notes made during these visits range from brief descriptions of the mine location to long narratives (including sketches) of mining conditions and geology.

Federal Land Bank of St. Louis, Preliminary Reports on Subsidence Investigations Mining engineers working for the Federal Land Bank of St. Louis mapped areas of subsidence due to coal mining in the early 1930s. These reports often include county maps of mine properties with mined-out areas including shaft locations, as well as subsidence areas.

REFERENCES

Bauer, R. A., B. A. Trent, and P. B. Dumontelle, 1993, Mine Subsidence in Illinois: Facts for the Homeowner Considering Insurance, Illinois State Geological Survey, Environmental Geology Note 144, 16p.

Guither, H. D., J. K. Hines, and R. A. Bauer, 1985, The Economic Effects of Underground Mining Upon Land Used for Illinois Agriculture, Illinois Department of Energy and Natural Resources Document 85/01, 185p.

PART II DIRECTORY OF MINES IN THE THACKERAY QUADRANGLE

MINE SUMMARY SHEETS

A summary sheet on the geology and production history of each mine in the Thackeray Quadrangle is provided. These summary sheets are arranged numerically by mine index number. Consult Part I for a complete explanation of the data listed in the summary sheet.

Mine Index 938
Consolidation Coal Company, Wheeler Creek Mine

Type: Underground Total mined-out acreage shown: 1,605

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Shaft A	Hamilton	5S 7E	30	NW NW NW
Shaft B	Hamilton	5S 6E	25	NE NE NE
Shaft C	Hamilton	5S 6E	25	NE NE NE

GEOLOGY

Seam(s) Mined	Depth (ft)	Thickness (ft) Min	Max	Avg	Mining Method
Springfield	929			6.0	HER

Geologic Problems Reported:

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)
Inland Steel Coal Company	Inland Steel No. 2	1979-1985	4,425,560
Consolidation Coal Company	Wheeler Creek	1986-1988	1,725,270
			6,150,830

Last reported production: 1988

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
Company	12-31-1990	1:12000	1:12000	Final

Annotated Bibliography (data source, brief description of information)

Coal Reports - Production, ownership, years of operation.
Directory of Illinois Coal Mines (Hamilton County) - Mine names, mine index, ownership, years of operation.
ENR Document 85/01 - Mining method.
Mine notes (Hamilton County) - Mine type, shaft location, seam, depth, thickness.
Company map, ISGS map library, 4103.H31 i5.1-1 - Mine outline, mining method.
Company map, Coal Section files, 6-249a - Shaft locations.
Company map, Coal Section files, 6-249c - Shaft locations.

OTHER MINES SHOWN ON THACKERAY QUADRANGLE

Mine Index 7127 SW NW NE 12-T5S-R6E, Womac Coal   source: ISGS field notes (J. L. Lester, 8-9-1938)
Mine Index 7128 SE SW NE 15-T5S-R7E, slope, Womac Coal   source: ISGS field notes (H. R. Wanless, 8-8-1938)
Mine Index 7129 SE NE SW 18-T5S-R7E, surface mine, Womac Coal   source: ISGS field notes (H. R. Wanless, 8-26-1936 and M. W. Fuller, 8-2-1938)
Mine Index 7130 SW NE NE 24-T5S-R7E, surface mine, Womac Coal   source: ISGS field notes (J. L. Lester, 8-3-1938)

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Wheeler Creek Mine 9

PLAN ADOPTION RESOLUTIONS

APPENDIX N