Montgomery County Multi-Jurisdictional

Natural Hazards Mitigation Plan

Participants

Coffeen, City of
Donnellson, Village of
Farmersville, Village of
Hillsboro, City of
Hillsboro Area Hospital
Litchfield, City of
Montgomery, County of
Nokomis, City of
Panama, Village of
Raymond, Village of
Regional Office of Education #3
Schram City, Village of
St. Francis Hospital
Taylor Springs, Village of
Waggoner, Village of
Witt, City of

July 2016

The five year update of this Plan must be completed on or before September 6, 2021.

ACKNOWLEDGEMENTS

Flood mitigation in Montgomery County began because of the vision and courage of those residents involved in the planning and construction of Lake Lou Yeager in Litchfield, Lake Glenn Shoals in Hillsboro and several dams along the middle and west forks of Shoal Creek during the middle of the 20th century. These efforts protected residents and critical infrastructure from the repetitive damages caused by flooding.

Damages from severe weather and other natural hazards extend beyond the impacts caused by flooding. A comprehensive effort to broaden protection began with the completion of the first county-wide Natural Hazards Mitigation Plan in 2010.

The commitment to protect Montgomery County residents from natural hazards was demonstrated again with the completion of the Five-Year Update of this Plan. The spirit of cooperation by those Montgomery County residents who participated on the Committee to update this Plan should stand as an example to future generations about the benefits that come when concerned citizens and local governments work together for the common good.

Cover photographs were provided courtesy of the Hillsboro Journal-News, City of Hillsboro, Montgomery County EMA, Village of Nokomis, and Village of Witt.

From top to bottom and left to right:

- *August 19, 2009 thunderstorm – Hillsoboro*
- *December 27, 2015 flooding – Meisenheimer Ave. looking east, Glenn Shoals Lake, Hillsboro*
- *June 20, 2015 thunderstorm – Lipe Architecture, Nokomis*
- *December 1, 2006 winter storm – Hillsboro*
- *April 10, 2015 high wind event – Witt Tavern, Witt*

MONTGOMERY COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

MONTGOMERY COUNTY, ILLINOIS

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Researched and written for the Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee
by Andrea J. Bostwick and Greg R. Michaud
American Environmental Corporation

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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 Montgomery County. Since 1965, Montgomery County has had three federally-declared disasters. **Figure 1** identifies each declaration including the year the disaster was declared and the type of natural hazard that triggered the declaration.

Figure 1
Federal Disaster Declarations: Montgomery County

Declaration #	Year	Natural Hazard(s) Covered by Declaration
1416	2002	flooding; excessive rainfall; severe storms and tornadoes
1681	2006	severe winter storm
1800	2008	severe storms and flooding

In addition, in the past decade alone, there have been 41 thunderstorms with damaging winds, 30 severe storms with hail 1 inch in diameter or greater, 19 extreme heat events, 18 severe winter storms, 10 tornadoes, 9 recorded flash flood events, 3 recorded lightning strike events, 3 droughts, 2 recorded extreme cold events, and 1 earthquake felt by residents 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 natural 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 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 can help provide local government entities with the opportunity to complete mitigation projects 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 Montgomery County has updated its hazard mitigation plan since the original plan was prepared in 2010. This update that 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 an updated natural hazards mitigation plan, the Montgomery County Board Chairman signed a Statement of Intent on July 17, 2014 authorizing the update of the Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan (hereto referred to as the Plan). **Appendix A** contains a copy of the Statement of Intent. The County then invited all the local government entities within Montgomery County to participate. **Figure 2** identifies the participating jurisdictions that are represented in the Plan.

Figure 2
Participating Jurisdictions Represented in the Plan

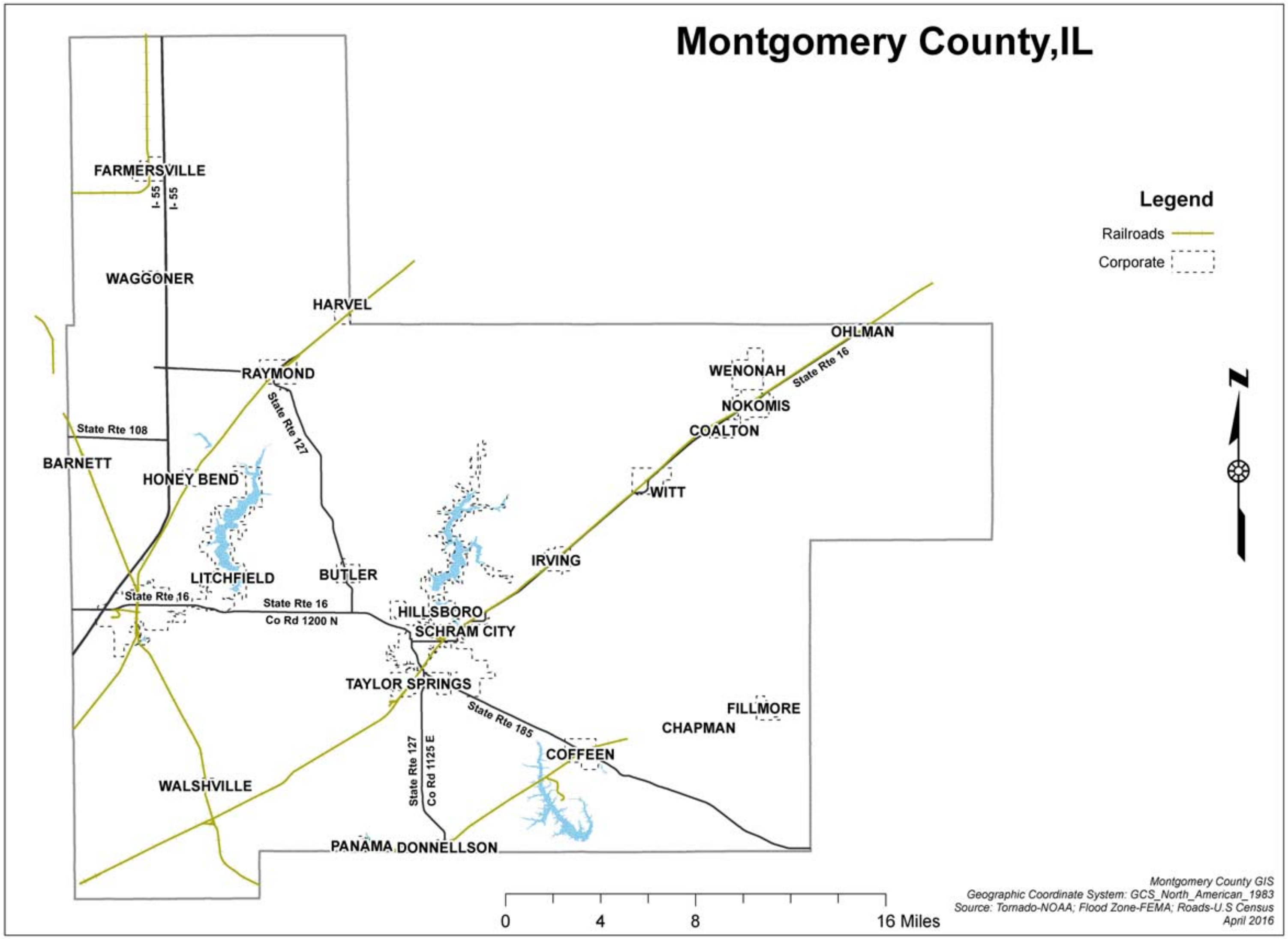
- Coffeen, City of
- Donnellson, Village of
- Farmersville, Village of
- Hillsboro, City of
- Hillsboro Area Hospital
- Litchfield, City of
- Nokomis, City of
- Panama, Village of
- Raymond, Village of
- Regional Office of Education #3
- Schram City, Village of
- St. Francis Hospital
- Taylor Springs, Village of
- Waggoner, Village of
- Witt, City of

1.2 DEMOGRAPHICS

Montgomery County is located in central Illinois and covers approximately 710 square miles. **Figure 3** provides a location map of Montgomery County and the participating municipalities. The topography is generally flat to gently sloping. The County is bounded to the north by Sangamon and Christian Counties, to the east by Shelby and Fayette Counties, to the south by Bond and Madison Counties and to the west by Macoupin County. The County seat is located in Hillsboro.

Agriculture is an important enterprise in Montgomery County. According to the 2012 Census of Agriculture, there were 1,021 farms in Montgomery County occupying approximately 84% (382,388 acres) of the total acreage in the County. The major crops include soybeans, wheat and corn while the major livestock includes pheasants, hogs and sheep. The County ranks 13th in the State for soybeans, 21st for wheat and winter wheat, and 22nd for corn. In terms of livestock, the County ranks 9th for pheasants, 10th for hogs and pigs and 18th for sheep and lambs. Montgomery County ranks in the top 20 Illinois counties for livestock cash receipts and in the top 30 for crop cash receipts.

Figure 3
Location Map



Manufacturing in the County is primarily located in Litchfield, where such items as PVC pipe, marine engine parts, steel grating, construction components, farm equipment, and athletic equipment are produced. In the southern portion of the county, a coal-fired power plant near Coffeen supplies much of the surrounding area with power. Other important industries located in the County include coal mining, healthcare, retail trade and corrections.

Figure 4 provides demographic data on the County and each of the participating municipalities 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 Montgomery County is approximately one-third of the market value.

Figure 4
Demographic Data by Participating Jurisdiction

Participating Jurisdiction	Population (2010)	Projected Population (2030)	Land Area (Sq. Miles) (2010)	Number of Housing Units (2010)	Housing Unit Density (Units/ Sq. Mile) (Rounded Up)	Total Assessed Value of Housing Units (2014)
Montgomery County (unincorporated)	7,521	8,275	676.047	3,432	6	$48,639,001
Coffeen	685	754	1.191	315	265	$4,283,870
Donnellson	210	231	0.325	106	---	$982,363
Farmersville	724	797	0.903	342	---	$7,936,042
Hillsboro	6,207	6,830	6.552	2,029	310	$45,558,654
Litchfield	6,939	7,635	6.448	3,158	490	$68,091,218
Nokomis	2,256	2,482	1.304	1,070	821	$18,299,600
Panama	343	377	0.359	177	---	$1,312,385
Raymond	1,006	1,107	1.321	457	346	$11,331,074
Schram City	586	645	0.733	295	---	$4,348,673
Taylor Springs	690	759	1.004	282	281	$4,603,074
Waggoner	266	293	0.263	115	---	$1,203,150
Witt	903	994	1.400	471	337	$5,344,398

Sources: Durston, Ray, Montgomery County Supervisor of Assessments.
Illinos Department of Commerce and Economic Opportunity, Projection Summary by County.
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. Montgomery County is largely rural with a population that experienced a decrease of 1.8% between 2000 and 2010. Since 1960, the County's population has experienced modest decreases, except between 1970 and 1980 when the population increased by 4.7%. All of the participating municipalities except Litchfield, Panama, Raymond, Taylor Springs and Waggoner experienced declines in their populations since 2000, with some experiencing sharp declines.

While there are no large-scale economic development initiatives underway in the County, the creation of the Route 66 Industrial Park in 1999 has resulted in land use changes on the west side of Litchfield. Further economic development is anticipated to occur at this industrial park as well as Dean Meier Litchfield Industrial Park because of their close proximity to I-55 which connects Litchfield and the County with the St. Louis metropolitan area to the south and Springfield and the Chicago metropolitan area to the north.

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 residential or commercial/industrial developments are expected within the next five years. Since the adoption of the original Plan, the County developed and approved its first comprehensive plan in 2012 which examined in greater detail development trends within the County.

2.0 PLANNING PROCESS

2.0 PLANNING PROCESS

The Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan (the Plan) was updated through the Montgomery 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 5** provides a brief description of the process utilized to prepare this Plan.

Figure 5
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 updated draft Plan summarized the results of Tasks One through Six. In addition, it describes the responsibilities to monitor, evaluate and update the Plan. The updated 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 updated 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 updated Plan. The final updated 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 Plan update and development was led at the staff level by Diana Holmes, the Montgomery County Emergency Management Agency Coordinator. Johnson, Depp & Quisenberry (JDQ), an environmental and engineering 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.

The JDQ staff responsible for the Plan update merged with American Environmental Corporation (AEC) in February, 2016. As a result, the Plan update was completed under AEC.

Participation in the planning process, especially by the County and local government representatives, was crucial to the update and 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 updated Plan. All of the participating jurisdictions met the participation requirements.

- Attend at least two Planning Committee meetings.
- Submit a list of documents (i.e., plans, studies, reports, maps, etc.) relevant to the natural hazard mitigation planning process.
- Identify and submit a list of critical infrastructure and facilities.
- Review the risk assessment and provide information on additional events and damages.
- Participate in the update 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 updated draft Plan.
- Formally adopt the updated Plan.
- Where applicable, incorporate the updated Plan into existing planning efforts.
- Participate in the updated Plan maintenance.

2.1 PLANNING COMMITTEE

As previously mentioned, at the start of the planning process, the Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee was formed to update the hazard mitigation plan. The Planning Committee included representatives from each participating jurisdiction, as well as civic organizations, education, emergency services (fire, law enforcement, American Red Cross), healthcare, GIS, insurance, planning and development, and utilities.

Figure 6 details the entities represented on the Planning Committee and the individuals who attended on their behalf. The Planning Committee was chaired by the Montgomery County Emergency Management Agency (EMA).

Additional technical expertise was provided by the staff at the Illinois Emergency Management Agency Hazard Mitigation Unit, the Illinois Department of Natural Resources Office of Water Resources, the Illinois Environmental Protection Agency, the Illinois State Water Survey, the Illinois State Geological Survey, and the University of Illinois.

Figure 6
(Sheet 1 of 2)
Montgomery County Planning Committee Member Attendance Record

Representing	Name	Title	5/14/2015	7/23/2015	10/22/2015	1/21/2016	4/21/2016
Ameren Illinois	Passariello, Vito	Supervisor of Business Admin & Customer Service			X		
American Red Cross	Beaver, Mark	Disaster Manager				X	
American Red Cross	Davis, Jamie	Disaster Manager				X	X
Audubon Township	Hamlin, Lester	Trustee		X			
Butler Grove Township	Fuchs-Daryl, Mary	Clerk				X	
Coffeen, City of	Cooper, Carolyn	Clerk	X	X	X	X	X
Coffeen, City of	White, Sheila	Mayor	X	X	X	X	X
Donnellson, Village of	Buckingham, David	Clerk/Treasurer	X	X			
Donnellson, Village of	Jett, Darrell	President	X				
Donnellson, Village of	Jett, Frances	Trustee			X		X
Donnellson, Village of	Reynolds, Sheryl	Water/Sewer Clerk / Clerk/Treasurer	X	X	X	X	X
Donnellson, Village of	Welzbacher, Jamie	Water Clerk			X	X	
Farmersville, Village of	Nimmo, Greg	Trustee	X				X
Farmersville, Village of	Tischkau, Joe	President	X				X
Fayette County - Emergency Management Agency	Craig, Kendra	Director					X
Fayette County - Emergency Management Agency	Depew, Kiley	Deputy Director					X
Fillmore, Village of	Beckman, Darin	Police Chief			X		
Hearts United Assoc.	Houser, Matt	Administrator	X	X			
Hillsboro, City of	Downs, Don	Commissioner				X	
Hillsboro, City of	Hewitt, Richard	Fire Department Investigator		X	X	X	X
Hillsboro, City of	Murphy, Michael	Commissioner		X	X		
Hillsboro, City of	Satterlee, Gary	Chief of Police	X	X	X	X	X
Hillsboro, City of	Sullivan, Brian	Mayor				X	
Hillsboro Area Hospital	Henson, Chris	Director of Emergency Services				X	
Hillsboro Area Hospital	Payne, Amanda	Supervisor Emergency Preparedness			X	X	X
Hillsboro Area Hospital	Sebeschak, Mandy	Respiratory Therapy Leader					X
Irving Township	Singler, Randy	Supervisor	X	X		X	
Irving Township	Speiser, Phil	Trustee	X	X			
Johnson, Depp & Quisenberry/American Environmental Corp.	Bostwick, Andrea	Environmental Specialist	X	X	X	X	X
Johnson, Depp & Quisenberry/American Environmental Corp.	Michaud, Greg	Environmental Services Manager	X	X	X		X
Latter Rain Ministries	Ferguson, Scott	Dorm Director				X	
Latter Rain Ministries	Giles, Bill	Designated Representative				X	X
Latter Rain Ministries	Schuette, Dennis	Board Member	X	X			
Litchfield, City of	Dougherty, Steve	Mayor	X	X			
Litchfield, City of	Flannery, Tonya	City Administrator/Econ. Development Dir.		X			X
Litchfield, City of	Gerl, Dwayne	Alderman					X
Litchfield, City of	Sisson, Marilyn	Alderman					X
Litchfield, City of	Waggoner, Sarah	Tourism Coordinator					X
Litchfield, Park District	Leonard, Johny	President					X
Macoupin County - Emergency Management Agency	Pitchford, Jim	Coordinator					X
Montgomery County - Board	Bergen, Bill	Member		X	X		
Montgomery County - Board	Deabenderfer, Ronald	Member	X	X	X		X
Montgomery County - Board	Gasparich, Joe	Member	X	X			X
Montgomery County - Board / Audubon Township	Graden, Chuck	Member / Trustee		X	X	X	X
Montgomery County - Board / Regional Office of Education #3	Hertel, Roy	Chairman / Designated Representative			X	X	X
Montgomery County - Board	Hopper, Tim	Member					X
Montgomery County - Board	Savage, Glenn	EMA/Ambulance Committee Chairman	X	X	X		
Montgomery County - Board / Waggoner, Village of	Webb, Mike	Member / Designated Representative	X		X	X	X
Montgomery County - Board	Young, Evan	Member	X				
Montgomery County - Clerk & Recorder	Leitheiser, Sandy	Clerk		X	X		
Montgomery County - County Coordinator	Daniels, Christine	Administrator	X	X	X	X	X
Montgomery County - Econ. Dev. Corp. / U of I Extension	Shalter, Will	Director / Program Coord., Comm. & Econ. Dev.	X	X		X	
Montgomery County - Emergency Management Agency	Holmes, Diana	Coordinator	X	X	X	X	X
Montgomery County - GIS	Younkers, Cassidy	GIS Technician			X		
Montgomery County - Highway Department	Smith, Kevin	County Engineer	X	X	X	X	X
Montgomery County - Health Department	Satterlee, Hugh	Administrator	X	X	X		X
Montgomery County - Sheriff's Office	Sanford, Bruce	Chief Deputy		X			

Figure 6
(Sheet 2 of 2)
Montgomery County Planning Committee Member Attendance Record

Representing	Name	Title	5/14/2015	7/23/2015	10/22/2015	1/21/2016	4/21/2016
Nokomis, City of	Brookshire, Tim	Commissioner		X	X		X
Nokomis, City of	Chumley, Tim	Street Superindentent	X				
Nokomis, City of	Hill, Terry	Mayor	X				
Nokomis, City of	Johnston, Kelly	Assistant Clerk		X			
Nokomis, City of	Keagy, Angela	Clerk	X		X		X
Nokomis, City of	Voyles, Jeanne	Commissioner	X		X	X	X
Panama, Village of	McCario, Joe	President	X	X	X	X	X
Panama, Village of	Hancock, Deborah	Clerk	X	X	X	X	
Panama, Village of	Knight, Leea	Board Member				X	
Pitman Township	Krager, Tony	Highway Commissioner	X		X		
Public Representative	Wheelhouse, Dolores	---		X	X	X	X
Raymond, Village of	Held, Dennis	President	X	X		X	X
Rosentreter Insurance	Rosentreter, Andrew	Agent	X	X			
Roundtree Township	Folkerts, Kenneth	Supervisor		X	X		
Schram City, Village of	Oberle, Albert	President	X	X	X		X
Schram City, Village of	Stewart, Kelvin	Trustee				X	
St. Francis Hospital	Guinn, Brian	Facility Director		X		X	X
St. Francis Hospital	Hunter, Aryn	Nurse Educator					X
Taylor Springs, Village of	Jagodzinski, Dennis	President	X				
Taylor Springs, Village of	Hamilton, Lisa	Trustee		X			
Taylor Springs, Village of	Laurent, Cindy	Clerk	X	X	X	X	X
Taylor Springs, Village of	Richardson, Nancy	Trustee		X	X	X	
Taylor Springs, Village of	Rufus, Patty	Trustee	X	X	X		X
Taylor Springs, Village of	Saathoff, Elwin	Trustee / President	X	X	X	X	X
Waggoner, Village of	Seaton, Ronald	President	X	X			X
Witt, City of	Beasley, Patsy	Alderman	X	X	X	X	X
Witt, City of	Tolle, Kathy	Alderman	X	X	X	X	X

Mission Statement

Over the course of the first two meetings, the Planning Committee members reviewed and discussed the mission statement set forth in the original Plan. The Committee determined that the mission statement still accurately reflected its objectives for the updated Plan and approved it with no changes.

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

Planning Committee Meetings

The Planning Committee met five times between May, 2015 and April, 2016. **Figure 6** identifies the representatives present at each meeting. **Appendices B** and **C** contain copies of the attendance sheets and meeting minutes for each meeting. The purpose of each meeting, including the topics discussed, is provided below.

First Planning Committee Meeting – May 14, 2015

The purpose of this meeting was to explain the planning process to the Planning Committee members and give them a brief overview on what a natural hazards mitigation plan is and why it needs to be updated. Copies of the original mission statement and mitigation goals were presented for review and discussion. Representatives for the County and the participating jurisdictions were asked to complete and/or update the forms entitled "List of Existing Planning

Documents", "Critical Facilities" and "Severe Weather Shelters" and return them at the next meeting. Copies of a hazard events questionnaire and citizen questionnaire were also distributed.

Second Planning Committee Meeting – July 23, 2015

At the second Planning Committee meeting the updated natural hazard risk assessment sections were presented for review. Committee members were asked to think about whether any critical facilities have been damaged by a natural hazard event within their jurisdiction since the original Plan was prepared. The Planning Committee continued their review and discussions on the mission statement and mitigation goals and finalized both.

Committee members were asked to identify any mitigation projects that their jurisdictions had started and/or completed since adopting the original Plan in 2010. Ideas for potential mitigation projects/activities were presented. Representatives for the County and the participating jurisdictions were asked to complete the forms entitled "Critical Facilities Damaged by Natural Hazard Events", "Existing Mitigation Project/Activity Status", and "New Hazard Mitigation Projects" and return them at the next meeting. All representatives were asked to complete a compensation questionnaire for us in administering the grant.

Third Planning Committee Meeting – October 22, 2015

The purpose of the third Planning Committee meeting was to review the new mitigation actions identified by the participating jurisdictions and review/discuss the mitigation strategy. The mitigation strategy discussion focused on the original project prioritization methodology and categories of mitigation actions. The Committee determined that the project prioritization methodology still accurately reflected its priorities for the updated Plan and approved it with no changes. The portion of the vulnerability assessment for tornadoes was presented for review.

Fourth Planning Committee Meeting – January 21, 2016

At the fourth meeting the sections of the Plan focusing on the mitigation strategy, plan maintenance and adoption were presented for review. In addition, the new/updated mitigation action tables and existing mitigation action tables for each participating jurisdiction were distributed for review. The tables listed all of the mitigations actions identified and prioritized them using the approved project prioritization methodology. The portion of the vulnerability assessment for floods was presented for review.

Fifth Planning Committee Meeting – April 21, 2016

The purpose of the fifth Planning Committee meeting was to provide the public an opportunity to provide comments on the draft updated Plan.

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 updated Plan's development; and
- nurture ownership of the updated 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 updated 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

The citizen questionnaire was updated to again help gather facts and gauge public perceptions about natural hazards. The questionnaire was made available at the offices of participating jurisdictions. A copy of the questionnaire is contained in **Appendix D**.

A total of 34 questionnaires were completed and returned to the Planning Committee. The questionnaires were filled out by residents of unincorporated Montgomery County as well as all of the participating municipalities. These responses provide useful information to decision makers as they deliberate how best to disseminate information about natural hazards and how residents can protect themselves and their property.

Additionally, these results provide an indication as to the types of projects that are most likely to receive public support. A review of the questionnaires revealed the following:

- Severe storms (thunderstorms, hail, lightning and heavy rain), severe winter storms and extreme heat have been the most frequently encountered natural hazards in Montgomery County. This response is consistent with the weather records compiled for the County and as described in this updated Plan.
- Electronic and print media (radio, internet, newspapers and television) were identified as the most effective means of disseminating information about natural hazards. Mailings and materials distributed via municipal/county governments, the public health department, and fire and law enforcement departments also received strong support among respondents.
- Four (4) categories of mitigation projects and activities were felt to be most needed. The following identifies each category and provides the percentage of support received:
  - maintain power during storms by burying power lines, trimming trees and/or purchasing backup generators (77.4%);
  - provide flood or drainage protection (74.2%) – the respondents who selected this category felt that culvert and drainage ditch maintenance was the most needed activity followed by hydraulic studies to determine drainage problems;

- retrofit critical infrastructure (public water supplies, schools, sewage treatment facilities, bridges, hospitals and other important services) to reduce potential damages (67.7%); and
- maintain roadway passages during snow storms and heavy rains (61.3%).

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

Press Releases
Press releases were prepared and submitted to local print 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 updated Plan's development. **Appendix F** contains a list of the print media outlets that received the press releases while copies of the releases and news articles published can be found in **Appendix G**. A copy of the press release for the July 23, 2015 meeting was unavailable, however it was issued and appeared in both the Hillsboro and Litchfield newspapers.

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
The final meeting of the Planning Committee, held on April 21, 2016, was conducted as an open-house public forum. The open-house format was chosen for this forum instead of a hearing to provide greater convenience for residents who wished to participate. Residents were able to come and go at any time during the forum, reducing conflicts with business, family, and social obligations.

At the forum, residents could review a draft of the updated Plan; meet with representatives from the County, the participating jurisdictions and the Consultant; ask any questions; and provide comments on the draft updated Plan. Individuals attending the public forum were provided with a two-page handout summarizing the planning process and a comment sheet that could be used to provide feedback on the draft updated Plan. **Appendices H** and **I** contain copies of these materials.

Public Comment Period
After the public forum, the draft updated Plan was made available for public review and comment through May 6, 2016 at the Montgomery County EMA Office. Residents were encouraged to submit their comments electronically, by mail or through representatives of the Planning Committee.

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 severe storms, severe winter storms and tornadoes not available from state and federal databases.
- *Obtained critical facilities damage information.* Data collection surveys soliciting information about critical facilities damaged by severe storms and other natural hazards were used to supplement information obtained from government databases. This information was vital to the preparation of the vulnerability assessment.
- *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 ***115 new potential mitigation projects and activities*** at the local level that had not been previously identified in the original Plan or any other planning process. In addition, five municipalities (Donnellson, Panama, Schram City, Taylor Springs and Waggoner), the Regional Office of Education, Hillsboro Area Hospital and St. Francis Hospital all chose to participate in the Plan update.

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 reach anyone who might have an interest or possess information which could be helpful in updating the Plan.

Business Community

Representatives from those segments of the business community who had the most interest in natural hazard mitigation were invited to serve on the Planning Committee. . Input was sought from the insurance industry to provide balance and context for discussions on property damages, not only to agriculture, but also to residences. An experienced and well respected local insurance agent represented the insurance industry and his perspectives on storm damages were useful in the development of the Plan.

Not-For-Profit & Other Organizations

The American Red Cross, Hillsboro Area Hospital and St. Francis Hospital (Litchfield) all served on the Planning Committee. The Director of Emergency Services and the Supervisor of Emergency Preparedness from Hillsboro Area Hospital and the Facility Director from St. Francis Hospital participated and identified mitigation projects for inclusion in the updated Plan.

Representatives from Latter Rain Ministries also served on the Committee. Latter Rain Ministries owns a complex in Litchfield that has been designated as an emergency shelter by the County in the event a natural hazard event displaces multiple individuals.

The University of Illinois Extension Program Coordinator for Community and Economic Development and Director of the Montgomery County Economic Development Corp., a not-for-profit organization dedicated to promoting the development opportunities available in its member communities and helping businesses thrive and expand within the County, also served on the Planning Committee.

Neighboring Counties

An announcement was sent to EMA/ESDA offices in neighboring counties inviting them to participate in the mitigation planning process. **Appendix J** contains a copy of the invitation memo.

2.4 INCORPORATING EXISTING PLANNING DOCUMENTS

As part of the planning process, each participating jurisdiction was asked to identify and provide existing documents (plans, studies, reports and technical information) relevant to the updated Plan. **Figure 7** summarizes the availability of existing planning documents by participating jurisdiction. These documents were reviewed and incorporated into the Plan whenever applicable.

Figure 7
Existing Planning Documents by Participating Jurisdiction

Existing Planning Documents	Participating Jurisdiction												
	Montgomery County	Coffeen	Donnellson	Farmersville	Hillsboro	Litchfield	Nokomis	Panama	Raymond	Schram City	Taylor Springs	Waggoner	Witt
Plans													
Comprehensive Plan	X					X							
Emergency Management Plan	X				X	X	X		X				
Land Use Plan	*												
Codes & Ordinances													
Building Codes					X	X	X				X		
Drainage Ordinances						X					X		
Historic Preservation Ordinance													
Subdivision Ordinance(s)	X	X		X	X	X			X		X		
Zoning Ordinances				X	X	X			X	X			
Maps													
Existing Land Use Map	X					X			X				
Infrastructure Map	X			X	X	X	X	X	X	X	X		X
Zoning Map				X	X	X				X	X		
Flood-Related													
Flood Ordinance(s)	X				X	X	X						X
Flood Insurance Rate Maps	X				X	X	X						
Repetitive Flood Loss List													
Elevation Certificates for Buildings													

* While Montgomery County does not have a separate Land Use Plan, the Comprehensive Plan does include a discussion of the land uses within the County.

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3.0 RISK ASSESSMENT

3.0 RISK ASSESSMENT

Risk assessment is the process of evaluating the vulnerability of people, buildings and infrastructure to natural hazards 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 that pose a threat to Montgomery County. The information contained in this section was gathered by evaluating local, state and federal records from the last 60 years.

This risk assessment identifies the natural hazards that pose a threat to the County and includes a profile of each which identifies past occurrences, the severity or extent of the hazard, and the likelihood of future occurrences. It also provides a vulnerability assessment 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 the buildings, critical facilities and infrastructure located within the County. Where applicable, the differences in vulnerability between participating jurisdictions are described.

One of the responsibilities of the Planning Committee was to decide if additional natural hazards should be included in the updated Plan. Therefore, over the course of the first two meetings, the Planning Committee members discussed their experiences with natural hazard events and reviewed information about various natural hazards. After discussing their options, the Committee chose not to add any additional natural hazards to those included in the original Plan. The following identifies the natural hazards included in this updated Plan:

- ❖ severe storms (thunderstorms, hail, lighting & heavy rain)
- ❖ severe winter storms (snow, ice & extreme cold)
- ❖ extreme heat
- ❖ tornadoes
- ❖ floods
- ❖ drought
- ❖ earthquakes
- ❖ dams

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, starting with severe storms (thunderstorms, hail, lightning and heavy rain). Each natural hazard section contains three subsections: identifying the hazard, profiling the hazard and assessing vulnerability.

While problems related to land subsidence and sinkholes have occurred in counties west and south of Montgomery County, neither of these hazards has been reported to the Montgomery County Emergency Management Agency. In addition, discussions with the Planning Committee did not reveal any isolated problems not reported to county officials. Interstate 55 south of Farmersville shows evidence of land subsidence in the undulating pavement surface. This "ripple effect" in the pavement does not pose a safety problem for travelers nor have these undulations shown any movement or changes.

Sinkholes commonly occur in areas where carbonate rock formations characteristic of karst geology are present. Mapping prepared by the Illinois State Geological Survey show that these geologic characteristics are not present in Montgomery County. Sinkholes can also occur in areas where coal mining has been conducted. Although coal mining has and still does occur in Montgomery County, problems with sinkholes have not been reported.

The relatively flat topography of Montgomery County is not conducive to experiencing landslide problems. The closest areas to Montgomery County where landslide problems have been identified are along steeper sloped river valleys to the west. Montgomery County has no major river valleys, only minor streams.

3.1 SEVERE STORMS (THUNDERSTORMS, HAIL, LIGHTNING & HEAVY RAIN)

IDENTIFYING THE HAZARD

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 excessive rainfall 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 they are both 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 8** shows conversions from knots to miles per hour for various wind speeds.

Figure 8
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 it would encounter more supercooled water and continue to grow. Eventually the hail becomes too heavy to be supported by the updraft and 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 9** provides descriptions for various hail sizes.

Figure 9
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 10** 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 10 TORRO Hailstorm Intensity Scale					
Intensity Category		**Typical Hail Diameter**		**Description**	**Typical Damage Impacts**
		millimeters (approx.)*	**inches (approx.)***		
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 300 injuries annually in the United States. Most fatalities and injuries occur when people are caught outdoors in the summer months. 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 St. Louis, Missouri is responsible for issuing ***severe thunderstorm watches*** and ***warnings*** for Montgomery 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 conditions are favorable for a severe thunderstorm to develop. The watch will tell individuals when and where a severe thunderstorm is likely to occur.
- **Warning.** A severe thunderstorm warning is issued when severe weather (i.e., hail 1 inch in diameter or greater and/or damaging winds of 58 miles or greater) has been reported by spotters or indicated on radar. Warnings indicate imminent danger to life and property for those who are in the path of the storm.

PROFILING THE HAZARD

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

Figures 11, **12**, **13**, and **14**, located at the end of this section, summarize the previous occurrences as well as the extent or magnitude of severe storm events recorded in Montgomery County. The severe storm events are separated into four categories: thunderstorms with damaging winds, hail, lightning and heavy rain. Severe storms are the most frequently occurring natural hazard in Montgomery County.

Severe Storms Fast Facts – Occurrences

Number of Thunderstorms with Damaging Winds (1956 – 2014): ***114***

Number of Severe Hail Events (1968 – 2014): ***56***

Number of Lightning Strike Events (1996 – 2014): ***5***

Number of Heavy Rain Events (2003 – 2014): ***2***

Highest Recorded Wind Speed: ***70 knots (May 30, 2004 & May 31, 2013)***

Largest Hail Recorded: ***4.50 inches (May 28, 2011)***

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

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

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

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

Thunderstorms with Damaging Winds

NOAA's Storm Events Database and Planning Committee member records were used to document 114 reported occurrences of thunderstorms with damaging winds in Montgomery County between 1956 and 2014. Of the 114 occurrences, 75 had reported wind speeds of 50 knots or greater. There were 39 occurrences, however, where the wind speed was not recorded.

The highest wind speed recorded in Montgomery County occurred in Litchfield on May 30, 2004 and again near Farmersville on May 31, 2013 when winds reached 70 knots (81 mph) during a thunderstorm event. Thunderstorms with damaging winds have been *recorded* in every participating municipality within the County on multiple occasions, with exception of Panama. This does not indicate that thunderstorms with damaging winds have never occurred within Panama, it simply means that the events were not recorded.

Figure 15 charts the reported occurrences of thunderstorms with damaging winds in Montgomery County by month. Of the 114 events, 69 (61%) took place in May, June and July making this the peak period for thunderstorms with damaging winds in Montgomery County. Of those 69 events, 29 (42%) occurred during May, making this the peak month for thunderstorms with damaging winds.

Figure 15
Thunderstorms with Damaging Winds by Month
1956 – 2014

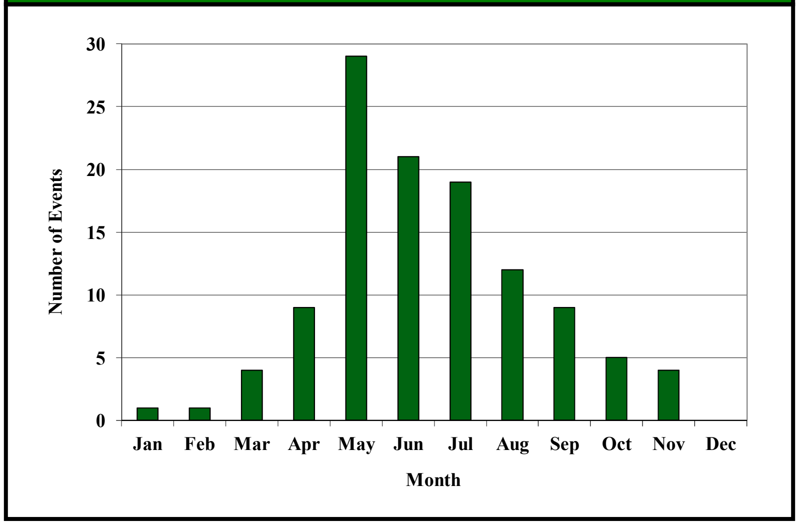
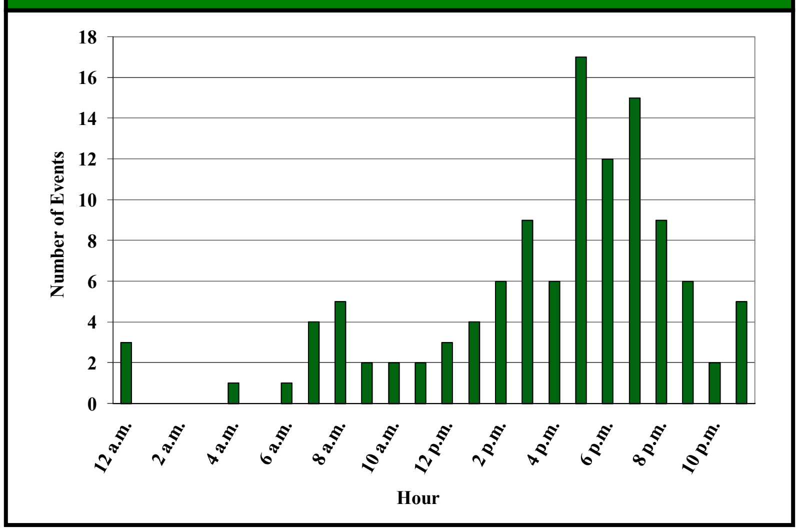


Figure 16 charts the reported occurrences of thunderstorms with damaging winds by hour. Approximately 82% of all thunderstorms with damaging winds occurred during the p.m. hours, with 68 of the events (72%) taking place between 3 p.m. and 9 p.m.

Figure 16
Thunderstorms with Damaging Winds by Hour
1956 – 2014



Hail

NOAA's Storm Events Database and Planning Committee member records were used to document 56 reported occurrences of severe storms with hail one (1) inch in diameter or greater in Montgomery County between 1968 and 2014. Of the 56 occurrences, 26 produced hailstones 1.50 inches or larger in diameter.

The largest hail documented in Montgomery County measured 4.50 inches in diameter (slightly softball-sized) and fell on May 28, 2011 at Irving and Lake Lou Yaeger. Hail one (1) inch in diameter or greater has been *recorded* at least once in every participating municipality, with the exception of Panama, Schram City, Waggoner and Witt. This does not indicate that hail of this diameter has never fallen within these communities, it simply means that it has not been recorded.

Figure 17 charts the reported occurrences of hail by month. Of the 56 occurrences, 35 (63%) took place in April, May and June making this the peak period for hail in Montgomery County. Of the 35 events, 23 (66%) occurred during May, making this the peak month for hail events.

Figure 17
Hail Events by Month
1968 – 2014

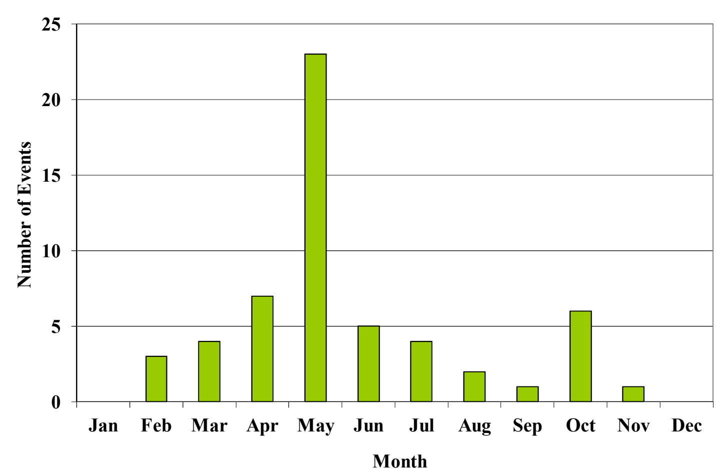
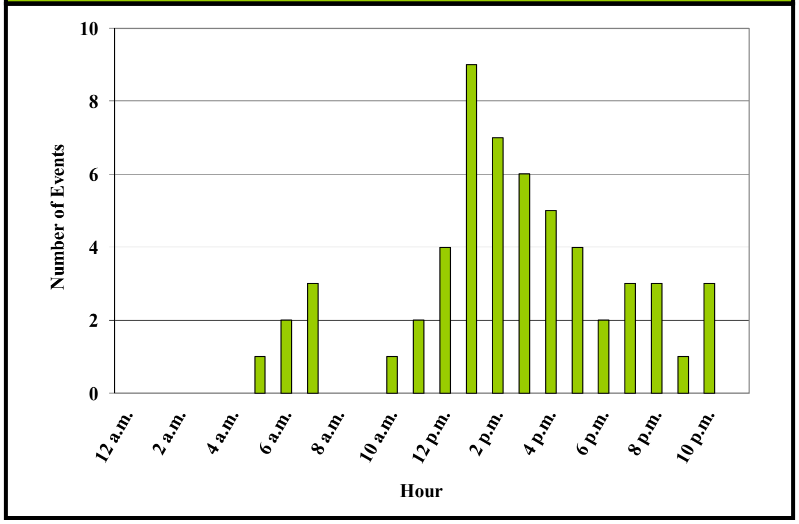


Figure 18 charts the reported occurrences of hail by hour. Approximately 84% of all the hail events occurred during the p.m. hours, with 35 of the events (63%) taking place between 12 p.m. and 6 p.m.

Lightning

While lightning strike events occur regularly across central Illinois, NOAA's Storm Events Database has only five *recorded* occurrences of lightning strikes in Montgomery County between 1996 and 2014. This is almost certainly due to the rural nature of the County. Each of the five events took place in a different month from January through August. All of the events with recorded times occurred during the p.m. hours.

Figure 18
Hail Events by Hour
1968 – 2014



Heavy Rain

While heavy rain events occur on a fairly regular basis across central Illinois, NOAA's Storm Events Database has only two *recorded* occurrences of heavy rain in Montgomery County between 2003 and 2014. This may be due in part to a lack of uniform reporting guidelines for heavy rain events. One of the events occurred in November and other occurred in January. Both events started in the a.m. hours and caused widespread flooding and property damage.

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 *2013 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency (IEMA) classifies Montgomery County's hazard rating for severe storms as "severe." (IEMA's hazard rating system has five levels: low, guarded, elevated, high and severe.)

This tree along School Street in Nokomis was uprooted during a thunderstorm accompanied by high winds

Photograph provided by Angela Keagy, Nokomis City Clerk

What is the probability of future severe storm events occurring?

Thunderstorms with Damaging Winds

Montgomery County has had 114 verified occurrences of thunderstorms with damaging winds between 1956 and 2014. With 114 occurrences over the past 59 years, Montgomery County should expect to experience approximately two thunderstorms with damaging winds each year. There were 16 years over the last 59 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 27%.

Hail

There have been 56 verified occurrences of hail one (1) inch in diameter or greater between 1968 and 2014. With 56 occurrences over the past 47 years, Montgomery County should expect to experience at least one severe hail event each year. There were eight years over the last 47 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 17%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to severe storms?

Yes. All of Montgomery 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 northwestern Illinois. Since 2005, Montgomery County has recorded 41 thunderstorms with damaging winds, 30 severe storms with hail one (1) inch in diameter or greater, three lightning strikes, and one heavy rain event producing at least 1.50 inches of rain.

Figure 19 details the number thunderstorms with damaging winds and hail events that were recorded in or near each participating municipality. Of the five lightning strikes recorded, four occurred in Hillsboro while the remaining event occurred near Waggoner.

Figure 19
Verified Severe Storm Events by Participating Municipality

Participating Municipality	Number of Events	
	Thunderstorm & High Wind	Severe Hail
Coffeen	6	3
Donnellson	3	2
Farmersville	9	1
Hillsboro	19	6
Litchfield	27	22
Nokomis	14	6
Panama	0*	0†
Raymond	13	2
Schram City	1	0†
Taylor Springs	4	2
Waggoner	4	0†
Witt	5	0†

Figure 20
Verified Severe Storm Events in Unincorporated Montgomery County

Participating Municipality	Number of Events	
	Thunderstorm & High Wind	Severe Hail
Chapman	0	1
Honey Bend	2	1
Lake Lou Yaeger	0	2
Van Burensburg	0	1

* While no verified thunderstorms with damaging winds were recorded for Panama, there have been multiple verified events in the area that almost certainly impacted the Village.

† While no verified occurrences of hail one inch in diameter or greater were recorded for Panama, Schram City, Waggoner or Witt, there have been multiple verified events in the area that almost certainly impacted these municipalities.

Of the participating municipalities, Litchfield, Hillsboro and Nokomis have 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 municipalities in addition to the fact that the only active COOP observer for the NWS in Montgomery County is located in Hillsboro.

Figure 20 details the number of thunderstorms with damaging winds and hail events that were recorded in or near unincorporated areas of Montgomery County. No data was available on lightning strikes in the unincorporated areas.

What impacts resulted from the recorded severe storms?

Severe storms as a whole have caused an estimated $1,101,465 in recorded property damages and $50,000 in recorded crop damages. The following provides a breakdown of impacts by category.

While severe summer storms frequently occur in Montgomery County, the number of injuries and fatalities is very low. The hospitals in Hillsboro and Litchfield, as well as hospitals in Springfield (Sangamon County), Taylorville, (Christian County), Carlinville (Macoupin County), Greenville (Bond County), Vandalia (Fayette County), and the Metro East St. Louis area (Madison County), are equipped to provide care to persons injured during a severe storm. Consequently, the risk or vulnerability to public health and safety from severe storms is low.

Thunderstorms with Damaging Winds

Data obtained from NOAA's Storm Events Database and Planning Committee member records indicates that between 1968 and 2014, six of the 114 thunderstorms with damaging winds caused $374,040 in property damage. Damage information was either unavailable or none was recorded for the remaining 98 reported occurrences.

NOAA's Storm Events Database documented one injury as a result of a November 27, 1994 thunderstorm event in Witt. Detailed information on the type and severity of the injuries was unavailable.

Severe Storms Fast Facts – Impacts/Risk

Thunderstorms with Damaging Winds Impacts
- ❖ Total Property Damage: ***$374,040***
- ❖ Infrastructure/Critical Facilities Damage*: ***n/a***
- ❖ Total Crop Damage: ***n/a***
- ❖ Injuries: ***1***
- ❖ Fatalities: ***0***

Severe Hail Impacts
- ❖ Total Property Damage: ***$25,000***
- ❖ Infrastructure/Critical Facilities Damage*: ***$25,000***
- ❖ Total Crop Damage: $***50,000***

Lightning Strike Impacts
- ❖ Total Property Damage: ***$502,425***
- ❖ Infrastructure/Critical Facilities Damage*: ***$272,425***
- ❖ Total Crop Damage: ***n/a***
- ❖ Injuries: ***1***
- ❖ Fatalities: ***0***

Heavy Rain Impacts
- ❖ Total Property Damage: ***$200,000***
- ❖ Infrastructure/Critical Facilities Damage*: ***n/a***
- ❖ Total Crop Damage: ***n/a***

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

* Infrastructure/Critical Facilities Damage totals are included in the Total Property Damage amounts.

On November 17, 2013 a thunderstorm with damaging winds near Nokomis knocked down a power pole causing a line connected to a house to spark in the attic causing a house fire.

Photograph provided by Angela Keagy, Nokomis City Clerk

Hail

Data obtained from NOAA's Storm Events Database and Planning Committee member records indicates that between 1968 and 2014, two of the 56 hail events caused \$25,000 in property damage and \$25,000 in crop damage. Damage information was either unavailable or none was recorded for the remaining 54 reported occurrences. The property damage figure provided above is composed entirely of infrastructure and critical facilities damage sustained in Donnellson. Hail caused \$25,000 in roof damage to the Community Center on May 13, 2009. No injuries or fatalities were reported as a result of any of the hail events.

Lightning

Data obtained from NOAA's Storm Events Database and Planning Committee member records indicates that between 1996 and 2014, five lightning strike events caused \$502,425 in property damage. Included in the property damage figure provided above is \$272,425 in verified infrastructure and critical facilities damage sustained in Hillsboro. The following provides a brief description of the damages.

- A lightning strike on July 9, 2002 caused \$260,000 in damage to the communication tower at the Montgomery County Sheriff's Office base station.
- On August 5, 2008 lightning struck the City's Fire Department damaging computers, security equipment and radios causing \$3,195 in damages.
- A lightning strike on June 19, 2009 caused \$9,230 in damage to computers, security equipment and radios at the City's Fire Department.

NOAA's Storm Events Database documented one injury as a result of a July 9, 2002 lightning strike event in Hillsboro. A man was treated for burns at a local hospital after being struck by lightning.

Heavy Rain

Information obtained from Planning Committee member records indicates that each of the heavy rain events caused approximately \$100,000 in property damage. No injuries or fatalities were reported as a result of either event.

What other impacts can result from severe storms?

In Montgomery 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 2009 through

2013 indicates that wet road surface conditions were present for 10.9% to 16.5% 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 21** 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 21
Severe Weather Crash Data for Montgomery County

Year	Total # of Crashes	Presence of Wet Road Surface Conditions		
		# of Crashes	# of Injuries	# of Fatalities
2009	674	99	24	0
2010	664	89	31	0
2011	561	85	22	1
2012	641	70	25	0
2013	551	91	26	0
Total:	**3,091**	**434**	**128**	**1**

Source: Illinois Department of Transportation.

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

Yes. All existing buildings, infrastructure and critical facilities located in Montgomery County and the participating municipalities 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.

A thunderstorm with damaging winds downed a large tree at Beckemeyer Elementary School in Hillsboro.

Photograph courtesy of the Hillsboro Journal-News

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. Most of the participating municipalities acknowledged the need for emergency backup generators to allow continued operation of critical facilities such as municipal buildings, police and fire stations, heating and cooling centers, storm shelters and lift stations.

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 Montgomery 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 to high.

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

Yes and No. While four of the participating municipalities have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from severe storms, the County and the other eight municipalities do not. 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 15 of the 177 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 Montgomery County are vulnerable to damage, it is highly probable that there will be future dollar losses from severe storms.

Figure 11
(Sheet 1 of 8)
Severe Storms – Thunderstorms with Damaging Winds Reported in Montgomery County
1956 – 2014

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
7/28/1956	2:30 p.m.	Hillsboro	n/a	n/a	n/a	n/a	n/a	
10/10/1959	5:45 p.m.	Taylor Springs	n/a	n/a	n/a	n/a	n/a	
9/30/1961	1:46 p.m.	Farmersville	52 kts	n/a	n/a	n/a	n/a	
5/10/1962	8:23 p.m.	Butler	n/a	n/a	n/a	n/a	n/a	
8/18/1965	4:45 a.m.	Witt	n/a	n/a	n/a	n/a	n/a	
4/20/1966	4:30 p.m.	Walshville	n/a	n/a	n/a	n/a	n/a	
10/10/1969	11:20 p.m.	Walshville	n/a	n/a	n/a	n/a	n/a	
10/11/1969	12:15 a.m.	Fillmore	n/a	n/a	n/a	n/a	n/a	
3/29/1974	1:40 p.m.	Raymond	n/a	n/a	n/a	n/a	n/a	
7/14/1974	8:30 p.m.	Raymond	n/a	n/a	n/a	n/a	n/a	
5/19/1975	4:35 p.m.	Litchfield	n/a	n/a	n/a	n/a	n/a	
3/26/1976	9:30 p.m.	Nokomis	n/a	n/a	n/a	n/a	n/a	
4/10/1978	2:30 p.m.	Hillsboro	n/a	n/a	n/a	n/a	n/a	
9/7/1980	12:00 p.m.	Irving	n/a	n/a	n/a	n/a	n/a	
9/16/1980	5:50 p.m.	Hillsboro	n/a	n/a	n/a	n/a	n/a	
6/15/1982	1:50 p.m.	Litchfield	n/a	n/a	n/a	n/a	n/a	
7/21/1982	5:00 p.m.	Hillsboro	n/a	n/a	n/a	n/a	n/a	
3/15/1984	7:08 p.m.	Raymond	n/a	n/a	n/a	n/a	n/a	
6/23/1985	2:05 p.m.	Hillsboro	56 kts	n/a	n/a	n/a	n/a	
11/19/1985	3:33 p.m.	Walshville	52 kts	n/a	n/a	n/a	n/a	
9/29/1986	3:45 p.m.	Coffeen	57 kts	n/a	n/a	n/a	n/a	
9/29/1986	4:10 p.m.	Donnellson	57 kts	n/a	n/a	n/a	n/a	
6/2/1987	3:55 p.m.	Litchfield	n/a	n/a	n/a	n/a	n/a	
7/6/1987	3:10 p.m.	Litchfield	n/a	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$0**	**$0**	

Figure 11
(Sheet 2 of 8)
Severe Storms – Thunderstorms with Damaging Winds Reported in Montgomery County
1956 – 2014

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
3/24/1988	10:49 p.m.	Irving	n/a	n/a	n/a	n/a	n/a	
4/5/1988	7:00 p.m.	Raymond	52 kts	n/a	n/a	n/a	n/a	
5/9/1990	6:15 p.m.	Irving	n/a	n/a	n/a	n/a	n/a	
6/22/1990	8:00 p.m.	Irving	n/a	n/a	n/a	n/a	n/a	
7/1/1991	6:15 p.m.	Litchfield Nokomis	n/a	n/a	n/a	n/a	n/a	
7/2/1992	6:00 p.m.	Litchfield	n/a	n/a	n/a	n/a	n/a	
7/2/1992	7:45 p.m.	Litchfield	56 kts	n/a	n/a	n/a	n/a	
9/9/1992	6:49 p.m.	Nokomis	n/a	n/a	n/a	n/a	n/a	
8/19/1993	5:55 p.m.	Litchfield	n/a	n/a	n/a	n/a	n/a	
8/19/1993	6:15 p.m.	Hillsboro	n/a	n/a	n/a	n/a	n/a	
8/19/1993	6:35 p.m.	Hillsboro	n/a	n/a	n/a	n/a	n/a	
4/26/1994	8:40 p.m.	Hillsboro	n/a	n/a	n/a	n/a	n/a	
4/26/1994	9:18 p.m.	Litchfield Hillsboro	n/a	n/a	n/a	n/a	n/a	
4/26/1994	9:40 p.m.	Nokomis	n/a	n/a	n/a	n/a	n/a	
11/20/1994	7:40 p.m.	Hillsboro	n/a	n/a	n/a	n/a	n/a	
11/27/1994	1:04 p.m.	Witt	n/a	1	n/a	$3,000	n/a	
5/27/1995	5:17 p.m.	Hillsboro	n/a	n/a	n/a	$10,040	n/a	
6/8/1995	7:07 a.m.	Raymond	n/a	n/a	n/a	n/a	n/a	
6/8/1995	7:13 a.m.	Harvel	61 kts	n/a	n/a	n/a	n/a	
7/22/1995	11:30 a.m.	Walshville	n/a	n/a	n/a	$3,000	n/a	
7/22/1995	11:48 a.m.	Coffeen	n/a	n/a	n/a	$8,000	n/a	
Subtotal:				**1**	**0**	**$24,040**	**$0**	

Figure 11
(Sheet 3 of 8)
Severe Storms – Thunderstorms with Damaging Winds Reported in Montgomery County
1956 – 2014

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
7/25/1995	9:15 p.m.	Raymond	n/a	n/a	n/a	n/a	n/a	
7/25/1995	9:24 p.m.	Raymond	n/a	n/a	n/a	n/a	n/a	
1/18/1996	9:55 a.m.	Nokomis	50 kts	n/a	n/a	n/a	n/a	
5/25/1996	7:00 p.m.	Waggoner	55 kts	n/a	n/a	n/a	n/a	
10/22/1996	2:00 p.m.	Coffeen	50 kts	n/a	n/a	n/a	n/a	
5/22/1998	8:30 a.m.	Farmersville	55 kts	n/a	n/a	n/a	n/a	
6/14/1998	6:10 a.m.	Hillsboro	55 kts	n/a	n/a	n/a	n/a	
6/14/1998	7:00 p.m.	Farmersville	60 kts	n/a	n/a	n/a	n/a	
6/18/1998	8:14 p.m.	Waggoner	52 kts	n/a	n/a	n/a	n/a	
6/18/1998	8:30 p.m.	Litchfield	52 kts	n/a	n/a	n/a	n/a	
6/18/1998	8:53 p.m.	Raymond	52 kts	n/a	n/a	n/a	n/a	
6/18/1998	9:00 p.m.	Butler Farmersville Waggoner	55 kts	n/a	n/a	n/a	n/a	
6/29/1998	5:00 p.m.	Farmersville	55 kts	n/a	n/a	n/a	n/a	
6/29/1998	5:20 p.m.	Hillsboro	55 kts	n/a	n/a	n/a	n/a	
7/9/2002	5:50 p.m.	Nokomis	55 kts	n/a	n/a	n/a	n/a	
7/9/2002	5:55 p.m.	Coffeen	55 kts	n/a	n/a	n/a	n/a	
7/9/2002	6:00 p.m.	Fillmore	55 kts	n/a	n/a	n/a	n/a	
5/18/2004	3:35 p.m.	Litchfield	55 kts	n/a	n/a	n/a	n/a	
5/24/2004	11:34 p.m.	Litchfield	52 kts	n/a	n/a	n/a	n/a	
5/24/2004	11:35 p.m.	Raymond	55 kts	n/a	n/a	n/a	n/a	
5/24/2004	11:40 p.m.	Harvel	55 kts	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$0**	**$0**	

Figure 11
(Sheet 4 of 8)
Severe Storms – Thunderstorms with Damaging Winds Reported in Montgomery County
1956 – 2014

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
5/24/2004	11:50 p.m.	Nokomis Witt	55 kts	n/a	n/a	n/a	n/a	
5/30/2004	4:57 p.m.	Litchfield	70 kts	n/a	n/a	n/a	n/a	
5/31/2004	7:05 p.m.	Litchfield	61 kts	n/a	n/a	n/a	n/a	
5/31/2004	7:20 p.m.	Nokomis	55 kts	n/a	n/a	n/a	n/a	
5/31/2004	7:30 p.m.	Nokomis	55 kts	n/a	n/a	n/a	n/a	
7/5/2004	9:35 a.m.	Witt	55 kts	n/a	n/a	n/a	n/a	
8/25/2004	5:45 p.m.	Raymond	55 kts	n/a	n/a	n/a	n/a	
5/11/2005	7:20 p.m.	Taylor Springs	51 kts	n/a	n/a	n/a	n/a	
5/11/2005	7:27 p.m.	Litchfield	51 kts	n/a	n/a	n/a	n/a	
5/11/2005	7:40 p.m.	Donnellson Hillsboro Taylor Springs	51 kts	n/a	n/a	$275,000	n/a	
5/11/2005	7:45 p.m.	Coffeen	51 kts	n/a	n/a	$75,000	n/a	
6/10/2005	8:15 p.m.	Litchfield	50 kts	n/a	n/a	n/a	n/a	
6/13/2005	5:10 p.m.	Litchfield	55 kts	n/a	n/a	n/a	n/a	
6/13/2005	5:30 p.m.	Butler Raymond	55 kts	n/a	n/a	n/a	n/a	
6/13/2005	6:00 p.m.	Irving	55 kts	n/a	n/a	n/a	n/a	
6/13/2005	6:15 p.m.	Nokomis	55 kts	n/a	n/a	n/a	n/a	
5/24/2006	3:05 p.m.	Farmersville	56 kts	n/a	n/a	n/a	n/a	
5/24/2006	4:00 p.m.	Nokomis	52 kts	n/a	n/a	n/a	n/a	
6/17/2006	2:28 p.m.	Litchfield	50 kts	n/a	n/a	n/a	n/a	
8/16/2007	10:20 a.m.	Farmersville	52 kts	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$350,000**	**$0**	

Figure 11
(Sheet 5 of 8)
Severe Storms – Thunderstorms with Damaging Winds Reported in Montgomery County
1956 – 2014

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
8/16/2007	10:30 a.m.	Litchfield	61 kts	n/a	n/a	n/a	n/a	
5/2/2008	8:15 a.m.	Farmersville Litchfield	56 kts	n/a	n/a	n/a	n/a	
5/2/2008	8:40 a.m.	Hillsboro	52 kts	n/a	n/a	n/a	n/a	
7/12/2008	3:35 p.m.	Hillsboro	52 kts	n/a	n/a	n/a	n/a	
8/5/2008	5:45 p.m.	Litchfield	61 kts	n/a	n/a	n/a	n/a	
8/5/2008	5:55 p.m.	Walshville	65 kts	n/a	n/a	n/a	n/a	
5/13/2009	10:54 p.m.	Honey Bend^ Wenonah^	65 kts	0	0	n/a	n/a	- winds blew a semi over on I-55 near mile marker 56 - winds caused minor damage to the soffits and downspouts of a home and the roof of a machine shed
6/19/2009	5:20 p.m.	Raymond	52 kts	n/a	n/a	n/a	n/a	several large tree limbs were blown down
7/25/2009	12:15 a.m.	Ohlman	56 kts	n/a	n/a	n/a	n/a	- winds blew down numerous trees and tree limbs as well as power lines - a few trees caused minor damage to a few homes - 2 vehicles sustained moderate damage from the fallen trees and tree limbs
8/19/2009	3:12 p.m.	Hillsboro	56 kts	n/a	n/a	n/a	n/a	winds blew down numerous large tree limbs and a 30 inch diameter oak tree was snapped off near its base
Subtotal:				**0**	**0**	**$0**	**$0**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 6 of 8)
Severe Storms – Thunderstorms with Damaging Winds Reported in Montgomery County
1956 – 2014

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
7/18/2010	8:10 a.m.	Litchfield	54 kts	n/a	n/a	n/a	n/a	
7/19/2010	12:10 p.m.	Witt^	52 kts	n/a	n/a	n/a	n/a	winds blew down several large tree limbs
8/20/2010	6:00 p.m.	Litchfield	60 kts	n/a	n/a	n/a	n/a	- winds caused widespread damage on the north side of the City - numerous trees, tree limbs and power lines were blown down - a couple of homes sustained minor roof damage
2/28/2011	12:00 a.m.	Litchfield	52 kts	n/a	n/a	n/a	n/a	
4/19/2011	5:15 p.m.	Raymond^	56 kts	n/a	n/a	n/a	n/a	winds blew part of the roof off a large barn just east of I-55 and just south of IL Rte. 48
5/25/2011	3:05 p.m.	Waggoner	56 kts	n/a	n/a	n/a	n/a	winds blew down several large trees and power lines
5/25/2011	4:49 p.m.	Nokomis	52 kts	n/a	n/a	n/a	n/a	winds blew down several trees and power lines as well as numerous large tree limbs
8/16/2012	2:28 p.m.	Coalton Irving Nokomis Witt	56 kts	n/a	n/a	n/a	n/a	*Irving/Nokomis* - numerous tree limbs and a few power lines were blown down
Subtotal:				**0**	**0**	**$0**	**$0**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 7 of 8)
Severe Storms – Thunderstorms with Damaging Winds Reported in Montgomery County
1956 – 2014

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
9/5/2012	7:35 a.m.	Litchfield Raymond	56 kts	n/a	n/a	n/a	n/a	*Litchfield* - several large trees were blown down as well as several power lines *Raymond* - a gutter was torn off of a house - numerous large tree limbs were blown down
9/5/2012	7:40 a.m.	Hillsboro Irving Schram City Witt	56 kts	n/a	n/a	n/a	n/a	several large trees, numerous tree limbs and several power lines were blown down
9/5/2012	8:15 a.m.	Coffeen	65 kts	n/a	n/a	n/a	n/a	winds blew down several trees and power lines
10/17/2012	5:25 p.m.	Litchfield	56 kts	n/a	n/a	n/a	n/a	winds blew down several large trees
4/10/2013	7:45 p.m.	Litchfield	54 kts	n/a	n/a	n/a	n/a	winds blew down a large tree which knocked down some power lines
4/10/2013	7:55 p.m.	Butler^	56 kts	n/a	n/a	n/a	n/a	winds caused minor roof damage to a home on Witt Ave. just east of IL Rte. 127
5/30/2013	6:30 p.m.	Donnellson^ Hillsboro Taylor Springs^	56 kts	n/a	n/a	n/a	n/a	*Taylor Springs area* - winds blew down a large walnut tree *Hillsboro* - several large trees were blown down - a tree fell on top of an unoccupied vehicle causing major damage
Subtotal:				**0**	**0**	**$0**	**$0**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Figure 11
(Sheet 8 of 8)
Severe Storms – Thunderstorms with Damaging Winds Reported in Montgomery County
1956 – 2014

Date(s)	Start Time	Location(s)	Magnitude (Knots)	Injuries	Fatalities	Property Damage	Crop Damage	Description
5/30/2013	6:39 p.m.	Honey Bend^	56 kts	n/a	n/a	n/a	n/a	winds blew down several large tree limbs
5/31/2013	8:04 p.m.	Farmersville^	70 kts	n/a	n/a	n/a	n/a	- several outbuildings sustained minor to moderate damage - 5 grain bins were blown off their foundations into a field on Thomasville Trail about ½ mile west of I-55 - several large trees and numerous tree limbs were blown down
11/17/2013	12:25 p.m.	Nokomis	61 kts	n/a	n/a	n/a	n/a	- winds caused moderate damage to several homes - several homes sustained minor siding damage
Subtotal:				**0**	**0**	**$0**	**$0**	
GRAND TOTAL:				**1**	**0**	**$374,040**	**$0**	

^ Thunderstorm with damaging winds verified in the vicinity of this location(s).

Sources: Fenton, Dennis, State Farm Insurance Agent.
Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee group discussion on May 14, 2015.
Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee Member responses to Montgomery County Natural Hazard Events Questionnaire.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

Figure 12
(Sheet 1 of 3)
Severe Storms – Hail Events Reported in Montgomery County
1968 – 2014

Date(s)	Start Time	Location(s)	Magnitude (Diameter)	Injuries	Fatalities	Property Damage	Crop Damage	Description
6/15/1968	3:00 p.m.	Walshville	1.75 in.	n/a	n/a	n/a	n/a	
6/7/1982	6:25 p.m.	Fillmore	1.75 in.	n/a	n/a	n/a	n/a	
7/6/1987	4:30 p.m.	Litchfield	2.00 in.	n/a	n/a	n/a	n/a	
5/25/1989	12:53 p.m.	Litchfield	2.50 in.	n/a	n/a	n/a	n/a	
5/6/1993	2:15 p.m.	Raymond	1.75 in.	n/a	n/a	n/a	n/a	
6/20/1994	3:15 p.m.	Litchfield	1.00 in.	n/a	n/a	n/a	n/a	
5/12/1998	10:02 p.m.	Litchfield	1.75 in.	n/a	n/a	n/a	n/a	
5/12/1998	10:16 p.m.	Hillsboro	1.75 in.	n/a	n/a	n/a	n/a	
6/18/1998	8:53 p.m.	Raymond	1.00 in.	n/a	n/a	n/a	n/a	
10/29/1998	6:47 p.m.	Litchfield	1.00 in.	n/a	n/a	n/a	n/a	
5/12/2000	5:00 p.m.	Litchfield	1.75 in.	n/a	n/a	n/a	n/a	
5/12/2000	5:01 p.m.	Hillsboro	1.00 in.	n/a	n/a	n/a	n/a	
8/23/2000	8:20 p.m.	Irving	2.75 in.	n/a	n/a	n/a	$50,000	- numerous crops were destroyed - some roofs and vehicles were damaged
8/23/2000	8:45 p.m.	Chapman Fillmore	1.75 in.	n/a	n/a	n/a	n/a	- crops were damaged - numerous gardens were virtually destroyed
9/3/2000	2:50 p.m.	Nokomis	1.75 in.	n/a	n/a	n/a	n/a	
4/24/2002	1:32 p.m.	Litchfield	1.00 in.	n/a	n/a	n/a	n/a	
4/24/2002	2:07 p.m.	Coffeen	1.00 in.	n/a	n/a	n/a	n/a	
5/1/2002	12:20 p.m.	Litchfield	1.75 in.	n/a	n/a	n/a	n/a	
5/1/2002	12:41 p.m.	Coffeen	1.00 in.	n/a	n/a	n/a	n/a	
5/1/2002	2:12 p.m.	Farmersville	1.00 in.	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$0**	**$50,000**	

Figure 12 (Sheet 2 of 3) Severe Storms – Hail Events Reported in Montgomery County 1968 – 2014								
Date(s)	**Start Time**	**Location(s)**	**Magnitude (Diameter)**	**Injuries**	**Fatalities**	**Property Damage**	**Crop Damage**	**Description**
5/30/2004	3:40 p.m.	Hillsboro	1.75 in.	n/a	n/a	n/a	n/a	
5/30/2004	3:45 p.m.	Donnellson	1.25 in.	n/a	n/a	n/a	n/a	
10/18/2004	1:55 p.m.	Litchfield	1.00 in.	n/a	n/a	n/a	n/a	
10/18/2004	2:05 p.m.	Litchfield	1.75 in.	n/a	n/a	n/a	n/a	
10/18/2004	5:20 p.m.	Hillsboro	1.75 in.	n/a	n/a	n/a	n/a	
10/18/2004	5:33 p.m.	Litchfield	1.75 in.	n/a	n/a	n/a	n/a	
3/31/2005	4:45 p.m.	Nokomis	1.00 in.	n/a	n/a	n/a	n/a	
5/11/2005	7:20 p.m.	Litchfield	1.00 in.	n/a	n/a	n/a	n/a	
5/11/2005	7:25 p.m.	Honey Bend	1.00 in.	n/a	n/a	n/a	n/a	
5/11/2005	7:50 p.m.	Irving	1.00 in.	n/a	n/a	n/a	n/a	
2/16/2006	3:40 p.m.	Hillsboro	1.50 in.	n/a	n/a	n/a	n/a	
2/16/2006	4:15 p.m.	Fillmore	1.00 in.	n/a	n/a	n/a	n/a	
4/16/2006	1:45 p.m.	Taylor Springs	1.00 in.	n/a	n/a	n/a	n/a	
4/30/2006	2:40 p.m.	Irving	1.00 in.	n/a	n/a	n/a	n/a	
7/18/2006	5:35 a.m.	Nokomis	1.00 in.	n/a	n/a	n/a	n/a	
7/18/2006	6:40 a.m.	Litchfield	1.00 in.	n/a	n/a	n/a	n/a	
3/1/2007	11:51 a.m.	Litchfield	1.00 in.	n/a	n/a	n/a	n/a	
10/18/2007	3:40 p.m.	Nokomis	1.00 in.	n/a	n/a	n/a	n/a	
2/3/2008	4:25 p.m.	Litchfield	1.00 in.	n/a	n/a	n/a	n/a	
7/11/2008	4:50 p.m.	Litchfield	1.50 in.	n/a	n/a	n/a	n/a	
5/13/2009	10:55 p.m.	Litchfield Donnellson	1.00 in.	n/a	n/a	$25,000	n/a	<u>*Donnellson*</u> - committee members indicated that hail damaged the roof of the Community Center
4/19/2011	7:26 a.m.	Van Burensburg	1.00 in.	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$25,000**	**$0**	

Figure 12
(Sheet 3 of 3)
Severe Storms – Hail Events Reported in Montgomery County
1968 – 2014

Date(s)	Start Time	Location(s)	Magnitude (Diameter)	Injuries	Fatalities	Property Damage	Crop Damage	Description
4/22/2011	10:20 a.m.	Litchfield	1.00 in.	n/a	n/a	n/a	n/a	
5/25/2011	2:04 p.m.	Taylor Springs	1.00 in.	n/a	n/a	n/a	n/a	
5/28/2011	12:28 p.m.	Litchfield Lake Lou Yaeger	1.75 in.	n/a	n/a	n/a	n/a	
5/28/2011	1:00 p.m.	Lake Lou Yaeger	4.50 in.	n/a	n/a	n/a	n/a	
5/28/2011	1:29 p.m.	Litchfield	1.75 in.	n/a	n/a	n/a	n/a	
5/28/2011	1:35 p.m.	Butler	2.75 in.	n/a	n/a	n/a	n/a	- hail damaged a number of car windows - several reports of siding and roof damage due to large hail
5/28/2011	1:37 p.m.	Hillsboro	2.50 in.	n/a	n/a	n/a	n/a	
5/28/2011	1:40 p.m.	Irving	4.50 in.	n/a	n/a	n/a	n/a	hail broke a few car windows
5/28/2011	1:52 p.m.	Nokomis	1.25 in.	n/a	n/a	n/a	n/a	
6/5/2011	6:08 a.m.	Litchfield^	1.75 in.	n/a	n/a	n/a	n/a	
3/2/2012	7:03 a.m.	Coffeen	1.00 in.	n/a	n/a	n/a	n/a	
3/2/2012	7:10 a.m.	Nokomis	1.00 in.	n/a	n/a	n/a	n/a	
4/28/2012	9:25 p.m.	Litchfield^	1.75 in.	n/a	n/a	n/a	n/a	
11/17/2013	11:53 a.m.	Wenonah^	1.00 in.	n/a	n/a	n/a	n/a	
Subtotal:				**0**	**0**	**$0**	**$0**	

GRAND TOTAL:		**0**	**0**	**$25,000**	**$50,000**

^ 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.
Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee Member responses to Montgomery County Natural Hazard Events Questionnaire.

Figure 13 **Severe Storms – Lightning Events Reported in Montgomery County** **1996 – 2014**							
Date(s)	**Start Time**	**Location(s)**	**Injuries**	**Fatalities**	**Property Damage**	**Crop Damage**	**Description**
5/3/1996	10:30 p.m.	Waggoner^	n/a	n/a	$80,000	n/a	lightning struck a house causing a fire that destroyed the home
7/9/2002	5:45 p.m.	Hillsboro	1	n/a	$150,000	n/a	a man was treated for burns at a local hospital from the lightning strike
1/3/2006	n/a	Hillsboro	n/a	n/a	$260,000	n/a	lighting struck the communication tower at the Montgomery County Sheriff's Office base station, damaging the tower and disrupting the communication network
8/5/2008	n/a	Hillsboro	n/a	n/a	$3,195	n/a	lightning struck the Fire Department damaging computer and security equipment and radios
6/19/2009	n/a	Hillsboro	n/a	n/a	$9,230	n/a	lightning struck the Fire Department damaging computer and security equipment and radios
GRAND TOTAL:			**1**	**0**	**$502,425**	**$0**	

^ Lightning strike event verified in the vicinity of this location(s).

Sources: Bone, Terry, County Board Member
Fenton, Dennis, State Farm Insurance Agent.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.
Satterlee, Gary, Hillsboro Police Chief.

Figure 14
Severe Storms – Heavy Rain Events Reported in Montgomery County
2003 – 2014

Date(s)	Start Time	Location(s)	Magnitude (inches)	Injuries	Fatalities	Property Damage	Description
11/17/2003 thru 11/18/2003	7:00 a.m.	countywide	2.00 – 5.00 in.	n/a	n/a	$100,000	- very heavy rains fell over a 12 to 24 hour period causing widespread flooding
1/5/2005	10:00 a.m.	countywide	3.00 – 6.00 in.	n/a	n/a	$100,000	- heavy rains over a 4 to 5 day period caused general flooding; many streams and creeks flooded - numerous roads were flooded and closed due to the flooded streams or excessing ponding of water from the rain
Subtotal:				**0**	**0**	**$200,000**	

Sources: Fenton, Dennis, State Farm Insurance Agent.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

3.2 SEVERE WINTER STORMS & EXTREME COLD

IDENTIFYING THE HAZARD

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.

- **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 for at least three hours. Blizzards are the most dangerous of all winter storms.
- **Heavy Snow Storms.** A heavy snow storm occurs when a winter storm produces 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 National Weather Service (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 the wind chill?

The 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 22** identifies the formula and calculates the wind chill temperatures for certain air temperatures and wind speeds.

Figure 22
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 during severe winter storm and extreme cold events. 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 National Weather Service Weather Forecast Office in St. Louis, Missouri is responsible for issuing ***winter storm watches*** and ***warnings*** for Montgomery County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Advisories.** Winter advisories are issued for lesser winter weather events that while presenting an inconvenience, do not pose an immediate threat of injury, death or significant property damage. The following advisories will be issued when an event is occurring, is imminent or has a high probability of occurring.

- ❖ **Winter Weather Advisory.** A winter weather advisory is issued for:
  - ❑ average snowfalls of 3 to 5 inches;
  - ❑ sleet accumulations of less than ½ inch; or
  - ❑ a combination of winter precipitation which will produce hazardous conditions.

  An advisory can be issues for lesser amounts of snow if the timing of the event creates hazardous conditions.
- ❖ **Freezing Rain Advisory.** A freezing rain advisory is issued when light freezing rain will produce less than ¼ inch ice accumulation.
- ❖ **Wind Chill Advisory.** A wind chill advisory is issued when the wind chill values are expected to be between -15°F and -24°F.

➢ **Winter Storm Watch.** A winter storm watch is issued when the risk of severe winter weather, such as heavy snow and/or ice, has increased significantly and there is a strong possibility that conditions will reach warning criteria for the area within the next 12 to 48 hours.

➢ **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 when freezing rain is expected to produce ¼ inch or more of ice accumulation.
- ❖ **Winter Storm Warning.** A winter storm warning is issued when:
  - ❑ 6 inches or more of snow is expected;
  - ❑ ½ inch or more of sleet accumulations are expected; or
  - ❑ a combination of winter precipitation will produce life threatening conditions.
- ❖ **Wind Chill Warning.** A wind chill warning is issued when wind chill values are expected to be -25°F or below.

PROFILING THE HAZARD

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

Figures 23 and **24**, located at the end of this section, summarize the previous occurrences as well as the extent or magnitude of severe winter storms (snow & ice) and extreme cold events recorded in Montgomery County.

<u>*Severe Winter Storms*</u>

Severe Winter Storm Fast Facts – Occurrences

Number of Severe Winter Storm Events Reported (1950 – 2014): ***77***
Number of Extreme Cold Events Reported (2000 – 2014): ***3***
Maximum One-Day Snow Accumulation: ***14.3 inches (Mar. 25, 2013)***
Coldest Temperature Recorded in the County: ***-22°F (Feb. 14, 1905)***
Most Likely Month for Severe Winter Storms to Occur: ***January***
Most Likely Time for Severe Winter Storms to Occur: ***Morning***

NOAA's Storm Events Database, NWS's COOP Data records, the Illinois State Water Survey, and Planning Committee member records were used to document 77 reported occurrences of severe winter storms (snow, ice and/or a combination of both) in Montgomery County between 1950 and 2014. Of the 77 recorded occurrences there were:

- ❖ 55 heavy snow storms or blizzards;
- ❖ 13 combination events (freezing rain, sleet, ice and/or snow); and
- ❖ 9 ice storms.

Figure 25 charts the reported occurrences of severe winter storms by month. Of the 77 events, 45 (58%) took place in January and February. Of these 45 events, 28 (62%) occurred during January, making this the peak month for severe winter storms. There were three events that spanned two months; however for illustration purposes only the month when the event started is graphed.

Figure 25
Severe Winter Storms by Month
1950 – 2014

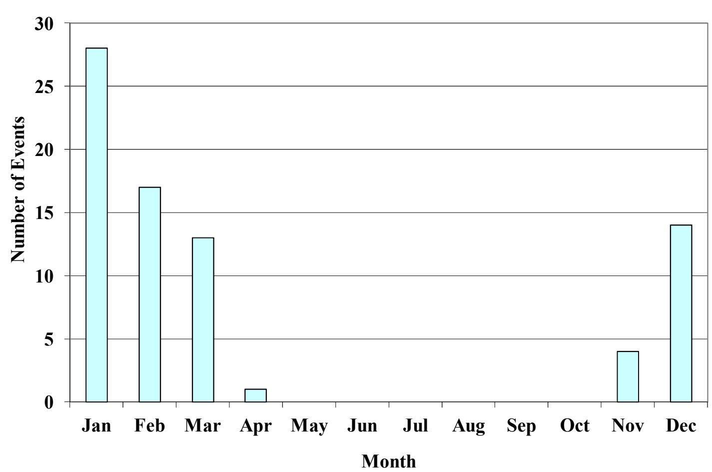
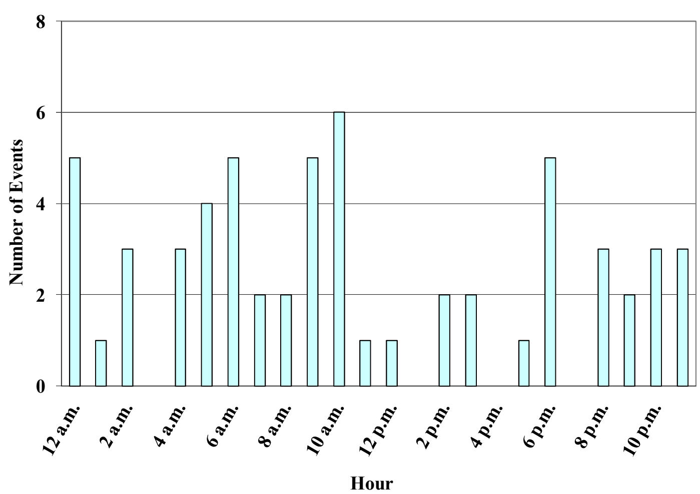


Figure 26 charts the reported occurrences of severe winter storms by hour. Of the 77 occurrences, start times were unavailable for 18 events. Of the remaining 59 severe winter storm events with recorded times, approximately 63% began during the a.m. hours, with 24 (65%) beginning between 5 a.m. and 11 a.m.

Figure 26
Severe Winter Storms by Hour
1950 – 2014



According to the NWS's COOP data records, the maximum one-day snow accumulation total recorded over the last 65 years in Montgomery County was 14.3 inches which occurred at Hillsboro on March 24, 2013. The heaviest seasonal snowfall on record for Montgomery County is 58.0 inches which occurred during the winter of 1911-1912.

Extreme Cold

NOAA's Storm Events Database was used to document three occurrences of extreme cold (dangerously low temperatures and wind chill values) in Montgomery County between 2000 and 2014. Of the three occurrences, two preceded recorded severe storms while one followed a recorded severe winter storm. Two of the three events (66%) took place in January and the remaining event took place in December. All of the events began during the a.m. hours.

According to the Midwestern Regional Climate Center records from 1895 through 2015, the coldest temperature recorded in Montgomery County was -22°F at Hillsboro on February 14, 1905.

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

Severe winter storms and extreme cold affect the entire County. All communities in Montgomery 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 *2013 Illinois Natural Hazard Mitigation Plan* prepared by IEMA classifies Montgomery County's hazard rating for severe winter storms as "high."

Do any of the participating municipalities have designated warming centers?

Yes. Eight of the twelve participating municipalities 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 27** identifies the location of each warming center by jurisdiction. The County is also served by one state-designated warming center located at the Illinois Department of Human Services office, 210 East Fairground Avenue in Hillsboro.

Figure 27
Designated Warming Centers by Participating Municipality

Name/Address	Name/Address
Coffeen	*Nokomis*
City Hall, 107 Locust St.	City Complex, 22 S. Cedar St.
Fire Station, 101 Locust St.	Jr./Sr. High School, 511 Oberle St.
Donnellson	North Elementary School, 110 W. Hamilton St.
---	South School/Cornerstone Academy, 316 E. South St.
Farmersville	St. Louis Parish Center, 523 E. Union St.
---	*Panama*
Hillsboro	---
Free Methodist Church, 1400 Seymour Ave.	*Raymond*
Moose Lodge, 411 S. Main St.	Fire Station, 121 E. Broad St.
The Zone, 206 S. Main St.	*Schram City*
Litchfield	---
City Hall, 120 E. Ryder St.	*Taylor Springs*
Community & Senior Center, 1100 S. State St.	Community Building, 613 E. Main St.
High School, 1705 N. State St.	*Waggoner*
National Guard Armory, 1617 N. Jefferson St.	Centennial Building, 369 E. Main St.
LRM Missions Hospitality House, 1285 E. Union Ave.	*Witt*
	City Hall, 106A W. Broadway St.
	Fire Station, 226 N. Hirst St.

What is the probability of future severe winter storms occurring?

Severe Winter Storms

Montgomery County has had 77 verified occurrences of severe winter storms between 1950 and 2014. With 77 occurrences over the past 65 years, Montgomery County should expect at least one severe winter storm each year. There were 23 years over the past 65 years where two or more severe winter storms occurred. This indicates that the probability that more than one severe winter storm may occur during any given year within the County is 35%.

Extreme Cold

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

ASSESSING VULNERABILITY

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

Yes. All of Montgomery County, including the participating municipalities, is vulnerable to the dangers presented by severe winter storms and extreme cold. Severe winter storms are among the most frequently occurring natural hazards in Illinois. Since 2005, Montgomery County has experienced 18 severe winter storms and two 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 and municipalities must budget for snow removal and de-icing of roads and bridges as well as for roadway repairs.

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 Montgomery County.

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

Severe Winter Storm (Snow & Ice) Impacts
- Total Property Damage: ***$969,347***^
- Infrastructure/Critical Facilities Damage*: ***$464,847***
- Injuries: ***0***
- Fatalities: ***0***

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

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

^ Included in the property damage total is $4,500 for the January 6, 1995 ice storm event which represent losses sustained by 8 counties (including Montgomery County). A detailed breakdown by county was not available.

* Infrastructure/Critical Facilities Damage totals are included in the Total Property Damage amounts.

While severe winter storms and extreme cold occur regularly in Montgomery County, the number of injuries and fatalities is very low. Even 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 relatively low.

Severe Winter Storms

Data obtained from NOAA's Storm Events Database and Planning Committee member records indicates that between 1950 and 2014, four severe winter storms caused $969,347 in property damages. Included in the property damage total is $4,500 for the January 6, 1995 ice storm event which represents losses sustained in eight counties (including Montgomery County). A detailed breakdown of the damages by county was unavailable. Property damage information was either unavailable or none was recorded for the remaining 73 reported occurrences of severe winter storms.

In comparison, the State of Illinois has averaged an estimated $102 million annually in property damage losses from severe winter storms since 1950, ranking severe winter storms second only to flooding in terms of economic loss. 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.

Included in the total property damage figure provided above is $464,847 in verified infrastructure and critical facilities damage sustained by multiple jurisdiction as a result of two separate severe winter storms. The following provides a brief description by event.

- A total of $455,322 in property damages and emergency protective measures was sustained during the winter storm that began on November 29, 2006. Provided below is a breakdown by jurisdiction. This event was part of a federally-declared disaster.

Municipalities	
Coffeen	$4,194
Farmersville	$6,429
Fillmore	$2,028
Harvel	$141
Hillsboro	$9,700
Irving	$3,520
Litchfield	$15,029
Nokomis	$27,500
Ohlman	$850
Panama	$685
Raymond	$13,859
Schram City	$2,874
Taylor Springs	$1,932
Waggoner	$2,452
Walshville	$950
Witt	$2,860
Subtotal:	**$95,003**

Montgomery County	
911	$4,000
EMA	$450
Highway	$10,536
Sheriff	$173
Subtotal:	**$15,159**

Townships	
Butler Grove	$616
East Fork	$160
Grisham	$1,700
Hillsboro	$115
Irving	$1,200
South Litchfield	$3,000
Witt	$1,560
Zanesville	$1,400
Subtotal:	**$9,751**

Schools	
Hillsboro	$8,664
Litchfield	$8,027
Nokomis	$8,134
Panhandle	$685
Subtotal:	**$25,510**

Fire Departments*	
Coffeen	$400
Farmersville-Waggoner	$3,771
Fillmore Community	$15,805
Hillsboro	$18,303
Irving	$1,467
Litchfield	$21,874
Nokomis Area	$5,783
Raymond-Harvel	$4,158
Taylor Springs	$110
Witt	$400
Subtotal:	**$72,071**

Ambulance Services	
Hillsboro Area	$1,028
Nokomis/Witt	$300
Subtotal:	**$1,328**

Electric Coops	
Shelby Electric	$56,500
Rural Electric	$180,000
Subtotal:	**$236,500**

* All fire service expenses were incurred due to implementation of emergency protective measures

- The City of Coffeen sustained $9,525 in property damage and emergency protective measures, including snow removal, during the February 13, 2007 heavy snow event. The event downed trees and power lines and caused equipment damage.

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 reported extreme cold events. In addition, no injuries or fatalities were reported.

What other impacts can result from severe winter storms?

In Montgomery 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 2009 through 2013 indicates that treacherous road conditions caused by snow and ice were present for 7.3% to 15.8% of all crashes recorded annually in the County. **Figure 28** 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.

Figure 28
Severe Winter Weather Crash Data for Montgomery County

Year	Total # of Crashes	Presence of Treacherous Road Conditions caused by Snow and Ice		
		# of Crashes	# of Injuries	# of Fatalities
2009	674	67	20	0
2010	664	105	25	0
2011	561	41	8	0
2012	641	54	11	0
2013	551	45	22	0
Total:	**3,091**	**312**	**86**	**0**

Source: Illinois Department of Transportation.

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.

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 Montgomery County and the participating municipalities 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 occur in Montgomery 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 winter storms is medium.

Many trees were damaged in Hillsboro during the winter storm that began on November 29, 2006.

Photograph courtesy of the Hillsboro Journal-News

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 Montgomery 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.

Snow accumulations along Niemanville Trail South during the winter of 1978 reached the height of a pickup truck.

Photograph provided by the Montgomery County Highway Dept.

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 and municipalities for snow removal and de-icing.

According to the Montgomery County Highway Engineer, the County spends approximately $33,800 for snow removal and de-icing for an average winter weather event. (An average winter weather event is considered to be 5 inches or less of snow with normal winds and average temperatures.) To completely clear the roads for this type of event, it generally takes two-12 hour days and one-8 hour day and requires approximately 650 gallons of fuel and 168 tons of sand/salt mixture.

The winter storm that began on November 29, 2006 covered the area with up to an inch of ice and sleet.

Photograph courtesy of the Hillsboro Journal-News

Road resurfacing and pothole repairs are additional costs incurred each year as a result of severe winter storms.

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

Yes and No. While four of the participating municipalities have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from severe winter storms and extreme cold, the County and the other eight municipalities do not.

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 Montgomery 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 four of the 80 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 Montgomery County are vulnerable to damage, it is likely that there will be future dollar losses from severe winter storms and extreme cold.

Figure 23
(Sheet 1 of 10)
Severe Winter Storm Events Reported in Montgomery County
1950 – 2014

Date(s)	Start Time	Event Type	Magnitude	Injuries	Fatalities	Property Damages
12/6/1950	n/a	Heavy Snow	- COOP observer at Hillsboro measured 6.5 inches of snow	n/a	n/a	n/a
11/5/1951 thru 11/6/1951	9:00 p.m.	Heavy Snow	- COOP observer at Hillsboro measured 10.9 inches of snow	n/a	n/a	n/a
3/1/1953	11:00 a.m.	Heavy Snow	- COOP observer at Hillsboro measured 5.5 inches of snow in 11 hours	n/a	n/a	n/a
3/9/1958	n/a	Heavy Snow	- COOP observer at Hillsboro indicated in his notes that 9.0 inches of snow had fallen	n/a	n/a	n/a
3/3/1960	n/a	Heavy Snow	- COOP observer at Hillsboro measured 6.0 inches of snow	n/a	n/a	n/a
3/8/1960 thru 3/9/1960	6:00 p.m.	Heavy Snow	- COOP observer at Hillsboro measured 5.0 inches of snow in 13 hours	n/a	n/a	n/a
12/11/1960	7:00 a.m.	Heavy Snow	- COOP observer at Hillsboro measured 5.0 inches of snow in 6 hours	n/a	n/a	n/a
2/3/1961	n/a	Heavy Snow	- COOP observer at Hillsboro measured 6.0 inches of snow	n/a	n/a	n/a
1/12/1964 thru 1/13/1964	n/a	Heavy Snow	- COOP observer at Hillsboro indicated that 8.0 inches of snow was observed on the ground	n/a	n/a	n/a
2/15/1964	9:00 a.m.	Heavy Snow	- COOP observer at Hillsboro measured 5.0 inches of snow in 13 hours	n/a	n/a	n/a
2/25/1965	n/a	Heavy Snow	- COOP observer at Hillsboro measured 5.0 inches of snow	n/a	n/a	n/a
3/4/1965	n/a	Heavy Snow	- COOP observer at Hillsboro measured 5.0 inches of snow	n/a	n/a	n/a
2/1/1966 thru 2/2/1966	n/a	Heavy Snow	- COOP observer at Hillsboro measured 8.0 inches of snow	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 23
(Sheet 2 of 10)
Severe Winter Storm Events Reported in Montgomery County
1950 – 2014

Date(s)	Start Time	Event Type	Magnitude	Injuries	Fatalities	Property Damages
1/13/1968 thru 1/14/1968	n/a	Heavy Snow	- COOP observer at Hillsboro measured 6.5 inches of snow	n/a	n/a	n/a
4/5/1971 thru 4/6/1971	9:00 a.m.	Heavy Snow	- COOP observer at Hillsboro measured 7.0 inches of snow	n/a	n/a	n/a
12/18/1973 thru 12/20/1973	8:15 p.m.	Heavy Snow	- COOP observer 2 miles south-southwest of Hillsboro measured 12.5 inches of snow	n/a	n/a	n/a
12/30/1973 thru 12/31/1973	8:00 a.m.	Heavy Snow	- COOP observer 2 miles south-southwest of Hillsboro measured 12.0 inches of snow	n/a	n/a	n/a
1/9/1974	n/a	Heavy Snow	- COOP observer 2 miles south-southwest of Hillsboro measured 5.0 inches of snow	n/a	n/a	n/a
3/23/1974	10:00 a.m.	Heavy Snow	- COOP observer 2 miles south-southwest of Hillsboro measured 6.0 inches of snow	n/a	n/a	n/a
2/24/1975	n/a	Heavy Snow	- COOP observer 2 miles south-southwest of Hillsboro measured 5.0 inches of snow	n/a	n/a	n/a
11/26/1975	10:00 a.m.	Heavy Snow	- COOP observer 2 miles south-southwest of Hillsboro measured 8.0 inches of snow	n/a	n/a	n/a
1/16/1978 thru 1/17/1978	5:00 a.m.	Heavy Snow	- COOP observer at Fillmore measured 8.0 inches of snow	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 23
(Sheet 3 of 10)
Severe Winter Storm Events Reported in Montgomery County
1950 – 2014

Date(s)	Start Time	Event Type	Magnitude	Injuries	Fatalities	Property Damages
3/2/1978	5:00 a.m.	Heavy Snow	- COOP observer 2 miles south-southwest of Hillsboro measured 6.0 inches of snow - COOP observer at Fillmore measured 4.0 inches of snow	n/a	n/a	n/a
3/6/1978 thru 3/8/1978	2:30 a.m.	Heavy Snow	- COOP observer at Fillmore measured 20.0 inches of snow - COOP observer 2 miles south-southwest of Hillsboro measured 19.0 inches of snow	n/a	n/a	n/a
1/27/1979	4:30 a.m.	Heavy Snow	- COOP observer at Fillmore measured 8.0 inches of snow	n/a	n/a	n/a
1/30/1980	12:00 a.m.	Heavy Snow	- COOP observers at Fillmore and Hillsboro measured 6.0 inches of snow respectively	n/a	n/a	n/a
3/1/1980	12:00 a.m.	Heavy Snow	- COOP observers at Fillmore and Hillsboro measured 8.0 inches of snow	n/a	n/a	n/a
11/26/1980 thru 11/27/1980	11:00 p.m.	Heavy Snow	- COOP observer at Fillmore measured 8.0 inches of snow - COOP observer at Hillsboro measured 6.0 inches of snow	n/a	n/a	n/a
2/9/1981 thru 2/10/1981	10:00 p.m.	Heavy Snow	- COOP observer at Hillsboro measured 8.0 inches of snow - COOP observer at Fillmore measured 7.0 inches of snow	n/a	n/a	n/a
12/17/1981	3:30 p.m.	Heavy Snow	- COOP observer at Hillsboro measured 5.5 inches of snow - COOP observer at Fillmore measured 4.0 inches of snow in 8 ½ hours	n/a	n/a	n/a
1/29/1982 thru 1/31/1982	2:00 p.m.	Heavy Snow	- COOP observer at Fillmore measured 18.0 inches of snow - COOP observer at Hillsboro measured 16.0 inches of snow	n/a	n/a	n/a
2/3/1982 thru 2/4/1982	n/a	Heavy Snow	- COOP observer at Hillsboro measured 9.5 inches of snow - COOP observer at Fillmore measured 5.0 inches of snow	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 23
(Sheet 4 of 10)
Severe Winter Storm Events Reported in Montgomery County
1950 – 2014

Date(s)	Start Time	Event Type	Magnitude	Injuries	Fatalities	Property Damages
2/9/1982	n/a	Heavy Snow	- COOP observer at Hillsboro measured 6.0 inches of snow - COOP observer at Fillmore measured 4.0 inches of snow	n/a	n/a	n/a
2/24/1984 thru 2/25/1984	5:00 a.m.	Heavy Snow	- COOP observer at Fillmore measured 13.0 inches of snow	n/a	n/a	n/a
1/9/1987	6:00 a.m.	Heavy Snow	- COOP observer at Hillsboro measured 9.0 inches of snow	n/a	n/a	n/a
1/18/1987 thru 1/19/1987	8:00 p.m.	Heavy Snow	- COOP observer at Hillsboro measured 10.0 inches of snow	n/a	n/a	n/a
12/14/1987 thru 12/15/1987	9:00 a.m.	Winter Storm	- COOP observer at Hillsboro measured 7.0 inches of snow noted that freezing rain started at 5:00 p.m. on the 14th	n/a	n/a	n/a
2/10/1988 thru 2/11/1998	9:00 a.m.	Heavy Snow	- COOP observer at Hillsboro measured 5.5 inches of snow and noted that drifting was occurring	n/a	n/a	n/a
12/26/1988	8:30 a.m.	Winter Storm	- COOP observer at Hillsboro measured 5.5 inches of snow and noted freezing rain occurred during the morning	n/a	n/a	n/a
3/5/1989 thru 3/6/1989	n/a	Winter Storm	- COOP observer at Hillsboro measured 10.0 inches of snow and noted the presence of freezing rain on the 5th	n/a	n/a	n/a
12/21/1990	7:00 a.m.	Winter Storm	- COOP observer at Hillsboro measured 3.0 inches of snow and indicated the presence of ice pellets and glaze ice caused by freezing rain	n/a	n/a	n/a
1/9/1993	n/a	Heavy Snow	- COOP observer at Hillsboro measured 6.0 inches of snow	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 23
(Sheet 5 of 10)
Severe Winter Storm Events Reported in Montgomery County
1950 – 2014

Date(s)	Start Time	Event Type	Magnitude	Injuries	Fatalities	Property Damages
2/15/1993 thru 2/16/1993	3:00 p.m.	Heavy Snow	- COOP observer at Hillsboro measured 7.0 inches of snow and noted blowing	n/a	n/a	n/a
2/24/1993 thru 2/25/1993	11:00 p.m.	Heavy Snow	- COOP observer at Hillsboro measured 10.0 inches of snow and noted blowing	n/a	n/a	n/a
1/16/1994	12:00 a.m.	Winter Storm	- COOP observer at Hillsboro measured 7.0 inches of snow and noted the presence of sleet	n/a	n/a	n/a
1/6/1995	2:00 a.m.	Ice Storm	- glaze ice accumulations of ¼ to ¾ inch left roads hazardous - numerous vehicle accidents were reported - schools remained closed in the morning	n/a	n/a	$4,500†
12/19/1995	n/a	Heavy Snow	- COOP observer at Hillsboro measured 6.5 inches of snow	n/a	n/a	n/a
1/3/1996	n/a	Heavy Snow	- COOP observer at Hillsboro measured 7.0 inches of snow	n/a	n/a	n/a
1/8/1997 thru 1/9/1997	6:00 p.m.	Winter Storm	- 5 to 8 inches of snow accompanied by strong winds and very cold temperatures - COOP observer at Hillsboro measured 7.0 inches of snow - winds caused drifting snow and very cold wind chills - schools closed for several days	n/a	n/a	n/a
1/15/1997 thru 1/16/1997	11:00 p.m.	Winter Storm	- freezing rain, sleet and 3 to 7 inches of snow fell across the region - COOP observer at Hillsboro measured 3.6 inches of snow - numerous auto accidents occurred along with some power outages - most area schools were closed	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$4,500†**

† Property damage totaling $4,500 for the January 6, 1995 glaze ice event represent losses sustained in 8 counties (including Montgomery County.) A breakdown by county was not available.

Figure 23
(Sheet 6 of 10)
Severe Winter Storm Events Reported in Montgomery County
1950 – 2014

Date(s)	Start Time	Event Type	Magnitude	Injuries	Fatalities	Property Damages
1/12/1998	2:00 a.m.	Winter Storm	- freezing drizzle coated area roads causing widespread early morning travel problems - COOP observer at Hillsboro indicated the presence of freezing drizzle	n/a	n/a	n/a
12/21/1998 thru 12/22/1998	12:00 a.m.	Winter Storm	- light freezing drizzle, sleet and snow came in with a cold front - roads across much of the area were covered with a thin coating of ice - vehicle accidents were numerous - temperatures dropped into the single digits overnight and only rose into the teens the next day	n/a	n/a	n/a
1/1/1999 thru 1/2/1999	6:00 p.m.	Winter Storm	- a major winter storm hit the area with 6 to 14 inches of snow and about 1 inch of freezing rain and sleet which fell during the middle of the storm and created a hard layer of ice that was very difficult to move - COOP observer at Hillsboro measured 8.0 inches of snow - transportation across the area came to a stop for much of the holiday weekend - very cold temperatures after the storm kept conditions icy into the next week and caused most area schools to stay closed Monday, the 4th through Wednesday, the 6th	n/a	n/a	n/a
1/13/1999	4:30 a.m.	Ice Storm	- an ice storm struck the area leaving at least ¼ inch coating of ice - some trees and power lines were downed - ice covered roads made travel difficult to impossible - area schools closed through the end of the week (Thursday & Friday)	n/a	n/a	n/a
12/13/2000	6:00 a.m.	Heavy Snow	- first major winter storm of the season dropped 6 to 10 inches of snow across the region - COOP observer at Hillsboro measured 8.0 inches of snow - some schools in rural areas remained closed into the middle of the next week as temperatures remained very cold and a couple minor snow falls kept traveling conditions poor	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 23
(Sheet 7 of 10)
Severe Winter Storm Events Reported in Montgomery County
1950 – 2014

Date(s)	Start Time	Event Type	Magnitude	Injuries	Fatalities	Property Damages
1/26/2001	1:00 a.m.	Winter Storm	- light rain during the early morning hours resulted in a thin coating of ice on area roads - COOP observer at Hillsboro indicated there was sleet and light rain - numerous traffic accidents were reported - most schools across the area were closed	n/a	n/a	n/a
3/25/2002 thru 3/26/2002	6:00 p.m.	Winter Storm	- a winter storm brought about 1 inch of sleet and 3 to 4 inches of snow to the area during the overnight hours - the combination of sleet and snow made for extremely hazardous travel conditions across the area	n/a	n/a	n/a
12/24/2002	6:00 a.m.	Winter Storm	- snowfall across the region ranged from 4 to 8 inches - COOP observer at Hillsboro measured 5.5 inches of snow - the snow made for difficult travel conditions through Christmas Day	n/a	n/a	n/a
1/25/2004	6:00 a.m.	Winter Storm	- a combination of freezing rain, sleet and snow fell with some places receiving ¼ to ½ inch of freezing rain, 1 to 2 inches of sleet and 1 to 2 inches of snow - COOP observer at Hillsboro measured 1.25 inches of snow - transportation was brought to a standstill across the region - many schools were closed into mid-week as another fast moving storm brought additional snow accumulations of 1 to 2 inches	n/a	n/a	n/a
12/8/2005	10:00 a.m.	Winter Storm	- COOP observer at Hillsboro measured 5.5 inches of snow	n/a	n/a	n/a
3/21/2006	n/a	Heavy Snow	- COOP observer at Hillsboro measured 8.0 inches of snow	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 23
(Sheet 8 of 10)
Severe Winter Storm Events Reported in Montgomery County
1950 – 2014

Date(s)	Start Time	Event Type	Magnitude	Injuries	Fatalities	Property Damages
11/29/2006 thru 12/1/2006	10:00 p.m.	Winter Storm	- a major winter storm hit the region and covered the area with up to an inch of ice and sleet accumulations - COOP observer at Hillsboro indicated the presence of ice pellets and glaze ice as well as damaging winds - EMA officials reported that 1 in 4 residents lost power due to the storm - many rural schools were closed for several days due to slick roads and power outages - numerous buildings & vehicles were damaged by falling trees & limbs - this event was part of a federally-declared disaster (Declaration #1681)	n/a	n/a	$455,322
1/12/2007 thru 1/14/2007	10:00 p.m.	Ice Storm	- three rounds of freezing precipitation occurred resulting in ice accumulations between ¼ and ½ inch - significant tree and limb damage was reported as a result of this storm - many lost power during the storm	n/a	n/a	$500,000
2/13/2007	12:00 a.m.	Heavy Snow	- a winter storm brought up to 10 inches of snow to the region - COOP observer at Hillsboro measured 5.0 inches of snow - Committee Member records from Coffeen identified $9,525 in emergency cleanup costs and indicated that the snow downed trees and power lines and caused equipment damage	n/a	n/a	$9,525
12/15/2007	6:00 a.m.	Heavy Snow	- a winter storm brought up to 8 inches of snow to the region - COOP observer at Hillsboro measured 5.75 inches of snow - travel was disrupted across the area through the weekend	n/a	n/a	n/a
1/31/2008 thru 2/1/2008	12:00 p.m.	Heavy Snow	- a winter storm dropped up to 11 inches of snow across the region - COOP observer at Hillsboro measured 9.0 inches of snow	n/a	n/a	n/a
2/11/2008	10:00 a.m.	Winter Storm	- light freezing rain and sleet fell cross the area - numerous auto accidents were report - schools closed early	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$964,847**

Figure 23 **(Sheet 9 of 10)** **Severe Winter Storm Events Reported in Montgomery County** **1950 – 2014**						
Date(s)	**Start Time**	**Event Type**	**Magnitude**	**Injuries**	**Fatalities**	**Property Damages**
2/21/2008 thru 2/22/2008	4:00 a.m.	Sleet	- ½ and 2 inches of sleet fell across the region - numerous auto accidents were reported across the region - most area schools were closed both days	n/a	n/a	n/a
1/26/2009 thru 1/28/2009	9:00 p.m.	Winter Storm	- a winter storm brought several bands of sleet as well as 6 to 10 inches of snow to the region - COOP observer at Hillsboro measured at least 5.0 inches of snow	n/a	n/a	n/a
1/6/2010 thru 1/7/2010	8:00 p.m.	Winter Storm	- 3 to 5 inches of snow fell across the area - COOP observer at Hillsboro measured 4.8 inches of snow - winds gusted from 20 to 30 mph causing blowing and drifting snow - many rural roads were impassable due to drifting	n/a	n/a	n/a
1/31/2011 thru 2/2/2011	2:00 p.m.	Winter Storm	- a winter storm brought 2 to 3 inches of sleet and 2 to 6 inches snow to the County, with the highest totals occurring in the northern half - COOP observer at Hillsboro measured 5.0 inches of snow - strong winds produced very cold wind chill values	n/a	n/a	n/a
1/20/2012	5:00 p.m.	Winter Storm	- Committee Member records indicated that freezing rain coated area roads, quickly turning to black ice - many accidents were reported along I-55 - 69 travelers (including 2 basketball teams) were sheltered at the Litchfield Middle and High School gyms - COOP observer at Hillsboro indicated the presence of freezing rain	n/a	n/a	n/a
2/20/2013	9:00 a.m.	Winter Storm	- a mixture of freezing rain, sleet & 6 to 8 inches of snow fell across the region	n/a	n/a	n/a
3/24/2013	10:00 a.m.	Heavy Snow	- a spring storm hit on Palm Sunday bringing with it 6 to 16 inches of snow - COOP observer at Hillsboro measured 14.3 inches of snow - most area schools were closed on Monday, however overall impacts were minimal - most roads were in good condition by Monday afternoon	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

Figure 23
(Sheet 10 of 10)
Severe Winter Storm Events Reported in Montgomery County
1950 – 2014

Date(s)	Start Time	Event Type	Magnitude	Injuries	Fatalities	Property Damages
1/1/2014 thru 1/2/2014	6:00 p.m.	Winter Storm	- isolated areas of heavy snow fell across the region with Montgomery County receiving 6 to 7 inches of snow - COOP observer at Hillsboro measured 5.5 inches of snow	n/a	n/a	n/a
1/5/2014	5:00 a.m.	Winter Storm	- a very strong winter storm brought between 9 and 15 inches of snow to the region - COOP observer at Hillsboro measured 12.5 inches of snow - strong northerly winds produced snow drifts from 2 to 5 feet tall - all schools and most businesses were closed on the 5th and 6th, with many schools remaining closed for several days due to very cold temperatures and wind chills	n/a	n/a	n/a
2/4/2014	10:00 a.m.	Winter Storm	- a winter storm dropped 6 to 10 inches of snow across parts of the region - COOP observer at Hillsboro measured 6.5 inches of snow - travel was very difficult, especially in rural areas - most rural schools were closed for a couple of days	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**

GRAND TOTAL	**0**	**0**	**969,347†**

† Property damage totaling $4,500 for the January 6, 1995 glaze ice event represent losses sustained in 8 counties (including Montgomery County.) A breakdown by county was not available.

Sources: Montgomery County Emergency Management Agency, Diana Holmes, Coordinator.
Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee Member responses to Montgomery County 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.
State Farm Insurance, Dennis Fenton, Agent.

Figure 24
Extreme Cold Events Reported in Montgomery County
2000 – 2014

Date(s)	Start Time	Event Type	Magnitude	Injuries	Fatalities	Property Damages
12/16/2000 thru 12/17/2000	8:00 p.m.	Extreme Cold / Windchill	- a strong cold front moved across the area bringing a blast of artic air - temperatures dropped into the single digits with wind chill values down to -30°F during the evening of the 16th - wind chills remained at -20°F to -40°F through noon on the 17th	n/a	n/a	n/a
1/1/2010 thru 1/12/2010	12:00 a.m.	Windchill	- temperature dropped below zero for the first time in 10 years in many locations	n/a	n/a	n/a
1/6/2014 thru 1/7/2014	12:00 a.m.	Windchill	- low temperatures and wind chills followed a winter storm that brought heavy snow to much of the area - wind chill readings the morning of the 7th ranged from -25°F to -39°F	n/a	n/a	n/a
Subtotal:				**0**	**0**	**$0**
GRAND TOTAL:				**0**	**0**	**$0**

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

3.3 EXTREME HEAT

IDENTIFYING THE HAZARD

What is the definition of extreme heat?

Extreme heat is characterized by temperatures that hover 10 degrees or more above the average high temperature of a region for a prolonged period of time (several days to several weeks) and is often accompanied by high humidity. In comparison, a heat wave is generally defined as a prolonged period of excessive heat and humidity. While there is no universally agreed upon definition of a heat wave, for most the United States the "standard" definition is a period of three or more consecutive days of highs reaching at least 90°F.

Extreme 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.

On average, more than 1,000 people die each year in the United States from extreme heat. In fact, extreme heat claims more lives each year than floods, lightning, tornadoes and hurricanes combined.

What is the Heat Index?

In an effort to raise the public's awareness of the hazards of extreme heat, the National Weather Service 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 29** 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.

- **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. It can significantly retard the skin's ability to shed excess heat.
- **Heat Cramps.** Heat cramps are characterized by heavy sweating and painful spasms, usually in the muscles of the legs and possibly the abdomen. 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, weakness, nausea, exhaustion, dizziness and faintness. Breathing may become rapid and shallow and the pulse thready (weak). The skin may appear cool, moist and pale. Blood flow to the skin increases, causing blood flow to decrease to the vital organs. This results in a mild form of shock. If not treated, the victim's condition will worsen.
- **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 dry and flushed with very little perspiration present. The individual may become mentally confused and aggressive. The pulse is rapid and strong. There is a possibility that the individual will faint or slip into unconsciousness. If the body is not cooled quickly, then brain damage and death may result.

Figure 29
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.

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 30 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 National Weather Service will initiate extreme or excessive heat alert procedures.

Figure 30
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 National Weather Service 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 National Weather Service Weather Forecast Office in St. Louis, Missouri. The St. Louis Office is responsible for issuing alerts for Montgomery 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 12 to 28 hours.
- **Advisory.** An excessive heat advisory is issued when the heat index is expected to be around 105°F, *or* when the heat index will range from 100°F to 104°F for at least four (4) consecutive days.
- **Warning.** An excessive heat warning is issued when the heat index is expected to be around 110°F, *or* when the heat index is expected to reach 105°F for four (4) consecutive days.

PROFILING THE HAZARD

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

Extreme Heat Fast Facts – Occurrences

Number of Extreme Heat Events Reported (1995 – 2014): ***34***
Hottest Temperature Recorded in the County: ***114°F (July 14, 1954)***
Most Likely Month for Extreme Heat Events to Occur: ***July***

Figure 31, located at the end of this section, summarizes the previous occurrences as well as the extent or magnitude of extreme heat events recorded in Montgomery County. NOAA's Storm Events Database has documented 34 occurrences of extreme heat in Montgomery County between 1995 and 2014.

Since 1995, at least one extreme heat event has occurred each year in Montgomery County with the exception of 1996, 1997, 1998, 2000, and 2008. A review of the NWS's COOP data records suggests that extreme heat events have occurred with similar frequency between 1950 and 1995.

Figure 32 charts the reported occurrences of extreme heat by month. Of the 34 events, 21 (62%) took place in July making this the peak month for extreme heat events in Montgomery County. There were seven events that spanned two month; however, for illustration purposes only the month the event started in is graphed.

Figure 32
Extreme Heat Events by Month
1995 – 2014

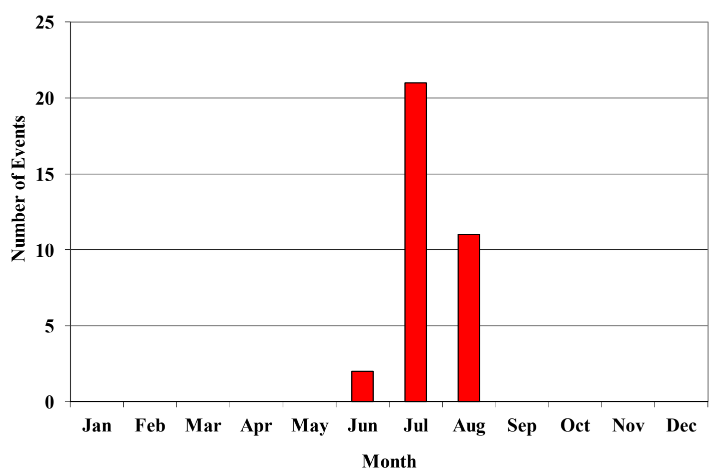
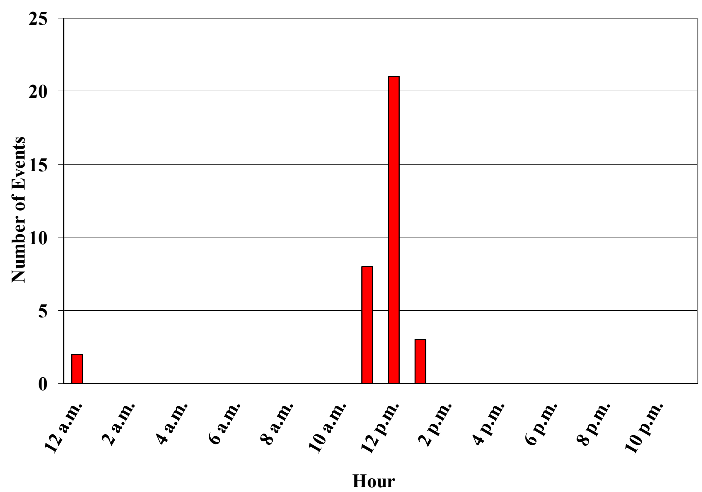


Figure 33 charts the reported occurrences of extreme heat by hour. Of the 34 occurrences,71% began during the p.m. hours, with 21 of the events (87.5%) beginning at 12:00 p.m.

According to the available historical data from the Midwestern Regional Climate Center, the hottest recorded temperature over a 121-year period between 1895 and 2015 in Montgomery County was 114°F on July 14, 1954 at Hillsboro.

Figure 33
Extreme Heat Events by Hour
1995 – 2014



What locations are affected by extreme heat?

Extreme heat affect the entire County. All communities in Montgomery County have been affected by extreme heat. Extreme heat events generally extend across an entire region and affect multiple counties. The *2013 Illinois Natural Hazard Mitigation Plan* classifies Montgomery County's hazard rating for extreme heat as "elevated."

Do any of the participating municipalities have designated cooling centers?

Yes. Seven of the twelve participating municipalities have designated cooling centers. A "designated" cooling 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 of the jurisdiction during extreme heat events. **Figure 34** identifies the location of each cooling center by jurisdiction. At this time Donnellson, Farmersville, Panama, Schram City and Waggoner do not have any cooling centers designated within their municipalities.

What is the probability of future extreme heat events occurring?

Montgomery County has experienced 34 verified occurrences of extreme heat between 1995 and 2014. With 34 occurrences over the past 20 years, Montgomery County should expect to experience at least one extreme heat event a year. There were eight years over the past 20 years where two or more extreme heat events occurred. This indicates that the probability that more than one extreme heat event may occur during any given year within the County is 40%.

Figure 34
Designated Cooling Centers by Participating Municipality

Name/Address	Name/Address
Coffeen	*Nokomis*
City Hall, 107 Locust St.	City Complex, 22 S. Cedar St.
Fire Station, 101 Locust St.	Jr./Sr. High School, 511 Oberle St.
Donnellson	North Elementary School, 110 W. Hamilton St.
---	South School/Cornerstone Academy, 316 E. South St.
Farmersville	St. Louis Parish Center, 523 E. Union St.
---	*Panama*
Hillsboro	---
Free Methodist Church, 1400 Seymour Ave.	*Raymond*
Moose Lodge, 411 S. Main St.	Fire Station, 121 E. Broad St.
The Zone, 206 S. Main St.	*Schram City*
Litchfield	---
City Hall, 120 E. Ryder St.	*Taylor Springs*
Community & Senior Center, 1100 S. State St.	Community Building, 613 E. Main St.
High School, 1705 N. State St.	*Waggoner*
National Guard Armory, 1617 N. Jefferson St.	---
LRM Missions Hospitality House, 1285 E. Union Ave.	*Witt*
	City Hall, 106A W. Broadway St.
	Fire Station, 226 N. Hirst St.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to extreme heat?

Yes. All of Montgomery County, including the participating municipalities, is vulnerable to the dangers presented by extreme heat. Since 2005, Montgomery County has experienced 19 extreme heat events.

What impacts resulted from the recorded extreme heat events?

The data provided by NOAA's Storm Events Database indicates that between 1995 and 2014, three of the 34 extreme heat events caused $55,000 in property damage and $410,000 in crop damage. Both the property and crop damage totals represent losses sustained in 21 counties (including Montgomery County). A breakdown by county was unavailable. Property damage information was either unavailable or none was recorded for the remaining 31 reported occurrences.

Extreme Heat Fast Facts – Impacts/Risk

Extreme Heat Events
- Total Property Damage: ***$55,000^***
- Infrastructure/Critical Facilities Damage: ***n/a***
- Total Crop Damage: ***$410,000^***
- Fatalities: ***8****
- Injuries: ***341****

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

^ The property and crop damage totals represent losses sustained during three separate events over a 21-county area (including Montgomery County). A detailed breakdown by county was not available.

* The fatality and injury totals represent losses sustained during five separate events over at least a 17-county area (including Montgomery County). A detailed breakdown by county was unavailable.

NOAA's Storm Events Database documented a total of eight fatalities and 341 heat-related injuries as a result of four extreme heat events. The fatality and heat-related injury totals represent losses sustained over a multi-county area (including Montgomery County). A breakdown by county was unavailable.

In comparison, Illinois averages 74 deaths per year as a result of extreme heat. Extreme heat has triggered more deaths than any other natural hazard in Illinois. More deaths are attributed to extreme heat than the combined number of deaths attributed to floods, tornadoes, lightning and extreme cold.

No other injuries or deaths were reported as a result of extreme heat in Montgomery County. This does not mean however that none occurred; it simply means that extreme heat was not identified as the primary cause. This is especially true for deaths. Usually heat is not listed as the primary cause of death, but rather an underlying cause. The heat indices were sufficiently high for all 34 extreme heat events to produce heat cramps or heat exhaustion with the possibility of heat stroke in cases of prolonged exposure or physical activity.

The level of risk or vulnerability posed by extreme heat to the public health and safety of the *general population* is considered to be low to medium. This assessment is based on the absence of designated cooling centers in some of the participating municipalities tempered by the fact that Montgomery County does not have 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 extreme heat to the public health and safety of *sensitive populations* is considered to medium to high. Sensitive populations such as the elderly, small children, individuals with chronic conditions, those on certain medication and persons with weight or alcohol problems are more susceptible to heat-related reactions and therefore their risk is elevated.

What other impacts can result from extreme heat events?

Other impacts of extreme heat include road buckling, power outages, stress on livestock, early school dismissals and school closings. In addition, extreme heat events can also lead to an increase in water usage and may result in municipalities imposing water use restrictions. In Montgomery County, extreme heat has the ability to impact seven municipal water supplies. Hillsboro and Litchfield rely solely on surface water (Lake Hillsboro, Glenn Shoals Lake, Lake Lou Yaeger and Lake Litchfield) to obtain their drinking water. Coffeen, Schram City and Taylor Springs purchase their water from Hillsboro. Donnellson and Panama purchase water from Greenville which obtains its drinking water from Governor Bond Lake.

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

No. In general, existing buildings, infrastructure and critical facilities located in the County and the participating municipalities are not vulnerable to extreme 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 extreme heat, in rare cases infrastructure and critical facilities may be directly or indirectly damaged. While uncommon, extreme heat has been known to contribute to damage caused to roadways within Montgomery County. The combination of extreme heat and vehicle loads has caused pavement cracking and buckling.

Extreme 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 Montgomery 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 extreme 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 extreme heat?

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

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

Unlike other natural hazards there are no standard loss estimation models or methodologies for extreme heat. With only two of the 34 recorded events listing property damage numbers for extreme heat, there is no way to accurately estimate future potential dollar losses. Since extreme heat typically does not cause structure damage, it is unlikely that future dollar losses will be excessive. The primary concern associated with extreme heat is the health and safety of those living in the County and municipalities, especially sensitive populations such as the elderly, infants, young children and those with medical conditions.

Figure 31
(Sheet 1 of 8)
Extreme Heat Events Reported in Montgomery County
1995 – 2014

Date(s)	Start Time	Magnitude	Injuries	Fatalities	Property Damage	Crop Damage
7/11/1995 thru 7/17/1995	12:00 p.m.	- a very hot and humid air mass settled over the region for nearly a week, producing high temperatures close to 100°F and heat indices approaching 120°F at times - COOP observer at Hillsboro recorded high temperatures ranging from 90°F to 101°F and low temperatures ranging from 63°F to 78°F - many roads throughout the region experienced buckling - crops withered with the dry weather - there was no widespread loss of livestock although dairy cows produced less milk and cattle/swine/chickens put on less weight - 95 heat-related injuries, $50,000 in property damage and $200,000 in crop damage was recorded over a 21 county area (including Montgomery County)	95[^]	0	$50,000[^]	$200,000[^]
7/28/1995 thru 7/31/1995	12:00 p.m.	- another heat wave moved through the area with heat indices at 110°F for several days - several people were treated in area hospitals for heat related illnesses, mainly across metropolitan areas just east of St. Louis - 30 heat-related injuries, $5,000 in property damage and $10,000 in crop damage was recorded over a 21 county area (including Montgomery County)	30[†]	0	$5,000[†]	$10,000[†]
Subtotal:			**125[^†]**	**0**	**$55,000[^†]**	**$210,000[^†]**

[^] The 95 heat-related injuries, $50,000 in property damages and $200,000 in crop damages resulting from the July 11-17, 1995 extreme heat event represent losses sustained over a 21 county area (including Montgomery County). A detailed breakdown by county was not available.

[†] The 30 heat-related injuries, $5,000 in property damages and $10,000 in crop damages resulting from the July 28-31, 1995 extreme heat event represent losses sustained over a 21 county area (including Montgomery County). A detailed breakdown by county was not available.

Figure 31
(Sheet 2 of 8)
Extreme Heat Events Reported in Montgomery County
1995 – 2014

Date(s)	Start Time	Magnitude	Injuries	Fatalities	Property Damage	Crop Damage
8/9/1995 thru 8/24/1995	1:00 p.m.	- a heat wave developed during most of the middle of August with high temperatures near the 100°F mark and heat indices over 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 89°F to 97°F and low temperatures ranging from 72°F to 77°F between the 9th and the 19th - area crops suffered greatly from the hot and dry weather - 2 heat-related deaths, 97 heat-related injuries, and $200,000 in crop damage was recorded over a 21 county area (including Montgomery County)	97[§]	0	n/a	$200,000[§]
7/18/1999 thru 7/31/1999	12:00 p.m.	- a heat wave gripped the region the last 2 weeks of July – temperatures remained in the middle to upper 90s with a few days topping 100°F and the heat indices ranged from 105°F to near 115°F - COOP observer at Hillsboro recorded high temperatures ranging from 89°F to 100°F and low temperatures ranging from 68°F to 80°F - 8 heat-related deaths and 119 heat-related injuries were recorded over a 17 county area – most the deaths and injuries occurred in the Metro East area, primarily in Madison and St. Clair Counties	119[^]	8[^]	n/a	n/a
7/7/2001 thru 7/10/2001	11:00 a.m.	- the first heat wave of the summer gripped the region with temperatures peaking in the middle to upper 90s and heat indices ranging from 105°F to 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 93°F to 98°F and low temperatures ranging from 70°F to 76°F	n/a	n/a	n/a	n/a
Subtotal:			**216[§][^]**	**8[^]**	**$0**	**$200,000[§]**

[§] The 97 heat-related injuries and $200,000 in crop damages resulting from the August 9-24,1995 extreme heat event represent losses sustained over a 21 county area (including Montgomery County). A detailed breakdown by county was not available.

[^] The 119 heat-related injuries and 8 fatalities resulting from the July 1999 extreme heat event represent losses sustained over a 17 county area (including Montgomery County). A detailed breakdown by county was not available.

Figure 31
(Sheet 3 of 8)
Extreme Heat Events Reported in Montgomery County
1995 – 2014

Date(s)	Start Time	Magnitude	Injuries	Fatalities	Property Damage	Crop Damage
7/17/2001	11:00 a.m.	- a one-day heat wave hit as temperatures climbed into the lower to middle 90s and very humid conditions pushed the heat indices into the 110°F to 115°F range - COOP observer at Hillsboro recorded a high temperature of 93°F and a low temperature of 71°F	n/a	n/a	n/a	n/a
7/29/2001 thru 8/2/2001	11:00 a.m.	- the 3rd heat wave of the month hit the region with high temperatures in the lower to middle 90s and the humidity pushing the heat indices to between 105°F and 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 90°F to 94°F and low temperatures ranging from 71°F to 75°F	n/a	n/a	n/a	n/a
8/7/2001 thru 8/9/2001	12:00 a.m.	- another heat wave hit the area with high temperatures in the lower to upper 90s and the heat indices ranging from 102°F to 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 92°F to 96°F and low temperatures ranging from 73°F to 74°F	n/a	n/a	n/a	n/a
8/21/2001 thru 8/22/2001	12:00 a.m.	- the last heat wave of the summer hit the area – temperatures reached the hottest of the summer with highs in the middle 90s to around 100°F and heat indices ranging from 105°F to 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 85°F to 98°F and low temperatures ranging from 61°F to 71°F	n/a	n/a	n/a	n/a
7/8/2002 thru 7/9/2002	11:00 a.m.	- a two day heat wave hit the area with high temperatures in the middle to upper 90s and heat indices ranging from 105°F to 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 94°F to 97°F and low temperatures ranging from 69°F to 76°F	n/a	n/a	n/a	n/a
7/20/2002 thru 7/22/2002	11:00 a.m.	- another heat wave enveloped the area with high temperatures in the middle to upper 90s and heat indices ranging from 105°F to 115°F - COOP observer at Hillsboro recorded high temperatures ranging from 94°F to 97°F and low temperatures ranging from 71°F to 77°F	n/a	n/a	n/a	n/a
Subtotal:			**0**	**0**	**$0**	**$0**

Figure 31
(Sheet 4 of 8)
Extreme Heat Events Reported in Montgomery County
1995 – 2014

Date(s)	Start Time	Magnitude	Injuries	Fatalities	Property Damage	Crop Damage
7/26/2002 thru 8/6/2002	11:00 a.m.	- a heat wave blanketed the region with high temperatures in the middle to upper 90s and heat indices ranging from 105°F to near 115°F - there was a one day break in the heat as a weak cold front dropped temperatures back into the 80s on July 29; however temperatures quickly rebounded and remained high into August - COOP observer at Hillsboro recorded high temperatures ranging from 83°F to 97°F and low temperatures ranging from 67°F to 77°F	n/a	n/a	n/a	n/a
8/15/2003 thru 8/21/2003	12:00 p.m.	- a late summer heat wave hit the area with high temperatures in the middle to upper 90s and heat indices ranging from 105°F to 110°F - the heat wave hit as most schools were opening, resulting in many schools reducing their schedule to a half day while a few closed altogether - COOP observer at Hillsboro recorded high temperatures ranging from 91°F to 99°F and low temperatures ranging from 65°F to 74°F	n/a	n/a	n/a	n/a
8/24/2003 thru 8/28/2003	12:00 p.m.	- the heat returned to the area with high temperatures pushing into the middle 90s to around 100°F and heat indices ranging from 105°F to 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 90°F to 98°F and low temperatures ranging from 62°F to 73°F	n/a	n/a	n/a	n/a
7/20/2004 thru 7/22/2004	12:00 p.m.	- a heat wave hit region with temperatures in the lower to middle 90s and the heat indices ranging from 105°F to 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 89°F to 95°F and low temperatures ranging from 68°F to 78°F	n/a	n/a	n/a	n/a
7/20/2005 thru 7/26/2005	12:00 p.m.	- a significant heat wave hit the region - COOP observer at Hillsboro recorded high temperatures ranging from 93°F to 99°F and low temperatures ranging from 71°F to 78°F	n/a	n/a	n/a	n/a
Subtotal:			**0**	**0**	**$0**	**$0**

Figure 31
(Sheet 5 of 8)
Extreme Heat Events Reported in Montgomery County
1995 – 2014

Date(s)	Start Time	Magnitude	Injuries	Fatalities	Property Damage	Crop Damage
7/17/2006 thru 7/21/2006	12:00 p.m.	- a heat wave hit the region with temperatures ranging from the middle 90s to around 100°F and heat indices ranging from 100°F to close to 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 83°F to 96°F and low temperatures ranging from 71°F to 76°F	n/a	n/a	n/a	n/a
7/30/2006 thru 8/2/2006	12:00 p.m.	- excessive heat returned to the area with high temperatures in the upper 90s to around 100°F and heat indices ranging from 105°F to 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 100°F to 101°F and low temperatures ranging from 73°F to 78°F	n/a	n/a	n/a	n/a
8/4/2007 thru 8/16/2007	12:00 p.m.	- the first and only real heat wave of the summer enveloped the area with temperatures in the middle 90s to around 100°F and heat indices ranging from 105°F to 110°F - many schools across the area went to an early dismissal schedule in order to combat the heat - COOP observer at Hillsboro recorded high temperatures ranging from 89°F to 103°F and low temperatures ranging from 68°F to 78°F	n/a	n/a	n/a	n/a
6/21/2009 thru 6/27/2009	11:00 a.m.	- the first heat wave of the season produced high temperatures in the middle to upper 90s and heat indices averaging around 105°F	n/a	n/a	n/a	n/a
7/14/2010	12:00 p.m.	- a one-day heat wave hit the area with temperatures in the middle 90s and heat indices ranging from 105°F to 110°F - COOP observer at Hillsboro recorded a high temperature of 94°F and a low temperatures of 73°F	n/a	n/a	n/a	n/a
7/17/2010	12:00 p.m.	- another one-day heat wave hit the area with temperatures in the middle 90s and heat indices averaging around 105°F - COOP observer at Hillsboro recorded a high temperature of 93°F and a low temperatures of 71°F	n/a	n/a	n/a	n/a
Subtotal:			**0**	**0**	**$0**	**$0**

Figure 31
(Sheet 6 of 8)
Extreme Heat Events Reported in Montgomery County
1995 – 2014

Date(s)	Start Time	Magnitude	Injuries	Fatalities	Property Damage	Crop Damage
7/22/2010 thru 7/24/2010	12:00 p.m.	- a three-day heat wave hit the area with temperatures in the middle to upper 90s and heat indices ranging from 105°F to 110°F - COOP observer at Hillsboro recorded a high temperatures of 95°F and low temperatures ranging from 70°F to 78°F	n/a	n/a	n/a	n/a
8/2/2010 thru 8/4/2010	1:00 p.m.	- a short but intense heat wave hit the area with high temperatures on the 3rd and 4th near 100°F and heat indices around 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 87°F to 100°F and low temperatures ranging from 66°F to 76°F	n/a	n/a	n/a	n/a
8/8/2010 thru 8/14/2010	1:00 p.m.	- a significant heat wave gripped the area with high temperatures in the upper 90s to around 100°F and heat indices in the 110°F to 115°F range due to high moisture levels - COOP observer at Hillsboro recorded high temperatures ranging from 93°F to 99°F and low temperatures ranging from 64°F to 76°F	n/a	n/a	n/a	n/a
7/1/2011 thru 7/3/2011	12:00 p.m.	- a hot and humid air mass settled over the area the first three days of July with high temperatures in the lower to upper 90s and heat indices around 105°F - COOP observer at Hillsboro recorded high temperatures ranging from 89°F to 98°F and low temperatures ranging from 71°F to 76°F	n/a	n/a	n/a	n/a
7/10/2011 thru 7/12/2011	12:00 p.m.	- a short but intense heat wave hit the area with high temperatures in the upper 90s to around 100°F and hear indices ranging from 110°F to 115°F - COOP observer at Hillsboro recorded high temperatures ranging from 92°F to 97°F and low temperatures ranging from 65°F to 80°F	n/a	n/a	n/a	n/a
7/17/2011 thru 8/3/2011	12:00 p.m.	- a major heat wave hit the area lasting from mid-July into the beginning of August; high temperatures ranged from the lower 90s to around 100°F and night time temperatures hovering around 80°F; heat indices ranged from around 105°F to 115°F - COOP observer at Hillsboro recorded high temperatures ranging from 87°F to 100°F and low temperatures ranging from 69°F to 82°F	n/a	n/a	n/a	n/a
Subtotal:			**0**	**0**	**$0**	**$0**

Figure 31
(Sheet 7 of 8)
Extreme Heat Events Reported in Montgomery County
1995 – 2014

Date(s)	Start Time	Magnitude	Injuries	Fatalities	Property Damage	Crop Damage
8/31/2011 thru 9/3/2011	12:00 p.m.	- the last heat wave of the summer hit the region with high temperatures topping 100°F in many locations on the 31st and heat indices ranging around 105°F - COOP observer at Hillsboro recorded high temperatures ranging from 98°F to 100°F and low temperatures ranging from 69°F to 75°F	n/a	n/a	n/a	n/a
6/27/2012 thru 7/8/2012	12:00 p.m.	- some of the hottest temperatures in many years occurred the last 4 days of June and continued into July; nearly all reporting stations were over 100°F the last 3 to 4 days of June with most sites around 105°F; while the temperatures were high, the dry was very dry leading to heat indices that were not much different than the air temperature - COOP observer at Hillsboro recorded high temperatures ranging from 95°F to 104°F and low temperatures ranging from 67°F to 76°F	n/a	n/a	n/a	n/a
7/16/2012 thru 7/19/2012	12:00 p.m.	- excessive heat returned to the area with high temperatures between 100°F and 106°F and heat indices only a few degrees higher - COOP observer at Hillsboro recorded high temperatures ranging from 96°F to 102°F and low temperatures ranging from 75°F to 77°F	n/a	n/a	n/a	n/a
7/22/2012 thru 7/27/2012	12:00 p.m.	- after a brief break, excessive heat returned to the region once again with high temperatures ranging from 100°F to 108°F and heat indices only a few degrees higher - COOP observer at Hillsboro recorded high temperatures ranging from 92°F to 104°F and low temperatures ranging from 71°F to 80°F	n/a	n/a	n/a	n/a
8/30/2013 thru 9/1/2013	11:00 a.m.	- the first and only heat wave of the summer hit the area with high temperatures peaking around 100°F and heat indices ranging from 105°F to 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 98°F to 99°F and low temperatures ranging from 71°F to 74°F	n/a	n/a	n/a	n/a
Subtotal:			**0**	**0**	**$0**	**$0**

Figure 31
(Sheet 8 of 8)
Extreme Heat Events Reported in Montgomery County
1995 – 2014

Date(s)	Start Time	Magnitude	Injuries	Fatalities	Property Damage	Crop Damage
8/20/2014 thru 8/27/2014	12:00 p.m.	- a heat wave hit the region with high temperatures in the mid to upper 90s and the heat indices ranging from 105°F to 110°F - COOP observer at Hillsboro recorded high temperatures ranging from 87°F to 95°F and low temperatures ranging from 68°F to 76°F	n/a	n/a	n/a	n/a
Subtotal:			**0**	**0**	**$0**	**$0**

GRAND TOTAL:	**341‡**	**8‡**	**$55,000‡**	**$410,000‡**

‡ There were four (4) events where 341 heat-related injuries, 8 fatalities, $55,000 in property damage and $410,000 in crop damage were recorded and represent losses sustained by multiple counties (including Montgomery County). A detailed breakdown by county was not available.

Sources: 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.

3.4 TORNADOES

IDENTIFYING THE HAZARD

What is the definition of a tornado?

A tornado is a violently rotating column of air, usually characterized by a twisting, funnel-shaped cloud, that extends from the cloud formation of a thunderstorm to the ground. The strongest tornadoes have rotating wind speeds of more than 250 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. The average forward speed of a tornado is 30 mile per hour, but this may vary from nearly stationary to 70 miles per hour.

About 1,200 tornadoes hit the United States yearly. 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. Torndoes are known to blow off roofs, move cars and tractor trailers and demolish homes. Typically tornadoes cause the greatest damage to structures of light construction, such as residential homes. On average, tornadoes cause 70 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 35** 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 classifies the level of damage (one through eight) as calibrated by engineers and meteorologists to 28 different types of damage indicators (mainly various building types, towers/poles and trees.) The wind speeds assigned to each category are estimates, not measurements, based on the damage assessment. **Figure 35** identifies the Enhanced Fujita Scale.

Figure 35
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: National Oceanic and Atmospheric Administration, 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 St. Louis, Missouri is responsible for issuing ***tornado watches*** and ***warnings*** for Montgomery County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Watch.** A tornado watch is issued when conditions are favorable for tornadoes and severe thunderstorms to develop in the next several hours. It does not mean that a tornado is imminent, just that individuals need to be alert and prepared.
- **Warning.** A tornado warning is issued when a tornado has been spotted or indicated by radar. Warnings indicate imminent danger to life and property for those who are in the path of the tornado. Individuals should see shelter immediately.

PROFILING THE HAZARD

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

Figure 36, located at the end of this section, summarizes the previous occurrences as well as the extent or magnitude of tornado events recorded in Montgomery County. NOAA's Storm Events Database have documented 34 occurrences of tornadoes in Montgomery County between 1950 and 2014. In comparison, there have been 2,199 tornadoes statewide between 1950 and 2012.

Tornado Fast Facts – Occurrences

Number of Tornadoes Reported (1950 – 2014): ***34***

Highest F-Scale Rating Recorded: ***F3***

Most Likely Month for Tornadoes to Occur: ***April***

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

Average Length of a Tornado: ***5.18 miles***

Average Width of a Tornado: ***68 yards***

Average Damage Pathway of a Tornado: ***0.20 sq. mi.***

Longest Tornado Path in the County: ***30.0 miles (March 6, 1961)***

Widest Tornado Path in the County: ***200 yards (June 1, 1999; April 2, 2006; & April 19, 2011)***

Figure 37 charts the reported occurrences of tornadoes by magnitude. Of the 34 reported occurrences there were:

- Three – F3
- Seven – F2
- Seven – F1
- Eleven – F0
- Two – EF2
- Two – EF1
- Two – EF0

Figure 37
Tornadoes by Magnitude
1950 – 2014

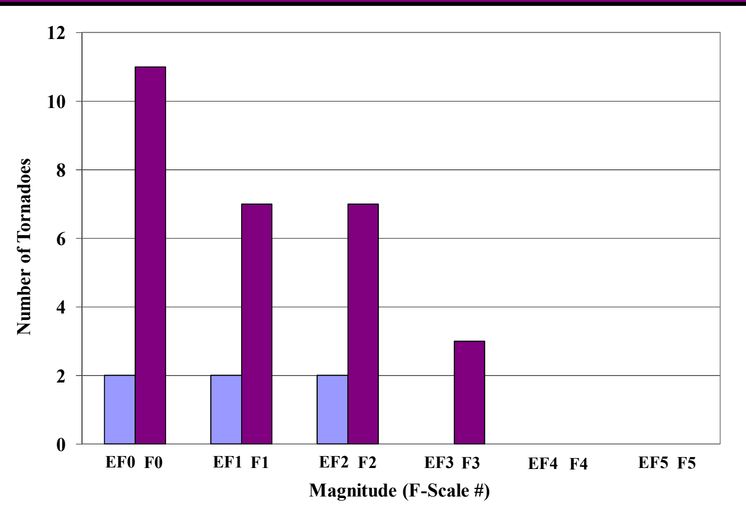


Figure 38 charts the reported tornadoes by month. Of the 34 events, 20 (59%) took place in April and May making this the peak period for tornadoes in Montgomery County. Of those 20 events, 12 (60%) occurred during April making this the peak month for tornadoes. In comparison, 1,457 of the 2,199 tornadoes (66%) recorded in Illinois since 1950 took place in April, May and June.

Figure 38
Tornadoes by Month
1950 – 2014

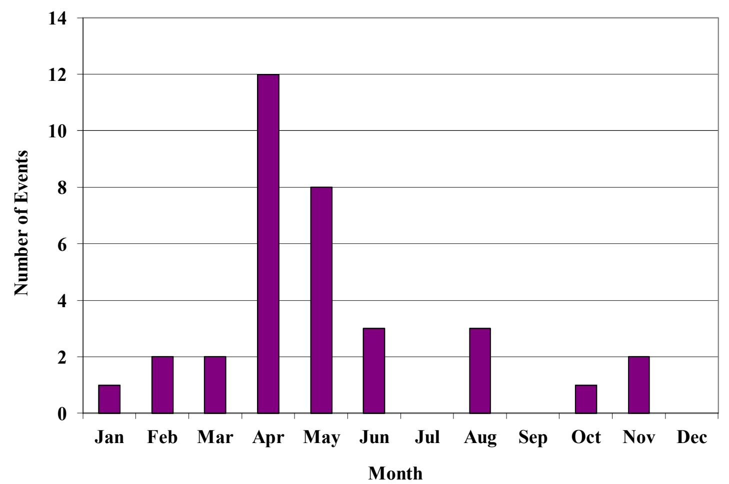
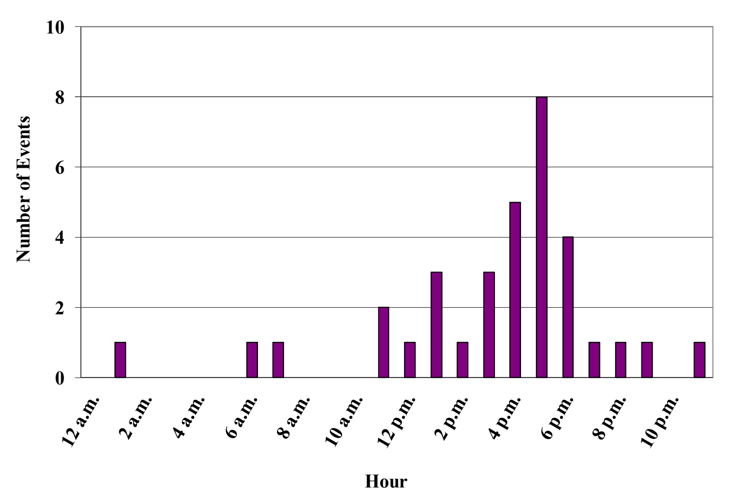


Figure 39 charts the reported tornadoes by hour. Approximately 85% of all tornadoes occurred during the p.m. hours, with 24 of the p.m. events (83%) taking place between 1 p.m. and 7 p.m. In comparison, more than half of all Illinois tornadoes occur between 3 p.m. and 7 p.m.

Figure 39
Tornadoes by Hour
1950 – 2014



The tornadoes that have impacted Montgomery County have varied from 0.1 miles to 30.0 miles in length and from 10 yards to 200 yards in width. The average length of a tornado in Montgomery County is 5.18 miles and the average width is 68 yards (0.039 miles).

Figures 40 shows the pathway of each reported tornado. The numbers by each tornado correspond with the tornado description in **Figure 36**. Unlike other natural hazards (i.e., severe winter storms, drought and extreme heat), tornadoes impact a relatively small area. Typically the area impacted by a tornado is less than four square miles. In Montgomery County, the average damage pathway or area impacted by a tornado is 0.20 square miles.

The longest tornado recorded in Montgomery County occurred on March 6, 1961. This F1 tornado measured 64.4 miles in length and touched down just north of Jerseyville (Jersey County) and traveled east-northeast through Macoupin County and into Montgomery County where it bypassed all populated areas before lifting off near the Montgomery County/Shelby County line, approximately 11 miles east-southeast of Witt. The tornado was on the ground in Montgomery County for approximately 30.0 miles. The damage pathway of this tornado covered an estimated 2.82 square miles, with approximately 1.31 square miles occurring in Montgomery County.

The widest tornado recorded in Montgomery County occurred on three different occasions: June 1, 1999; April 2, 2006; and April 19, 2011. The following provides a brief description of each tornado.

- ❖ On June 1, 1999 an F3 tornado measuring 200 yards wide and 10.0 miles long touched down west of Raymond and traveled northeast lifting off near the Montgomery County/Christian County line north of Harvel. The damage pathway of this tornado covered an estimated 1.14 square miles.
- ❖ An F2 tornado measuring 200 yards wide and 22.8 miles long touched down on April 2, 2006 on the south side of Hillsboro and traveled northeast, passing through the southwest tip of Shelby County before lifting off southwest of Pana in Christian County. The tornado was on the ground in Montgomery County for approximately 20.0 miles. The damage pathway of this tornado covered an estimated 2.59 miles, with approximately 2.27 miles occurring in Montgomery County.
- ❖ On April 19, 2011 an EF2 tornado measuring 200 yard and 3.5 miles long touched down southwest of Honey Bend and traveled east lifting off southeast of Honey Bend near Lake Lou Yaeger. The damage pathway of this tornado covered an estimated 0.40 square miles.

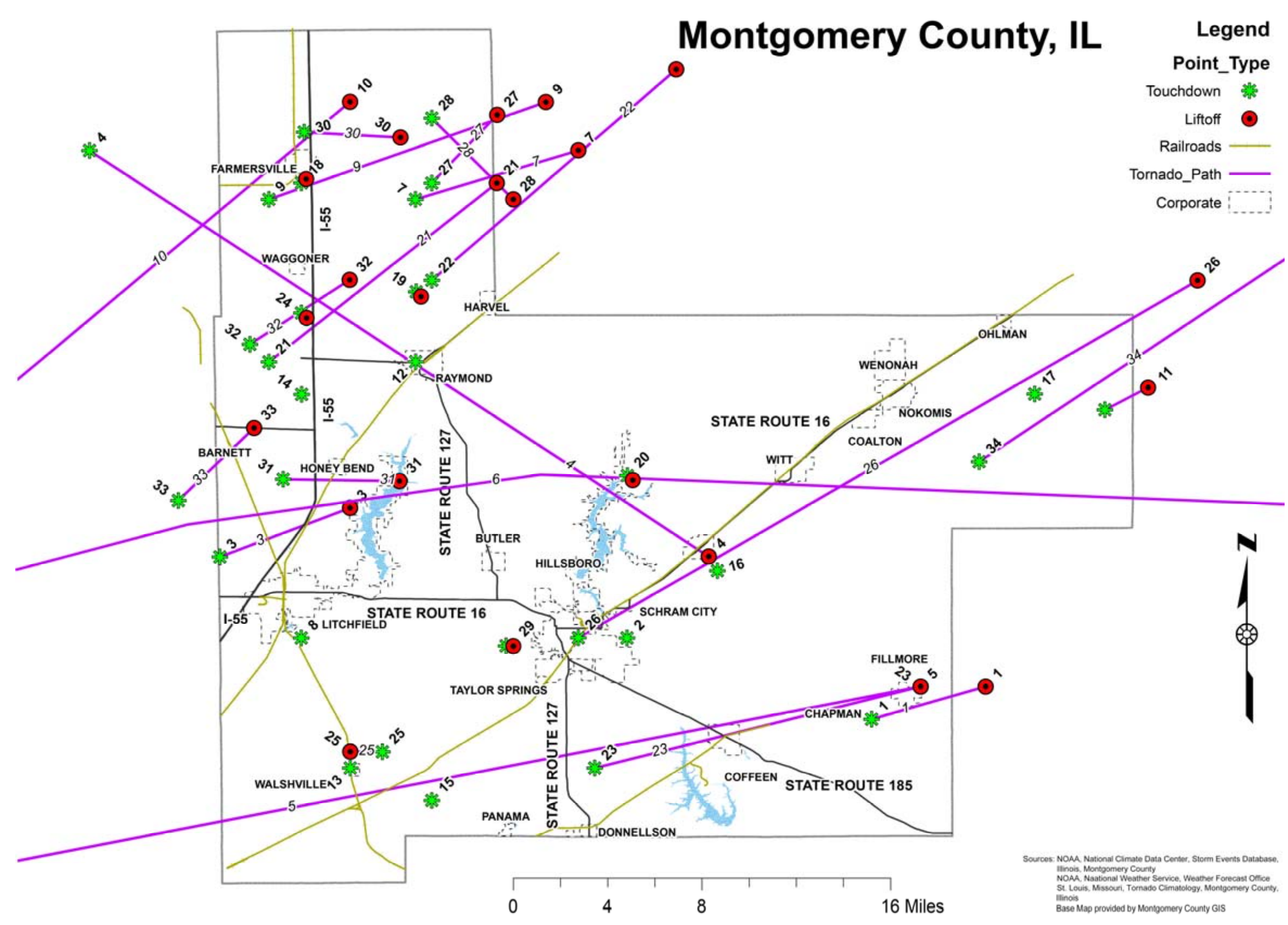
What locations are affected by tornadoes?

Tornadoes have the potential to affect the entire County. Six of the participating municipalities, Coffeen, Farmersville, Hillsboro, Litchfield, Raymond, and Schram City have had reported occurrences of tornadoes within their corporate limits. The *2013 Illinois Natural Hazard Mitigation Plan* prepared by IEMA classifies Montgomery County's hazard rating for tornadoes as "elevated."

What is the probability of future tornadoes occurring?

Montgomery County has had 34 verified occurrences of tornadoes between 1950 and 2014. With 34 tornadoes over the past 65 years, the probability or likelihood that a tornado will touchdown somewhere in the County in any given year is 52%. There were six years over the last 65 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 9%.

Figure 40
Tornado Touchdowns in Montgomery County



ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to tornadoes?

Yes. All of Montgomery County is vulnerable to the dangers presented by tornadoes. According to NOAA's Storm Events Database a majority of the tornadoes have touched down or passed through the northern half of the County. Coffeen, Farmersville, Hillsboro, Litchfield, Raymond, and Schram City are the only participating municipalities that have had a tornado touch down or pass through their municipal boundaries. **Figure 41** lists the verified tornadoes that have touched down in or near each participating municipality. In terms of unincorporated areas vulnerable to tornadoes, Barnett has had one tornado touch down in its vicinity while Chapman and Honey Bend have each had two tornadoes touch down in their vicinity.

Figure 41
Verified Tornado Touchdowns In or Near Participating Municipalities

Participating Municipality	Number of Verified Tornadoes	Year Tornado Touchdown
Coffeen	2	1959*, 2000*
Donnellson	1	2000
Farmersville	7	1964, 1976, 1978, 1996*, 2006, 2006, 2011
Hillsboro	2	2006*, 2010
Litchfield	4	1956, 1961, 1974*, 1993
Nokomis	4	1987, 1995, 2006, 2014
Panama	1	1995
Raymond	2	1959*, 1988, 1999
Schram City	1	1955
Taylor Springs	0	---
Waggoner	2	2005, 2013
Witt	2	1961, 2006

* Tornado touched down or passed through the municipality.

What impacts resulted from the recorded tornadoes?

Data obtained from NOAA's Storm Events Database and Committee Member records indicates that between 1950 and 2014, 15 of the 34 tornadoes caused $1,995,700 in property damage. Included in the property damage total is $525,000 in damages sustained as a result of three separate events (August 4, 1959, October 10, 1959 & May 12, 1978) and represents losses incurred in two or more counties (including Montgomery County.. A breakdown by county was unavailable.

There were four events where property damage totals were at least $250,000. Property damage information was either unavailable or none was recorded for the remaining 19 reported occurrences.

Included in the property damage figures provided above is $10,000 in verified infrastructure damage sustained by Farmersville during the EF2 tornado that occurred on April 19, 2011. The tornado damaged the ballpark bleachers and back stop as well as stop signs and other signs within the Village.

NOAA's Storm Events Database documented 15 injuries and three fatalities as a result of five tornado events. Detailed information on the injuries sustained was only available for four of the events. The following provides a brief description. In comparison, Illinois averages roughly four tornado fatalities annually; however, this number varies widely from year to year.

> **Tornado Fast Facts – Impacts/Risk**
>
> Tornado Impacts
> - Total Property Damage: ***$1,995,700***^
> - Infrastructure/Critical Facilities Damage*: ***$10,000***
> - Total Crop Damage: ***n/a***
> - Injuries: ***15***
> - Fatalities: ***3***
>
> Tornado Risk/Vulnerability to:
> - Public Health & Safety – Rural Areas: ***Low to Medium***
> - 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 $525,000 in damages sustained as the result of three separate events and represents losses incurred in two or more counties (including Montgomery County). A breakdown by county was not available.
>
> * Infrastructure/Critical Facilities Damage totals are included in the Total Property Damage amounts.

- Two men drown when an F1 tornado overturned their boat near Litchfield on April 28, 1956.
- On April 2, 1964 an individual sustained minor injuries when an F2 tornado ripped the roof off the Lone Elm School near Farmersville. Detailed information on the remaining three injuries associated with this event was unavailable.
- An F3 tornado overturned a two-truck on I-55 near Farmersville slightly injuring the driver and two passengers on March 20, 1976. Detailed information on the remaining injury associated with this event was unavailable.
- On June 1, 1999 an F3 tornado hit the rest area along I-55 west of Raymond overturning six tractor-trailer trucks, killing one driver and injuring four others.

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?

Montgomery County ranks in the top 25 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 relatively high. 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.

Montgomery County
For Montgomery County the level of risk or vulnerability posed by tornadoes to public health and safety is considered to be low to medium. This assessment is based on the fact that despite their relative frequency, 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 relatively 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, both St. Francis Hospital in Litchfield and Hillsboro Area Hospital in Hillsboro are equipped to provide continuous care to persons injured by a tornado assuming that they are not directly impacted. In addition, there are hospitals in Springfield (Sangamon County), Taylorville, (Christian County), Carlinville (Macoupin County), Greenville (Bond County), Vandalia (Fayette County), and the Metro East St. Louis area (Madison County) which are equipped to provide care.

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, with the exception of Hillsboro and Litchfield, all of the participating jurisdictions are small in size (less than 1 ½ square miles) 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.

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

Yes. All existing buildings, infrastructure and critical facilities located within the County and the participating municipalities are vulnerable to damage from tornadoes. 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 touchdown 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 of the tornado;
- the method used to estimate the area within each jurisdiction impacted by the tornado; 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 = 0.20 sq. miles

Size of Tornado: To calculate the number of existing residential structures vulnerable to a tornado, the size of 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 average tornado size will be used since it has a higher probability of recurring. In Montgomery County the average size of a tornado is 0.20 square miles. This average is based on over 60 years of data.

Assumption #2

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

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 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.

This method is quicker, easier and more likely to produce consistent results when the Plan is updated. 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

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

Method for Estimating Potentially-Damaged Housing Units: With the size of the tornado calculated and a method for estimating the area impacted chosen, a decision must be made on a method for estimating the number of potentially-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 calculations.

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 42** provides a sample calculation.

Figure 42
Calculation of Average Housing Unit Density

Total Housing Units ÷ Land Area = Average Housing Unit Density
(Rounded Up to the Nearest Whole Number)

Montgomery County: 13,080 housing units ÷ 703.687 sq. miles = 19 housing units/sq. mile

Figure 43 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.

Figure 43
Average Housing Unit Density by Participating Municipality

Jurisdiction	Total Housing Units (2010)	Mobile Homes (2000)*	Land Area (Sq. Miles) (2010)	Average Housing Unit Density (Units/Sq. Mile) (Raw)
Coffeen	315	58	1.191	264.48363
Donnellson	106	32	0.325	---
Farmersville	342	38	0.903	---
Hillsboro	2,029	54	6.552	309.67643
Litchfield	3,158	359	6.448	489.76427
Nokomis	1,070	37	1.304	820.55215
Panama	177	26	0.359	---
Raymond	457	19	1.321	345.95004
Schram City	295	21	0.733	---
Taylor Springs	282	51	1.004	280.87649
Waggoner	115	45	0.263	---
Witt	471	50	1.400	336.42857
Unincorp. County	3,432	315	676.047	5.07656
County	13,080	1,209	703.685	18.58781

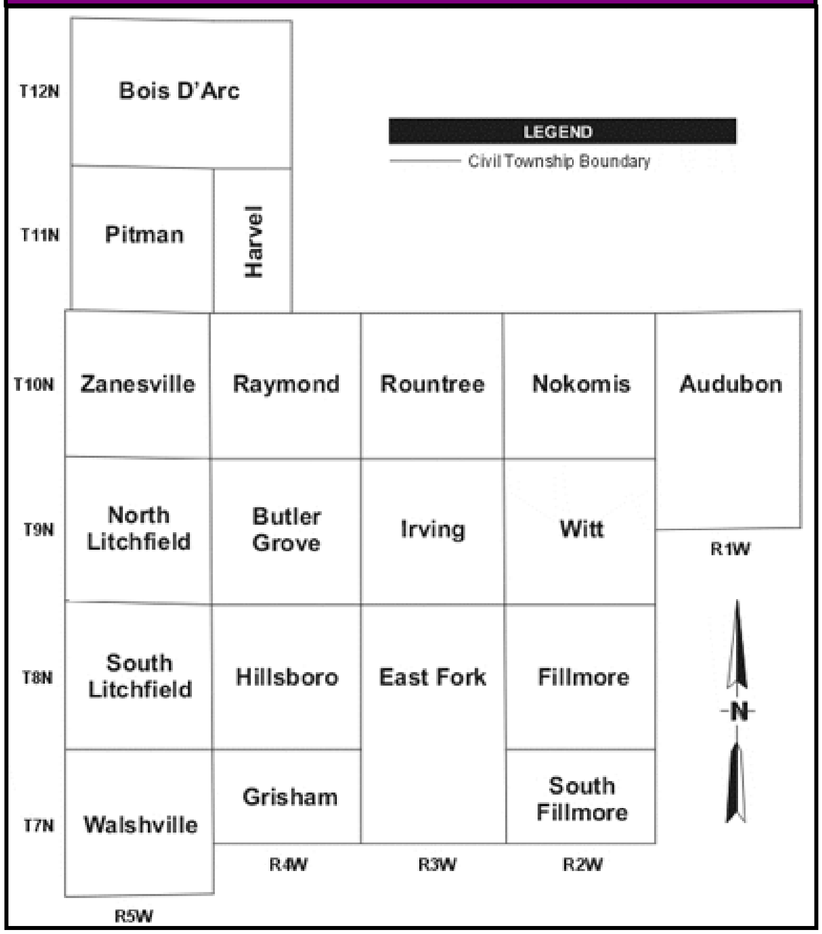
Source: U. S. Census Bureau.

* At the time this Plan was drafted the U.S. Census Bureau had not released the 2010 Census DP-4 Selected Housing Characteristics data tables for geographic type: place (i.e., municipalities.). It was decided that the 2000 census data would be used in its place instead of estimates for mobile homes.

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 Montgomery County.

In Montgomery County, as well as many other central Illinois counties, there are pronounced differences in housing unit densities within the County. Approximately 68% of all housing units and 62% of all mobile homes are located in five of the County's 19 townships (East Fork, Hillsboro, Nokomis, North Litchfield and South Litchfield). **Figure 44** 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.

Figure 44
Montgomery County Township Boundaries



Source: Illinois Secretary of State.

This substantial difference in density skews the average *county* housing unit density in Montgomery County and is readily apparent when the average *county* housing unit density is compared to the average housing unit densities for each of the townships within the County. **Figure 45** provides a breakdown of housing unit densities by township and illustrates the differences between the various townships and the County as a whole.

For 14 of the 19 townships, the average *county* housing unit density is greater (in some cases considerably greater) than the average *township* housing unit densities. In addition, the average *county* housing unit density is considerably less than the housing unit densities for four of the five most populated townships.

Figure 45
Average Housing Unit Density by Township

Township	Total Housing Units (2010)	Mobile Homes (2000)*	Land Area (Sq. Miles) (2010)	Average Housing Unit Density (Units/Sq. Mile) (Raw)
Audubon	253	39	53.944	4.69005
Bois D'Arc	451	38	54.561	8.26598
Butler Grove	374	32	35.773	10.45481
East Fork	1,093	153	57.964	18.85653
Fillmore	290	38	36.379	7.97163
Grisham	318	56	24.371	13.04830
Harvel	124	8	18.021	6.88086
Hillsboro	2,508	120	36.151	69.37567
Irving	454	51	34.285	13.24194
Nokomis	1,386	48	36.400	38.07692
North Litchfield	2,315	115	36.110	64.10966
Pitman	227	61	36.410	6.23455
Raymond	545	19	36.061	15.11328
Roundtree	111	2	35.810	3.09969
South Fillmore	116	3	24.118	4.80969
South Litchfield	1,579	310	37.148	42.50565
Walshville	162	44	36.754	4.40768
Witt	585	57	36.768	15.91057
Zanesville	189	15	36.657	5.15590
County	13,080	1,209	703.685	18.58781
Townships – 5 most populated	8,881	746	203.773	43.58281
Townships – 14 least populated	4,199	463	499.912	8.39948

Source: U. S. Census Bureau.

* At the time this Plan was drafted the U.S. Census Bureau had not released the 2010 Census DP-4 Selected Housing Characteristics data tables for geographic type: county subdivisions (i.e., townships.). It was decided that the 2000 census data would be used in its place instead of estimates for mobile homes.

Estimating the Number of Potentially-Damaged Housing Units

With the 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 taking the average housing unit density and multiplying that by the average-sized tornado. **Figure 46** provides a sample calculation.

Figure 46
Calculation of Potentially-Damaged Existing Housing Units

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

Montgomery County: 18.58781 housing units/sq. mile x 0.20 sq. miles = 3.71756 housing units
(4 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, take the average area impacted by the tornado and divide that 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 47** provides a sample calculation.

Figure 47
Calculation of Potentially-Damaged Housing Units
for Municipalities Covering Less Than One Square Mile

Average Area Impacted (Sq. Miles) ÷ Land Area (Sq. Miles) = Impacted Land Area

Donnellson: 0.20 sq. mile ÷ 0.325 sq. miles = 0.615384615

Impacted Land Area x Total Housing Units = Potentially-Damaged Housing Units
(Rounded Up to the Nearest Whole Number)

Donnellson: 0.615384615 x 106 housing units = 65.23076923 housing units
(66 housing units)

Figures 48 and **49** 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 five 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.

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.).

Montgomery County

For Montgomery County the level of risk or vulnerability posed by tornadoes to existing buildings, infrastructure and critical facilities is consider to be medium to 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 as well as 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.

Figure 48
Estimated Number of Housing Units by Municipality Potentially Damaged by a Tornado

Participating Municipality	Total Housing Units (2010)	Land Area (Sq. Miles) (2010)	Average Housing Unit Density (Units/Sq. Mi.) (Raw)	Potentially-Damaged Housing Units (Units/0.20 Sq. Mi.) (Raw)	Potentially-Damaged Housing Units (Units/0.20 Sq. Mi.) (Rounded Up)
Coffeen	315	1.191	264.48363	52.89673	53
Donnellson	106	0.325	---	65.23077	66
Farmersville	342	0.903	---	75.74751	76
Hillsboro	2,029	6.552	309.67643	61.93529	62
Litchfield	3,158	6.448	489.76427	97.95285	98
Nokomis	1,070	1.304	820.55215	164.11043	165
Panama	177	0.359	---	98.60724	99
Raymond	457	1.321	345.95004	69.19001	70
Schram City	295	0.733	---	80.49113	81
Taylor Springs	282	1.004	280.87649	56.17530	57
Waggoner	115	0.263	---	87.45247	88
Witt	471	1.400	336.42857	67.28571	68
Unincorp. County	3,432	676.047	5.07657	1.01531	2
County	13,080	703.685	18.58781	3.71756	4

Participating Municipalities

In general if a tornado were to touchdown 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 of 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 four of the participating jurisdictions have building codes in place that will likely lessen the vulnerability of new buildings and critical facilities to damage from tornadoes, others do not.. However, even new buildings and critical facilities built to code are vulnerable to the risks posed by a high rated tornado.

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.

Figure 49
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/0.20 Sq. Mi.) (Raw)	Potentially-Damaged Housing Units (Units/0.20 Sq. Mi.) (Rounded Up)
Audubon	253	53.944	4.69005	0.93801	1
Bois D'Arc	451	54.561	8.26598	1.65320	2
Butler Grove	374	35.773	10.45481	2.09096	3
East Fork	1,093	57.964	18.85653	3.77131	4
Fillmore	290	36.379	7.97163	1.59433	2
Grisham	318	24.371	13.04830	2.60966	3
Harvel	124	18.021	6.88086	1.37617	2
Hillsboro	2,508	36.151	69.37567	13.87513	14
Irving	454	34.285	13.24194	2.64839	3
Nokomis	1,386	36.400	38.07692	7.61538	8
North Litchfield	2,315	36.110	64.10966	12.82193	13
Pitman	227	36.410	6.23455	1.24691	2
Raymond	545	36.061	15.11328	3.02266	4
Roundtree	111	35.810	3.09969	0.61994	1
South Fillmore	116	24.118	4.80969	0.96194	1
South Litchfield	1,579	37.148	42.50565	8.50113	9
Walshville	162	36.754	4.40768	0.88154	1
Witt	585	36.768	15.91057	3.18211	4
Zanesville	189	36.657	5.15590	1.03118	2
County	13,080	703.685	18.58786	3.71757	4
Townships – 5 most populated	8,881	203.773	43.58281	8.71656	9
Townships – 14 least populated	4,199	499.912	8.39948	1.67990	2

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 Montgomery 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.

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 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. **Figure 50** provides a sample calculation. The total assessed value is based on 2014 tax assessment information provided by the Montgomery County Supervisor of Assessments.

Figure 50
Calculation of Average Assessed Value

Total Assessed Value of Residential Buildings ÷ Total Housing Units = Average Assessed Value (Rounded to the Nearest Penny)

Coffeen: $4,283,870 ÷ 315 housing units = $13,599.59

To determine the average market value, the average assessed value is multiplied by three (the assessed value of a structure in Montgomery County is approximately one-third of the market value). **Figure 51** provides the average assessed value and average market value for each participating municipality as well as for the unincorporated areas of the County and the County as a whole.

Assumption #5

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

Structural Damage = 100%
Content Damage = 100%

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 gets complex and provides an additional complication when updating the Plan.

Figure 51
Average Market Value of Housing Units

Participating Jurisdiction	Total Assessed Value of Residential Buildings (2014)	Total Housing Units (2010)	Average Assessed Value (Raw)	Average Market Value (Raw)	Average Market Value (Rounded)
Coffeen	$4,283,870	315	$13,599.58730	$40,798.76190	$40,799
Donnellson	$982,363	106	$9,267.57547	$27,802.72641	$27,803
Farmersville	$7,936,042	342	$23,204.80117	$69,614.40351	$69,614
Hillsboro	$45,558,654	2,029	$22,453.74766	$67,361.24298	$67,361
Litchfield	$68,091,218	3,158	$21,561.50032	$64,684.50096	$64,685
Nokomis	$18,299,600	1,070	$17,102.42991	$51,307.28973	$51,307
Panama	$1,312,385	177	$7,414.60452	$22,243.81356	$22,244
Raymond	$11,331,074	457	$24,794.47265	$74,383.41795	$74,383
Schram City	$4,348,673	295	$14,741.26441	$44,223.79323	$44,224
Taylor Springs	$4,603,074	282	$16,322.95745	$48,968.87235	$48,969
Waggoner	$1,203,150	115	$10,462.17391	$31,386.52173	$31,387
Witt	$5,344,398	471	$11,346.91720	$34,040.75160	$34,041
Unincorp. County	$48,639,001	3,432	$14,172.20309	$42,516.60927	$42,517
County	$231,995,742	13,080	$17,736.67752	$53,210.03256	$53,210

Source: Durston, Ray, Montgomery County Supervisor of Assessments.

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 it by the percent damage (100%) to get the average structural damage per unit. Next the average structural damage per unit is then multiplied by the number of potentially-damaged housing units. **Figure 52** provides a sample calculation.

Figure 52
Structure **– Potential Dollar Loss Calculations**

Average Market Value per Housing Unit x Percent Damage = Average Structural Damage
Coffeen: $40,799 x 100% = $40,799 per Unit

Average Structural Damage x Number of Potentially-Damaged Housing Units =
Potential Dollar Losses – Structure
(Rounded to the Nearest Dollar)

Coffeen: $40,799 x 53 housing units = $2,162,347

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 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 53** provides a sample calculation.

Figure 53 ***Content* – Potential Dollar Loss Calculations**
½ (Average Market Value of a Housing Unit) x Percent Damage = Average Content Damage Coffeen: ½ ($40,799) x 100% = $20,399.50 per Unit
Average Content Damage x Number of Potentially-Damaged Housing Units = Potential Dollar Losses – Content (Rounded to the Nearest Dollar) Coffeen: $20,399.50 x 53 housing units = $1,081,174

Finally the ***total potential dollar losses*** may be calculated by adding together the potential dollar losses to the structure and content. **Figure 54** gives a breakdown of the total potential dollar losses by jurisdiction.

Figure 54
Estimated Potential Dollar Losses to Potentially-Damaged Housing Units from a Tornado

Participating Jurisdiction	Average Market Value (2014)	Potentially-Damaged Housing Units (Rounded Up)	Potential Dollar Losses		Total Potential Dollar Losses
			Structure	Content	
Coffeen	$40,799	53	$2,162,347	$1,081,174	$3,243,521
Donnellson	$27,803	66	$1,834,998	$917,499	$2,752,497
Farmersville	$69,614	76	$5,290,664	$2,645,332	$7,935,996
Hillsboro	$67,361	62	$4,176,382	$2,088,191	$6,264,573
Litchfield	$64,685	98	$6,339,130	$3,169,565	$9,508,695
Nokomis	$51,307	165	$8,465,655	$4,232,828	$12,698,483
Panama	$22,244	99	$2,202,156	$1,101,078	$3,303,234
Raymond	$74,383	70	$5,206,810	$2,603,405	$7,810,215
Schram City	$44,224	81	$3,582,144	$1,791,072	$5,373,216
Taylor Springs	$48,969	57	$2,791,233	$1,395,617	$4,186,850
Waggoner	$31,387	88	$2,762,056	$1,381,028	$4,143,084
Witt	$34,041	68	$2,314,788	$1,157,394	$3,472,182
Unincorp. County	$42,517	2	$85,034	$42,517	$127,551
County	$53,210	4	$212,840	$106,420	$319,260
Townships – 5 Most Populated	$53,210	9	$478,890	$239,445	$718,335
Townships – 14 Least Populated	$53,210	2	$106,420	$53,210	$159,630

For comparison, an estimate of potential dollar losses was also calculated for the entire County, the unincorporated portions of the County, and for the five most populated and the 14 least populated townships. As discussed previously, the estimate for the County is skewed because it does not take into consideration the differences in the housing density within the County.

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 Montgomery County would be expected to ***exceed at least $2.75 million*** in any of the participating municipalities.

Figure 36
(Sheet 1 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
1	1/3/1950	11:55 a.m.	Chapman^ Fillmore^	F3	3.0	130	3	0	$250,000	n/a	*Touchdown/Liftoff – Two Counties* Touched down in Montgomery County southwest of Fillmore and traveled east-northeast lifting off just west of Bingham in Fayette County – total length: 4.0 miles - 4 farm houses were reduced to splinters and several barns were destroyed
2	11/15/1955	3:35 p.m.	Schram City^	F1	n/a	n/a	0	0	$25,000	n/a	
3	4/28/1956	11:30 p.m.	Litchfield^	F1	5.0	33	0	2	$25,000	n/a	- damaged the roofs of 2 farm houses - threw two-ton grain bins 100 yards - overturned a boat with 5 men in it causing 2 of the men to drown
4	8/4/1959	6:15 a.m.	Raymond Irving	F2	21.0	33	0	0	$25,000[†]	n/a	*Touchdown/Liftoff – Two Counties* Touched down in Macoupin County at Girard and followed an intermittent path to the southeast traveling through Raymond and lifting off at Irving – total length: 26.7 miles - caused light to moderate damage in Raymond and near Irving
Subtotal:							**3**	**2**	**$325,000[†]**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

^ Tornado touchdown verified in the vicinity of this location(s).

[†] The $25,000 in property damages sustained as a result of the August 4, 1959 tornado represent losses sustained in two counties. A detailed breakdown by county was not available.

Figure 36
(Sheet 2 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
5	10/10/1959	5:15 p.m.	Walshville[^] Coffeen Fillmore	F2	24.0	50	0	0	$250,000[‡]	n/a	*Touchdown/Liftoff – Multiple Counties* Touched down in Madison County near Godfrey traveled northeast, crossing southeastern Macoupin County before lifting off at Fillmore in Montgomery County – total length: 48.7 miles - caused damage to a home and 2 farmsteads at Cofee
6	3/6/1961	1:30 a.m.	Litchfield[^] Butler[^] Witt[^]	F1	30.0	77	0	0	$500,000	n/a	*Touchdown/Liftoff – Multiple Counties* Touched down in Jersey County just north of Jerseyville and traveled east-northeast through Macoupin County into Montgomery County north of Hillsboro where it changed courses tracking east-southeast through Shelby County and into Cumberland County before lifting off approx. 5 miles southeast of Greenup – total length: 118.3 miles
Subtotal:							**0**	**0**	**$750,000[‡]**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

[^] Tornado touchdown verified in the vicinity of this location(s).

[‡] The $250,000 in property damages sustained as a result of the October 10, 1959 tornado represent losses sustained in two counties. A detailed breakdown by county was not available.

Figure 36
(Sheet 3 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
7	4/2/1964	7:45 p.m.	Farmersville^	F2	3.3	20	4	0	$25,000	n/a	*Touchdown/Liftoff – Two Counties* Touched down in Montgomery County southeast of Farmerville and traveled northeast lifting off just west of Morrisonville in Christian County– total length: 4.0 miles - damaged a farmhouse and outbuilding - ripped the roof off the Lone Elm School while about 25 people were inside – only one person sustained minor injuries - a coalhouse and heavy lumps of coal were carried away as well as hog houses
8	8/10/1974	1:50 p.m.	Litchfield	F2	3.0	20	0	0	$2,500	n/a	- destroyed a brick garage and chicken house - uprooted a tree while passing through a cemetery - blew lawn chairs and tree limbs into a house
Subtotal:							**4**	**0**	**$27,500**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

^ Tornado touchdown verified in the vicinity of this location(s).

Figure 36
(Sheet 4 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
9	3/20/1976	12:05 p.m.	Farmersville[^]	F3	7.3	27	4	0	$250,000	n/a	*<u>Touchdown/Liftoff – Two Counties</u>* Touched down in Montgomery County southwest of Farmerville and traveled east-northeast lifting off northwest of Morrisonville in Christian County– total length: 9.0 miles - caused considerable damage to farm homes, barns and sheds - overturned a tow-truck on I-55 slightly injuring the driver and 2 passengers
10	5/12/1978	4:20 p.m.	Farmersville[^]	F2	6.0	33	0	0	$250,000[*]	n/a	*<u>Touchdown/Liftoff – Two Counties</u>* Touched down in Macoupin County at Shipman and traveled northeast lifting off northeast of Farmersville in Montgomery County– total length: 33.9 miles
Subtotal:							**4**	**0**	**$500,000[*]**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

[^] Tornado touchdown verified in the vicinity of this location(s).

[*] The $250,000 in property damages sustained as a result of the May 12, 1978 tornado represent losses sustained in two counties. A detailed breakdown by county was not available; however narrative descriptions indicate that the tornado caused extensive damage in Macoupin County as well as one injury.

Figure 36
(Sheet 5 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
11	4/13/1987	7:30 a.m.	Nokomis[^]	F1	0.6	10	0	0	$25,000	n/a	<u>*Touchdown/Liftoff – Two Counties*</u> Touched down in Montgomery County east of Nokomis and traveled northeast lifting off northwest of Oconee in Shelby County– total length: 1.0 miles - demolished several farm buildings, including a 2-story barn
12	4/22/1988	5:39 p.m.	Raymond[^]	F0	0.3	20	0	0	n/a	n/a	tornado touched down briefly in an open area outside of the Village
13	5/12/1990	5:05 p.m.	Walshville	F2	0.3	100	0	0	$250,000	n/a	destroyed a 150 ft. long machine shed, grain silos and damaged other structures
14	8/19/1993	5:12 p.m.	Litchfield[^]	F0	0.1	35	0	0	n/a	n/a	tornado touched down near I-55 and IL Rte. 108
15	5/9/1995	5:38 p.m.	Panama[^]	F0	0.3	40	0	0	n/a	n/a	
16	5/9/1995	6:00 p.m.	Irving[^]	F0	0.3	40	0	0	n/a	n/a	
17	5/9/1995	6:15 p.m.	Nokomis[^]	F1	0.8	70	0	0	$8,200	n/a	- tornado struck 3 farms doing significant damage to several outbuildings - one farm lost a machine shed and a grain bin - homes on the farms suffered superficial roof damage
Subtotal:							**0**	**0**	**$283,200**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

[^] Tornado touchdown verified in the vicinity of this location(s).

Figure 36
(Sheet 6 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
18	2/26/1996	6:15 p.m.	Farmersville	F0	0	75	0	0	n/a	n/a	the roof of a house was damaged and the porch blown off
19	4/30/1997	2:05 p.m.	Harvel^	F0	0	25	0	0	n/a	n/a	tornado touched down in an open field
20	5/12/1998	9:16 p.m.	Irving^	F0	0	50	0	0	n/a	n/a	
21	6/1/1999	5:58 p.m.	Raymond^ Harvel^	F3	10.0	200	4	1	n/a	n/a	- tornado hit a rest area along I-55 overturning 6 tractor-trailer trucks, killing 1 driver and injuring 4 others - 2 trucks were also overturned just north of the rest area - caused damage at two farms – numerous barns and other outbuildings were destroyed and 1 house severely damaged
22	6/1/1999	6:11 p.m.	Harvel^	F0	2.0	50	0	0	n/a	n/a	*Touchdown/Liftoff – Two Counties* Touched down in Montgomery County northwest of Harvel and traveled northeast into Christian County where it intensified to an F1 before lifting off north of Palmer – total length: 13.1 miles - caused damage to trees and crops in Montgomery County
Subtotal:							**4**	**1**	**$0**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

^ Tornado touchdown verified in the vicinity of this location(s).

Figure 36
(Sheet 7 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
23	6/20/2000	1:40 p.m.	Donnellson^ Coffeen Chapman^ Fillmore	F0	10.0	50	0	0	n/a	n/a	- a grain bin was destroyed - trees and power lines were downed
24	4/12/2005	1:07 p.m.	Waggoner^	F0	0	40	0	0	n/a	n/a	tornado touched down in a field near the rest area on I-55
25	4/2/2006	4:41 p.m.	Walshville^	F0	1.0	50	0	0	n/a	n/a	destroyed a shed, caused minor roof damage to a home and downed a couple of trees
Subtotal:							**0**	**0**	**$0**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

^ Tornado touchdown verified in the vicinity of this location(s).

Figure 36
(Sheet 8 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
26	4/2/2006	4:50 p.m.	Hillsboro Schram City Irving^ Witt^ Nokomis^	F2	20.0	200	0	0	n/a	n/a	_Touchdown/Liftoff – Multiple Counties_ Touched down in Montgomery County on the south side of Hillsboro and traveled northeast, passing through southwest tip of Shelby County before lifting off southwest of Pana in Christian County – total length: 22.8 miles _Hillsboro_ - caused a narrow path of sign and window damage at a car dealership and two gas stations - blew metal sheeting into nearby trees at a home improvement store _Irving/Witt Area_ - destroyed barns _Nokomis Area_ - destroyed a metal shed - caused minor damage to machine shed - toppled and destroyed 2 high tension electric power line towers - destroyed a grain bin
Subtotal:							**0**	**0**	**$0**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

^ Tornado touchdown verified in the vicinity of this location(s).

Figure 36
(Sheet 9 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
27	4/2/2006	4:56 p.m.	Farmersville^	F1	2.0	100	0	0	n/a	n/a	*Touchdown/Liftoff – Two Counties* Touched down in Montgomery County east of Farmersville and traveled north-northeast into Christian County lifting off northwest of Morrisonville – total length: 2.5 miles - machine sheds and barns were heavily damaged at 3 farms along its path in Montgomery County
28	5/24/2006	3:05 p.m.	Farmersville^	F1	2.0	150	0	0	$100,000	n/a	*Touchdown/Liftoff – Two Counties* Touched down in Montgomery County northeast of Farmersville and traveled southeast before lifting off west of Morrisonville into Christian County – total length: 3.4 miles - destroyed 1 machine shed; damaged 2 houses, 2 barns and 3 other machine sheds
29	4/5/2010	3:14 p.m.	Hillsboro^	EF0	0.2	10	0	0	n/a	n/a	briefly touched down in a field
Subtotal:							**0**	**0**	**$100,000**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

^ Tornado touchdown verified in the vicinity of this location(s).

Figure 36
(Sheet 10 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
30	4/19/2011	5:12 p.m.	Farmersville	EF2	3.2	150	0	0	$10,000	n/a	- snapped 3 power poles just west of I-55 - a grain bin originally located just west of I-55 was rolled across the interstate and deposited in a tree line ¼ mile to the east of the interstate - a number of trees were also snapped or uprooted in the vicinity of the grain bin - destroyed/damaged 2 machine sheds *Farmersville* - Committee Member identified $10,000 in property damage to ball park bleachers and back stop, stop signs and other signs
Subtotal:							**0**	**0**	**$10,000**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

^ Tornado touchdown verified in the vicinity of this location(s).

Figure 36
(Sheet 11 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
31	4/19/2011	5:17 p.m.	Honey Bend^	EF2	3.5	200	0	0	n/a	n/a	- snapped off a dozen power poles on E. 2nd Rd. near intersection with N.17th Ave. - as it traveled along N. 17th Ave. it destroyed several outbuildings, shed and silos and caused minor to moderate damage to a couple of homes just west of I-55 - crossed I-55 knocking down several power lines onto the highway causing it to be shut down for about 4 hours until they could be removed - caused extensive damage to a two story log home just east of I-55 - further east several farmsteads had minor to moderate damage to homes, barns and other outbuildings - a farmstead off of Rugby Rd. sustained extensive damage and a large outbuilding was destroyed - caused minor damage to a home on Shady Ln.
Subtotal:							**0**	**0**	**$0**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

^ Tornado touchdown verified in the vicinity of this location(s).

Figure 36
(Sheet 12 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
32	5/31/2013	8:02 p.m.	Waggoner^	EF1	4.3	50	0	0	n/a	n/a	- several large trees were blown down ½ mile north of the intersection of CR 100E & 2200N - damaged 1 barn and a few outbuildings on Goby Ave. - severely damaged an outbuilding on Coalfield Ave. - tornado crossed I-55 blowing over 3 tractor trailers - damaged a farmstead on CR 2500N – windows were blown inward on the 2-story farm house and 2 machine sheds were severely damaged - downed large tree branches on E. Waggoner Rd.
33	11/17/2013	11:33 a.m.	Barnett^	EF0	1.0	50	0	0	n/a	n/a	*Touchdown/Liftoff – Two Counties* Touched down in Macoupin County southeast of Womac and traveled northeast into Montgomery County before lifting off northeast Barnett – total length: 4.0 miles - minor damage to power poles and 1 barn
Subtotal:							**0**	**0**	**$0**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

^ Tornado touchdown verified in the vicinity of this location(s).

Figure 36
(Sheet 13 of 13)
Tornadoes Reported in Montgomery County
1950 – 2014

Map No.	Date(s)	Start Time	Location(s)	Magnitude (Fujita Scale)	Length[1] (Miles)	Width (Yards)	Injuries	Fatalities	Property Damage	Crop Damage	Description
34	2/20/2014	4:09 p.m.	Nokomis^	EF1	6.3	50	0	0	n/a	n/a	<u>*Touchdown/Liftoff – Multiple Counties*</u> Touched down in Montgomery County southeast of Nokomis and traveled northeast, crossing the southwest tip of Shelby County into Christian County and then crossing back over into Shelby County, lifting off northwest of Henton – total length: 22.2 miles - caused structural damage to a garage - damaged a barn - blew down a double trussed metal transmission tower - downed several large trees
Subtotal:							**0**	**0**	**$0**	**$0**	
GRAND TOTAL							**15**	**3**	**1,995,700§**	**$0**	

[1] The length provided is only for the portion(s) of the tornado that occurred in Montgomery County.

^ Tornado touchdown verified in the vicinity of this location(s).

§ There were 3 events that occurred on August 4, 1959, October 10, 1959 and May 12, 1978 where $525,000 in property damages was sustained as a result of these tornadoes and represent losses sustained in two or more counties. A detailed description and breakdown by county was not available.

Sources: Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee Member responses to Montgomery County Natural Hazard Events Questionnaire.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Image and Publications System, Storm Data.
NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database.

3.5 FLOODS

IDENTIFYING THE HAZARD

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 Montgomery County?

There are two main types of flooding that affect Montgomery 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 results in the waterway overflowing 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 shear 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 scour out new channels. Flash flood-producing rains can also weaken soil and trigger mud slides 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 eater 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 channelizations 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.

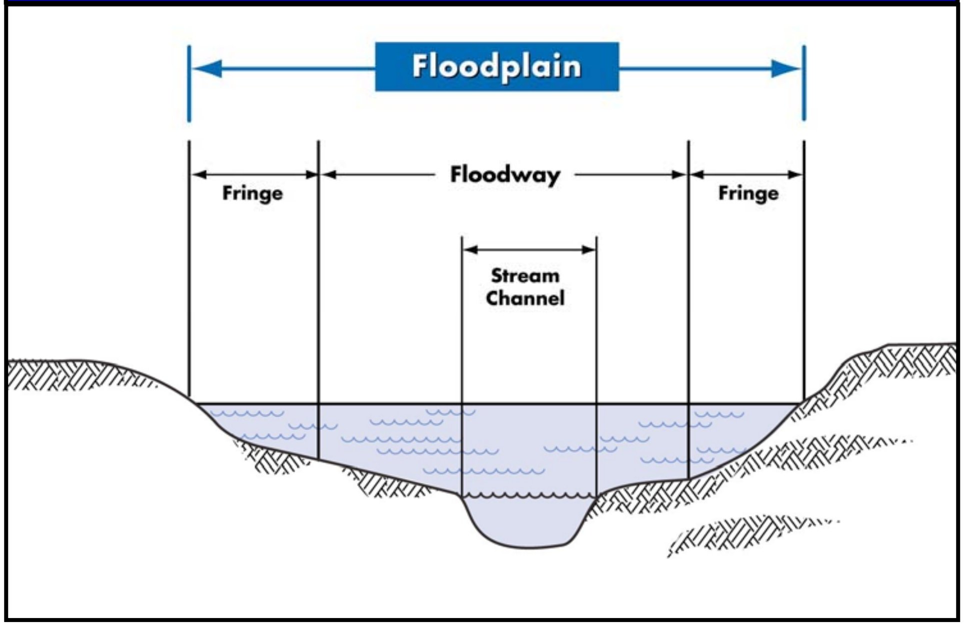
What is a floodplain?

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 55** illustrates the various components of a base floodplain.

Figure 55
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?

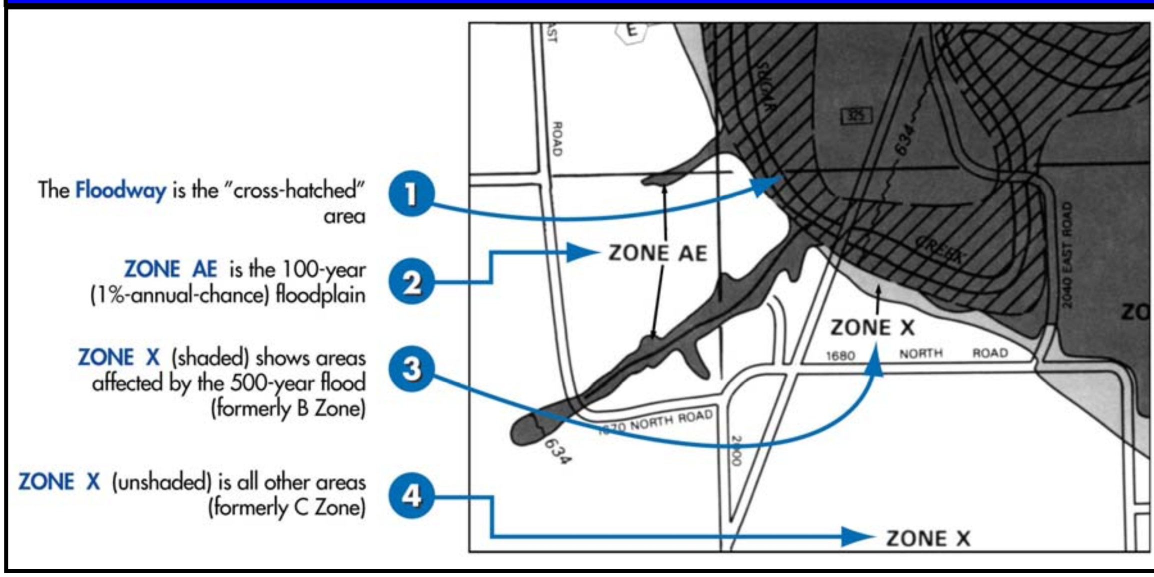
A Special Flood Hazard Area (SFHA) is the base floodplain. As discussed previously, this is the land area that is covered by the floodwaters of the base flood and has a 1% chance of flooding in any given year. The term SFHA is most commonly used when referring to the based floodplain on the Flood Insurance 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. Special Flood

Hazard Areas 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 Special Flood Hazard Areas 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 56** shows an example of a FIRM.

Figure 56
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 at a high risk for flooding.

During a 30 year period, the length of many mortgages, there is at least a 1 in 4 chance that a base flood will occur in a SFHA. All home and business owners in SFHAs with mortgages from federally regulated or insured lenders are required to purchase flood insurance.

- **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 1.3% of all policies, but are expected to account for 15% to 20% of future losses. 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 Special Flood Hazard Area (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 areas. 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%. Those discounts provide an incentive for new flood protection activities that can help save lives and property in the event of a flood.

Are alerts issued for flooding?

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

- **Watch.** A flash flood or flood watch is issued when current or developing hydrologic conditions are favorable for flooding to develop in or close to the watch area. It does not mean that flooding is imminent, just that individuals need to be alert and prepared.
- **Warning.** A flash flood or flood warning is issued when flooding is in progress, imminent or highly likely. Warnings indicate imminent danger to life and property for those who are in the area of the flooding.

PROFILING THE HAZARD

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

Flood Fast Facts – Occurrences

Number of General Floods Reported (1994 – 2014): ***0***

Number of Flash Floods Reported (1994 – 2014): ***15***

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

Most Likely Time for Flash Floods to Occur: ***Afternoon/ Early Evening***

Figure 57, located at the end of this section, summarize the previous occurrences as well as the extent or magnitude of flash flood events recorded in Montgomery County.

Flood events are usually separated and discussed as two categories, general floods (riverine and shallow/overland) and flash floods; however, in Montgomery County there were ***no general flood events recorded*** by NOAA's Storm Events Database for the reported time period from 1994 through 2014.

Flash Floods

NOAA's Storm Events Database and NWS's COOP data records documented 15 reported occurrences of flash flooding in Montgomery County between 1994 and 2014.

Figure 58 charts the reported occurrences of flash flooding by month. Seven (47%) of the 15 flash flood events took place in May and June. Of the seven events, four (57%) occurred in May, making this the peak month for flash flooding.

Figure 58
Flash Flood Events by Month

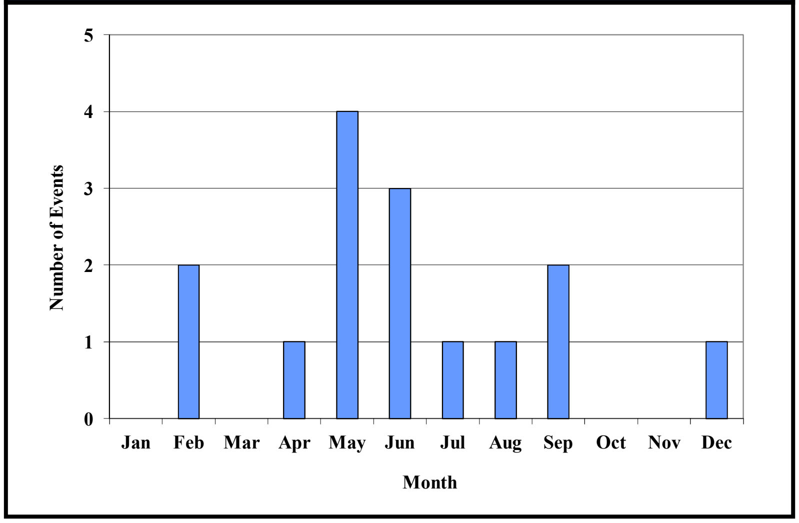
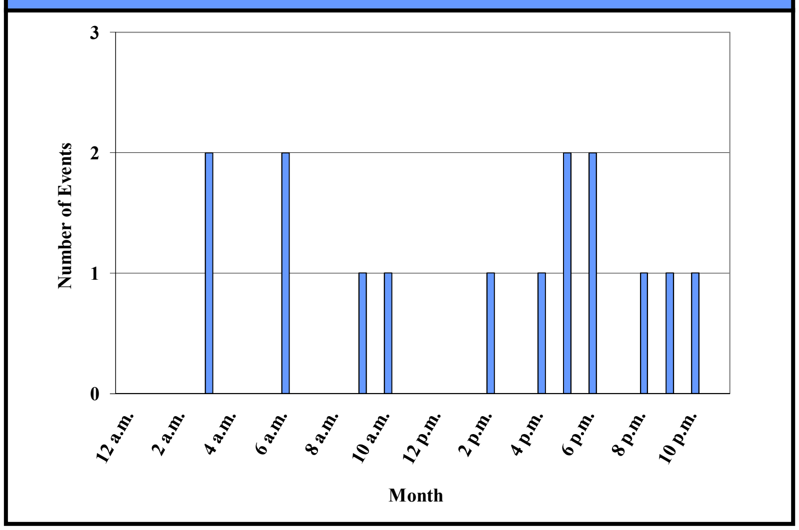


Figure 59 charts the reported occurrences of flash flooding by hour. Sixty percent (60%) of the flash flood events began during the p.m. hours with eight of the events (89%) taking place between 4 p.m. and 11 p.m.

Figure 59
Flash Flood Events by Hour



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. Only 2.8% of the area in Montgomery County is designated as being within the base floodplain and susceptible to riverine floods. The *2013 Illinois Natural Hazard Mitigation Plan* by IEMA classifies Montgomery County's hazard rating for floods as "guarded."

FIRMs have only been developed for three of the participating jurisdictions: Hillsboro, Litchfield and Nokomis. These maps were developed between 1985 and 1987 and are the current effective maps. 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 1980 and became effective on January 9, 1981. Copies of the County FHBMs are also located in **Appendix K**.

A portion of IL Rte. 16 outside of Nokomis was temporarily closed due water flowing over the road as a result of a flash flood event on December 28, 2015.

Photograph provided by the Montgomery County EMA Coordinator

No other FIRMs or FHBMs have been developed for any of the municipalities in Montgomery 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 60 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 located within a participating jurisdiction (as identified on the FIRMs and FHBMs) are identified in bold.

Figure 60
Bodies of Water Subject to Flooding

Participating Jurisdiction	Water Bodies
Coffeen	unnamed tributary East Fork Shoal Creek
Donnellson	Yankee Creek
Farmersville	**Macoupin Creek**
Hillsboro	**Middle Fork Shoal Creek**, **Glenn Shoals Lake**, Lake Hillsboro, **Shoal Creek**
Litchfield	**Lake Lou Yaeger**, Litchfield Lake, Walton Park Lake, **West Fork Shoal Creek**
Nokomis	**East Fork Shoal Creek**, **Tributary East Fork Shoal Creek**
Panama	Panama Lake
Raymond	**West Fork Shoal Creek**
Schram City	unnamed tributary Lake Hillsboro
Taylor Springs	unnamed tributary Middle Fork Shoal Creek
Waggoner	---
Witt	unnamed tributary East Fork Shoal Creek
Unincorporated Montgomery County	**Bearcat Creek**, **Blue Grass Creek**, **Brush Creek**, **Caesar Creek**, Chautauqua Lake, **Coffeen Lake**, **Cress Creek**, Crown Mine Pond, Dry Branch, **Dry Fork**, **East Branch**, **East Fork Shoal Creek**, **Elliott Creek**, Fillmore Lake, **Five Mile Lake**, Gilham Creek, **Grove Branch**, **Horse Creek**, **Hurricane Creek**, **Lake Fork**, **Lake Lou Yaeger**, **Lanes Branch**, **Little Creek**, Long Branch, **Macoupin Creek**, McDavid Branch, **Middle Fork Shoal Creek**, **Miller Creek**, Mud Creek, **Otter Branch**, Panama Lake, **Piatt Creek**, **Ramsey Creek**, Rocky Ford Lakes, **Shoal Creek**, **Shop Creek**, **Three Mile Branch**, Walton Park Lake, **Waveland Creek**, **West Branch Horse Creek**, **West Fork Shoal Creek**, Yankee Creek

Source: FEMA FIRMs & FHBMs.

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

Prior to the 1960s, overland flooding occurred frequently in Litchfield and Hillsboro. To combat the flooding, federal funds were obtained to help create Lake Lou Yaeger in Litchfield and Glen Shoals Lake in Hillsboro. The creation of these two bodies of water substantially reduced the impacts flooding had on these communities. **Figure 61** contains an article published in the Hillsboro Journal-News on June 18, 2015 discussing the historic flooding in Hillsboro during June, 1957.

Figure 61
The Journal-News: Remembering the Rains, Floods from June 1957

The Journal-News

Remembering The Rains, Floods From June 1957

This month's wet weather brought to mind another wet spring for Hillsboro farmer Harold Green: June 1957.

In one six-day period, according to *The Hillsboro Journal,* nearly seven inches of rain fell, including a four-inch soaking that began on June 14.

Mr. Green can remember water running over Route 16 just west of Hillsboro, and a photo printed on the front page of the June 17, 1957, edition of *The Hillsboro Journal* showed the entire Shoal Creek east fork out of its banks, flooding the Bremer bottoms and covering the North Road in places.

The 1957 rain also inundated the creek that runs through Hillsboro, flooding the Central Park pool and the dress factory on School Street just upstream.

Floods such as the one that followed the June 1957 rain provided much of the impetus behind the construction of Lake Lou Yaeger in Litchfield in 1964-66 and Glenn Shoals Lake in Hillsboro in 1976-78.

Date	H	L	Rain
June 11	90	67	.05
June 12	88	68	1.14
June 13	85	66	.47
June 14	85	67	.72
June 15	89	65	4.05
June 16	91	92	.40

This clipping taken from the June 17, 1957 edition of *The Hillsboro Journal* show nearly seven inches of rain fell in six days.

A much larger version of this photo was published on the front page of the June 17, 1957, edition of *The Hillsboro Journal.* The caption, in part, read "An indication of the vast amount of rich cropland that was flooded last weekend is shown in this picture taken just north of Hillsboro, looking south down the east branch of Shoal Creek. The circle in the lower left corner is the Hillsboro sewage disposal plant. The North Road, under water in several places, is shown in the center of the picture."

Source: Hillsboro Journal-News June 18, 2015

Do any of the participating jurisdictions take part in the NFIP?

Yes. Montgomery County, Hillsboro, Litchfield, Nokomis, and Witt all participate in the NFIP. **Figure 62** provides information about each jurisdiction's participation in the NFIP, including the date each participant joined and the year of the most recently adopted floodplain zoning ordinance.

Coffeen, Donnellson, Farmersville, Panama, Raymond, Schram City, Taylor Springs and Waggoner have no identified flood hazard boundaries within their corporate limits and are not required to participate.

Figure 62
NFIP Participating Jurisdictions

Participating Jurisdictions	Participation Date	Current Effective FIRM Date	CRS Participation	Most Recently Adopted Floodplain Zoning Ordinance
Montgomery County	02/03/2000	01/09/1981	No	1999
Hillsboro	08/19/1986	08/19/1986	No	1994
Litchfield	08/19/1985	08/19/1985	No	1998
Nokomis	08/2010	08/19/1987	No	2010
Witt	06/15/1998	n/a	No	1998

Sources: FEMA, Community Status Book.
Illinois Department of Natural Resources, Office of Water Resources, Statewide Floodplain Programs

What is the probability of future flood events occurring?

<u>*General Floods*</u>

Since there have been ***no recorded*** occurrences of general flooding between 1994 and 2014, it is difficult to specifically establish the probability of a future occurrences. It is highly likely that general flooding occurred during this time period but was either not recorded due to the rural nature of the County or was initially reported as flash flooding and a second record was not created to report subsequent riverine/overland flooding. Since general flooding has occurred in the past, it is most likely to occur again in the future.

The West Fork Shoal Creek has overflowed its banks on several occasion, flood this golf course near Raymond's wastewater treatment facility.

Photograph courtesy of the Hillsboro Journal-News

<u>*Flash Floods*</u>

There have been 15 verified occurrences of flash flooding between 1994 and 2014. With 15 occurrences over the past 21 years, the probability or likelihood of a flash flood event occurring in Montgomery County in any given year is 71%. There were three years over the past 21 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 14%.

ASSESSING VULNERABILITY

Several factors including topography, precipitation and an abundance of rivers and streams make Illinois especially vulnerable to flooding. Since the 1940s, Illinois climate records show an increase in heavy precipitation which has led to increased flood peaks on Illinois rivers.

Are the participating jurisdictions vulnerable to flooding?

Yes. Montgomery County, including the participating municipalities, is vulnerable to the dangers presented by flooding. Precipitation levels, a seasonal high water table, and a generally flat topography are all factors that cumulatively make virtually the entire County susceptible to some form of flooding. Flooding occurs along the floodplains of all the rivers and streams within the County as well as outside of the floodplains in low-lying areas where drainage problems occur due to culvert or drainage ditches that need improvement or proper maintenance.

Figure 63 details the number of *recorded* flash flood events by participating jurisdiction.

Figure 63
Verified Flash Flood Events by Participating Jurisdiction

Participating Municipality	Number	Year
Coffeen	0	---
Donnellson	0	---
Farmersville	0	---
Hillsboro	3	1995*, 2010, 2010
Litchfield	2	2010, 2010
Nokomis	1	1995*
Panama	0	---
Raymond	3	2008, 2008, 2010
Schram City	1	2010
Taylor Springs	0	---
Waggoner	2	2008,2010
Witt	2	1995*, 2010
countywide	9	1994, 1998, 2002, 2002, 2002, 2008, 2008, 2009, 2011

* Flash flood verified within the municipality.

Montgomery County's vulnerability to flooding was greatly reduced following a series of construction projects that began in the 1950s. Federal funds were used to help construct Lake Lou Yeager in Litchfield, Glenn Shoals Lake in Hillsboro and several dams along the Middle and West Forks of Shoal Creek. These projects helped reduce the number and severity of flood events within the County, especially in Litchfield and Hillsboro.

During the December 28, 2015 flash flood event, Glenn Shoals Lake overtopped Glenn Shoals Drive as the emergency spillway was utilized to handle the excess water.

Photograph provided by Montgomery County EMA Coordinator

While the frequency and severity of flooding is greater in most other counties, localized drainage problems remain in several municipalities where poorly drained soils and small creeks are present. The majority of these recurring drainage problems occur in Litchfield, Nokomis, Hillsboro and to a lesser extent in Raymond.

During the planning process to develop Litchfield's Comprehensive Plan (approved November 2007), drainage was identified as the most important infrastructure issue. According to the Comprehensive Plan, the lack of natural drainage features combined with the high density of development in most of Litchfield is attributed as the basis for these drainage problems. Recommendations listed within the Comprehensive Plan call for:

- evaluating the causes and remedies for alleviating drainage problems throughout the City;
- creating a drainage plan; and
- requiring all new developments to have a stormwater management plan.

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, 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.

What impacts resulted from the recorded floods?

The data obtained from NOAA's Storm Events Database and Planning Committee records indicates that between 1994 and 2014, five of the 15 flash flood events caused approximately $51.1 million in property damages. Included in the property damage total is $50 million for the April 1994 flash flood which represents losses sustained in eight counties (including Montgomery County). A breakdown by county was unavailable. Property Damage information was either unavailable or none was recorded for the remaining 10 reported occurrences.

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

<u>Flash Flood Impacts</u>

- Total Property Damage: ***$51,101,800***^
- Infrastructure/Critical Facilities Damage*: ***$1,100,000***
- Total Crop Damage: ***n/a***
- Injuries: ***0***
- Fatalities: ***1***

<u>Flood Risk/Vulnerability to:</u>

- Public Health & Safety – General Flooding: ***Low***
- Public Health & Safety – Flash Flooding: ***Medium***
- Buildings/Infrastructure/Critical Facilities: ***Medium/High***

^ Included in the property damage total is $50 million for the April 1994 flash flood event which represents losses sustained by 8 counties (including Montgomery County). A detailed breakdown by county was not available.

* Infrastructure/Critical Facilities Damage totals are included in the Total Property Damage amounts.

Included in the property damage figures provided above is $1.1 million in verified infrastructure and critical facilities damage sustained by the Montgomery County Highway Department as a result of two separate flash flood events: September 14, 2008 ($1 million) and February 11, 2009 ($100,000). A detailed damage assessment was not available for either event.

NOAA's Storm Events Database documented one fatality as a result of the April 11, 1994 flash event. A man traveling north near White Oak drowned when he tried to cross a flooded roadway and his car was swept off the road into Horse Creek. In comparison, the State of Illinois averages four fatalities per year and an estimated $257 million annually in property damage losses, making flooding the single most financially damaging natural hazard in Illinois.

While the number of injuries and fatalities associated with *flash flooding* are very low, there is very little warning associated with each event. As a result, the risk to public health and safety from flash floods is seen as medium. In terms of the risk or vulnerability to public health and safety from *general floods*, the risk is seen as low due to the lack of recorded events and the nature of riverine/overland floods.

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.

Flash flooding on September 13, 2008 flooded Litchfield Armory and OK Grain Elevator in Litchfield.

Photograph courtesy of the Hillsboro Journal-News

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 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.

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

Yes. According to information obtained from IEMA, there is one repetitive flood loss property located near Litchfield. As described previously, FEMA defines a "repetitive loss structure" as an NFIP-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.

This single family residence has incurred three flood insurance claim payments totaling $94,153 ($75,585 in structure payments and $18,568 in content payments). The exact location and/or address of the insured property is not included in this Plan to protect the owners' privacy.

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

Yes. **Figure 64** identifies the number of existing residential structures by participating jurisdiction located within a base floodplain. These counts were prepared by the consultant and are based on discussions with municipal leaders, law enforcement officials, public works staff, the Montgomery County supervisor of Assessments, the Montgomery County EMA coordinator and a limited number of current FIRMs. Aside from key roads and bridges and buried power and communication lines, no specific infrastructure/critical facilities are located within or adjacent to a floodplain.

Figure 64
Existing Residential Structures Located within a Base Floodplain

Participating Jurisdiction	Number of Residential Structures	Participating Jurisdiction	Number of Residential Structures
Coffeen	0	Panama	0
Donnellson	0	Raymond	0
Farmersville	0	Schram City	0
Hillsboro	25	Taylor Springs	0
Litchfield	0	Waggoner	0
Nokomis	12	Witt	0

Source: FEMA FIRMs

Only three of the jurisdictions within Montgomery County have current FIRMs: Hillsboro, Litchfield and Nokomis. These FIRMs were prepared between 1985 and 1987. None of the other municipalities have been mapped. While Flood Hazard Boundary Maps were developed in 1974 for the unincorporated portions of Montgomery County, FIRMs have not. As a result, estimates of existing residential structures in unincorporated Montgomery are not included. Only one other county in Illinois has a smaller percentage of acres located in the floodplain. This fact, coupled with the lack of mapping is the primary reason that there are so few residential structures located in the floodplain.

Water flows across South Main Street in downtown Hillsboro as a result of a flash flood event.

Photograph courtesy of the Hillsboro Journal-News

The original Plan (2010) estimated that Litchfield had 1,690 residential buildings vulnerable to flooding and drainage issues while Raymond had two. The measure was changed as part of the update process to existing residential structures located within a base floodplain to eliminate subjectivity in the estimating process.

While 2.8% of the land area in Montgomery 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 municipalities* can be calculated if several assumptions are made. These assumptions represent a probable scenario based on the reported occurrences of flooding in Montgomery County.

The purpose of providing an estimate is to help residents and municipal 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 in each of the municipalities.

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 within each municipality.

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 the most recent events have been recorded as flood floods, 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 municipality (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 within a municipality will flood and experience the same degree of flooding.

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

Generally speaking, a riverine flood event only affects one or two streams or creeks 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 stream or creek. However, for this scenario, it was decided that:

- ❖ all streams and creeks with base floodplains would overflow their banks, and
- ❖ the base floodplains of each stream and/or creek located within the corporate limits of each municipality would experience the same degree of flooding.

This assumption results in the following conditions for each municipality:

- ➢ Coffeen, Donnellson, Farmersville, Panama, Raymond, Schram City, Taylor Springs, Waggoner and Witt would not experience any residential flooding since there are no mapped stream or creek base floodplains located in their municipal limits;
- ➢ *Hillsboro*: Tributary Middle Fork Shoal Creek (shown as Shoals Creek on FIRM) would overflow its banks and flood a small portion along the eastern edge of the City;
- ➢ *Litchfield*: Would not experience any residential flooding based on the current FIRM (1985) since there are no stream or creek base floodplains located in the municipal boundaries shown on the FIRMs; and

➢ *Nokomis:* Tributary East Branch Shoal Creek would overflow its banks and flood a small portion along the southern edge of the City.

Assumption #3

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

Number of Potentially-Damaged Housing Units. Since this scenario assumes that a riverine flood will impact all of the base floodplains within a municipality, the number of potentially-damaged housing units can be determined by counting the number of existing residential structures located within the base floodplain(s) in each municipality. These counts were prepared by the consultant and are based on discussions with municipal leaders, law enforcement officials, public works staff, the Montgomery County Supervisor of Assessments, the Montgomery County EMA coordinator and a limited number of current FIRMs.

The following municipalities have existing residential buildings located within base floodplain(s) of their communities:

- ❖ Hillsboro has 25 residential structures located in the Tributary Middle Fork Shoal Creek base floodplain; and
- ❖ Nokomis has 12 residential structures located in the Tributary East Branch Shoal Creek base floodplain.

Assumption #4

The average market value for a residential structure in each municipality 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 in each municipality will be used to calculate the potential dollar losses.

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 in the jurisdiction. **Figure 65** provides a sample calculation. The total assessed value is based on 2014 tax assessment information provided by the Montgomery County Supervisor of Assessments.

Figure 65
Calculation of Average Assessed Value

Total Assessed Value of Residential Buildings ÷ Total Housing Units = Average Assessed Value (Rounded to the Nearest Penny)

Hillsboro: \$45,558,654 ÷ 3,158 housing units = \$17,102.43

To determine the average market value, the average assessed value is multiplied by three (the assessed value of a structure in Montgomery County is approximately one-third of the market value). **Figure 66** provides the average assessed value and average market value for each participating municipality.

Figure 66
Average Market Value of Housing Units

Participating Jurisdiction	Total Assessed Value of Residential Buildings (2014)	Total Housing Units (2010)	Average Assessed Value (Raw)	Average Market Value (Raw)	Average Market Value (Rounded)
Coffeen	$4,283,870	315	$13,599.58730	$40,798.76190	$40,799
Donnellson	$982,363	106	$9,267.57547	$27,802.72641	$27,803
Farmersville	$7,936,042	342	$23,204.80117	$69,614.40351	$69,614
Hillsboro	$45,558,654	2,029	$22,453.74766	$67,361.24298	$67,361
Litchfield	$68,091,218	3,158	$21,561.50032	$64,684.50096	$64,685
Nokomis	$18,299,600	1,070	$17,102.42991	$51,307.28973	$51,307
Panama	$1,312,385	177	$7,414.60452	$22,243.81356	$22,244
Raymond	$11,331,074	457	$24,794.47265	$74,383.41795	$74,383
Schram City	$4,348,673	295	$14,741.26441	$44,223.79323	$44,224
Taylor Springs	$4,603,074	282	$16,322.95745	$48,968.87235	$48,969
Waggoner	$1,203,150	115	$10,462.17391	$31,386.52173	$31,387
Witt	$5,344,398	471	$11,346.91720	$34,040.75160	$34,041

Source: Durston, Ray, Montgomery County Supervisor of Assessments.

Assumption #5

The potentially-damaged housing units are one or two story homes with basements and the flood depth is two feet.

Structural Damage = 20%
Content Damage = 30%

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.

For this scenario it is assumed that the potentially-damaged housing units are one or two story homes with basements and the flood depth is two feet. With these assumptions the expected percent damage sustained by the ***structure*** is estimated to be 20% and the expected percent damage sustained by the structure's ***contents*** is estimated to be 30%.

Calculations

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 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 67** provides a sample calculation.

Figure 67
***Structure* – Potential Dollar Loss Calculations**

Average Market Value Per Housing Unit x Percent Damage = Average Structural Damage

Hillsboro: $67,361 x 20% = $13,472.20 per unit

Average Structural Damage x Number of Potentially-Damaged Housing Units = Potential Dollar Losses – Structure (Rounded to the Nearest Penny)

Hillsboro: $13,472.20 per unit x 25 housing units = $336,805.00

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 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 68** provides a sample calculation.

Figure 68
***Content* – Potential Dollar Loss Calculations**

½ (Average Market Value Per Housing Unit) x Percent Damage = Average Content Damage

Hillsboro: ½ ($67,361) x 30% = $10,104.15 per unit

Average Content Damage x Number of Potentially-Damaged Housing Units = Potential Dollar Losses – Content (Rounded to the Nearest Penny)

Albany: $10,104.15 per unit x 25 housing units = $252,603.75

Finally the ***total potential dollar losses*** may be calculated by adding together the potential dollar losses to the structure and the content. **Figure 69** provides a breakdown of the total potential dollar losses by municipality.

This assessment illustrates the potential residential dollar losses that should be considered when municipalities are deciding which mitigation projects to pursue. Potential dollar losses caused by riverine flooding to vulnerable residences within the participating municipalities would be expected to range from $215,000 to $915,000. There are 10 participating municipalities in this scenario who do not have any residences considered vulnerable to riverine flooding.

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.

Figure 69 **Estimated Potential Dollar Losses to Potentially-Damaged Housing Units from a Riverine Flood Event**					
Participating Jurisdiction	**Average Market Value (2014)**	**Potentially-Damaged Housing Units**	**Potential Dollar Losses**		**Total Potential Dollar Losses (Rounded to the Nearest Dollar)**
			Structure	**Content**	
Coffeen	40,799	0	$ 0.00	$ 0.00	$ 0
Donnellson	27,803	0	$ 0	$ 0	$ 0
Farmersville	69,614	0	$ 0.00	$ 0.00	$ 0
Hillsboro	67,361	25	$336,805.00	$252,603.75	$915,622
Litchfield	64,685	0	$ 0	$ 0	$ 0
Nokomis	51,307	12	$123,136.80	$92,352.60	$215,489
Panama	22,244	0	$ 0.00	$ 0.00	$ 0
Raymond	74,383	0	$ 0	$ 0	$ 0
Schram City	44,224	0	$ 0.00	$ 0.00	$ 0
Taylor Springs	48,969	0	$ 0.00	$ 0.00	$ 0
Waggoner	31,387	0	$ 0	$ 0	$ 0
Witt	34,041	0	$ 0	$ 0	$ 0

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, none of the municipalities that are mapped have infrastructure within or adjacent to the base floodplain. However, the wastewater treatment in Raymond has experienced flooding issues. The potential dollar loss to relocate this facility is estimated at $8 million.

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 informed through the planning process to prepare the original Plan and conduct the five year update about the impacts that can result from flash flood events. Montgomery 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.

Figure 57
(Sheet 1 of 6)
Flash Flood Events Reported in Montgomery County
1994 – 2014

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Fatalities	Property Damages	Crop Damages
4/11/1994 thru 4/12/1994	5:00 p.m.	countywide	- 1.40 to 5.28 inches of very heavy rain fell in less than 6 hours resulting in flash flooding across most of central Illinois. COOP observer at Hillsboro measured 2.74 inches of rain. - Numerous homes were damaged and many roads were closed due to flooding. - One fatality was recorded in Montgomery County as a result of this event. A man traveling north near White Oak tried crossing a flooded roadway when his car went off the road into Horse Creek.	0	1	$50,000,000†	n/a
5/9/1995	6:44 p.m.	Hillsboro Irving Nokomis Witt	- A series of severe thunderstorms brought flash flooding to parts of the County. COOP observer at Hillsboro measured 1.75 inches of rain. - As much as 2 to 3 feet of water was over some roads prompting the Highway Department to close sections of IL Rte. 116 around Witt. - A 91 year-old woman had to be rescued at the "broken bridge" between Hillsboro and Irving after she attempted to cross the flood waters and her car got caught in the current.	0	0	$800	n/a
Subtotal:				**0**	**1**	**$50,000,800†**	**$0**

^ Flash flood event verified in the vicinity of this location(s).

† The property damage total of $50 million for the April 1994 flood event represents losses sustained in 8 counties (including Montgomery County.) A breakdown by county was not available.

Figure 57
(Sheet 2 of 6)
Flash Flood Events Reported in Montgomery County
1994 – 2014

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Fatalities	Property Damages	Crop Damages
8/4/1998 thru 8/5/1998	8:30 p.m.	countywide	- 3 to 7 inches of rain fell causing flash flooding across much of the County. 3 inches of rain was reported just south of Hillsboro and 7 inches was reported in Witt. COOP observer at Hillsboro measured 3.05 inches. - IL Rte. 16 in Witt had to be closed - One man was rescued from IL Rte. 16 when his truck was swept off the road. Luckily it came to rest on top of a guardrail, enabling firemen to rescue him. - Firefighters in Witt had to use sandbags to keep water out of the firehouse. - The north and south marinas at Glenn Shoals Lake had to be closed on the 5th due to high water. - Numerous basements were flooded across the region.	0	0	n/a	n/a
5/7/2002	3:30 a.m.	countywide	- 2 to 4 inches of heavy rain caused flash flooding across much of the County. COOP observer at Hillsboro measured 4.02 inches of rain between the 6th and 7th. - Numerous creeks and small streams in the area flooded closing area roads.	0	0	n/a	n/a
Subtotal:				**0**	**0**	**$0**	**$0**

^ Flash flood event verified in the vicinity of this location(s).

Figure 57
(Sheet 3 of 6)
Flash Flood Events Reported in Montgomery County
1994 – 2014

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Fatalities	Property Damages	Crop Damages
5/12/2002 thru 5/13/2002	6:00 p.m.	countywide	- Heavy rains produced flash flooding across the area - IL Rte. 16 was closed in areas east of Irving	0	0	n/a	n/a
5/27/2002	4:30 p.m.	countywide	- The 2nd consecutive day of 2 to 3 inches of rain caused flash flooding across much of the area. - Flooding was reported along IL Rte. 16 and IL Rte. 127 near Litchfield and Hillsboro.	0	0	n/a	n/a
2/5/2008	5:45 p.m.	Raymond^ Harvel^	- 2 to 3 inches of rain fell over portions of the County during the afternoon and evening hours causing flash flooding. - 6 to 8 inches of water was over IL Rte. 127 just west of Raymond	0	0	n/a	n/a
6/3/2008	6:07 a.m.	Waggoner^ Raymond^ Harvel^	- 2 inches of rain fell on already saturated soils in the County causing flash flooding. - Water was over several roads in the Raymond area including IL Rte. 48 west of the Village.	0	0	$1,000	n/a
Subtotal:				**0**	**0**	**$1,000**	**$0**

^ Flash flood event verified in the vicinity of this location(s).

Figure 57
(Sheet 4 of 6)
Flash Flood Events Reported in Montgomery County
1994 – 2014

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Fatalities	Property Damages	Crop Damages
9/14/2008	6:00 a.m.	countywide	- Flash flooding occurred across the area when up to 6 inches of rain from the remnants of Hurricane Ike fell on already saturated soils. COOP observer at Hillsboro measured 6.19 inches of rain from the 12th through the 14th, with 3.33 inches falling on the 14th. - Numerous roads were flooded countywide, especially in the Nokomis, Hillsboro, Litchfield, Witt and Raymond areas. - In Raymond, one person drove into the flood waters at the railroad underpass on IL Rte. 127 just south of IL Rte. 48 and got stuck. The individual managed to get out of his truck and get to dry land on his own. - Montgomery County Highway Department estimated that $1 million in damages resulted from the flooding.	0	0	$1,000,000	n/a
12/28/2008	9:00 a.m.	countywide	- Montgomery County Highway Department indicated that 1.8 inches of rain fell causing flash flooding within the County.	0	0	n/a	n/a
2/11/2009	10:00 a.m.	countywide	- 2 inches of rain fell across the area causing flash flooding according to the Montgomery County Highway Department. COOP observer at Hillsboro measured 2.02 inches on the 11th. - Montgomery County Highway Department estimated that $100,000 in damages resulted from the flooding	0	0	$100,000	n/a
Subtotal:				**0**	**0**	**$1,100,000**	**$0**

^ Flash flood event verified in the vicinity of this location(s).

Figure 57
(Sheet 5 of 6)
Flash Flood Events Reported in Montgomery County
1994 – 2014

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Fatalities	Property Damages	Crop Damages
6/14/2010	2:40 p.m.	Butler^ Hillsboro^ Schram City^ Irving^ Witt^	- Between 2 and 3 inches of rain fell in a short amount of time on already saturated soils causing flash flooding. COOP observer at Hillsboro measured 1.86 inches. - Numerous roads were flooded including IL Rte. 16 between Hillsboro and Witt	0	0	n/a	n/a
7/24/2010 thru 7/25/2010	9:30 p.m.	Litchfield^ Butler^ Hillsboro^	- Up to 3 inches of rain fell in a short amount of time causing flash flooding. COOP observer at Hillsboro measured 4.81 inches. - Numerous roads were flooded including the intersection of IL Rte. 127 and IL Rte. 16. 1 to 2 feet of water was reported at this location.	0	0	n/a	n/a
9/2/2010	10.30 p.m.	Waggoner^ Raymond^ Litchfield^	- Up to 3 inches of rain fell in a short amount of time causing flash flooding. - Several roads were flooded including East 1st Rd. near N. 20th Ave. near Raymond.	0	0	n/a	n/a
Subtotal:				**0**	**0**	**$0**	**$0**

^ Flash flood event verified in the vicinity of this location(s).

Figure 57
(Sheet 6 of 6)
Flash Flood Events Reported in Montgomery County
1994 – 2014

Date(s)	Start Time	Location(s)	Magnitude	Injuries	Fatalities	Property Damages	Crop Damages
6/18/2011	3:00 a.m.	countywide	- Up to 3 inches of rain fell in a short amount of time causing flash flooding. COOP observer at Hillsboro measured 1.92 inches. - Numerous roads were flooded including IL Rte. 16 about a mile northeast of Irving and viaducts in Hillsboro and Raymond.	0	0	n/a	n/a
Subtotal:				**0**	**0**	**$0**	**$0**

GRAND TOTAL:	**0**	**1**	**$51,101,800†**	**$0**

^ Flash flood event verified in the vicinity of this location(s).

† The property damage total of $50 million for the April 1994 flood event represents losses sustained in 8 counties (including Montgomery County.) A breakdown by county was not available.

Sources: 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.
Ruben Boehler, Montgomery County Highway Engineer.

3.6 DROUGHTS

IDENTIFYING THE HAZARD

What is the definition of a drought?

While there is no universally accepted definition of drought, it can generally be defined as a period of unusually persistent dry weather that continues long enough to cause serious problems such as crop damage and/or water supply shortages. A drought may also be defined as the cumulative deficit of precipitation relative to what is normal for a region over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group or environmental sector.

There are four types of drought. 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 a period of well-below-average precipitation that spans a few months to a few years. It can be identified by a shortfall in precipitation. 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 is a period when soil moisture no longer meets the needs of a particular crop to germinate and grow. It can be identified by a deficit in soil moisture.
- **Hydrological Drought.** Hydrological drought is a period when surface and subsurface water supplies (i.e., streams, lakes, aquifers, etc.) drop below normal levels. It can be identified by a deficit in surface and groundwater.
- **Socioeconomic Drought.** Socioeconomic drought is a period when water shortages begin to affect people. In this case, there is not enough water to meet human and environmental needs.

The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. It is generally difficult to pinpoint the beginning and the end of a drought. Because the impacts of a drought accumulate slowly at first, a drought may not be recognized until it has become well established. Even during a drought there may be one or two months with above average precipitation totals. These wet months do not necessarily signal the end of a drought and generally do not have a major impact on moisture deficits.

Droughts can be short, lasting just a few months, or they can persist for several years before regional climate conditions return to normal. While drought conditions can occur at any time throughout the year, the most apparent time is during the summer months. Nationally, drought impacts often exceed $1 billion due in part to the sheer size of the areas affected.

How are droughts measured?

There are several quantitative measures (indices) that have been developed to measure drought in the United States. How these indices measure drought depends on the discipline affected (i.e., agriculture, hydrology, meteorology, etc.) and the region being considered. Although none of the major indices are inherently superior to the rest, some are better suited than others for certain uses. Two of the indices highlighted in this plan are:

- the Palmer Drought Severity Index (PDSI) and
- the U.S. Drought Monitor.

The PDSI was the first comprehensive drought index developed in the United States and is still in use today. It is designed to indicate when weather conditions have been abnormally dry or wet and provides a standardized method of identifying and comparing drought conditions regardless of time or location.

The U.S. Drought Monitor 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. In the last several years, NOAA has begun including the U.S. Drought Monitor's drought intensity ratings along with the weather information provided for drought events recorded with the National Climate Data Center.

The following provides a more detailed discussion of these two indices to aid the plan's developers and the general public in understanding how droughts are identified and categorized. The information used to prepare this section utilizes one or both of these indices to identify previous drought events recorded in the County.

Palmer Drought Severity Index (PDSI)

The Palmer Drought Severity Index (PDSI), developed in 1965, was the first comprehensive drought index used in the United States. The PDSI is a long-term meteorological index that indicates when weather conditions have been abnormally dry or abnormally wet. It is most effective at measuring impacts that are sensitive to soil moisture conditions, such as agriculture.

The PDSI is calculated based on precipitation and temperature data, as well as the local available water content of the soil and the cumulative patterns of previous months. The index ranges from +4 (extremely moist) to -4 (extreme drought). **Figure 70** shows the classification system utilized by the PDSI.

The PDSI has been useful as a drought monitoring tool and many federal and state agencies rely on it to trigger drought relief programs. It provides a standardized method to measure moisture conditions so that comparisons can be made between various locations and times. The PDSI is most useful when working with large areas of uniform topography. It is not as well suited for use in the western states, with their mountainous terrain and varying climate extremes.

Figure 70
Palmer Classification System

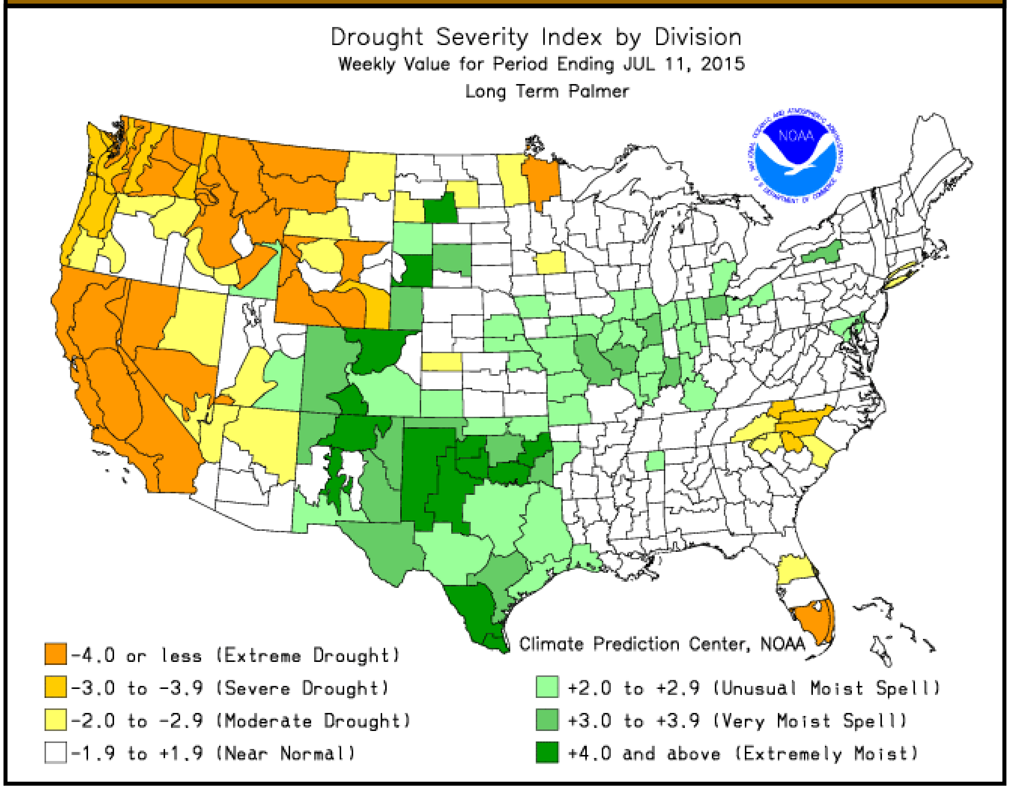
Index Value	Description
4.00 or more	extremely wet
3.00 to 3.99	very wet
2.00 to 2.99	moderately wet
1.00 to 1.99	slightly wet
0.50 to 0.99	incipient wet spell
0.49 to -0.49	near normal
-0.50 to -0.99	incipient dry spell
-1.00 to -1.99	mild drought
-2.00 to -2.99	moderate drought
-3.00 to -3.99	severe drought
-4.00 or less	extreme drought

Source: National Drought Mitigation Center.

Calculations of the PDSI are made for 350 climate divisions in the United States and Puerto Rico. PDSI values have typically been calculated on a monthly basis. The National Climate Data Center has records on the monthly PDSI values for every climate division in the United States dating back to 1895.

In addition to the monthly calculations, weekly PDSI values are now being calculated for the climate divisions during every growing season. NOAA's Climate Prediction Center produces a weekly map that shows the climate divisions and their PDSI value by color. **Figure 71** shows an example of this map.

Figure 71
Palmer Drought Severity Index Map



Source: National Weather Service, Climate Prediction Center.

U.S. Drought Monitor

A relatively new index used for assessing drought conditions is the U.S. Drought Monitor. The U.S. Drought Monitor is unique in that it blends multiple numeric measures of drought with the best judgments of experts to create a weekly map that depicts drought conditions across the United States. It began in 1999 as a federal, state and academic partnership, growing out of a Western Governors' Association initiative to provide timely and understandable scientific information on water supplies and drought for policymakers.

The U.S. Drought Monitor is produced jointly 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. Five drought intensity categories, D0 through D4, are utilized to identify areas of drought. **Figure 72** provides a brief description of each category.

Figure 72
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.

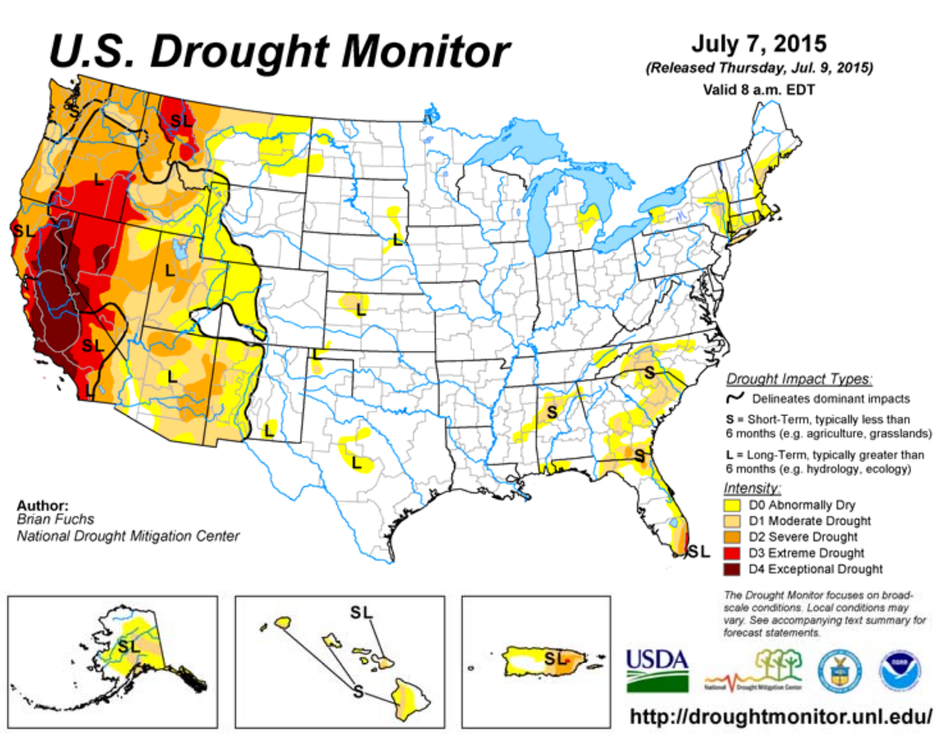
The drought intensity categories are based on five key indicators, numerous supplementary indictors and local reports from more than 350 expert observers around the Country. The five key indicators include the Palmer Drought Severity Index, Climate Prediction Center's Soil Moisture Model (percentiles), United States Geological Survey Weekly Streamflow (percentiles), Standardized Precipitation Index and Objective Short and Long-term Drought Indicator Blends (percentiles).

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 weekly map 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 73** shows an example of the U.S. Drought Monitor weekly map.

The U.S. Drought Monitor is designed to provide a general and up-to-date overview of current drought conditions. It is not designed to depict local conditions. As a result, there could be water shortages or crop failures within areas not designated as drought, just as there could locations with adequate water supplies in an area designated as D3 or D4.

Figure 73
U. S. Drought Monitor Map



Map Courtesy of NDMC-UNL.

PROFILING THE HAZARD

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

Drought Fast Facts – Occurrences

Number of Drought Events Reported (1983 – 2014): ***4***

According to NOAA's Storm Events Database, the Illinois State Water Survey, the Illinois Emergency Management Agency (IEMA) and the USDA there have been four official drought events reported for Montgomery County between 1983 and 2014. The following provides a summary of these previous occurrences as well as the extent or severity of each event.

- In 1983, all 102 Illinois counties were proclaimed state disaster areas because of high temperatures and insufficient precipitation beginning in mid-June. USDA crop yield statistics indicates that soybean and corn yields were 37 to 56 percent lower than the previous year.
- In 1988, approximately half of all Illinois counties (including Montgomery County) were impacted by drought conditions, although none of the counties were proclaimed state disaster areas. Lower than normal precipitation levels were recorded between April and

June and unusually dry weather conditions persisted throughout the summer months. Soybean and corn yields were 26 to 37 percent lower than the previous year, according to USDA crop yield statistics.

- In 2005, drought conditions impacted much of the state, including Montgomery County. A dry winter and spring developed into full-blown drought conditions by the end of May. On May 31, 2005 Montgomery County was designated as D1 – moderate drought. The drought conditions for the County were downgraded to D0 – abnormally dry on September 27, 2005. Abnormally dry to moderate drought conditions continued throughout the rest of the winter into the spring before the designation were removed on April 11, 2006.

  On July 27, 2005 the USDA designated 93 counties in Illinois as primary natural disaster areas due to the damage and losses caused by drought. While Montgomery County was not one of the designated counties, it did qualify for natural disaster assistance because it was contiguous to the disaster area. According to USDA crop yield statistics, soybean and corn yields were 10 to 12 percent lower than the previous year.

- In 2012, drought conditions impacted all of Illinois and most of the Midwest. On June 19, 2012 Montgomery County was designated as D1 – moderate drought and upgraded to D2 – severe drought on July 10, 2012 due to an abnormally warm and dry spring. Two weeks later, on July 24, 2012 the County was classified as D3 – extreme drought due to the continued hot and dry conditions.

  Extreme drought conditions continued through August before being downgraded to D1 – moderate drought on September 4, 2012. On October 30, 2012 the County was downgraded to D0 – abnormally dry with that designation being removed on November 13, 2012.

  Crop stress was extreme for corn and soybeans during this event. On August 1, 2012 the USDA designated 66 counties in Illinois, including Montgomery County, as primary natural disaster areas due to damage and losses caused by drought and excessive heat. Soybean and corn yields were 3 to 47 percent lower than the previous year according to USDA crop yield statistics.

The Illinois State Water Survey records indicate that droughts also occurred in the region in 1931, 1934, 1936 and 1954; however, the extent to which Montgomery County was impacted was unavailable.

What locations are affected by drought?

Drought events affect the entire County. Droughts, like extreme heat and severe winter storms, tend to impact large areas, extending across an entire region and affecting multiple counties. The *2013 Illinois Natural Hazard Mitigation Plan* classifies Montgomery County’s hazard rating for drought as “guarded.”

What is the probability of future drought events occurring?

Montgomery County has experienced four droughts between 1983 and 2014. With four occurrences over 32 years, the probability or likelihood that the County may experience a drought in any given year is 12.5%. However, if earlier recorded droughts are factored in, then the probability that Montgomery County may experience a drought in any given year decreases to 9.5%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to drought?

Yes. All of Montgomery County 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 2005 Montgomery County has experienced two droughts.

What impacts resulted from the recorded drought events?

Damage information was only available for one of the four drought events experienced between 1983 and 2014. According to an estimate developed by the Montgomery County Farm Bureau, the University of Illinois Extension Service serving Christian, Jersey, Macoupin & Montgomery Counties, and the Montgomery County Soil and Water Conservation District in conjunction with the Consultant, the 2012 drought caused $72.3 million in crop damage to corn. Damage information was either unavailable or none was recorded for the remaining three reported occurrences.

Drought Fast Facts – Impacts/Risk

Drought Impacts
- Total Property Damage: ***n/a***
- Infrastructure/Critical Facilities Damage*: ***n/a***
- Total Crop Damage: ***$72.3 million***

Drought Risk/Vulnerability to:
- Public Health & Safety: ***Low***
- Buildings/Infrastructure/Critical Facilities: ***Low***

* Infrastructure/Critical Facilities Damage totals are included in the Total Property Damage amounts.

Of the four 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.

No injuries or fatalities were reported as a result of any of the recorded drought events in Montgomery County. 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.

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.

Crop Yield Reductions

Agriculture is an important enterprise in Montgomery County. Farmland accounts for approximately 84% of all the land in the County. According to the 2012 Census of Agriculture, there were 1,021 farms in Montgomery County occupying 382,388 acres. Of the land in farms, approximately 91% or 346,716 acres is in crop production. Based on past Census of Agricultures, less than 1.0% of the land in crop production is irrigated.

According to the 2012 Census of Agriculture, crop sales accounted for 178.7 million in revenue while livestock sales accounted for $48.6 million. Montgomery County ranks 28th in Illinois for crop cash receipts and 20th for livestock cash receipts. A severe drought would have a great 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, 2005-2006, and 2012 droughts. **Figure 74** illustrates the reduction yields seen for corn and soybeans during the four recorded drought events.

Figure 74
Crop Yield Reductions Due to Drought in Montgomery County

Year	Corn		Soybeans	
	Yield (bushel)	% Reduction Previous Year	Yield (bushel)	% Reduction Previous Year
1982	132.0	--	37.5	--
1983	**58.0**	**56.1%**	**23.5**	**37.3%**
1984	112.0	--	30.0	--
1987	128.0	--	34.0	--
1988	**80.0**	**37.5%**	**25.0**	**26.5%**
1989	127.0	--	38.0	--
2004	181.0	--	50.0	--
2005	**159.0**	**12.2%**	**45.0**	**10.0%**
2006	**139.0**	**12.6%**	47.0	--
2007	154.0	--	**37.0**	**21.3%**
2010	156.3	--	55.5	--
2011	**138.6**	**11.3%**	**44.2**	**20.4%**
2012	**73.2**	**47.2%**	**42.5**	**3.8%**
2013	182.9	--	50.0	--

Source: USDA, National Agricultural Statistics Service.

Records obtained from the USDA's National Agricultural Statistics Service show that the 1983 drought resulted in corn yield reductions of 56.1% and soybean yield reductions of 37.3% while the 1988 drought resulted in corn yield reductions of 37.5% and soybean yield reductions of 26.5%. In 2005, the drought caused a 12.2% reduction in corn yields and a 10.0% reduction in soybean yields. The 2012 drought caused corn yield reductions of 47.2% and soybean yield reductions of 3.3%.

Drinking Water Shortages

Municipalities that rely on surface water sources for their drinking water supplies are more vulnerable to shortages as a result of drought. In Montgomery County ***seven participating municipalities rely on surface water sources*** for their drinking water supplies. Hillsboro and Litchfield rely solely on surface water (Lake Hillsboro, Glenn Shoals Lake, Lake Lou Yaeger and Lake Litchfield) to obtain their drinking water. Coffeen, Schram City and Taylor Springs purchase their water from Hillsboro. Donnellson and Panama purchase water from Greenville which obtains its drinking water from Governor Bond Lake.

Because these participants received all of their drinking water supply from a surface water source, they are more vulnerable to shortages as a result of a prolonged drought or a series of droughts in close succession. Those participants that obtain water from wells are less vulnerable to drinking water shortages, although a prolonged drought or a series of droughts in close succession do have the potential to impact water levels in aquifers used for individual drinking water wells in rural areas.

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

No. In general, existing buildings, infrastructure and critical facilities located in Montgomery 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 the potential to impact drinking water supplies. Reductions in the water levels of wells and surface water supplies can cause water shortages that require water conservation measures to be enacted in an effort to maintain a sufficient supply of water to provide drinking water and fight fires.

In general, the risk or vulnerability to buildings, infrastructure and critical facilities from drought is low, 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.

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.).

3.7 EARTHQUAKES

IDENTIFYING THE HAZARD

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.

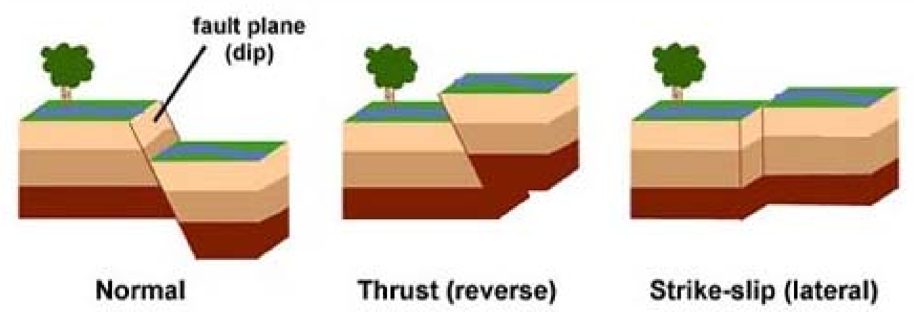
According to the U.S. Geological Survey earthquakes pose a significant risk to more than 75 million Americans in 39 states. Twenty-six urban areas across the United States, including St. Louis, Missouri, are at risk of significant seismic activity. The Federal Emergency Management Agency has estimated future annual earthquake losses in the United States at $5.6 billion a year.

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 75** provides an illustration of each type of fault.

Figure 75
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 76** 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 microquake 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 76
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 77** 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 77
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.

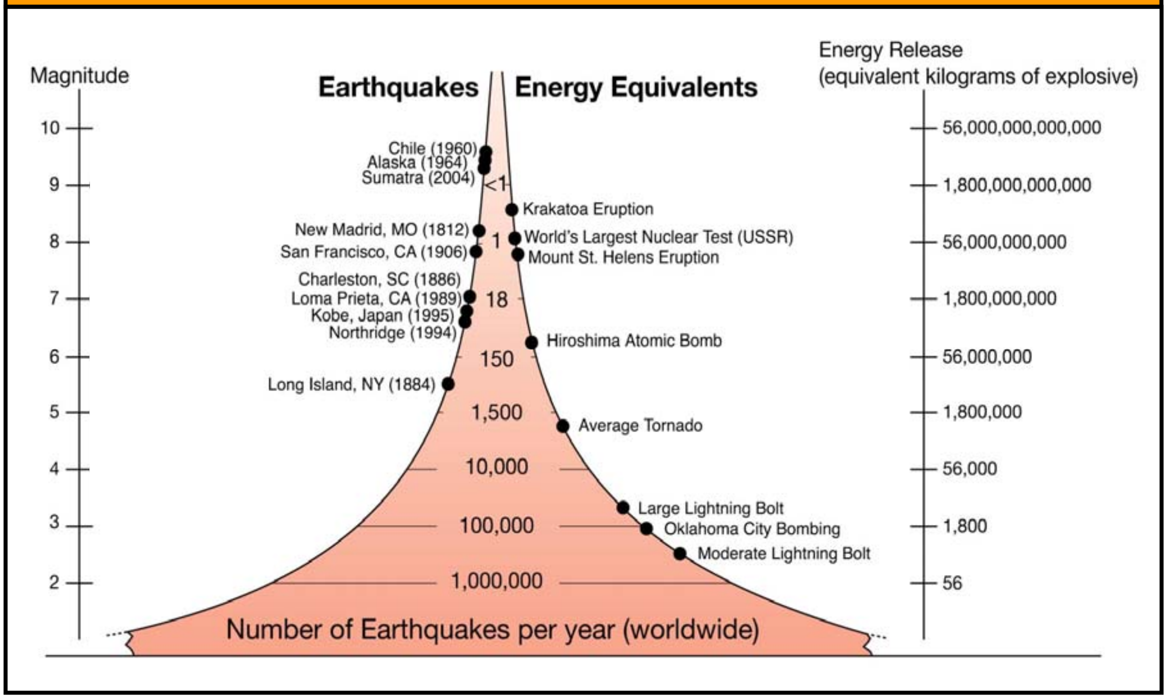
The second prominent belt is the Alpide, which extends from Java to Sumatra and through the Himalayan Mountains, the Mediterranean Sea and out into the Atlantic Ocean. It accounts for about 17 percent of the world's largest earthquakes, including those in Iran, Turkey and Pakistan. The third belt follows 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. Worldwide, small earthquakes, such as magnitude 2 earthquakes, occur over 2,500 times a day. These earthquakes are known as microquakes and are generally not felt by humans. Major earthquakes, such as magnitude 7 earthquakes, generally occur at least once a month. **Figure 78** 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 78
Approximate Number of Earthquakes Recorded Annually



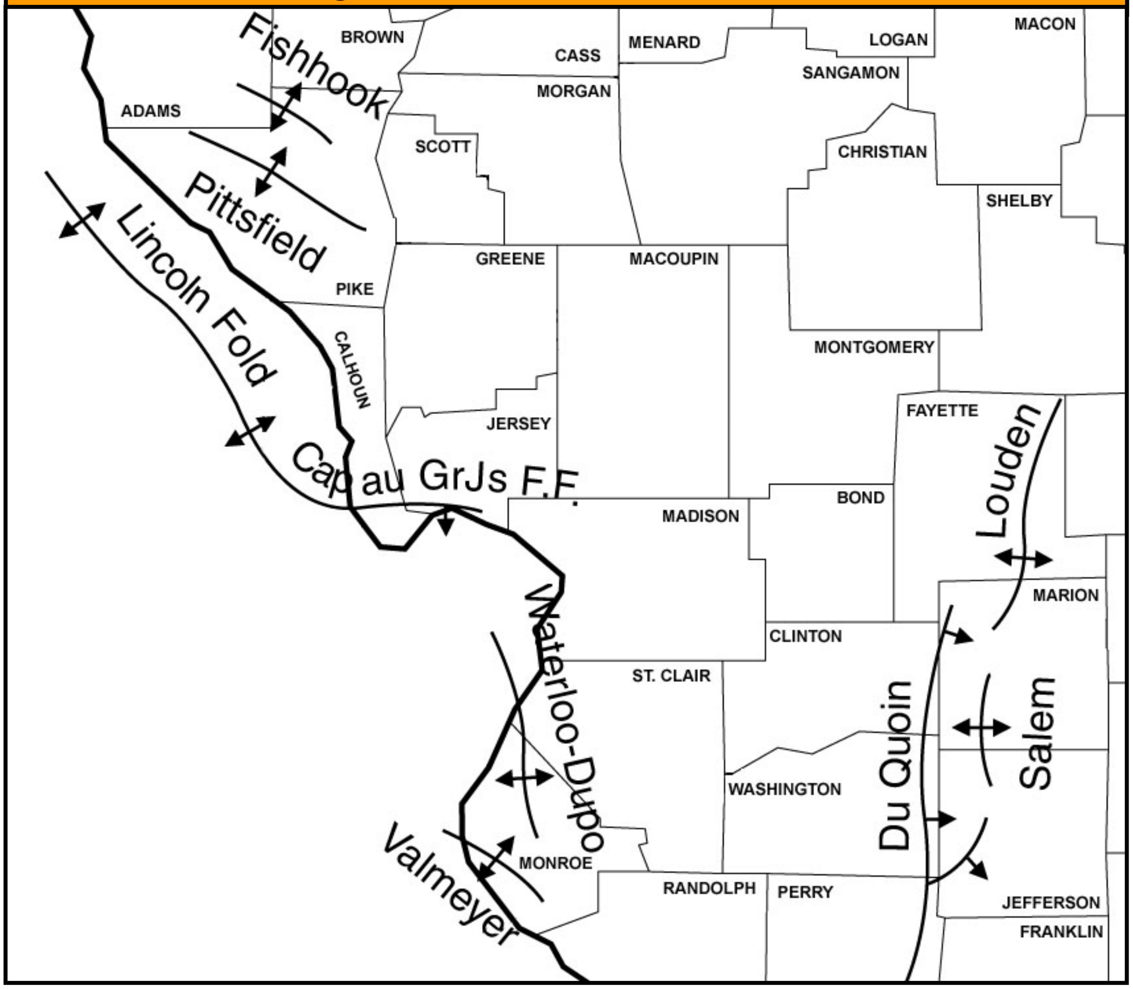
Source: Incorporated Research Institutions for Seismology, Education and Outreach Series – Educational One-Pagers, How Often Do Earthquakes Occur?

PROFILING THE HAZARD

Are there any faults located within the County?

No. However, there are several known fault zones in the immediate region: the Lincoln Anticline, the Cap au Gres Faulted Flexure, Waterloo-Dupo Anticline, the Louden Anticline, the Du Quoin Monocline and the Salem Anticline. **Figure 79** illustrates the location of these fault zones.

Figure 79
Geological Structures in Southwestern Illinois



Source: Illinois State Geological Survey.

The Lincoln Anticline is at least 165 miles long and as much as 15 miles wide. It is the most prominent structural feature in northeastern Missouri and trends northwest to southeast before swinging eastward into Illinois and terminating in southernmost Jersey County. The Cap au Gres Faulted Flexure is about 60 miles long and arises on the southwest flank of the Lincoln Anticline in Lincoln County, Missouri. It follows the anticline into Illinois, and also terminates in southernmost Jersey County.

The Waterloo-Dupo Anticline is a sharply asymmetrical structure that trends south-southeast from St. Louis County, Missouri through the western tip of St. Clair County terminating in Monroe County.

The Louden Anticline is a slightly sinuous structure that occurs mainly in eastern Fayette County and provides the structural closure for the Louden Oil Field, the second-largest oil-producing structure of the Illinois Basin. The Salem Anticline lies south of and almost in line with the Louden Anticline and is most noteworthy for providing the structural trap for the Salem Oil Field, the largest oil-producing structure of the Illinois Basin. The area of closure is approximately seven miles north to south and 3.5 miles maximum east to west extending from Jefferson County into Marion County.

The Du Quoin Monocline closely follows the Third Principal Meridian from northeastern Jackson County to northwestern Marion County. Near the northeast corner of Perry County the flexure splits; the west branch continues northward and the east branch veers to the northeast. The west branch flattens out and loses its identity in northwestern Marion County whereas the east branch curves toward and merges with the east flank of the Salem Anticline.

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

<u>Earthquake Fast Facts – Occurrences</u>

Earthquakes Originating in the County (1795 – 2013): ***4***

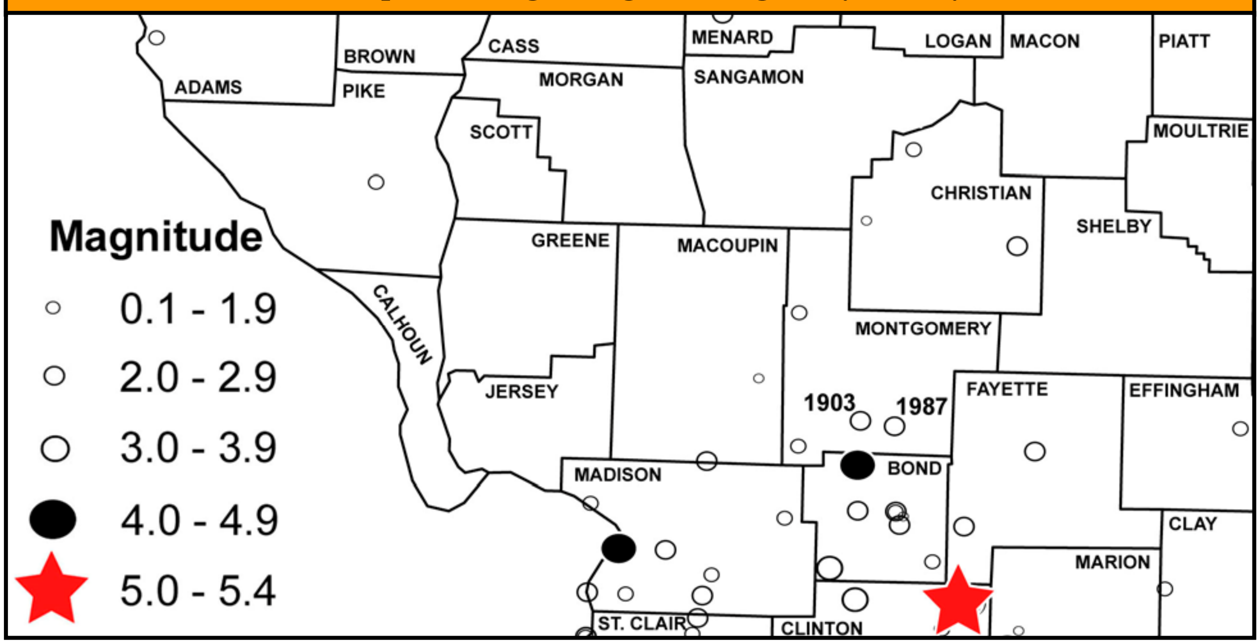
Fault Zones Located within the County: ***None***

Earthquakes Originating in nearby Counties (1795-2013): ***24***

Fault Zones Located in Nearby Counties: ***6***

According to the Illinois State Geological Survey (ISGS) *Earthquakes of Illinois: 1795 – 2013* map, four earthquakes have originated in Montgomery County during the last 200 years. **Figure 80** illustrates the epicenters of each earthquake. A brief description of each earthquake with an estimated magnitude of 3.0 or greater is provided below. Two of the four earthquakes ranged in magnitude between 2.0 to 2.9 and as a result information on their location and the date of their occurrence was not available from the USGS earthquake catalog files.

Figure 80
Earthquakes Originating in Montgomery County



Source: Illinois State Geological Survey.

- On March 17, 1903 an estimated 3.6 magnitude earthquake took place approximately 2 miles south of Taylor Springs in unincorporated Montgomery County. The magnitude for this earthquake was determined from epicentral intensity.
- An estimated 3.2 magnitude earthquake took place on March 13, 1987 approximately one mile west of Coffeen in unincorporated Montgomery County.

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

- On April 18, 2008, a magnitude 5.4 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.
- A magnitude 5.1 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.
- The strongest earthquake in the central United States during the 20th century occurred along the Wabash Valley seismic zone in southeastern Illinois near Dale in Hamilton County. This magnitude 5.4 earthquake occurred on November 9, 1968 with an intensity estimated at VII for the area surrounding the epicenter. Moderate structural damage was reported in several towns in south-central Illinois, southwest Indiana and northwest Kentucky. Ground shaking was felt over all or parts of 23 states in the central and eastern United States and southern Ontario, Canada.

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 7.7 and 7.5 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?

Earthquake events can affect the entire County. Earthquakes, like drought and extreme heat, impact large areas extending across an entire region and affecting multiple counties. Montgomery County's proximity to multiple fault zones, both large and small, makes the entire area likely to be affected by an earthquake if these faults become seismically active. The *2013 Illinois Natural Hazard Mitigation Plan* classifies Montgomery County's hazard rating for earthquakes as "elevated."

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 fault, 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 estimate 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%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to earthquakes?

Yes. All of Montgomery 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 Montgomery 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 Montgomery

County would be a V on the Modified Mercalli Intensity Scale. If a magnitude 8.6 earthquake were to occur, then the highest projected intensity felt would be a VII.

The infrequency of major earthquakes, coupled with relatively low magnitude/intensity of past events, has led the public to perceive that Montgomery County is not vulnerable to damaging earthquakes. This perception has allowed the County and participating municipalities to develop largely without regard to earthquake safety.

What impacts resulted from the recorded earthquake events?

Property damage information was either unavailable or none was recorded for the four documented earthquake that occurred in Montgomery County. While Montgomery County residents felt the earthquakes that occurred in 2008, 1987 and 1968, no damages were reported as a result of these events. Given the magnitude of the great earthquakes of 1811 and 1812, it is almost certain that individuals in what is now Montgomery County felt those quakes; however historical records do not indicate the intensity or impacts that these quakes had on the County.

Earthquake Fast Facts – Risk

Earthquake Risk/Vulnerability to:

- Public Health & Safety – Light/Moderate Quake: ***Low***
- Public Health & Safety – Major/Great Quake: ***Low/ Medium***
- Buildings/Infrastructure/Critical Facilities – Light/ Moderate Quake: ***Low***
- Buildings/Infrastructure/Critical Facilities – Major/ Great Quake: ***Medium***

The risk or vulnerability to public health and safety from an earthquake is dependent on the intensity and location of the event. Since there are no known faults in Montgomery County, the likelihood that an earthquake will originate in the County is very small, decreasing the changes for catastrophic damages. However, if another 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 low to low/medium for a major earthquake originating along the Wabash Valley seismic zone. Finally, if a major or great earthquake similar to those experienced in 1811 and 1812 were to occur along the New Madrid seismic zone, then risk or vulnerability to public health and safety is elevated to medium.

What other impacts can result from earthquakes?

Earthquakes can impact human life, health and public safety. **Figure 81** details the potential impacts that may be experienced by the County should a magnitude 6.0 or greater earthquake occur in the region.

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

Yes. All existing buildings, infrastructure and critical facilities located in Montgomery County and the participating municipalities are vulnerable to damage from earthquakes. While four of the participating municipalities have building codes in place, these codes do not contain seismic provisions that address structural vulnerability for earthquakes. 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 81 **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 Interstate and State Routes (especially if the quake originates along the New Madrid fault) 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 • Structural dmage and disruption of service at the coal-fired power facility outside of Coffeen *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 (especially if the quake originates along the New Madrid Fault) 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 (i.e., central and southern Illinois) • 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

Depending on the intensity of the earthquake, building damage in Montgomery County could range from negligible to moderate in well-built structures and considerable in poorly-built structures. An earthquake has the ability to damage infrastructure and critical facilities 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.

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. Of great concern would be structural damage to the coal-fired power facility outside of Coffeen. Damage to the power facility could disrupt service for a large number of customers in Montgomery County and surrounding areas. 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 from a light to moderate earthquake is likely to be low, while the risk from a major or great earthquake is likely to be medium.

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

Yes. All future buildings, infrastructure and critical facilities located in Montgomery County and the participating municipalities are vulnerable to damage from earthquakes. While four of the participating municipalities have building codes in place, these codes do not contain seismic provisions that address structural vulnerability for earthquakes. As a result, there is the potential for future buildings, infrastructure and critical facilities to 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 in Montgomery County there is no way to accurately estimate future potential dollar losses to vulnerable structures in the County. In addition, there is insufficient data available to make useful predictions regarding potential earthquake damages through the use of computer modeling.

Given Montgomery County's proximity to both major and minor faults 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.

3.8 DAMS

IDENTIFYING THE HAZARD

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 National Inventory of Dams (NID), there are approximately 87,359 dams in the United States and Puerto Rico, with 1,592 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 1,592 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 extent and type of development and 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 is 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 the lives of 125 people, injuring 1,100 people, destroying 500 homes and causing more than $400 million in damages.

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 20 reported dam failures in Illinois between 1950 and 2001.

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 in Illinois is assigned a hazard classification based on the potential for loss of life and damage to property in the event of a dam failure. The three classifications are Class I, Class II and Class III. **Figure 82** provides a brief description of each hazard classification. The hazard classifications used in Illinois are similar to those used by the U.S. Army Corps of Engineers to classify dams listed in the National Inventory of Dams. It is important to note that the hazard 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 82
Dam Hazard Classification System

Class	Description
Class I	Dams located where failure has a high probability of causing loss of life or substantial economic loss downstream (i.e., a dam located where its failure may cause additional damage to such structures as a home, a hospital, a nursing home, a highly travelled roadway, a shopping center or similar type facilities where people are normally present downstream of the dam).
Class II	Dams located where failure has a moderate probability of causing loss of life or may cause substantial economic loss downstream (i.e., a dam located where its failure may cause additional damage to such structures as a water treatment facility, a sewage treatment facility, a power substation, a city park, a U.S. Route or Illinois Route highway, a railroad or similar type facilities where people are downstream of the dam for only a portion of the day or on a more sporadic basis).
Class III	Dams located where failure has a low probability of causing loss of life, where there are no permanent structures for human habitation, or minimal economic loss downstream (i.e., a dam located where its failure may cause additional damage to agricultural fields, timber areas, township roads or similar type areas where people seldom are present and where there are few structures).

Source: Illinois Administrative Code.

Are there any classified dams owned by any of the participating jurisdictions?

Yes. Hillsboro and Litchfield both own classified dams. **Figure 83** provides a brief description of each dam.

Figure 83
Publicly-Owned Classified Dams Located in Montgomery County

Name	Associated Waterway	Owner	Type	Purpose	Completion Date
Class I					
Lake Lou Yaeger Dam	West Fork Shoal Creek	Litchfield	Earth	Water Supply; Recreation	1966
Litchfield City lake Dam	Tributary West Fork Shoal Creek	Litchfield	Earth	Recreation	n/a
Shoal Creek Structure 5 Dam	Tributary Middle Fork Shoal Creek	Hillsboro	Earth	Flood Control	1973
Class II					
Glenn Shoals Lake Dam	Middle Fork Shoal Creek	Hillsboro	Earth	Water Supply; Flood Control	1978
Lake Hillsboro Dam	Tributary Middle Fork Shoal Creek	Hillsboro	Earth	Water Supply; Recreation	na/
Shoal Creek Structure 2 Dam	Tributary West Fork Shoal Creek	Litchfield	Earth	Flood Control; Recreation	1964
Class III					
Walton Park Lake Dam	Long Branch West Fork Shoal Creek	Litchfield	Earth	Recreation	n/a

Sources: Diedrichsen, Mike, Illinois Department of Natural Resources, Office of Water Resources.
U.S. Army Corps of Engineers, National Inventory of Dams Interactive Report.

Are there any privately-owned classified dams within the County?

Yes. There are 41 privately-owned classified dams within Montgomery County. **Figure 84** provides a brief description of each dam. Twenty-one of the dams are owned by individuals/estates; seven are owned by coal companies; six are owned by a public utility; four are owned by sportsman's clubs; and the remaining three are owned by various private businesses.

PROFILING THE HAZARD

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

Dam Failure Fast Facts – Occurrences

Number of Dam Failures Reported: ***1***

There has been one recorded dam failure in Montgomery County. On September 8, 2008 the Walton Park Lake Dam in Litchfield experienced a partial dam failure as a result of approximately six inches of rain within a two hour period. The excess precipitation and runoff caused overtopping of the dam. While the incident did not cause any structural breaks in the dam, it did cause cracks to form, impairing the dam's integrity.

Figure 84 (Sheet 1 of 3) Privately-Owned Classified Dams Located in Montgomery County					
Name	**Associated Waterway**	**Owner**	**Type**	**Purpose**	**Completion Date**
Class I					
Coffeen GMF Gypsum Stack Dam	McDavid Branch East Fork Shoal Creek	Ameren Energy Resources	Earth	Debris Control	n/a
Springfield Coal / Crown 3/ North Refuse Dam	Perched Reservoir	Springfield Coal Co., LLC	Earth	Other	n/a
Springfield Coal / Crown 3 / North Refuse Extension Dam	Perched Reservoir	Springfield Coal Co., LLC	Earth	Other	n/a
Class II					
Coffeen Lake Dam	McDavid Branch East Fork Shoal Creek	Ameren Energy Resources	Earth	Other	n/a
Coffeen Power Sta. Supplemental Cooling Lake Dam	Tributary McDavid Branch	Ameren Energy Resources	Earth	Other	n/a
Crown Mine Pond Dam	Tributary Macoupin Creek	Crown Coal Co.	Earth	Water Supply, Recreation	n/a
Kilton Lake Dam	Threemile Creek – off stream	Kilton Farms, Inc.	Earth	Fish & Wildlife Pond; Recreation; Fire Protection; Stock; Small Fish Pond	1970
Panama Lake Dam	Tributary Bearcat Creek	Individual	Earth	Recreation	n/a
Class III					
American Zinc Smelter Co. Large Lake Dam	Middle Fork Shoal Creek	Asarco Inc.	Earth	Water Supply	n/a
Coffeen East Fork Shoal Creek Gate Dam	East Fork Shoal Creek	Ameren Energy Resources	Other	Water Supply	n/a
Coffeen GMF Recycle Pond Dam	McDavid Branch East Fork Shoal Creek	Ameren Energy Resources	Earth	Debris Control	n/a
Coffeen Southwest Detention Pond Dam	Tributary McDavid Branch	Ameren Energy Resources	Earth	Flood Control	n/a
Fillmore Lake Dam	Tributary Dry Fork Hurricane Creek	Fillmore Sportsman Club	Earth	Recreation	1957
Heenren Pond Dam	Tributary Silver Creek	Individual	Earth	Recreation	1958

Figure 84
(Sheet 2 of 3)
Privately-Owned Classified Dams Located in Montgomery County

Name	Associated Waterway	Owner	Type	Purpose	Completion Date
Class III Continued…					
Helen Lake Dam	Tributary West Fork Shoal Creek	Individual	Earth	Recreation	1967
Nokomis Sportsman Club Lake Dam	Elliot Creek – off stream	Nokomis Sportsman Club	Earth	Recreation	1956
Rocky Ford Sportsman Club North Lake Dam	Tributary East Fork Shoal Creek	Rocky Ford Sportsman Club	Earth	Recreation	n/a
Rock Ford Sportsman Club South Lake Dam	Tributary East Fork Shoal Creek	Rocky Ford Sportsman Club	Earth	Recreation	n/a
Sampsons Lake Dam	Tributary West Fork Shoal Creek	Individual	Earth	Recreation	n/a
Shoal Creek Structure 14 Dam	Middle Fork Shoal Creek	Individuals	Earth	Flood Control	1972
Class Unknown					
Bell Pond Dam 1	Tributary Shoal Creek East – East Fork	Individual	Earth	Fish & Wildlife Pond, Recreation	1964
Clarified Water Pond	n/a	Freeman United Coal Mining Co.	Earth	Water Supply	n/a
Fine Refuse Pond	n/a	Freeman United Coal Mining Co.	Earth	Water Supply; Tailings	n/a
Fresh Water Lake	n/a	Freeman United Coal Mining Co.	Earth	Water Supply	n/a
Settling Pond	n/a	Freeman United Coal Mining Co.	Earth	Water Supply; Tailings	n/a
Ekiss Pond Dam 1	Tributary Shoal Creek East – Middle Fork	Individual	Earth	Fish & Wildlife Pond; Recreation; Fire Protection; Stock; Small Fish Pond	1978
Hillsboro Energy / Deer Run / Coal Refuse Disposal 1 Dam	Tributary Middle Fork Shoal Creek	Hillsboro Energy, LLC	Earth	Tailings	n/a
Hughes Pond Dam 1	Tributary Shoal Creek West – Middle Fork	Individual	Earth	Fish & Wildlife Pond; Recreation; Fire Protection; Stock; Small Fish Pond	1974

Figure 84
(Sheet 3 of 3)
Privately-Owned Classified Dams Located in Montgomery County

Name	Associated Waterway	Owner	Type	Purpose	Completion Date
Class Unknown Continued…					
Johnson Pond Dam 1	Tributary Shoal Creek East – Middle Fork	Individual	Earth	Other; Recreation; Fish & Wildlife Pond	1966
Justison Pond Dam 1	Tributary Shoal Creek West – Middle Fork	Individual	Earth	Fish & Wildlife Pond; Recreation	1970
Kilton Pond Dam 2	Tributary Shoal Creek West – West Fork	Estate	Earth	Fish & Wildlife Pond; Recreation; Fire Protection; Stock; Small Fish Pond	1963
Matthews Pond Dam 1	Tributary Shoal Creek West – West Fork	Individual	Earth	Other; Irrigation	1969
Matthews Pond Dam 2	Tributary Shoal Creek West – West Fork	Individual	Earth	Other; Irrigation	1974
Matway Pond Dam 1	Tributary Shoal Creek West – West Fork	Individual	Earth	Fish & Wildlife Pond; Other	1965
McWilliams Pond Dam 1	Tributary Shoal Creek East – West Fork	Individual	Earth	Fish & Wildlife Pond; Recreation; Other	1970
Moran Pond Dam 1	Tributary Shoal Creek West – West Fork	Individual	Earth	Other; Recreation; Fish & Wildlife Pond	1977
Rohrer Pond Dam 1	Tributary Ramsey Creek East	Individual	Earth	Other; Recreation; Fish & Wildlife Pond	1970
Ruppert Pond Dam A1	Tributary Shoal Creek West – West Fork	Individual	Earth	Other; Recreation; Fish & Wildlife Pond	1977
Six Pond Dam 1	Tributary Shoal Creek East – West Fork	Individual	Earth	Other; Recreation; Fish & Wildlife Pond	1961
Traylor Pond Dam 1	Tributary Shoal Creek Middle Fork	Individual	Earth	Other; Recreation; Fish & Wildlife Pond	1978
Vancil Pond Dam 1	Tributary Shoal Creek West – West Fork	Individual	Earth	Fish & Wildlife Pond; Recreation	1955

Sources: Diedrichsen, Mike, Illinois Department of Natural Resources, Office of Water Resources.
U.S. Army Corps of Engineers, National Inventory of Dams Interactive Report.

What locations are affected by dam failure?

Dam failures have the potential to impact Hillsboro, Litchfield, Schram City and unincorporated areas of Montgomery County. In addition, if the Coffeen Lake Dam were to experience a dam failure, portions of Bond and Clinton Counties may also be affected due to the dam's location near the southern border of the County. **Figure 85** shows the locations of the publicly-owned classified dams in Montgomery County.

What is the probability of future dam failure events occurring?

Montgomery County has only experienced one dam failure (Walton Park Lake Dam) during the life of all 48 of its classified dams.. Based on the age of the Walton Park Lake Dam and the fact that is has only experienced one recorded failure during its life, the probability it will experience another dam failure is considered to be low to medium, depending on proper maintenance, including maintain the reservoir's capacity.

Since none of the other dams have experienced a dam failure, it is difficult to specifically establish the probability of a future failure; however, it is estimated to be relatively low.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to dam failures?

Yes. Hillsboro, Litchfield, Schram City and portions or unincorporated Montgomery County are vulnerable to the dangers presented by dam failures. However, none of the rest of the County or participating municipalities are considered vulnerable.

What impacts resulted from the recorded dam failures?

There was no residential or infrastructure damage reported as a result of the partial dam failure experienced at Walton Park Lake Dam in Litchfield on September 8, 2008 with the exception of Nieman Trail. The Trail, which runs over the dam, experienced erosion and cracking that resulted in its closure to vehicle traffic.

Dam Failure Fast Facts – Risk

Dam Failure Risk/Vulnerability to:
- Public Health & Safety: Class I & II Dams – ***Medium/ High***
- Public Health & Safety: Class III Dams – ***Low***
- Buildings/Infrastructure/Critical Facilities: Class I & II Dams – ***Medium/High***
- Buildings/Infrastructure/Critical Facilities: Class III Dams – ***Low***

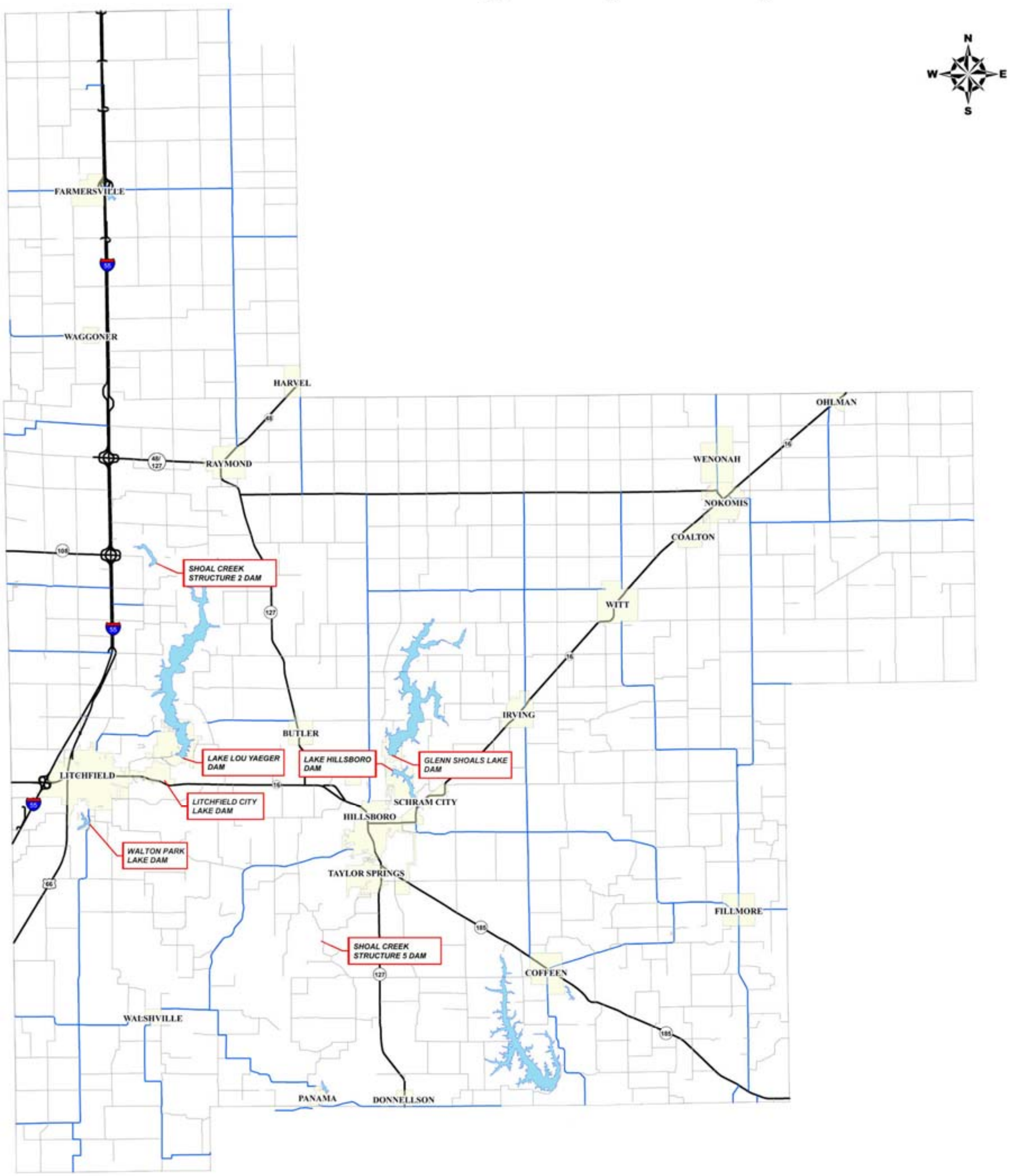
In terms of the risk or vulnerability to public health and safety from a dam failure, there are several factors that must be taken into consideration including the severity of the event, the capacity of the reservoir and the extent and type of development and infrastructure located downstream. When these factors are taken into consideration, the overall risk to public health and safety posed by a dam failure in Montgomery County is considered to be low for the Class III dams and medium to high for the Class I and II dams.

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

Figure 85
Locations of Publicly-Owned Classified Dams in Montgomery County

Montgomery County Dams



Source: U.S. Army Corps. of Engineers, National Inventory of Dams Interactive Report, Illinois, Montgomery County, April 5, 2010.

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.

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.

Are existing buildings, infrastructure and critical facilities vulnerable to dam failures?

Yes. **Figure 86** outlines the buildings, infrastructure and critical facilities that are vulnerable to a dam failure at each of the publicly-owned classified dams based on the available Emergency Action Plans and visual inspections of the area surrounding each dams.

Figure 86
Publicly-Owned Classified Dams: Buildings, Infrastructure and Critical Facilities Vulnerable to Dam Failures

Name	Owner	Number & Type of Vulnerable Structures
Class I		
Lake Lou Yaeger Dam	Litchfield	• Water Treatment Plant (WTP) • Pump Station for WTP • 2 residences
Litchfield City lake Dam	Litchfield	2 residences
Shoal Creek Structure 5 Dam	Hillsboro	none
Class II		
Glenn Shoals Lake Dam	Hillsboro	• Sewer Plant • Water Plant • 2 residences • 3 businesses • Central Park
Lake Hillsboro Dam	Hillsboro	• Sewer Plant • Water Plant
Shoal Creek Structure 2 Dam	Litchfield	3 residences
Class III		
Walton Park Lake Dam	Litchfield	none

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 building or nearby infrastructure.

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 Montgomery County is considered to be low for the Class III dams and medium to high for the Class I and II 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 only one recorded dam failures in Montgomery County, sufficient information was not available to prepare a reasonable estimate of future potential dollar losses to vulnerable structure from dam failures.

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4.0 MITIGATION STRATEGY

4.0 MITIGATION STRATEGY

The mitigation strategy identifies how participating jurisdictions are going to reduce or eliminate 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 terms 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. Mitigation actions are projects, plans, activities or programs that achieve at least one of the mitigation goals identified.
- Analyzing and prioritizing mitigation actions.
- Implementing and administering mitigation actions.

As part of the Plan update, the mitigation strategy was reviewed and revised. A detailed discussion of each aspect of the mitigation strategy and any updates that were made is provided below.

4.1 MITIGATION GOALS

As part of the Plan update process, the mitigation goals developed in the original Plan were reviewed and re-evaluated. Planning Committee members were provided a list of the hazard mitigation goals developed for the original Plan at the first meeting held on May 14, 2015. Members were asked to review the list before the second meeting and consider whether any changes needed to be made or if additional goals should be included. At the Planning Committee's July 23, 2015 meeting, the group discussed the original list of goals and approved them with one minor language addition to Goal 3. **Figure 87** lists the approved mitigation goals.

4.2 REVIEW & EVALUATION OF EXISTING MITIGATION ACTIONS

The Plan update included a review and evaluation of the *existing* hazard mitigation actions listed in the original Plan. Each of the jurisdictions who originally participated were provided a list of their existing mitigation actions at the second meeting held on July 23, 2015. They were asked to identify those actions that were either in progress or that had been completed since the original Plan was adopted in 2010. **Figure 88** through **Figure 95** located at the end of this section, summarize the results of this evaluation by jurisdiction.

4.3 IDENTIFICATION OF NEW MITIGATION ACTIONS

Following the review and evaluation of the existing mitigation actions, all of the Planning Committee members were asked to consult with their respective jurisdictions to identify *new* mitigation actions. The five jurisdictions new to the Plan update (Donnellson, Panama, Schram City, Taylor Springs and Waggoner) were encouraged to identify a comprehensive range of mitigation actions that would meet the specific needs and risks associated with their jurisdiction.

Figure 87 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 the people and animals in the County from the dangers of natural hazards.
Goal 3	Protect existing infrastructure and design new infrastructure (roads, bridges, utilities, water supplies, sanitary sewer systems, stormwater retention and elimination systems, etc.) to be resilient to the impacts of natural hazards.
Goal 4	Incorporate natural hazard mitigation into 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 rivers 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.
Goal 9	Ensure proper communication between emergency services and government organizations that comply with NIMS regulations.

Representatives of the following jurisdictions were also asked to identify mitigation actions that would ensure their continued compliance with the National Flood Insurance Program.

- Hillsboro
- Litchfield
- Montgomery County
- Nokomis
- Witt

The compiled lists of new mitigation actions were 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.

4.4 ANALYSIS OF MITIGATION ACTIONS

Next, those existing mitigation actions retained and all of the new mitigation actions identified were assigned to one of six broad mitigation activity categories which allowed Committee members to compare and consolidate similar actions. **Figure 96** identifies each mitigation activity category and provides a brief description.

Each mitigation action was then analyzed to determine:

- the hazard or hazards being mitigated;
- the degree to which the impacts associated with a particular hazard(s) would be mitigated (i.e., reduced or eliminated);
- 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 96 **Types of Mitigation Activities**	
Category	**Description**
Regulatory Activities (RA)	Regulatory activities are designed to reduce a jurisdiction's vulnerability to specific hazard events. These activities are especially effective in hazard prone areas where development has yet to occur. Examples include: planning and zoning, floodplain regulations and local ordinances (i.e., building codes, etc.).
Structural Projects (SP)	Structural projects lessen the impact that a hazard has on a particular structure through design and engineering. Examples include: storm sewers, road and bridge projects, storm/tornado shelters, flood walls and seismic retrofits.
Public Information & Awareness (PI)	Public information and awareness activities are used to educate individuals about the potential hazards that affect their community and the mitigation strategies that they can take part in to protect themselves and their property. Examples include: outreach programs, school programs, brochures and handout materials, evacuation planning and drills, volunteer activities (i.e., culvert cleanout days, initiatives to check on the elderly/disabled during hazard events, etc.).
Studies (S)	Studies are used to identify activities that can be undertaken to reduce the impacts associated with certain hazards. Examples include: hydraulic and drainage studies.
Miscellaneous Projects (MP)	Miscellaneous projects is a catchall for those activities or projects that help to reduce or lessen the impact that a hazard may have on a critical facility or community service. Examples include: snow fences, generators, warning sirens, etc.
Property Protection (PP)	Property protection activities are designed to retrofit existing structures to withstand natural hazards or to remove structures from hazard prone areas. In Illinois, this category of activities primarily pertains to flood protection. Examples include: acquisition, relocation, elevation, insurance (i.e., flood, homeowners, etc.) and retrofitting (i.e., impact resistant windows, etc.).

4.5 REVIEW OF PRIORITIZATION METHODOLOGY

Also included in the Plan update process was a review of the methodology developed in the original Plan to prioritize each action. This original prioritization methodology was presented to the Planning Committee members at the third meeting held on October 22, 2015. The group reviewed and discussed the methodology and chose to approve it with no changes.

Figure 97 identifies and describes the four-tiered prioritization methodology re-adopted by the Committee. The methodology developed provides a means of objectively determining which actions have a greater likelihood of eliminating or 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 all the mitigation actions is desirable regardless of which prioritization category an action falls under.

4.6 IMPLEMENTATION & ADMINISTRATION OF MITIGATION ACTIONS

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.

<table>
<tr><th colspan="4">Figure 97
Mitigation Action Prioritization Methodology</th></tr>
<tr><td colspan="2" rowspan="2"></td><th colspan="2">Hazard</th></tr>
<tr><td>Most Significant Hazard
(M)
(i.e., severe storms, severe winter storms, extreme heat, tornadoes)</td><td>Less Significant Hazard
(L)
(i.e., floods, drought, earthquakes, dam failures)</td></tr>
<tr><td rowspan="2">**Mitigation Action**</td><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 fatalities and injuries from the most significant hazards</td><td>**HL**
mitigation action will virtually eliminate damages and/or significantly reduce the probability of fatalities and injuries from less significant 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, fatalities and/or injuries from the most significant hazards</td><td>**LL**
mitigation action has the potential to reduce damages, fatalities and/or injuries from less significant hazards</td></tr>
</table>

In addition, 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.

4.7 Results of Mitigation Strategy

Figures 98 through **113**, 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 88
(Sheet 1 of 3)
Montgomery County – Status of Existing Mitigation Actions

Activity/Project Description	Status			Year Completed	Summary/Details of Completed Activity/Project (i.e., location, scope, etc.)
	No Progress (✓)	In Progress (✓)	Completed (✓)		
911					
Purchase a reverse 911 system to notify public/responders of emergency information.			X	2013	
Improve lightning protection for file repeater and store forward radio sites.		X			Upgrading circuit protection sites are repaired/upgraded
Purchase stand alone generators for each repeater/store forward tower site in the County (seven total).	X				
Purchase a repeater system for backup needs in main system failure during emergencies.	X				
Evaluate existing 911 facilities/tower sites for potential natural hazard vulnerabilities.	X				
Alternate tower site for primary communications systems during primary system failure.		X			In the process of switching to a second tower
Alternate paging system for public safety agencies to enhance the ability to page agencies during reduced operations during an emergency.	X				
Evaluate the need and design of an enhanced trunked radio system for public safety agencies to improve crisis/emergency communications and meet narrow banding requirements.	X				
Clerk/Recorder					
Scanning of Montgomery County Land Records (deeds, mortgages, surveys, easements, misc.) from 1822 – 1991 for easier public access and secure archival of paper originals or paper copies of same housed in Land Records Vault, Historic Courthouse, Hillsboro, IL.	X				
Better binding and archiving of paper originals or paper copies of same housed in Land Records Vault, Historic Courthouse, Hillsboro, IL.	X				

Figure 88
(Sheet 2 of 3)
Montgomery County – Status of Existing Mitigation Actions

Activity/Project Description	Status			Year Completed	Summary/Details of Completed Activity/Project (i.e., location, scope, etc.)
	No Progress (✓)	In Progress (✓)	Completed (✓)		
EMA					
Review and present for adoption the revised Flood Insurance Rate Maps when they become available.	X				
Make the most recent Flood Insurance Rate Maps available at the County Clerk/Recorder's office to assist the public in considering where to construct new buildings and make county officials aware of these maps and issues related to construction in a floodplain.					
Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.					
Highway Department					
Remove and dispose of trees and brush adjacent to highways.		X			
Evaluate existing road, bridge, culvert and storm sewer infrastructure to identify natural hazard vulnerabilities.		X			
Perform preliminary engineering and construct retrofit or completely replace road, bridge, culvert and storm sewer infrastructure as recommended to mitigate against the hazards identified during the previous evaluation.		X			
Evaluate existing Highway Department administrative, maintenance, equipment storage buildings and radio transmitter to identify natural hazard vulnerabilities.		X			
Perform preliminary engineering, architecture and construct retrofit or complete replacement of Highway Department administrative, maintenance, equipment storage buildings and radio transmitter as recommended to mitigate against the hazards identified during the previous evaluation.	X				

Figure 88
(Sheet 3 of 3)
Montgomery County – Status of Existing Mitigation Actions

Activity/Project Description	**Status**			**Year Completed**	**Summary/Details of Completed Activity/Project (i.e., location, scope, etc.)**
	No Progress (✓)	**In Progress (✓)**	**Completed (✓)**		
Highway Department Continued…					
Prepare public information and reporting via the world wide web including long range plan, maps, policies, procedures and an area for the public to make comments.		X			
Protect historical Highway Department documents including plans, specifications, construction records and agreements by scanning, inventorying and storing off site.	X				
Purchase road signage and barricades to warn and detour traffic in the event a natural disaster causes dangerous or impassable conditions.	X				
Retrofit the Simpson Bridge against seismic and flood damage.		X			
Sheriff's Office					
Establish a Montgomery County Sheriff's Office (MCSO) Building/Jail Emergency Operating Center (in case the main facility is destroyed or unfeasible to operate).	X				
Purchase all terrain vehicles to respond to victims/incidents associated with natural hazards.			X	2014	
Training for Montgomery County Sheriff's Office personnel on County Emergency Operating Procedures.		X			

Figure 89
Coffeen – Status of Existing Mitigation Actions

Activity/Project Description	Status			Year Completed	Summary/Details of Completed Activity/Project (i.e., location, scope, etc.)
	No Progress (✓)	In Progress (✓)	Completed (✓)		
Evaluate condition of water tower and assess vulnerability to natural hazards.	X				
If needed, replace existing water tower.	X				
Purchase emergency generator for city-owned water tower/pump station located on IL Rte. 185 northwest of Coffeen.	X				
Purchase emergency generator for water tower/pump station located on Maple Street in Coffeen.	X				
Purchase emergency generator for wastewater treatment facility.	X				
Designate an emergency shelter within Coffeen.			X	2014	Village Hall was formally designated as an emergency shelter
Purchase emergency generators for designated emergency shelter.			X	2015	
Purchase backhoe for use in debris removal and repairs following a natural hazard event.			X	2013	

Figure 90
Farmersville – Status of Existing Mitigation Actions

Activity/Project Description	Status			Year Completed	Summary/Details of Completed Activity/Project (i.e., location, scope, etc.)
	No Progress (✓)	In Progress (✓)	Completed (✓)		
Bury power lines to prevent power outages.	X				
Install emergency generator at critical facilities/shelter for power outages.	X				
Conduct study to identify ways to improve road drainage to prevent flooding of residential areas.	X				
Improve road drainage to prevent flooding of residential areas.	X				
Upgrade wastewater treatment facility to prevent down time during natural hazards.	X				
Upgrade drinking water treatment facilities to prevent down time during natural hazards.	X				

Figure 91
Hillsboro – Status of Existing Mitigation Actions

Activity/Project Description	Status			Year Completed	Summary/Details of Completed Activity/Project (i.e., location, scope, etc.)
	No Progress (✓)	In Progress (✓)	Completed (✓)		
Redesign the drainage system for the Route 16 underpass of the Union Pacific Railroad.	X				
Purchase four new warning sirens.	X				
Purchase 80-foot portable manlift to provide access when repairing elevated storm damage.	X				
Conduct drainage study to identify how to correct a chronic drainage problem impacting homes in the vicinity of an unnamed creek near Mechanic Street and Hollis Lane.	X				
Review and present for adoption the revised Flood Insurance Rate Maps when they become available.	X				
Make the most recent Flood Insurance Rate Maps available at the City Clerk's Office to assist the public in considering where to construct new buildings and make county officials aware of these maps and issues related to construction in a floodplain.	X				
Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.	X				

Figure 92
Litchfield – Status of Existing Mitigation Actions

Activity/Project Description	Status			Year Completed	Summary/Details of Completed Activity/Project (i.e., location, scope, etc.)
	No Progress (✓)	In Progress (✓)	Completed (✓)		
Construct storm water drainage system.		X			New storm sewer from high school to Ferdon St. completed
Bury power supply lines to critical facilities.		X			Water treatment plant buried its electric lines
Seismic upgrades to critical facilities.	X				
Seismic bridge upgrade across Lake Yeager Dam.	X				
Seismic upgrade to upstream face of Lake Yeager Dam.	X				
Construct bad weather (including extreme heat & cold)/seismic shelters.	X				
Seismic upgrade to upstream face of Lake Litchfield.	X				
Mine subsidence protection for Litchfield High School.	X				
Review and present for adoption the revised Flood Insurance Rate Maps when they become available.	X				
Make the most recent Flood Insurance Rate Maps available at the City Clerk's Office to assist the public in considering where to construct new buildings and make county officials aware of these maps and issues related to construction in a floodplain.		X			
Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.		X			

Figure 93
Nokomis – Status of Existing Mitigation Actions

Activity/Project Description	Status			Year Completed	Summary/Details of Completed Activity/Project (i.e., location, scope, etc.)
	No Progress (✓)	In Progress (✓)	Completed (✓)		
Conduct investigation of storm sewer and small stream capacity to manage storm water runoff for an area south of UPRR tracks in Nokomis. The project will take into account the present configuration of the storm sewer and small stream "system" and make recommendations to increase capacity.	X				
Modify/correct small stream contour and path to allow for more efficient storm water runoff. Emphasis on increased capacity and environmental "friendliness" of the stream in the area of Shane Cole Park.	X				
Modify/correct storm sewers to increase capacity and efficiency in areas of Nokomis south of the UPRR tracks.	X				
Review and present for adoption the revised Flood Insurance Rate Maps when they become available.	X				
Make the most recent Flood Insurance Rate Maps available at the City Clerk's Office to assist the public in considering where to construct new buildings and make county officials aware of these maps and issues related to construction in a floodplain.	X				
Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.	X				

Figure 94 **Raymond – Status of Existing Mitigation Actions**					
Activity/Project Description	**Status**			**Year Completed**	**Summary/Details of Completed Activity/Project (i.e., location, scope, etc.)**
	No Progress (✓)	**In Progress (✓)**	**Completed (✓)**		
Cleanup Shoal Creek to prevent flooding of cemetery and Wastewater Plant.	X				
Repair/replace Southworth storm tile to prevent flooding of residential properties/Village streets.			X	2012	
Conduct a study of Springfield Road to identify the best corrective action to prevent flooding.			X	2013	Study and remedy completed

Figure 95 Witt – Status of Existing Mitigation Actions					
Activity/Project Description	**Status**			**Year Completed**	**Summary/Details of Completed Activity/Project (i.e., location, scope, etc.)**
	No Progress (✓)	**In Progress (✓)**	**Completed (✓)**		
Conduct hydraulic/drainage study(s) to identify how to correct chronic drainage problems associated with several areas within Witt.			X	2012	Shot grade in ditches, replaced 20 culverts
Purchase emergency generator for designated emergency shelter.			X	2011	Generator donated and installed at Village Hall
Review and present for adoption the revised Flood Insurance Rate Maps when they become available.	X				
Make the most recent Flood Insurance Rate Maps available at the City Clerk's Office to assist the public in considering where to construct new buildings and make city officials aware of these maps and issues related to construction in a floodplain.	X				
Make information materials available to the public about the National Flood Insurance Programs' Voluntary Community Rating System.	X				

Figure 98
(Sheet 1 of 9)
Montgomery County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
County Board													
LM	Scan Montgomery County records from all County offices for easier public access and secure archival of paper originals or paper copies of same.	EQ, F, SS, SWS, T	MP	Eliminates	Large	5, 8	n/a	n/a	County Board / Individual Departments	3 years	TBD	Medium/High	New
LL	Better binding and archiving of paper originals or paper copies of same of Montgomery County records from all County offices to preserve these valuable records.	EH	MP	Reduces	Large	5, 8	n/a	n/a	County Board / Individual Departments	3 years	TBD	Medium/High	New
HM	Design and construct a community safe room (tornado shelter) at the Recycling Center that is equipped with automatic emergency backup generator and heating/air conditioning units that can also serve as an emergency shelter/heating and cooling center for staff and area residents.	EH, EQ, F, SS, SWS, T	SP	Reduces	Small	2	Yes	n/a	County Board	TBD	75% Federal 25% Local	High/High	New
HM	Purchase and install R95 grounding system at all Montgomery County facilities to protect critical systems and improve the building's ability to survive a lightning strike/ electromagnetic pulse event.	SS	MP	Reduces	Small	2, 3, 5	n/a	Yes	County Board	TBD	TBD	Medium/High	New

Acronyms

<u>Hazard(s) to be Mitigated:</u>

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

<u>Type of Mitigation Activity:</u>

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 98
(Sheet 2 of 9)
Montgomery County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
County Board Continued…													
HM	Replace all the windows in the County buildings with shatter-resistant/shatter-proof glass to make the buildings resistant to natural hazards.	EQ, SS, T	SP	Reduces	Medium	2, 3, 5	n/a	Yes	County Board	TBD	75% Federal 25% Local	Medium/Medium	New
HM	Retrofit the Montgomery County Courthouse to include a community safe room (tornado sheltet) with automatic emergency backup generator for use by staff and area residents. The shelter would also serve as a heating/cooling center and emergency services shelter and contact center.	EH, EQ, F, SS, SWS, T	SP	Reduces	Small	2, 3, 5	n/a	Yes	County Board	TBD	75% Federal 25% Local	High/High	New
HM	Purchase and install automatic emergency backup generator at the County Courthouse to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	County Board	TBD	TBD	Low/High	New
HM	Purchase and install automatic emergency backup generator at the County Highway Department to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	County Board	TBD	TBD	Low/High	New
HM	Purchase and install automatic emergency backup generator at the County Health Department to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	County Board	TBD	TBD	Low/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 98
(Sheet 3 of 9)
Montgomery County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
County Board Continued…													
HM	Purchase and install automatic emergency backup generator at the Historic Courthouse to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	County Board	TBD	TBD	Low/High	New
HM	Purchase and install automatic emergency backup generator at the Montgomery County Jail to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	County Board	TBD	TBD	Low/High	New
Animal Control													
HM	Design and construct a community safe room (tornado shelter) at the Animal Control Facility that is equipped with automatic emergency backup generator and heating/air conditioning units that can also serve as an emergency shelter for staff, volunteers, visitors and area residents.	EQ, F, SS, T	SP	Reduces	Small	2	Yes	n/a	County Board	TBD	75% Federal 25% Local	High/High	New
LM	Develop and distribute educational materials to the general public on emergency preparedness and evacuation plans for companion animals & farm animals in the event of a natural hazard occurrence.	DF, EH, EQ, F, SS, SWS, T	PI	Reduces	Medium	1, 2	n/a	n/a	County Board	TBD	TBD	Low/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 98
(Sheet 4 of 9)
Montgomery County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
Animal Control Continued…													
HM	Purchase and install grounding system at Animal Control Facility to protect critical systems and improve each facility's ability to survive a lightning strike.	SS	MP	Reduces	Small	2, 3, 5	n/a	Yes	County Board	TBD	TBD	Medium/High	New
HM	Install landscape (living snow fences)/man-made barriers along 9th Ave. in Hillsboro in the low areas to maintain access to the Animal Control Facility and ease hazardous driving conditions.	SWS	MP	Reduces	Small	2, 3, 5	n/a	Yes	County Board	TBD	TBD	Low/Medium	New
LM	Instruct staff on Emergency Operations Plan for companion animals.	DF, EH, EQ, F, SS, SWS, T	PI	Reduces	Medium	2	n/a	n/a	County Board	TBD	County	Low/High	New
HM	Purchase and install a water storage tank to serve as an auxiliary water supply source during natural hazard events.	EQ, F, SS, SWS, T	MP	Reduces	Small	2, 5	n/a	n/a	County Board	TBD	TBD	Medium/Medium	New
LM	Develop small animal rescue strike tem per FEMA 508-1 Typed Resource Definitions Animal Health Resources guidance.	DF, EH, EQ, F, SS, SWS, T	PI	Reduces	Medium	2	n/a	n/a	County Board	TBD	County	Low/High	New
LM	Develop small animal sheltering team per FEMA 508-1 Typed Resource Definitions Animal Health Resources guidance.	DF, EH, EQ, F, SS, SWS, T	PI	Reduces	Medium	2	n/a	n/a	County Board	TBD	County	Low/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 98
(Sheet 5 of 9)
Montgomery County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
Clerk/Recorder													
LM	Scan Montgomery County Land Records (deeds, mortgages, surveys, easements, misc.) from 1822 – 1991 for easier public access and secure archival of paper originals or paper copies of same housed in Land Records Vault.	EQ, F, SS, SWS, T	MP	Eliminates	Large	5, 8	n/a	n/a	Clerk/Recorder	1 year	TBD	Medium/High	Existing (2010)
LL	Better binding and archiving of paper originals or paper copies of same housed in Land Records Vault, Historic Courthouse, Hillsboro, IL.	EH	MP	Reduces	Large	5, 8	n/a	n/a	Clerk/Recorder	1 year	TBD	Medium/High	Existing (2010)
911													
LM	Purchase and install a grounding system for file repeater and store forward radio sites to improve their ability to survive lightning strikes.	SS	MP	Reduces	Medium	2, 3, 5, 9	n/a	n/a	911	2 years	TBD	Medium/High	Existing (2010)
HM	Purchase stand alone generators for each repeater/store forward tower site in the County (seven total).	EH, EQ, F,SS, SWS, T	MP	Reduces	Medium	2, 3, 5, 9	n/a	n/a	911	3 years	TBD	Medium/High	Existing (2010)
HM	Purchase a repeater system for backup needs in case of main system failure during emergencies.	EQ, F, SS, SWS, T	MP	Reduces	Large	2, 5, 9	n/a	n/a	911	4 years	TBD	Medium/High	Existing (2010)
LM	Evaluate existing 911 facilities/tower sites for potential natural hazard vulnerabilities.	DF, EQ, EH, F, SS, SWS, T	S	Reduces	Large	2, 3, 5, 9	Yes	Yes	911	4 years	TBD	Low/High	Existing (2010)
HM	Alternate tower site for primary communications systems during primary system failure.	EH, EQ, F, SS, SWS, T	SP	Eliminates	Large	2, 3, 5, 9	n/a	n/a	911	5 years	TBD	High/High	Existing (2010)

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 98
(Sheet 6 of 9)
Montgomery County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
911 Continued…													
LM	Alternate paging system for public safety agencies to enhance the ability to page agencies during reduced operations during an emergency.	DF, EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2, 3, 5, 9	n/a	n/a	911	6 years	TBD	Medium/High	Existing (2010)
HM	Evaluate the need and design of an enhanced trunked radio system for public safety agencies to improve crisis/emergency communications and meet narrow banding requirements.	DF, EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2, 3, 5, 9	Yes	Yes	911	6 years	TBD	High/High	Existing (2010)
EMA													
HM	Purchase and install storm warning siren systems in unincorporated communities and subdivisions within the County.	SS, T	MP	Reduces	Small	2	n/a	n/a	EMA	TBD	TBD	Medium/High	New
HM	Purchase and install storm warning sirens in communities that do not have any sirens or do not have adequate coverage with existing sirens.	SS, T	MP	Reduces	Small	2	n/a	n/a	EMA	TBD	TBD	Medium/High	New
LL	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Small	6, 7	Yes	Yes	EMA	TBD	County	Low/Medium	Existing (2010)

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 98
(Sheet 7 of 9)
Montgomery County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
EMA Continued…													
LL	Make the most recent Flood Insurance Rate Maps available at the County Clerk/Recorder's office to assist the public in considering where to construct new buildings and make county officials aware of the maps and issues related to construction in a floodplain.*	F	RA	Reduces	Small	1, 6, 7	Yes	Yes	EMA	TBD	County	Low/Medium	Existing (2010)
LL	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Small	1, 6, 7	Yes	Yes	EMA	TBD	County	Low/Medium	Existing (2010)
Highway Department													
LM	Remove and dispose of trees and brush adjacent to highways.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	n/a	Yes	Highway Department	Ongoing	County	Medium/Medium	Existing (2010)
LM	Evaluate existing road, bridge, culvert and storm sewer infrastructure to identify natural hazard vulnerabilities.	EQ, F, SS, SWS	S	Reduces	Large	2, 3, 5	Yes	Yes	Highway Department	1 year	TBD	Medium/Medium	Existing (2010)
HM	Perform preliminary engineering and construct, retrofit or completely replace road, bridge, culvert and storm sewer infrastructure as recommended to mitigate natural hazard vulnerabilities.	EQ, F, SS, SWS	SP	Reduces	Large	2, 3, 5	n/a	Yes	Highway Department	Ongoing	TBD	High/High	Existing (2010)

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 98
(Sheet 8 of 9)
Montgomery County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
Highway Department Continued…													
LM	Evaluate existing Highway Department administrative, maintenance, equipment storage buildings and radio transmitter to identify natural hazard vulnerabilities	EH, EQ, F, SS, SWS, T	S	Reduces	Large	2, 3, 5	Yes	Yes	Highway Department	1 year	TBD	Low/Medium	Existing (2010)
HM	Perform preliminary engineering and architecture work to construct, retrofit or completely replace the Highway Department's administrative, maintenance, equipment storage buildings and radio transmitter to mitigate identified natural hazard vulnerabilities.	EH, EQ, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	n/a	Yes	Highway Department	2 years	TBD	High/High	Existing (2010)
LM	Prepare public information, including long range plans, maps, policies, and procedures and make them available online along with an area for the public to make comments.	DF, DR, EQ, EH, F, SS, SWS, T	PI	Reduces	Large	1, 2	Yes	Yes	Highway Department	2 years	TBD	Low/High	Existing (2010)
LM	Protect historical Highway Department documents including plans, specifications, construction records and agreements by scanning, inventorying and storing off site.	EQ, F, SS, SWS, T	MP	Eliminates	Large	5, 8	n/a	n/a	Highway Department	3 years	TBD	Medium/High	Existing (2010)
LM	Purchase road signage and barricades to warn and detour traffic in the event a natural disaster causes dangerous or impassable conditions.	DF, EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2	NA	NA	Highway Department	1 year	TBD	Low/High	Existing (2010)
HL	Retrofit the Simpson Bridge against seismic and flood damage.	EQ, F	SP	Reduces	Small	2, 3, 5	n/a	Yes	Highway Department	2 years	75% Federal 25% Local	High/Medium	Existing (2010)

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 98
(Sheet 9 of 9)
Montgomery County Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
Sheriff's Office													
HM	Establish a Montgomery County Sheriff's Office (MCSO) Building/Jail Emergency Operating Center (EOC) in the event that the main facility is destroyed or inoperable.	EQ, F, SS, SWS, T	SP	Reduces	Large	2, 5	Yes	Yes	Sheriff's Office	1 year	75% Federal 25% Local	High/High	Existing (2010)
HM	Training for Montgomery County Sheriff's Office personnel on County Emergency Operating Procedures.	DF, EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2, 9	n/a	n/a	Sheriff's Office	Ongoing	County	Low/High	Existing (2010)
Supervisor of Assessments													
LL	Obtain new high resolution orthographic photography of Montgomery County with LIDAR topographic Digital Elevation Model (1 ft. contours) for flood analysis.	F, SS, SWS	MP	Reduces	Large	2, 3, 5, 7	Yes	Yes	Supervisor of Assessments	TBD	TBD	Medium/Medium	New
LL	Upon obtaining new LIDAR data, perform floodway delineation analysis of selected waterways and streams in the County to identify areas where flood mitigation measures need to be implemented.	F, SS, SWS	S	Reduces	Medium	2, 3, 5, 7	Yes	Yes	Supervisor of Assessments	TBD	75% Federal 25% Local	Medium/Medium	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 99
(Sheet 1 of 2)
Coffeen Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
LM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the lines.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Street Department	Ongoing	TBD	Medium/High	New
HM	Repair/reline sewer line sections/mains where storm water infiltration is occurring to prevent sewage backups.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	Ye	Yes	Street Department	Ongoing	TBD	Medium/High	New
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems within the City.	F,SS, SWS	SP	Eliminate	Medium	2, 3, 5	Yes	Yes	Street Department	Ongoing	75% Federal 25% Local	Medium/High	New
HM	Install new storm water drainage system (ditches, culverts, etc.) in select areas of the City to alleviate recurring roadway drainage/ponding issues.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Street Department	Ongoing	TBD	Medium/High	New
HM	Construct retention pond next to wastewater treatment facility to manage excess storm water that infiltrates the sewer system during heavy rains, overwhelming the facility's capacity.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	Street Department	TBD	75% Federal 25% Local	High/High	New
LL	Secure agreement with neighboring water system(s) to provide alternative/backup drinking water supply to the City.	DF, DR, EQ, SS, SWS, T	RA	Reduces	Large	2, 3, 5	Yes	Yes	Water Department	TBD	City	Low/High	New
LM	Purchase barricades, road signage and portable light to warn and detour traffic in the event a natural disaster causes dangerous or impassable conditions.	EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2	n/a	n/a	Street Department	TBD	TBD	Medium/Medium	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 99
(Sheet 2 of 2)
Coffeen Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
LM	Develop a Memorandum of Agreement with Coffeen Elementary School designating the school as a storm/emergency shelter and heating/cooling center for City residents.	EH, EQ, F, SS, SWS, T	RA	Reduces	Medium	2	n/a	n/a	City Council	TBD	City	Low/Medium	New
LM	Evaluate condition of water tower and assess vulnerability to natural hazards.	EQ, SS, SWS, T	S	Reduces	Large	2, 3, 5	Yes	Yes	Water Department	TBD	TBD	Low/Medium	Existing (2010)
HM	If needed, replace existing water tower.	EQ, SS, SWS, T	SP	Reduces	Large	2, 3, 5	Yes	Yes	Water Department	TBD	TBD	High/High	Existing (2010)
HM	Purchase and install automatic emergency generator at city-owned water tower/pump station located on IL Rte. 185 northwest of the City to provide uninterrupted power and maintain operations during power outages.	EQ, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	Yes	Yes	Water Department	TBD	TBD	Medium/High	Existing (2010)
HM	Purchase and install an automatic emergency generator for water tower/pump station located on Maple Street to provide uninterrupted power and maintain operations during power outages.	EQ, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	Yes	Yes	Water Department	TBD	TBD	Medium/High	Existing (2010)
HM	Purchase and install an automatic emergency backup generator at the wastewater treatment facility to provide uninterrupted power and maintain operations during power outages.	EQ, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	Yes	Yes	Water Department	TBD	TBD	Medium/High	Existing (2010)

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 100
(Sheet 1 of 2)
Donnellson Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Retrofit the Community Building (current location of Village Hall) to include a community safe room and serve as a storm safe/emergency shelter and heating/cooling center for Village residents. As part of the retrofit, an emergency backup generator with automatic transfer switch would be purchased and installed and the HVAC, electrical, bathrooms and kitchen studied and upgraded as necessary.	EH, EQ, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	n/a	Yes	Village	5 years	75% Federal 25% Local	High/High	New
HM	Purchase a portable diesel transfer cell (fuel tank) and pump to provide fuel to the diesel-powered generator at the Sewer Plant to maintain operations during a power outage.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	n/a	Yes	Village	1 year	TBD	Low/High	New
LM	Purchase barricades, road signage and portable light to warn and detour traffic in the event a natural disaster causes dangerous or impassable conditions.	EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2	n/a	n/a	Village	2-3 years	TBD	Medium/Medium	New
HM	Reshape existing drainage ditches and construct new ditches where needed to increase flow capacity and alleviate drainage/flooding issues.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Village	Ongoing	TBD	Medium/Medium	New
HM	Remove debris, vegetative overgrowth, snags and drifts in Yankee Creek (within the City limits) to increase carrying capacity and reduce/prevent flooding problems.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Village	Ongoing	TBD	Medium/Medium	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 100
(Sheet 2 of 2)
Donnellson Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Replace/upsize culverts as needed to alleviate drainage/flooding issues.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Village	Ongoing	TBD	Medium/Medium	New
LM	Coordinate with Norfolk Southern to address drainage/flooding problems on the north end of the Village caused by runoff from the railroad tracks.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Village	Ongoing	Village	Low/Medium	New
HM	Purchase and install an automatic emergency backup generator at Community Building (current location of Village Hall) to provide uninterrupted power and maintain operation during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	Village	3 years	TBD	Medium/High	New
LM	Purchase NOAA weather radios and distribute to Village residents.	EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2	n/a	n/a	Village	TBD	TBD	Low/High	New
LM	Conduct feasibility study to determine the appropriateness of constructing an alternate route over or around the Norfolk Southern rail line at the north edge of the Village to maintain access to vital services in the event of a train breakdown or derailment. Currently there is only one way in or out of the Village from the north, IL Rte. 127. Should IL Rte. 127 become blocked, the closest county road with access to the north is over 1.5 miles away (Arrow Trail).	EH, EQ, F, SS, SWS, T	S	Reduces	Large	2, 3, 5	Yes	Yes	Village	TBD	TBD	High/Medium	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 101
Farmersville Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
HM	Design and construct an Emergency Operations Center (retrofit an existing building or construct a new multi-use building) to use during natural hazard or other emergency events.	DR, EH, EQ, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	5 years	75% Federal 25% Local	High/High	New
HM	Separate the combined sewer system within the Village to accommodate stormwater flow, maximize the carrying capacity of the sewer system and reduce the potential for sewer backups and flooding problems.	F, SS, SWS	SP	Eliminates	Large	2, 3, 5	Yes	Yes	Village Board	10 years	75% Federal 25% Local	High/High	New
HM	Bury power lines to critical facilities to limit service disruption during natural hazard events.	SS, SWS, T	MP	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	5 years	TBD	Medium/High	Existing (2010)
HM	Install emergency generator at critical facilities/shelter for power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	Yes	Yes	Village Board	5 years	TBD	Medium/High	Existing (2010)
LM	Conduct study to identify ways to improve road drainage to prevent flooding of residential areas.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	5 years	75% Federal 25% Local	Low/Medium	Existing (2010)
HM	Improve road drainage to prevent flooding of residential areas.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	10 years	75% Federal 25% Local	Medium/Medium	Existing (2010)
HM	Upgrade wastewater treatment facility to better protect it from natural hazard events and minimize down time.	EQ, EH, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	10 years	75% Federal 25% Local	High/High	Existing (2010)
HM	Upgrade drinking water treatment facility to better protect it from natural hazards to minimize down time.	EQ, EH, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	Yes	Yes	Village Board	10 years	75% Federal 25% Local	High/High	Existing (2010)

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 102
(Sheet 1 of 2)
Hillsboro Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
LM	Replace aging sanitary, storm and drinking water lines to prevent storm water infiltration and increase resilience to contraction and expansion of surrounding soils.	DR, F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	City Council / Water Department	TBD	TBD	High/Medium	New
HM	Improve storm sewer system to alleviate drainage problems and better manage stormwater.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	City Council / Sewer Department	TBD	75% Federal 25% Local	High/Medium	New
LM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the lines.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	City Council / Sewer Department	Ongoing	TBD	Low/High	New
HM	Repair/reline sewer line sections/mains where storm water infiltration is occurring to prevent sewage backups.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	Yes	Yes	City Council / Sewer Department	Ongoing	TBD	Medium/High	New
HM	Expand the City's storm sewer system to include the Northwood Heights and Parkside areas to better manage stormwater runoff and alleviate recurring drainage/flooding problems experienced in these areas.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	City Council / Sewer Department	TBD	75% Federal 25% Local	Medium/Medium	New
HM	Replace/upsize roadway culvert at Fairground Ave. (near Hillsboro Jr. & Sr. High Schools) to increase carrying capacity, alleviate recurring roadway overtopping and flooding problems.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	n/a	Yes	City Council	TBD	TBD	Medium/Medium	New
HM	Replace portable and in-car radio communication systems for fire, police and dispatch departments.	DF, EH, DQ, F, SS, SWS, T	MP	Reduces	Large	2, 3, 5	Yes	Yes	City Council	TBD	TBD	Medium/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 102
(Sheet 2 of 2)
Hillsboro Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Redesign the drainage system for the Route 16 underpass of the Union Pacific Railroad.	F, SS, SWS	S	Reduces	Large	2, 3, 5	n/a	Yes	City Council	TBD	75% Federal 25% Local	High/High	Existing (2010)
HM	Replace existing storm warning siren and/or system and install additional storm warning sirens at strategic locations within the City to ensure maximum coverage.	SS, T	MP	Reduces	Large	2	n/a	n/a	City Council / Police & Fire Departments	TBD	TBD	Medium/High	Existing (2010)
LM	Conduct drainage study to identify how to correct a chronic drainage problem impacting homes in the vicinity of an unnamed creek near Mechanic Street and Hollis Lane.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	City Council	TBD	75% Federal 25% Local	Medium/Medium	Existing (2010)
LL	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Small	1, 2, 6, 7	Yes	Yes	City Council	TBD	City	Low/Medium	Existing (2010)
LL	Make the most recent Flood Insurance Rate Maps available at the City Clerk's Office to assist the public in considering where to construct new buildings and make city officials aware of the maps and issues related to construction in a floodplain.*	F	RA	Reduces	Small	1, 2, 6, 7	Yes	Yes	City Council	TBD	City	Low/Medium	Existing (2010)
LL	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Small	1, 2, 3, 5, 6, 7	Yes	Yes	City Council	TBD	City	Low/Medium	Existing (2010)

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 103
Hillsboro Area Hospital Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Purchase and install and automatic emergency backup generator at Tremont Ridge Assisted Living Facility to provide uninterrupted power to critical systems during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	n/a	Yes	Administration / Safety Team	1 year	TBD	Low/High	New
HM	Replace all of the Hospital's external windows with shatter-resistant/shatter-proof glass and/or install storm shutters to make the building resistant to the effects of natural hazard events.	EQ, SS, T	SP	Reduces	Large	2, 3, 5	n/a	Yes	Administration / Safety Team	1 year	75% Federal 25% Local	Medium/Medium	New
HM	Retrofit a current space within the Hospital and/or design and construct a new structure on the Hospital campus to serve as a community safe room (tornado/storm shelter) for use by staff, visitors and patients.	SS, T	SP	Reduces	Large	2	Yes	Yes	Administration / Safety Team	TBD	75% Federal 25% Local	High/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 104
(Sheet 1 of 4)
Litchfield Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Purchase and install automatic emergency backup generator at the City Hall/Police Department (a designated storm/emergency shelter and heating/cooling center) to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	n/a	Yes	City Council	TBD	TBD	Low/High	New
HM	Purchase and install automatic emergency backup generator at the main Fire Station to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	n/a	Yes	City Council	TBD	TBD	Low/High	New
HM	Purchase and install automatic emergency backup generator at the Westside Emergency Station to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	n/a	Yes	City Council	TBD	TBD	Low/High	New
HM	Purchase and install automatic emergency backup generator at the Streets Shed to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	n/a	Yes	City Council	TBD	TBD	Low/High	New
HM	Repair/replace sewer line sections/mains to minimize storm water infiltration in the wastewater system and to prevent sewage backups.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	Yes	Yes	City Council	TBD	TBD	High/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 104
(Sheet 2 of 4)
Litchfield Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Design and construct a community safe room (tornado shelter) built to seismic standards and equipped with emergency backup generator and heating/air conditioning units that can also serve as an emergency shelter/heating and cooling center for City residents.	EH, EQ, F, SS, SWS, T	SP	Reduces	Medium	2	Yes	n/a	City Council	TBD	75% Federal 25% Local	High/High	New
HM	Construct railroad overpass/underpass over Norfolk Southern/BNSF rail lines to maintain vital municipal services throughout the entire City. Presently there are six at-grade crossings all within a mile of each other in the City. The main crossings are only blocks apart. If a train were to breakdown or derail, a majority, if not all of the crossings could be blocked separating west side of the City and Interstate 55 from critical services.	EH, EQ, F, SS, SWS, T	SP	Eliminated	Medium	2, 3, 5	Yes	Yes	City Council	TBD	TBD	High/Medium	New
HM	Construct a silt basin around Lake Lou Yaeger to capture sediment laden runoff and prevent it from entering the lake and impacting water quality and storage capacity. Lake Yaeger is one of two surface water bodies used to supply drinking water to Litchfield.	F, SS, SWS	SP	Reduces	Large	3, 5, 6	n/a	Yes	City Council	TBD	75% Federal 25% Local	Medium/Medium	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 104
(Sheet 3 of 4)
Litchfield Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Construct storm water drainage system (lines, ditches, culverts, etc.) in select areas of the City to alleviate recurring drainage/flooding problems.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	City Council	TBD	75% Federal 25% Local	High/High	Existing (2010)
HM	Bury power supply lines to critical facilities to limit service disruption during natural hazard events.	SS, SWS, T	MP	Reduces	Large	2, 3, 5	Yes	Yes	City Council	TBD	TBD	Medium/High	Existing (2010)
HL	Perform seismic upgrades to critical facilities.	EQ	SP	Reduces	Large	2, 3, 5	Yes	Yes	City Council	TBD	75% Federal 25% Local	High/Medium	Existing (2010)
HL	Perform seismic upgrade to bridge across Lake Yaeger Dam.	DF, EQ	SP	Reduces	Medium	2, 3, 5, 8	Yes	Yes	City Council	TBD	75% Federal 25% Local	High/Medium	Existing (2010)
HL	Perform seismic upgrade to the Lake Yaeger intake structure and earth dam.	DF, EQ	SP	Reduces	Medium	2, 3, 5, 8	Yes	Yes	City Council	TBD	75% Federal 25% Local	High/Medium	Existing (2010)
HL	Perform seismic upgrade to the Lake Litchfield intake structure and earth dam.	DF, EQ	SP	Reduces	Medium	2, 3, 5, 8	Yes	Yes	City Council	TBD	75% Federal 25% Local	High/Medium	Existing (2010)
HM	Design and construct community safe rooms (tornado shelters) equipped with emergency backup generators and heating/air conditioning units at strategic locations within the City that can also serve as an emergency shelters/heating and cooling centers for City residents.	SS, T	SP	Reduces	Medium	2	n/a	n/a	City council	TBD	75% Federal 25% Local	High/High	Existing (2010)
HL	Design and install mine subsidence protection measures at Litchfield High School.	---	SP	Reduces	Medium	2, 3, 5	n/a	Yes	City Council	TBD	TBD	High/Medium	Existing (2010)

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 104 (Sheet 4 of 4) Litchfield Hazard Mitigation Actions													
Priority	**Activity/Project Description**	**Hazard(s) to be Mitigated**	**Type of Mitigation Activity**	**Degree of Mitigation**	**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**	**Status**
							New	**Existing**					
LL	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Small	1, 2, 6, 7	Yes	Yes	City Council	TBD	City	Low/Medium	Existing (2010)
LL	Make the most recent Flood Insurance Rate Maps available at the City Clerk's Office to assist the public in considering where to construct new buildings and make city officials aware of the maps and issues related to construction in a floodplain.*	F	RA	Reduces	Small	1, 2, 6, 7	Yes	Yes	City Council	TBD	City	Low/Medium	Existing (2010)
LL	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Small	1, 2, 3, 5, 6, 7	Yes	Yes	City Council	TBD	City	Low/Medium	Existing (2010)

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 105
(Sheet 1 of 4)
Nokomis Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
LM	Conduct wastewater system reconnaissance study to identify locations where storm water is infiltrating the system.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Public Works / ESDA	1-2 years	TBD	Low/High	New
HM	Repair/reline sewer line sections and repair/replace mains to minimize storm water infiltration in the wastewater system and to prevent sewage backups.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	Yes	Yes	Public Works / ESDA	1-2 years	TBD	Medium/High	New
HM	Replace/upsize approx. 900 feet of storm sewer line along S. Union St. to better manage stormwater runoff and alleviate recurring drainage/flooding problems.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Public Works / ESDA	2-3 years	75% Federal 25% Local	Medium/High	New
HM	Replace/upsize approx. 2,000 feet of storm sewer line along South St. to better manage stormwater runoff and alleviate recurring drainage/flooding problems.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Public Works / ESDA	2-3 years	75% Federal 25% Local	High/High	New
HM	Replace/upsize approx. 900 feet of storm sewer line in an alley running between State St. and South St. (behind McKay's Auto Parts) to increase capacity, better manage stormwater runoff and alleviate recurring drainage/flooding problems.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Public Works / ESDA	2-3 years	75% Federal 25% Local	Medium/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 105
(Sheet 2 of 4)
Nokomis Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Replace S. Union St. structure over unnamed tributary of East Fork Shoal Creek (adjacent to Shane Coal Park) to address scour damage and erosion caused by repeated flooding and increase flow capacity.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Public Works / ESDA	1-2 years	TBD	High/Medium	New
HM	Purchase a portable emergency backup generator for use at lift stations to maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	Yes	Yes	Public Works / ESDA	1-2 years	TBD	Low/High	New
HM	Remove debris, vegetative overgrowth, snags and brush in unnamed tributary of East Fork Shoal Creek (within the City limits) to maintain/increase carrying capacity, better manage stormwater runoff and reduce/prevent flooding problems.	F, SS, SWS	MP	Reduces	Small	2, 3, 5	Yes	Yes	Public Works / ESDA	2-3 years	City	Low/High	New
HM	Design and construct a community safe room (tornado shelter) built to seismic standards and equipped with emergency backup generator and heating/air conditioning units that can also serve as an emergency shelter/heating and cooling center for City residents.	EH, EQ, F, SS, SWS, T	SP	Reduces	Medium	2	Yes	n/a	Public Works / ESDA	3-5 years	75% Federal 25% Local	High/High	New
HM	Purchase and install new storm warning sirens.	SS, T	MP	Reduces	Medium	2	n/a	n/a	Public Works	1-2 years	TBD	Low/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 105
(Sheet 3 of 4)
Nokomis Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
LM	Conduct study of storm sewer and small stream capacity in order to better manage storm water runoff for an area south of UPRR tracks within the City. The study will take into account the present configuration of the storm sewer and small stream "system" and make recommendations to increase capacity.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Public Works / EDSA	3 years	75% Federal 25% Local	Medium/Medium	Existing (2010)
HM	Modify/correct contour and path of unnamed tributary of East Fork Shoal Creek (within the City limits) to allow for more efficient management of storm water runoff. Emphasis on increased capacity (retention ponds) and environmental "friendliness" of the creek in the area of Shane Cole Park.	F, SS, SWS	MP	Reduces	Large	2, 3, 5, 6, 8	n/a	Yes	Public Works / EDSA	2-3 years	TBD	Medium/Medium	Existing (2010)
HM	Upgrade storm sewer system south of the UPRR tracks to increase capacity and alleviate drainage/flooding problems.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	n/a	Yes	Public Works / EDSA	3-5 years	75% Federal 25% Local	High/Medium	Existing (2010)
LL	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Small	1, 2, 6, 7	Yes	Yes	ESDA	TBD	City	Low/High	Existing (2010)

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 105
(Sheet 4 of 4)
Nokomis Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
LL	Make the most recent Flood Insurance Rate Maps available at the City Clerk's Office to assist the public in considering where to construct new buildings and make city officials aware of the maps and issues related to construction in a floodplain.*	F	RA	Reduces	Large	1, 2, 6, 7	Yes	Yes	ESDA	TBD	City	Low/High	Existing (2010)
LL	Make information materials available about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 2, 3, 5, 6, 7	Yes	Yes	ESDA	TBD	City	Low/High	Existing (2010)

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 106
(Sheet 1 of 3)
Panama Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Purchase and install storm warning siren(s).	SS, T	MP	Reduces	Large	2	n/a	n/a	Village Board	TBD	TBD	Medium/High	New
LM	Install riprap along the banks of sewer lagoon to stabilize the shoreline, halt erosion and prevent potential future flooding/drainage problems on adjacent properties.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	TBD	TBD	Medium/Medium	New
HM	Purchase and install an automatic emergency backup generator at Village Hall to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	Village Board	TBD	TBD	Medium/High	New
LM	Designate the Community Center as a storm/emergency shelter and heating/cooling center.	EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2	n/a	n/a	Village Board	TBD	Village	Low/High	New
HM	Purchase and install automatic emergency backup generator at the Community Center (a designated storm/emergency shelter and heating/cooling center) to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2	n/a	Yes	Village Board	TBD	TBD	Medium/High	New
LM	Develop a Memorandum of Agreement with the Outreach Center designating it as a storm (tornado) shelter for Village residents.	EH, EQ, F, SS, SWS, T	RA	Reduces	Medium	2	n/a	n/a	City Council	TBD	Village	Low/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 106
(Sheet 2 of 3)
Panama Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
LM	Designate the Outreach Center as a storm (tornado) shelter.	SS, T	MP	Reduces	Large	2	n/a	n/a	Village Board	TBD	Village	Low/High	New
HM	Purchase and install automatic emergency backup generator at the Outreach Center (a designated storm/emergency shelter and heating/cooling center) to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2	n/a	Yes	Village Board	TBD	TBD	Medium/High	New
LM	Purchase NOAA weather radios and distribute to Village residents.	EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2	n/a	n/a	Village Board	TBD	TBD	Low/High	New
HM	Purchase portable emergency backup generators for use at lift stations to maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	Yes	Yes	Village Board	TBD	TBD	Medium/High	New
HM	Replace/upsize roadway culverts along major drainage ditches and install new drainage structures where needed to alleviate drainage/flooding problems.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	TBD	TBD	Medium/Medium	New
HM	Identify and install "hardening" materials (i.e., shatter-proof glass, hail resistant shingles/doors, etc.) at Village Hall to make the buildings resistant to natural hazards.	EQ, SS, T	SP	Reduces	Small	2, 3, 5	n/a	Yes	Village Board	TBD	TBD	Medium/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 106
(Sheet 3 of 3)
Panama Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Upgrade pumps at sanitary lift stations to maximize pumping capacity and alleviate recurring drainage problems and sewer backups.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	n/a	Yes	Village Board	TBD	TBD	Medium/High	New
LM	Replace aging sanitary and drinking water lines to prevent storm water infiltration and increase resilience to contraction and expansion of surrounding soils.	DR, F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	City Council / Water Department	TBD	TBD	High/Medium	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 107
Raymond Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
LM	Drill an additional drinking water well to provide additional capacity to improve resiliency to drought and aid in fire suppression as necessary during natural hazard events.	DR	SP	Reduces	Large	2, 3, 5	n/a	Yes	Village Board	TBD	TBD	High/High	New
LM	Conduct reconnaissance study of the combined sewer system to identify locations where storm water infiltration is occurring.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	TBD	TBD	Medium/High	New
HM	Repair/reline sewer line sections and repair/replace mains to minimize storm water infiltration into the combined sewer system and to prevent sewage backups.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	Yes	Yes	Village Board	TBD	TBD	Medium/High	New
HM	Remove debris, vegetative overgrowth, snags and brush in Shoal Creek to maintain/increase carrying capacity, better manage stormwater runoff and reduce/prevent flooding problems at the cemetery and Wastewater Plant.	F, SS, SWS	MP	Reduces	Small	2, 3, 5, 6, 8	Yes	Yes	Village Board	TBD	Village	Medium/High	Existing (2010)

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 108
Regional Office of Education #3 Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
HM	Retrofit a current space within each school in the district and/or design and construct a new structure on school grounds to serve as a community safe room (tornado shelter) for use by staff and students.	T	SP	Reduces	Medium	2	Yes	Yes	Regional Office of Education & CUSD	TBD	75% Federal 25% Local	High/High	New

Acronyms

<u>Hazard(s) to be Mitigated:</u>

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

<u>Type of Mitigation Activity:</u>

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 109
(Sheet 1 of 2)
Schram City Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Designate emergency shelters within the Village (including the Kortkamp area) for use by residents.	EQ, F, SS, SWS, T	MP	Reduces	Medium	2	n/a	n/a	Village Board	1 year	Village	Low/High	New
HM	Purchase and install automatic emergency backup generators for use at designated emergency shelters to provide uninterrupted power and maintain operations during power outages.	EQ, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	n/a	Yes	Village Board	TBD	TBD	Medium/High	New
LM	Conduct drainage/hydraulic study to identify the cause(s) and determine the appropriate remedy(s) to alleviate recurring drainage/flooding problems experienced in residential areas.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	3 year	75% Federal 25% Local	Medium/Medium	New
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage/flooding problems experienced in residential areas.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	3 year	75% Federal 25% Local	High/Medium	New
HM	Design and construct a community safe room (tornado shelter) built to seismic standards and equipped with emergency backup generator and heating/air conditioning units that can also serve as an emergency shelter/heating and cooling center for Village residents (including those in the Kortkamp area).	EH, EQ, F, SS, SWS, T	SP	Reduces	Medium	2	Yes	n/a	3 year	3 year	75% Federal 25% Local	High/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 109
(Sheet 2 of 2)
Schram City Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Purchase and install automatic emergency backup generators at the Village's five (5) lift stations to provide uninterrupted power to maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	Yes	Yes	Village Board	3 years	TBD	Medium/High	New
HM	Upgrade and reroute the main sewer line and install a lift station and flow meter from the Kortkamp area to Hillsboro to increase capacity, better manage stormwater runoff and alleviate drainage/flooding problems.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	3 Years	75% Federal 25% Local	High/Medium	New
LM	Review and present for adoption the new Flood Insurance Rate Maps when they become available. Schram City has not been mapped and has no FIRM on record.	F	RA	Reduces	Small	1, 2, 6, 7	Yes	Yes	Village Board	TBD	Village	Low/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 110 St. Francis Hospital Hazard Mitigation Actions													
Priority	**Activity/Project Description**	**Hazard(s) to be Mitigated**	**Type of Mitigation Activity**	**Degree of Mitigation**	**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**	**Status**
							New	**Existing**					
HM	Purchase and install automatic emergency backup generators at outer buildings, including Dialysis and Medical Office buildings to provide uninterrupted power to critical systems during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Medium	2, 3, 5	n/a	Yes	Patient Safety Committee / Facility Management	1 year	TBD	Low/High	New
HM	Replace all external window glass with shatter-resistant/shatter-proof glass to make the building resistant to the effects of natural hazard events.	EQ, SS, T	SP	Reduces	Large	2, 3, 5	n/a	Yes	Patient Safety Committee / Facility Management	1 year	75% Federal 25% Local	Medium/Medium	New
HM	Retrofit boiler and chiller plants and install external auxiliary connections for emergency hook up of portable boiler or chiller to maintain climate control within the Hospital in the event of a natural gas disruption.	EQ, F, T	MP	Eliminates	Large	2, 3, 5	Yes	Yes	Patient Safety Committee / Facility Management	2 years	TBD	Low/Medium	New
HM	Purchase and install flood gates on lower level receiving doors (5) and the main doors (4) to prevent shipping and receiving area from flooding during heavy rain/flash flood events.	F, SS, SWS	MP	Eliminates	Large	2, 3, 5	n/a	Yes	Facility Management	2 years	TBD	Medium/Medium	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 111
(Sheet 1 of 2)
Taylor Springs Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Upgrade pumps at sanitary lift stations to maximize pumping capacity and alleviate recurring drainage problems and sewer backups.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	n/a	Yes	Village Board / Water/Sewer Department	1-5 years	TBD	Medium/High	New
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage problems south of Hamilton St.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Village Board / Water/Sewer Department	Ongoing	75% Federal 25% Local	High/Medium	New
HM	Purchase and install an automatic emergency backup generator at Village Hall to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	Village Board	1-2 years	TBD	Medium/High	New
HM	Purchase and install an automatic emergency backup generator at Community Building (a designated emergency shelter/heating and cooling center) to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	Village Board	1-2 years	TBD	Medium/High	New
HM	Purchase and install an automatic emergency backup generator at the Fire Department to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	Village Board	1-2 years	TBD	Medium/High	New
HM	Retrofit the bathrooms in the Community Building (a designated emergency shelter /heating and cooling center) to meet ADA standards.	EH, F, SS, SWS, T	SP	Reduces	Small	2	n/a	n/a	Village Board	1-5 years	TBD	Low/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 111
(Sheet 2 of 2)
Taylor Springs Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
HM	Identify and install "hardening" materials (i.e., shatter-proof glass, hail resistant shingles/doors, etc.) at the Community Building (a designated emergency shelter/heating and cooling center) to make the buildings resistant to natural hazards.	EQ, SS, T	SP	Reduces	Small	2, 3, 5	n/a	Yes	Village Board	1-5 years	TBD	Medium/High	New
HM	Identify and install "hardening" materials (i.e., shatter-proof glass, hail resistant shingles/doors, etc.) at the Village Hall to make the buildings resistant to natural hazards.	EQ, SS, T	SP	Reduces	Small	2, 3, 5	n/a	Yes	Village Board	1-5 years	TBD	Medium/High	New
HM	Construct an additional wastewater treatment lagoon to manage excess storm water from the combined sewer system during heavy rains.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	Water/Street Department	TBD	75% Federal 25% Local	High/High	New
HM	Replace/upsize roadway culverts along major drainage ditches and install new drainage structures where needed to alleviate drainage/flooding problems.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board / Street Department	1-3 years	TBD	Medium/Medium	New
LM	Construct a new water tower to increase the amount of water available in reserve and to aid in fire suppression as necessary during natural hazard events.	DF, DR, EQ, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	Yes	n/a	Village Board / Water Department	TBD	TBD	High/High	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 112
Waggoner Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
LM	Conduct drainage/hydraulic study to identify the cause(s) and determine the appropriate remedy(s) to alleviate recurring drainage/flooding problems experienced within the Village.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	Medium/Medium	New
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage/flooding problems experienced within the Village.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	TBD	75% Federal 25% Local	High/Medium	New
HM	Purchase and install an automatic emergency backup generator at Centennial Building (a designated emergency shelter/heating center) to provide uninterrupted power and maintain operations during power outages.	EH, EQ, F, SS, SWS, T	MP	Eliminates	Small	2, 3, 5	n/a	Yes	Village Board	TBD	TBD	Medium/High	New
HM	Upsize culverts at select locations to alleviate recurring drainage problems.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	Village Board	TBD	TBD	Medium/Medium	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 113
(Sheet 1 of 2)
Witt Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
							New	Existing					
LM	Replace aging sanitary and drinking water lines to prevent storm water infiltration and increase resilience to contraction and expansion of surrounding soils.	DR, F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	City Council	TBD	TBD	High/Medium	New
LM	Conduct sewer line reconnaissance study to identify locations where storm water infiltrates the lines.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	City Council	Ongoing	TBD	Medium/High	New
HM	Repair/reline sewer line sections/mains where storm water infiltration is occurring to prevent sewage backups.	F, SS, SWS	SP	Eliminates	Medium	2, 3, 5	Yes	Yes	City Council	Ongoing	TBD	Medium/High	New
HM	Design and construct a community safe room (tornado shelter) built to seismic standards and equipped with emergency backup generator and heating/air conditioning units that can also serve as an emergency shelter/heating and cooling center for Village residents.	EH, EQ, F, SS, SWS, T	SP	Reduces	Medium	2	Yes	n/a	City Council	3 year	75% Federal 25% Local	High/High	New
HM	Reshape existing drainage ditches and construct new ditches where needed to increase flow capacity and alleviate drainage/flooding issues.	F, SS, SWS	SP	Reduces	Small	2, 3, 5	Yes	Yes	City Council	Ongoing	TBD	Medium/Medium	New

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

Figure 113
(Sheet 2 of 2)
Witt Hazard Mitigation Actions

Priority	Activity/Project Description	Hazard(s) to be Mitigated	Type of Mitigation Activity	Degree of Mitigation	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	Status
LM	Conduct drainage/hydraulic study to identify the cause(s) and determine the appropriate remedy(s) to alleviate recurring drainage/flooding problems experienced in residential areas including but not limited to the areas at Vine Street & IL Rte. 16 and S. Main St. & IL Rte. 16.	F, SS, SWS	S	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	3 year	75% Federal 25% Local	Medium/Medium	New
HM	Select, design and construct the appropriate remedy(s) to alleviate recurring drainage/flooding problems experienced in residential areas.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	Yes	Yes	Village Board	3 year	75% Federal 25% Local	High/Medium	New
LL	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Small	6, 7	Yes	Yes	City Council	TBD	City	Low/Medium	Existing (2010)
LL	Make the most recent Flood Insurance Rate Maps available at the City Clerk's Office to assist the public in considering where to construct new buildings and make city officials aware of the maps and issues related to construction in a floodplain.*	F	RA	Reduces	Small	1, 6, 7	Yes	Yes	City Council	TBD	City	Low/Medium	Existing (2010)
LL	Make information materials available to the public about the National Flood Insurance Programs' Voluntary Community Rating System.*	F	PP	Reduces	Small	1, 6, 7	Yes	Yes	City Council	TBD	City	Low/Medium	Existing (2010)

* Mitigation action to ensure continued compliance with NFIP.

Acronyms

Hazard(s) to be Mitigated:

DF	Dam Failure	F	Flood
DR	Drought	SS	Severe Storms (Thunderstorms, etc.)
EH	Extreme Heat	SWS	Severe Winter Storms (Snow, etc.)
EQ	Earthquake	T	Tornado

Type of Mitigation Activity:

RA	Regulatory Activities	S	Studies
SP	Structural Projects	MP	Miscellaneous Projects
PI	Public Involvement	PP	Property Protection

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5.0 RECOMMENDATIONS

5.0 RECOMMENDATIONS

The following recommendations came about as a result of the mitigation planning process. These recommendations should be reviewed and discussed periodically by the professional staff and elected officials of each participating jurisdiction to determine if actions should be taken.

SEVERE STORMS/SEVERE WINTER STORMS

Bury Utility/Communication Lines & Install Backup Generators. Thunderstorms with damaging winds and ice storms frequently cause loss of power throughout Montgomery County. Residents in rural parts of Montgomery County report prolonged loss of power from thunderstorms with damaging winds and ice storms. Tree trimming near power lines, backup generators, and burying power lines are some of the steps that can help reduce power disruptions.

TORNADOES

Tornado Safe Shelters. Montgomery County is in the "tornado alley" of Illinois and experiences more tornadoes than over two-thirds the counties in the State. There is a need throughout the County to establish tornado safe shelters for residents who do not have basements and for government employees.

FLOODS

Mitigate Repetitive Loss Structures and Critical Facilities. Mitigation is strongly encouraged for all structures in the mapped floodplain, with a higher priority given to repetitive loss structures and critical facilities, as funding or other resources become available.

Stormwater Management to Reduce Flooding Problems. Stormwater management practices should be required for new subdivision development and other larger development projects, including commercial and industrial, to reduce flooding problems associated with excess runoff. Management practices could include the construction and use of retention and detention basins.

Drainage and Flooding Problems. Alleviating flooding and drainage problems across the County is a major concern repeatedly expressed throughout the planning process. County and community officials are encouraged to work together to find creative solutions to improve storm water management.

Donnellson: Runoff from the Norfolk Southern Railroad tracks is contributing to drainage problems on the north end of the Village. Officials will need cooperation from the railroad to address this issue.

Hillsboro: The IL Rte. 16 underpass of the Union Pacific Railroad experiences flooding problems that impact residents. In order to address this issue, coordination efforts will need to be undertaken with the Illinois Department of Transportation and the Union Pacific Railroad.

Litchfield: The Litchfield Comprehensive Plan identified drainage concerns expressed by residents as the “highest priority concerns.” Litchfield is encouraged to:

a.) evaluate the causes and remedies for alleviating drainage problems

b.) create a drainage plan that includes assessment of stormwater management

c.) require all new developments to have a stormwater management plan

Nokomis Steps to better manage storm water would reduce operating expenses for the wastewater treatment facility and alleviate drainage problems that residents experience.

FIRM Updates. Flood Insurance Rate Maps (FIRMs) are being revised to reflect changes in floodplain boundaries across the State. Funding to update the Montgomery County FIRMs has not yet been secured. However, funding becomes available and these maps are updated, those municipalities who participate in the National Flood Insurance Program (NFIP) will need to adopt the revised maps and update their flood ordinance.

When the digitized versions of the FIRMs are made available, the County GIS office should procure them to begin identifying the number and location of buildings present in the 100 year floodplain.

DROUGHT

Monitoring Surface Water Capacity. Hillsboro and Litchfield rely on surface water sources to provide residents with a sufficient quantity of safe drinking water. Consequently, the capacity of their surface water impoundments should be monitored and necessary steps taken to assure that adequate capacity will be maintained in the future.

Explore Alternate Water Sources. Adequate water capacity is important to attract new business, particularly those with “high” water usage. Measures to reduce shoreline erosion, sediment runoff from within the watershed, and dredging may be needed to maintain capacity. Installation of drinking water wells might be considered as a supplement so that fire protection and drinking water needs are met.

EARTHQUAKES

Protection of Infrastructure. The Planning Committee expressed a high degree of awareness about the risks and potential impacts associated with earthquakes. Because of its proximity to the New Madrid and Wabash Valley fault systems, steps should be taken at the municipal and County level to protect infrastructure from damage. Adoption and enforcement of building codes have proven successful in reducing damages from earthquakes.

Regional Medical Planning. Depending on the extent of road and bridge damage in the area, Montgomery County might see an influx of persons needing medical attention should there be a major earthquake in the region. Participating in regional medical planning activities may be helpful for preparing for an influx of patients and for medical care needed by Montgomery County residents who may need specialized assistance at facilities outside of the County.

GENERAL

Emergency Management Plans for Schools. Develop and annually update Emergency Operation Plans for elementary, middle and high schools. These plans should describe how to mitigate risks from natural hazards, structural failures, shooters and hostage situations, fires and bombs. A no-match federal grant has been used to develop these plans and conduct tabletop and full-scale exercises involving health, law enforcement, fire, and emergency management personnel. While the grant is not currently available, it is expected to resume in the future and in the interim information to assist schools with these tasks is available from the Montgomery County EMA Office.

Developing and Disseminating Hazard Information. Public information materials should be disseminated through local organizations that will help residents take protective actions prior to natural hazard events. Free state and federal hazard mitigation publications are available for use. In addition to disseminating printed materials, feedback from Montgomery County residents indicates that the radio, internet, newspapers and television should also be utilized to disseminate information.

Notification Systems. Early warning of impending storms provides residents valuable time to take protective measures. The use of warning sirens and maintaining existing county and municipal communication systems is vital for reducing impacts to health and property.

Shelters. The number of shelters available for use in the event of extreme heat/cold events should be expanded. While existing structures may be utilized in some areas, new structures will be needed in other areas.

Accidents along Interstate 55 can present sheltering issues in Montgomery County. A relatively recent accident on Interstate 55 revealed the need to be able to provide temporary housing for larger numbers of people. Traffic figures from the Illinois Department of Transportation and the results from the Montgomery County Commodity Flow Study identify the highest probability for this need will remain in the Litchfield area. Working with the faith based group Latter Rain Ministries provides a nearby option for providing this type of care when multiple persons are in need.

Maintaining Access to Critical Facilities. In the event a train breaks down or derails within Litchfield, the west side of the City and Interstate 55 would be separated from critical services, including healthcare. City and County officials should coordinated with the railroads to develop a strategy that can be implemented to ensure access to critical facilities if such an event occurs.

6.0 PLAN MAINTENANCE

6.0 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. Provided below is detailed discussion of each requirement.

6.1 MONITORING, EVALUATING & UPDATING THE PLAN

The County must establish 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.

6.1.1 Monitoring and Evaluating the Plan

The updated 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 Montgomery 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 Montgomery County EMA will be responsible for monitoring the status of the mitigation actions identified in the updated 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.

<u>Monitoring & Evaluating</u>

- ❖ A Plan Maintenance Subcommittee will be formed to monitor and evaluate the updated Plan.
- ❖ The updated 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 updated Plan on an annual basis to determine the effectiveness of the planning process and the 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 updated 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 updated 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.

6.1.2 Updating the Plan

The Plan must be updated within five years of the date the first participating jurisdiction adopts the updated Plan. (This date can be found in Section 7, 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.

It will be the responsibility of the Plan Maintenance Subcommittee to update 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 government entity that did not take part in the previous planning process that now wishes to participate may be added. It will be the responsibility of these entities to provide all of the information needed to be integrated into the updated Plan.

Updating

- The Plan Maintenance Subcommittee will be responsible for updating the Plan.
- The Plan ***must be updated within 5 years*** of the date the first participating jurisdiction adopts the updated Plan.
- Any government entities that did not take part in the previous planning process but who now wish to participate may do so.
- Once the updated Plan has received FEMA/IEMA approval, each participating jurisdiction ***must re-adopt the Plan*** to remain eligible to receive federal grant money.

A public forum will be held to present the updated Plan to the public for review and comment. The comments received at the public forum will be reviewed and incorporated into the updated Plan. The Subcommittee will then present the updated Plan to the participating jurisdictions for approval.

Once the Subcommittee has received approval from all of the participating jurisdictions, it will submit the updated Plan to the IEMA and FEMA for review. ***Once the updated Plan has received approval, FEMA requires that each of the participating jurisdictions re-adopt the Plan to remain eligible to receive federal grant money to implement identified mitigation actions.***

6.2 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 7** 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 updated Plan into the planning mechanisms identified for their jurisdiction.

6.3 Continued Public Involvement

The County and participating jurisdictions understand the importance of continued public involvement and will seek public input on the updated Plan throughout the plan maintenance process. A copy of the approved Plan will be maintained and available for review at the Montgomery County EMA. Individuals will be encouraged to provide feedback and submit comments for the Plan update to the Montgomery 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 updated Plan. 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 updating the Plan to provide the public an opportunity to comment on the updates proposed for the Plan.

7.0 PLAN ADOPTION

7.0 PLAN ADOPTION

The final step in the planning process is the adoption of the approved updated Plan by each participating jurisdiction. Each jurisdiction must formally re-adopt the Plan to remain eligible for federal grant money to implement mitigation actions identified in this Plan.

7.1 PLAN ADOPTION PROCESS

Before the updated Plan can be adopted by the participating jurisdictions, it must be made available for public review and comment through a public forum and comment period. Any comments received are incorporated into the updated Plan and the Plan is then submitted to the Illinois Emergency Management Agency (IEMA) and the Federal Emergency Management Agency (FEMA) for their review and approval.

Once IEMA and FEMA have reviewed and approved the updated Plan, it will be presented to the County and each participating jurisdiction for adoption. ***Each participating jurisdiction must formally re-adopt*** the Plan to become eligible to receive federal grant money to implement the mitigation actions identified in this Plan. If any of the jurisdictions choose not to adopt the updated Plan, their choice will not affect the eligibility of those that do adopt the updated Plan.

Figure 114 identifies the participating jurisdictions and the date each formally adopted the updated Plan. Signed copies of the adoption resolutions are located in **Appendix L**.

Figure 114
Plan Adoption Dates

Participating Jurisdiction	Plan Adoption Date
Raymond, Village of	09/06/2016
Schram City, Village of	09/12/2016
Hillsboro, City of	09/13/2016
Montgomery County	09/13/2016
Litchfield, City of	09/15/2016
Coffeen, City of	09/19/2016
Taylor Springs, Village of	09/20/2016
Nokomis, City of	09/26/2016
Witt, City of	09/27/2016
Waggoner, Village of	10/10/2016
Donnellson, Village of	11/14/2016
Panama, Village of	11/15/2016
Farmersville, Village of	12/05/2016
Regional Office of Education #3	
Hillsboro Area Hospital	
St. Francis Hospital	

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8.0 REFERENCES

Provided below is a listing, by section, of the resources utilized to create this document.

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4.0 MITIGATION STRATEGY

1. Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee. Existing Mitigation Project/Activity Status. Form. 23 July 2015.

2. Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee. New Hazard Mitigation Projects. Form. 23 July 2015.

MONTGOMERY COUNTY STATEMENT OF INTEREST

APPENDIX A

Statement of Intent in Natural-Hazard Mitigation Planning

Montgomery County

Montgomery County, in compliance with the Hazard Mitigation Assistance Guidance, has spoken with each jurisdiction listed in the Montgomery County - Hazard Mitigation Grant Application Scope of Work (1) in regards to their intent to participate. Each jurisdiction listed in the Scope of Work understands the roles and responsibilities expected of them, as well as the timeframe in which to complete their objectives as defined in the Scope of Work. This letter serves as verification that those jurisdictions listed in the plan as well as the County, have agreed to participate in the Montgomery County Hazard Mitigation planning process.

As signed, we understand this is a voluntary program and our participation may benefit our jurisdiction by identifying hazards and prioritizing potential projects to mitigate the effects of natural hazards.

7/17/14

Signature of Authorized Representative Date

Name and Title of Representative

(1) Montgomery County, Village/Municipalities of Coalton, Coffeen, Donnellson, Farmersville, Hillsboro, Irving, Litchfield, Nokomis, Panama, Raymond, Schram City, Waggoner, Witt

PLANNING COMMITTEE MEETING ATTENDANCE SHEETS

APPENDIX B

Attendance Sheet

Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee Meeting

May 14, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Hugh Sunderlin	Mont. County Health Dept	Administrator
2.	Patty Beasley	City of Witt	Alderman
3.	Kathy Tolle	City of Witt	Alderman
4.	Ronald E Deabenderfer	Mont. County Bd.	Dist 6
5.	[illegible]	Donnellson IL.	PRESIDENT
6.	KEVIN SMITH	MONTGOMERY CO	COUNTY ENGINEER
7.	SHEILA D. WHITE	CITY OF COFFEEN	MAYOR
8.	CAROLYN COOPER	City OF COFFEEN	CiTY CLERK
9.	MIKE WEBB	MONTGOMERY CTY / VILLAGE WAGGONER	Cty Bd / REPRESENTATIVE
10.	Will Shaffer	Montgomery Cty Development Corp	Director
11.	Christine Daniels	Montgomery County	County Bd. Admin
12.	Gary Satterlee	City of Hillsboro	Chief of Police
13.	Jeanie Voyles	Nokomis	Commissioner
14.	Angela Keagy	Nokomis	City Clerk
15.	Evan Young	Montgomery County Board	Board Member District 3
16.	Terry Hill	Nokomis	Mayor

Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

May 14, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Andrew Rosentroter	Insurance	Ins. Agent.
2.	Dennis Jurgotzski	Village of Taylor Springs	MAYOR.
3.	Joe Tieckkow	" FARMERSVILLE	MAYOR
4.	PATTY Betts	" TAYLOR SPRINGS	TRUSTEE
5.	Cindy Laurent	Village of Taylor Springs	Clerk
6.	Edwin L. Loathoff	Village of Taylor Springs	TrusTee
7.	Deborah Nancock	Village of Panama	CLERK
8.	Joe McCain		
9.	Ron Seaton	Village of Waggoner	Mayor
10.	Albert Oberle	VILLAGE OF SCHRAM CITY	MAYOR
11.	DENNIS SCHUETTE	LATTER RAIN MINISTRIES	ARCHITECT
12.	Matt Houser	Hearts United Assoc.	Administrator
13.	Joe Casparich	Mont Co	FINANCE COMMITTEE VICE CHAIR
14.	David Buckingham	Donnellson	Clerk / Treasurer
15.	Sheryl Reynolds	Donnellson	Water/Sewer Clerk
16.	Glenn Savage	M.C. Board EMA	

Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

May 14, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	STEVE DOUGHERTY	Litchfield	MAYOR
2.	Greg Nimmo	Farmersville	Trustee
3.	Tony Kruge	Pitman Twp	Highway Com
4.	GREG MICHAUD	JDQ	MGR, JDQ
5.	Andrea Bostwick	JDQ	Env. Specialist
6.	Diana Holmes per AB	Montgomery Co. EMA	Coordinator
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Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

May 14, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Tim Chumley	Nokomis	St. Dept
2.	Dennis Held	Raymond	Mayor
3.	Phil Speiser	Irving Township	Trustee
4.	Randy Singler	Irving Township	Supervisor
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Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

July 23, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Greg Michaud	Johnson, Depp & Quisenberry	Mgr, Env. Services
2.	Hugh Satterlee	Mont. County Health Dept	Administrator
3.	Richard Hewitt	Hillsboro Fire Dept	Investigator
4.	Nancy Richardson	Taylor Springs Village Board	Trustee
5.	Kathy Tolle	511 N. Main St. Witt	Alderman
6.	Kelly Johnston	City of Nokomis	Assistant City Clerk
7.	Bill Bergen	Mont Co Board	
8.	Brian Guinn	St. Francis Hosp.	Facility Dr.
9.	Ron Seaton	Waggoner ILL	
10.	David Buckingham	Donnellson	Clerk/Treasurer
11.	Sheryl Reynolds	Donnellson	Water/Sewer Clerk
12.	Michael Murphy	Hillsboro	Commissioner
13.	Gary Satterlee	Hillsboro Police	Chief
14.	Dennis Schuette	LRM Missions	Architect
15.	Will Shaller	Montgomery County EDC	Executive Director
16.	Sandy Leitheuser	Montgomery County	County Clerk/Recorder

Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

July 23, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Elwin L. Saathoff	Village of Taylor Springs	Mayor
2.	Andrew Rosentreter	Insurance	
3.	W. ALBERT OBERLE	VILLAGE OF SCHRAM CITY	MAYOR
4.	Debbie Hancock	Village of Panama	Clerk
5.	Joe McCain	Village of Panama	Village President
6.	Kenneth Folkerts	Rountree Township	Supervisor
7.	KEVIN SMITH	MONTGOMERY CO.	CO. ENGINEER
8.	CAROLYN COOPER	City of Coffeen	Clerk
9.	SHEILA O WHITE	City of COFFEEN	MAYOR
10.	Ronald E. Deabenderfer	Mont. County District 6	County Bd
11.	Cindy Laurent	Taylor Springs	Clerk
12.	Lisa Hamilton	Taylor Springs	Trustee
13.	PATTY Rufus	TAYLOR SPRINGS	Trustee
14.	Dolores Wheelhouse		
15.	Patsy Beasley	City of Witt	alder woman
16.	Bruce Sanford	Montgomery Co Sheriff Office	Deputy

Attendance Sheet

Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee Meeting

July 23, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Joe Gasparich	Montgomery County Board	Finance Vice Chair
2.	Chris Daniels	Mont. County	Bd. Admin.
3.	Lester Hamilton	Mgt. - County	Audubon Township Trustee
4.	C. J. Braden	" "	Board member
5.	Tim Brookshire	City of Nokomis	Commissioner
6.	Phil Speiser	IRVING TOWNSHIP	TRUSTEE
7.	Randy Singler	Irving Township	Supervisor
8.	[illegible]	Mont Co Bd S Litch	Bd member
9.	Diane [illegible]		EMA
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Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

July 23, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Dennis Heed	Raymond City	Mayor
2.	Matt Houser	Hearts United Assoc.	Admin.
3.	Steve Dougherty	Litchfield City	Mayor
4.	Tonya Flannery	city of Litchfield	admin
5.	Andrea Bostwick	WDQ	Env. Spec.
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Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

October 22, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	ROY L. HERTEL	MONTGOMERY CO	CHAIRMAN BOARD
2.	Joe McCario	Village of Panama	Village President
3.	Deb Hancock	Village of Panama	Clerk
4.	Kenneth Folkerts	Rountree Township	Supervisor
5.	FRANCES JETT	VILLAGE DONNELLSON	TRUSTEE
6.	Christine Daniels	Montgomery County	Cty Bd Admin
7.	Bill Bergen	Montgomery Co. Board	Board Member
8.	Darin Beckman	Village of Fillmore	Chief of Police
9.	Nancy Richardson	Village of Taylor Springs	Trustee
10.	CAROLYN COOPER	City of Coffeen	Clerk/Treasurer
11.	Kathy Tolle	City of Witt	Alderman
12.	Patsy Beasley	City of Witt	Alderman
13.	Hugh Satterlee	MCHD	Administrator
14.	Michael Murphy	City of Hillsboro	Commissioner
15.	Dolores Wheelhouse	MRC	Volunteer
16.	MIKE Webb	MCB / Village of WAGGONER	BOARD MEMBER / VOLUNTEER

Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

October 22, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Sheryl Reynolds	Donnellson, IL	Treasurer/Clerk
2.	Kevin Smith	Montgomery Co.	County Engineer
3.	Jamie Welzbacher	Donnellson, IL	Water clerk
4.	Cindy O'Laurent	T.S.	Clerk
5.	Patty Rufus	T. S.	Trustee
6.	Cassidy Younker	Montg. Cty	GIS Tech
7.	Ron Deabenderfer	Montg. Cty.	County Board
8.	C E Traden	" "	" "
9.	Albert Oberle	Schram City	Village President
10.	Richard Hewitt	Hillsboro	Hillsboro Fire Dept
11.	Elvin R Leathoff	Taylor Springs	Mayor
12.	[illegible]	City of Coffeen	Mayor
13.	Glen Savage	Litchfield/Co Board	Co Bd
14.	Vito Passariello	Ameren Illinois	Supv.
15.	Gary Satterlee	Hillsboro Police Dept.	Chief of Police
16.	Sandy Leitheiser	Montgomery County	County Clerk/Recorder

Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

October 22, 2015

	Name (Please Print)	*Representing (Jurisdiction/Organization)*	*Title*
1.	Jeanne Voytes	City of Nokomis	Commissioner
2.	Tim Brookshire	City of Nokomis	Commissioner
3.	[illegible]	EMA	coordinator
4.	Amanda Payne	Hillsboro Area Hospital	Emergency Preparedness
5.	Tony Kragen	Pitman Twp	Highway Comm
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Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

October 22, 2015

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Angela Keagy	City of Nokomis	City Clerk
2.	Andrea Bostwick	IDOA	Env. Spec.
3.	GREG MICHAUD	IDOA	Mgr, ENV. SERVICES
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Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

January 21, 2016

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Kelvin STewarT	SCHRAM CiTy	TrusTee
2.	Deborah Hancock	Panama	Clerk
3.	Joseph McCario	Panama	Village President
4.	DOLORES Wheelhouse	MRC -	VOLUNTEER
5.	DIANA Holmes	EMA	EMA coordinator
6.	BILL GILES	LRM	ENGINEER
7.	RICHARD HEWITT	HILLSBORO FIRE	INVESTIGATOR
8.	Ray HERTEL	MONT CO.	REP REG OFFICE of school CHAIRMAN BOARD
9.	Don Karban		Resident
10.	SHEILA D WHITE	CITY OF COFFEEN	MAYOR
11.	CAROLYN COOPER	CITY OF Coffeen	CITY CLERK
12.	Patsy beasley	City of Witt	alderman
13.	DON DOWNS	City of Hillsboro	Public Works Comissioner
14.	Amanda Payne	Hillsboro Area Hospital	Disaster Preparedness
15.	Jamie Welzbacher	Donnellson	Water/Sewer clerk
16.	Chris Daniels	Montgomery County	Cty Bd. Admin.

Attendance Sheet

Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee Meeting

January 21, 2016

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Elvin L. Saathoff	Taylor Springs	~~Mayor~~ President
2.	Cindy Laurent	Taylor Springs	Village Clerk
3.	KEVIN SMITH	MONTGOMERY CO.	ENGINEER
4.	Nancy Richardson	Taylor Springs	Board member
5.	Scott Ferguson	Latter Rain ministries	Dorm Director
6.	MIKE Webb	Village of WAGGONER / MONTGOMERY CTY	REP / BOARD MEMBER
7.	Jamie Davis	Red Cross	Disaster Mgr
8.	mark Beaver	Red Cross	Disaster
9.	Kathy Tolle	Witt city council	Alderman
10.	DENNIS Held	Ville of Raymond	Mayor
11.	Randy Singler	Irving Township	Supervisor
12.	Mary Fuchs-Daryl	Butler Grove Twp.	Clerk
13.	Gary Satterlee	City of Hillsboro	Chief of Police
14.	BRIAN GUINN	St. Francis Hospital	Facility
15.	Jeanne Voyles	City of Nokomis	Commissioner
16.	Leea Knight	Village of Panama	Board member

Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

January 21, 2016

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	CHARLES GRADEN	MONT. CO. BOARD	BOARD MEMBER
2.	Sheryl Reynolds	Village of Donnellson	Clerk/Treasurer
3.	Will Shalter	University of ~~##~~ Illinois	Community Economis
4.	Chris Henson	Hillsboro Area Hospital	Director of Em. Services
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Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

January 21, 2016

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Susan Graden	Public	
2.	Brian Sullivan	Mayor Hillsboro	
3.	Andrea Bostwick	JDQ	Env. Specialist
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Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

April 21, 2016

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Elwin L. Saathoff	Taylor Springs	President
2.	Joe McClario	Panama	President
3.	Ron Seaton	Waggoner	President
4.	JOE TISCHKAU	FARMERSVILLE IL	PRESIDENT
5.	MIKE WEBB	Montgomery Cty / Village of Waggoner	BOARD MEMBER
6.	ALBERT OBERLE	VILLAGE OF SCHRAM CITY	PRESIDENT
7.	Cindy Laurent	VILLAGE OF TAYLOR SPRINGS	CLERK
8.	Patty Ruts	Village of TS	TRUSTee
9.	Tim Brookshire	City of Nokomis	Commissioner
10.	Sheryl Reynolds	Village of Donnellson	Clerk/Treasurer
11.	Jamie Davis	American Red Cross	Disaster Program Mgr
12.	Brian Guinn	St. Francis Hospital	Facility/Supply Chain/EP
13.	CAROLYN COOPER	COFFEEN	CITY CLERK
14.	Tim Hopper	Montgomery County Board	Board member
15.	Gary Satterlee	Hillsboro Police	Chief of Police
16.	Jeanne Voyles	City of Nokomis	Commissioner

Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

April 21, 2016

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	GREG MICHAUD	AMERICAN ENVIRONMENTAL CORP.	MGR. EM. SERVICES
2.	Hugh Sutterlin	MCHD	Administrator
3.	Marinel Graden		Public
4.	C E GRADEN	MONT. CO. AUDUBON TWP	TRUSTEE
5.	FRAN JETT	DONNELLSON VILLAGE	TRUSTEE
6.	KEVIN SMITH	MONTGOMERY CO.	ENGINEER
7.	SHEILA D White	COFFEEN	MAYOR
8.	Patsy Beasley	Witt	alderman
9.	Dolores Wheelhouse	MCHD	
10.	RICHARD HEWITT	HILLSBORO FIRE	INVESTIGATOR
11.	Kathy Tolle	WITT	Alderman
12.	Angela Keagy	Nokomis	City Clerk
13.	BILL GILES	LITCHFIELD	LRM
14.	Diane Huhne	Hillsboro	EMA
15.	Mandy Sebeschak	Hillsboro Hospital	Respiratory
16.	Ron Deckerdufer	County Brd	[illegible]

Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

April 21, 2016

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Amanda Paye	Hillsboro Hospital	Performance Excellence
2.	Tonya Flannery	City of Litchfield	City Administrator
3.	Joe Casparick	County of Montgomery	Board Member
4.	Avyn Hunter	St. Francis Hospital	Nurse Educator
5.	Chris Daniels	Montgomery County	Bd Admin
6.	Dennis Held	Village of Raymond	Mayor
7.	Kiley Depew	Fayette Co EMA	Deputy Director
8.	[illegible] Craig	Fayette EMA	Director
9.	Sarah Waggoner	Litchfield	Tourism Coordinator
10.	Greg [illegible]	Farmersville	Board Member
11.	[illegible]	Litchfield	Alderman Litchfield
12.	[illegible]	Litchfield	Park District
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Attendance Sheet

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

April 21, 2016

	Name (Please Print)	Representing (Jurisdiction/Organization)	Title
1.	Jim Pitchford	Macoupin Co [illegible]	Consultant
2.	ROY HERTEL	MONT CO BOARD CHAIRMAN	
3.	Marilyn Sisson	Litchfield City Council	Alderwoman
4.	ROY L. HERTEL	REGIONAL OFFICE OF ED	(ROE)
5.	Andrea Bostwick	American Env. Corp	Senior Project Manager
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PLANNING COMMITTEE MEETING MINUTES

APPENDIX C

Meeting Minutes

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee

May 14, 2015
Montgomery County Public Health Department
11191 IL Route 185, Hillsboro
7:00 p.m.

Committee Members

Coffeen, City of
Donnellson, Village of
Farmersville, Village of
Hearts United Association
Hillsboro, City of
Irving Township
Latter Rain Ministries
Litchfield, City of
Mitigation Planning Consultants
  Johnson, Depp & Quisenberry
Montgomery County Offices
  Administrator
  Board
  Economic Development Corp.
  Emergency Management Agency
  Highway Department
  Health Department
Nokomis, City of
Panama, Village of
Pitman Township
Raymond, Village of
Rosentreter Insurance
Schram City, Village of
Taylor Springs, Village of
Waggoner, Village of
Witt, City of

Welcome and Introductions

Committee members introduced themselves by providing their name and who they represent.

Handout materials and binders were made available to attendees.

Why Should We Update Our Natural Hazard Mitigation Plan?

Greg Michaud, Johnson, Depp & Quisenberry (JDQ), described why mitigation planning is needed and how participating jurisdictions can benefit.

Since the early 1990s damages caused by weather extremes have risen substantially. In 2011, the United States experienced $52 billion in severe storm damages. Storm damage totals for 2012 were pushed higher by Superstorm Sandy. This year, the extreme winter weather that hit the northeast part of the nation, the severe drought in California, last week's heavy rainfall and tornado damage will again cause severe weather damages to rise. Consequently, the Federal Emergency Management Agency (FEMA) continues to encourage counties throughout the United States to prepare natural hazard mitigation plans. The natural hazards we are discussing are 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.

From the damages caused by natural disasters, FEMA has calculated that for every dollar spent on mitigation, $3 to $4 dollars can be reaped in savings.

Updating this plan provides three major benefits:

(1) When the next federally-declared natural disaster occurs, Montgomery 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.

(2) 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 projects that might not otherwise be realized.

(3) Verifiable information about the natural hazards that occur in Montgomery County will be gathered that will help participants in municipal and county meetings make decisions about how to better protect citizens and property from storm damages.

<u>The Planning Process</u>

The goal of the Committee meetings is to update the 2010 Plan to meet state and federal criteria so that it can be approved by the Illinois Emergency Management Agency (IEMA) and FEMA. A five meeting process has been developed to achieve this goal. Specific activities for the Committee meetings include:

1st Committee meeting	Orientation to the Planning Process Begin identifying Critical Facilities & Existing Planning Documents
2nd Committee meeting	Discuss the Risk Assessment Approve Mission Statement & Goals Committee returns the Critical Facilities List and the Existing Planning Documents List Identify completed Mitigation Projects
3rd Committee meeting	Begin discussing additional Mitigation Projects and Activities Develop a Mitigation Strategy Committee returns list of Mitigation Projects and Activities
4th Committee meeting	Finish discussing Mitigation Projects and Activities Committee discusses approval/adoption of the Plan

5th Committee meeting (Public Forum)	Present the Updated Plan for public review Committee helps answer questions from the public

Information Needed from the Committee

Forms

Andrea Bostwick, JDQ, distributed the following forms for each of the participating political jurisdictions to complete:

> ***Critical Facilities.*** Completed lists of Critical Facilities 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.
>
> ***Existing Planning Documents List***. This list includes Land Use Plans, Flood Ordinances, and related documents that a jurisdiction may already have.
>
> ***Shelter Surveys***. Locations for any designated severe weather shelters should be provided on this survey.
>
> ***Hazard Event Questionnaire.*** Dates and damages for severe weather events should be provided on this form.

Severe Weather Events

Committee members were asked to share their memories of severe weather events that have occurred relatively recently. Wind damage was the most frequently cited of the recent severe weather events which also included winter storms, flood and hail.

Two attendees were asked to share events that affected them:

- ❖ September 14, 2008—Remnants of Hurricane Ike resulted in at least 4 ½ to 6 inches of rain across the county which temporarily closed Route 16 near Nokomis.
- ❖ April, 2015—High winds lifted the roof off a building in Witt. There were no injuries, but the building suffered extensive damage.

Committee members were also asked to provide photographs depicting severe weather and damages caused by severe weather.

Mission Statement & Goals

Drafts of a proposed mission statement and goals were distributed. The goals were drafted in a manner that should help cover most, if not all, mitigation projects that are anticipated to be submitted. However, specific goals related to where you live can be added to this list. Every project included in the Plan should be aimed at one or more of the goals developed by this Committee. Committee Members were asked to review and discuss these drafts at the next meeting.

Community Participation

In addition to the requirement that members attend Committee meetings to help assure that the Plan can be approved by IEMA and FEMA, substitute representatives are acceptable. When an unforeseen obligation arises, a substitute can be designated and they do not have to be an official or employee of the municipality.

What Happens Next?

The risk assessment will be the main topic of the next committee meeting.

Committee members were asked to complete a citizen survey before they left, and to make copies of this survey available in their jurisdictions.

Diana will head the Risk Assessment subcommittee which will review the hazard mitigation tables assembled by Andrea and Greg. Volunteers to serve on this subcommittee should see Diana.

The second meeting of the Committee was scheduled for:

Thursday, July 23
Montgomery County Public Health Department
11191 IL Route 185, Hillsboro
6:30 p.m.—food served
7 p.m.—meeting commences

Public Comment

With no further comments or questions, Diana Holmes thanked the Committee members for their attendance and adjourned the meeting. She encouraged members to submit information requested to Andrea or Greg before the next Committee meeting.

Meeting Minutes

Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee

July 23, 2015
Montgomery County Public Health Department
11191 IL Route 185, Hillsboro
7:00 p.m.

Committee Members

Audubon Township
Coffeen, City of
Donnellson, Village of
Hearts United Association
Hillsboro, City of
Irving Township
Latter Rain Ministries
Litchfield, City of
Mitigation Planning Consultants
    Johnson, Depp & Quisenberry
Montgomery County Offices
    Administrator
    Board
    Clerk
    Economic Development Corp.
    Emergency Management Agency
    Highway Department
    Health Department
    Sheriff's Office
Nokomis, City of
Panama, Village of
Public Representative
    Dolores Wheelhouse
Raymond, Village of
Rosentreter Insurance
Roundtree Township
Schram City, Village of
St. Francis Hospital
Taylor Springs, Village of
Waggoner, Village of
Witt, City of

<u>Welcome and Introductions</u>

Diana Holmes opened the meeting and welcomed Committee members.

Handout materials were distributed to each member.

<u>Risk Assessment</u>

Greg Michaud, JDQ, began the presentation by noting that over $5 million in damages have resulted from nearly 350 severe storms and natural hazard events verified in Montgomery County over approximately 50 years. The actual damages are higher based on several facts: 1) damage descriptions for several tornadoes did not include dollar amounts; 2) damages to roads from heat and freeze/thaw conditions were not included; and 3) crop damage figures were incomplete. The Risk Assessment provides Committee Members information that can be used to develop mitigation project lists and for grant applications. This information will help decision-makers make informed choices about storm mitigation projects.

An overview of the Risk Assessment tables contained in the handout materials was provided. 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 Montgomery County with 177 events verified. Over $1.1 million in damages has resulted from severe thunderstorms with damaging winds, hail, lightning and heavy rain. At least 130 injuries and 1 fatality can be attributed to severe storms. Most of these injuries and deaths are attributed to slick road conditions.

Severe Winter Storms

There were 79 events involving excessive snow, ice, or extreme cold that have been verified since 1950. At least 86 injuries can be attributed to severe winter storms.

Approximately $1 million damages have been recorded but this figure does not include snow removal, salt spreading costs or vehicle damages. For snows of 5 inches or less with normal winds, the cost to remove snow in Montgomery County is approximately $34,000.

At least 11 major storms have occurred in every decade since 1960. With 7 storms in the current decade, this record is likely to continue.

The record maximum one-day snowfall in the county is 14.3 inches which occurred on March 25, 2013. The coldest recorded temperature is -22 F from 1905.

Extreme Heat

Thirty-four extreme heat events have been reported since 1995. Contrary to generally held conceptions, extreme heat causes more deaths than tornadoes, floods, and severe storms. At least 341 injuries and eight deaths have been attributed to excessive heat in the region encompassing Montgomery County. Public health officials believe that at least 1,000 heat related deaths occur annually in the U.S. Road buckling and crop damage often occur, but crop damage is usually not measurable unless drought occurs.

Tornadoes

Since 1950, 34 tornadoes have been verified in Montgomery County. The number of tornadoes in Montgomery County is relatively high because it is located on the southern end of "tornado alley" in Illinois. Damages reached $1.9 million including 15 injuries and 3 fatalities.

Twenty-six of these tornadoes have recorded property damage, (damage descriptions were not accompanied by dollar amounts for twelve of these tornadoes). Six of these tornadoes caused over $250,000 in damages during each event.

The average tornado in Montgomery County is approximately 5 miles long and 68 yards wide. The longest tornado recorded in the County was 30 miles long and it occurred in

March, 1961. There have been three F3, seven F2, seven F1, eleven F0, two EF2, two EF1, and two EFO tornadoes.

The three F3 tornadoes in the county occurred in 1950, 1976 and 1999. Cumulatively these three tornadoes caused over $500,000 in property damage and 11 injuries and 1 fatality. The Farmersville area has had the most verified tornadoes with seven.

Floods

Unlike most Illinois counties, Montgomery County has experienced fewer floods and less property damage. ***Construction of flood mitigation projects in Hillsboro and Litchfield coupled with the fact that no major rivers exist in Montgomery County are the primary reasons that Montgomery County has experienced less flood damage in recent times.***

Fifteen flood events have occurred since 1997 and all of these have been flash floods. At least $1.1 million in damages and one death occurred from these floods.

Drought

Four major droughts have occurred during the last three decades—1983, 1988, 2005, and 2012. Although one of these droughts were not declared for Montgomery County, farmers could apply for aid since the County was considered contiguous to other counties were the drought was declared. Following each declared drought, crop yield reductions were substantial.

Corn and soybean yield reductions for the worst of these droughts include:

Year	Corn	Soybeans
1983	56.1%	37.3%
1988	37.5%	26.5%
2012	47.2%	3.8%

Earthquakes

In the previous 200 years, there have been four earthquakes originating in Montgomery County and twenty-four earthquakes in the adjacent counties. All of these earthquakes measured less than 5.0 magnitude. There are no geologic faults in Montgomery County, but there are geologic faults in the immediate vicinity.

Information from the jurisdictions is needed to supplement the risk assessment. Andrea Bostwick asked attendees to submit their updated "**Critical Facilities,**" **"List of Existing Planning Documents," "Severe Weather Shelters," "Hazard Events Questionnaire,"** and **"Citizen Questionnaire."**

To help better identify storm damages to critical facilities, Andrea distributed a **Critical Facilities Damage Questionnaire.** Committee members were requested to provide information on this form about dates, type of hazard event, critical facility damaged, and, if available, the amount of damages incurred. Information provided by the Committee will be used to supplement other information to complete the Vulnerability Assessment for each participating jurisdiction.

Mission Statement & Goals

Andrea reminded members that a draft mission statement and goals were provided at the previous committee meeting.

The mission statement was accepted without any changes by the Committee.

She then asked if any additions were needed to the draft goals to reflect any specific situation in Montgomery County. The Committee agreed to add language about stormwater retention or elimination to Goal # 3.

Mitigation

Developing New Projects

Greg reminded Committee Members that the purpose of the next meeting is to bring ideas for mitigation projects.

Attendees were referred to the two handouts that lists examples of mitigation projects for the County and municipalities.

Studies may be needed to identify the cause of the problem. A drainage problem may exist, but the most effective remedy may be uncertain. Debris in culverts, undersized culverts, and changes in land use all contribute to drainage problems. A drainage study may be needed to determine the cause or group of causes for a recurring drainage problem.

Structural projects typically are the most frequently mentioned category of mitigation projects. He provided several examples of structural projects to illustrate the wide scope of projects that can be included.

While lower on the priority scale, but important to prevent damages are *Public information/education activities.* These activities have been proven to be useful to alert people about how to protect themselves and their property. Although weather radios and communication equipment, such as sirens, are not funded by IEMA/FEMA, they can still be listed as mitigation projects.

Status of Existing Projects

Andrea distributed forms to each of the jurisdictions who participated in the development of the original NHMP. She explained that the status of each project in the original Plan must be determined. She described how the form should be completed so that this information can be included in the Plan update.

New Projects

She started by saying that all projects listed in the original Plan which municipalities and the County still have an interest in pursuing **<u>must</u>** be re-entered in the updated Plan. She provided the following advice for completing the mitigation project list:

<u>Description:</u> We need more than the name of the project/activity. For example, if a power generator is desired describe whether it is intended to be permanent or portable.

<u>Jurisdiction Responsibility</u>: List who will be responsible for the project—City council, public works department, police, fire, other?

<u>Time Frame</u>: Often you may not know the time frame needed to obtain approval, design, and completion of a project. In these situations you can insert To Be Determined.

<u>What Happens Next?</u>

The Compensation form was distributed to municipal representatives. This information will be used to complete the calculations for the local in-kind match portion of the grant which funds this planning effort.

The location and starting time will remain the same and the date for the third committee meeting will be **Thursday, October 22.**

Public Comment

No additional questions or comments were raised. Diana Holmes adjourned the meeting.

Meeting Minutes

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee

October 22, 2015
7:00 p.m.
Montgomery County Public Health Department
11191 IL Route 185, Hillsboro

Committee Members

Ameren Illinois
Coffeen, City of
Donnellson, Village of
Fillmore, Village of
Hillsboro, City of
Hillsboro Area Hospital
Mitigation Planning Consultants
    Johnson, Depp & Quisenberry
Montgomery County Offices
    Administrator
    Board
    Clerk & Recorder
    Emergency Management Agency
    Geographic Information Services
    Highway Department
    Health Department
Nokomis, City of
Panama, Village of
Pitman Township
Public Representative
    Dolores Wheelhouse
Roundtree Township
Schram City, Village of
Taylor Springs, Village of
Waggoner, Village of
Witt, City of

Welcome and Introductions

Diana Holmes opened the meeting and welcomed Committee members.

Handout materials were distributed to each member.

Critical Facilities & Vulnerability Assessment

Greg Michaud, JDQ, provided a brief recap to help reorient Committee members as to what has been accomplished and what will be covered at this meeting. He noted that the Committee has accomplished all of its objectives up to this point and are ahead of schedule.

Before presenting the estimated potential damages to each participating municipality caused by tornadoes, he thanked Ray Durston for providing tax assessment figures and Cassidy Younker for preparing the tornado and floodplain maps posted on the board for Committee members to review.

Over **$77 million** in damages have resulted from approximately **350 severe storms and natural hazards in Montgomery County over the past 60 years.** If only 10% of the mitigation projects submitted thus far were implemented, an estimated $7-$8 million dollars could be saved.

This meeting focused on the vulnerability posed by tornadoes. The potential damages were calculated on the magnitude *most likely to be encountered, not on a worst-case event.* Buildings in the floodplain are being verified and so the projected damages by floods will be presented at the next committee meeting.

Tornadoes

Since 1950, 34 tornadoes have been verified in Montgomery County. The number of tornadoes in Montgomery County is relatively high because it is located on the southern end of "tornado alley" in Illinois. While occurring less frequently than severe thunderstorms and severe winter storms, tornadoes have caused nearly $1.9 million in damages including 15 injuries and 3 fatalities.

The average tornado in Montgomery County is approximately 5 miles long and 68 yards wide. Potential dollar losses for residences and contents would be expected to exceed at least $2.75 million in any of the participating municipalities.

In unincorporated Montgomery County, potential damages would range from approximately $718,335 in the five most populated townships to $159,630 in the 14 least populated townships.

Project Prioritization Method

A Project Prioritization Method is required by FEMA in the Plan. The term Project Prioritization Method actually refers to a method to classify each project.

Andrea Bostwick identified the two primary factors in the development of this strategy:

1) Frequency of hazard—severe storms occur more frequently than drought.
2) Degree of mitigation—some projects will *eliminate* damages while most projects will *reduce*, but not eliminate damages.

She acknowledged that while this methodology does not take cost or politics into consideration, these factors may affect the order in which projects are implemented. Decisions regarding which projects to pursue first are made by each jurisdiction without input or approval by the other participating jurisdictions.

Mitigation Projects

Committee members were asked to submit their Mitigation Projects forms. Andrea illustrated how the Project Prioritization Method, the lists of Mitigation Projects, and other information will be presented for Committee review.

Andrea chose a frequently needed mitigation project, a storm safe shelter, as an example to show how a typical project is prioritized and entered into the Plan on a Mitigation Table. Andrea described how each column in the Mitigation Action Table would be completed for this example project.

She explained that all mitigation projects should be submitted on the sample form previously distributed. The columns in the Mitigation Action Table are not to be completed by the

Committee members, but they will review this table when it is completed to identify any changes that might be needed.

Andrea noted that each municipality should have at least one mitigation project in the Plan before it is submitted to IEMA/FEMA. Committee members will have the opportunity at the next meeting to review all of the mitigation projects submitted so that they can make adjustments to their list.

It was noted that each municipality should develop their own list of mitigation projects. They do not need approval by the County.

If any participant is uncertain about the project source funding or the length of time that might be needed to complete the project, Andrea and Greg will help them with this information. "To Be Determined" is acceptable to FEMA if the information is unknown at the time the Plan is being assembled.

What Happens Next?

The Committee felt that mitigation project lists can be completed and ready for review by the end of December. The location and starting time will remain the same and the date for the fourth committee meeting will be **Thursday, January 21st.**

Greg will summarize the major milestones yet to be completed:

- Draft mitigation project lists need to be developed and provided to Andrea or Greg before the next Committee meeting.
- The draft Mitigation Projects Table will be prepared for Committee Review at the next meeting (Meeting #4). Attendees will have the opportunity to review all of the lists and make changes to their own lists.
- The final Committee meeting (Meeting # 5) will be conducted as a Public Forum so that others can review and comment on the draft Plan.
- The Plan should not be adopted until after FEMA has issued "tentative approval." A template for an Adoption Resolution will be distributed to the Committee.

Public Comment

With no additional questions or comments being raised, Diana adjourned the meeting.

Meeting Minutes

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee

January 21, 2016
7:00 p.m.
Montgomery County Public Health Department
11191 IL Route 185, Hillsboro

Committee Members

American Red Cross
Butler Grove Township
Coffeen, City of
Donnellson, Village of
Hillsboro, City of
Hillsboro Area Hospital
Irving Township
Latter Rain Ministries
Mitigation Planning Consultants
    Johnson, Depp & Quisenberry
Montgomery County Offices
    Administrator
    Board
    Emergency Management Agency
Montgomery County Offices Continued...
    Highway Department
    Health Department
Montgomery County Economic Development Corporation
Nokomis, City of
Panama, Village of
Public Representative
    Dolores Wheelhouse
Raymond, Village of
Schram City, Village of
St. Francis Hospital
Taylor Springs, Village of
Waggoner, Village of
Witt, City of

Welcome and Introductions

Diana Holmes opened the meeting and welcomed Committee members.

Handout materials were distributed to each member.

Welcome

Diana Holmes, Montogomery County EMA Coordinator, welcomed attendees. With no new or substitute representatives, she asked Andrea Bostwick, Johnson, Depp & Quisenberry (JDQ), to begin the presentations.

Risk/Vulnerability Assessment

An analysis of potential residential damages to each participating jurisdiction that might be caused by a tornado was presented at the previous committee meeting while the analysis of potential residential damages to each participating jurisdiction that might be caused by a flood event was presented to the Committee at this meeting. This information will be included in the Plan.

Over $77 million in damages have resulted from severe weather and other natural hazards in Montgomery County over the past 60 years. These damages would be larger were it not for flood mitigation efforts that occurred in Montgomery County over 40 years ago. As the risk and vulnerability assessments show, tornadoes pose a greater threat in this county than in many other Illinois counties. The number of tornadoes in Montgomery County is relatively higher because it is located on the southern end of "tornado alley" in Illinois.

Floods

Less than 3% of the land area in Montgomery County is in the floodplain. With the exception of Macoupin County, all of the neighboring counties have considerably more floodplain. Although the County is not considered to be highly vulnerable to riverine flooding, it is vulnerable to flash flooding.

Unlike most Illinois counties, Montgomery County has experienced fewer floods and less property damage. ***Construction of flood mitigation projects in Hillsboro and Litchfield coupled with the fact that no major rivers exist in Montgomery County are the primary reasons that Montgomery County has experienced less flood damage in recent times.***

Andrea pointed out that there are only three (3) municipalities in Montgomery County that have Flood Insurance Rate Maps (FIRMs) and are mapped. As a result, it is difficult to pinpoint the areas that are considered vulnerable to riverine flooding in most communities within the County.

Using tax assessment values for residential structures from 2014, riverine flood damages were calculated for structures and contents. Potential dollar losses caused by riverine flooding to vulnerable residences within the participating municipalities would be expected to range from approximately $215,000 in Nokomis to approximately $915,000 in Hillsboro.

Flash flooding is harder to calculate, but Montgomery County has experienced multiple flash flood events. Fifteen flood events have occurred since 1997 and all of these have been flash floods. At least $1.1 million in damages and one death occurred from these floods.

Mitigation Project Submittal & Action Tables

Andrea commended the Committee Members for assembling their lists of mitigation projects and activities. One hundred sixty-three (163) mitigation projects and activities were described and prioritized in the Action Tables.

Committee members were asked to review the Action Tables containing the descriptions of 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.

Plan Maintenance and Update

Andrea described the Plan maintenance and update commitments that are detailed in the Plan. A subgroup of the Natural Hazard Mitigation Committee will meet annually under the direction of the Montgomery County EMA. These annual meetings will focus on: (1) reporting on the status of their projects, (2) making any additions or edits to their list of projects, and (3) providing information on storms and storm damages. There is no penalty for not building any project. The intent of the planning process is to encourage mitigation, not to penalize municipalities or counties. 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 is formally updated and resubmitted to IEMA/FEMA. At the five year Update, any jurisdiction who wants to become part of the Plan may do so. Any new jurisdiction must supply the same information that all of the current jurisdictions supplied. Any jurisdiction that is not already part of this Plan has to wait until the five year Update before they can join. However, non-participating jurisdictions who want to be added to the Plan can attend the annual update meetings so that they can become oriented about the planning process and the information they will need to assemble when the next five year update occurs in 2021.

The first jurisdiction to formally adopt the Plan begins the five year clock. If a jurisdiction decides not to adopt the Plan, FEMA will still approve the Plan and those jurisdictions who adopt the Plan become eligible for state/federal funds.

She cautioned all of the jurisdictions not to adopt the Plan until after FEMA provides preliminary approval. FEMA will not accept adoption resolutions that are dated prior to time when preliminary approval is awarded. An e-mail will be issued notifying the Committee members that the Plan has received preliminary approval with a copy of a model adoption resolution attached.

<u>What Happens Next?</u>

The final Committee meeting will be conducted in the early evening as an open-house style public forum where the draft Plan will be presented to the public for review and comment. Contrary to conventional public meetings, at an open-house style public forum the public can come and go at their convenience.

After this public forum, there are three important milestones:

1. **Public Comment Period of two weeks** for residents to submit comments before the Plan is submitted to IEMA and FEMA for their approval;
2. **Adoption of the Approved Plan** by each participating jurisdiction through a resolution (***Attendees were cautioned to not adopt the Plan before FEMA issues "tentative approval"***); and
3. **Submitting the resolutions to the Consultant** so that each participating jurisdiction is eligible for state/federal funding.

Committee members were asked if they wanted paper or electronic copies of the draft Plan to make available for public comment. All of the attendees requested electronic copies.

<u>What Happens Next?</u>

The Committee agreed to schedule the final meeting on:

Thursday, April 21

Montogomery County EMA
6 p.m. to 8 p.m.

Public Comment

Diana reminded Committee members to submit any additional mitigation projects quickly. With no further questions, the meeting was adjourned.

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CITIZEN QUESTIONNAIRE

APPENDIX D

QUESTIONNAIRE

Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan Update

You can help protect lives and property from storm damage in Montgomery County by taking a few moments to complete this questionnaire.

1. Please indicate where you live in Montgomery County:

_____ Barnett
_____ Butler
_____ Chapman
_____ Coalton
_____ Coffeen
_____ Donnellson
_____ Farmersville
_____ Fillmore
_____ Harvel
_____ Hillsboro
_____ Honey Bend
_____ Irving
_______ Litchfield
_______ Nokomis
_______ Ohlman
_______ Panama
_______ Raymond
_______ Schram City
_______ Taylor Springs
_______ Van Burensburg
_______ Waggoner
_______ Walshville
_______ Wenonah
_______ Witt

_____ Other (please specify): ______________________________

2. Please place a check mark next to each of the natural hazards listed below that you have experienced in Montgomery 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)
_____ Extreme Heat
_____ Tornadoes
_____ Earthquakes
_____ Drought
_____ 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 7 based on which hazard you feel poses the greatest threat. (1 = greatest threat and 7 = least threat). *Each number should only be used once.*

_____ Severe Summer Storms
_____ Floods
_____ Severe Winter Storms
_____ Extreme Heat
_____ Tornadoes
_____ Earthquakes
_____ Drought
_____ Other (please specify): ______________________________

5. What types of mitigation projects or activities are most needed in Montgomery 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 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
_____ Mail
_____ Fact Sheet/Brochure
_____ Extension Service
_____ Public Workshops/Meeting
_____ Fire Department/Law Enforcement
_____ Public Health Department
_____ Municipal/County Government
_____ Other (please specify): ____

Thank you for your time in assisting with the update of the County's Natural Hazards Mitigation Plan.

Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee

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FREQUENTLY ASKED QUESTIONS FACT SHEET

APPENDIX E

Frequently Asked Questions

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee

1) **What is the Montgomery County Natural Hazard Mitigation Plan?**
The Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan evaluates damage to life and property from storms and other natural hazards in this county and identifies projects and activities that can reduce these damages. The Plan is considered to be multi-jurisdictional because it includes municipalities and institutions, such as schools and utilities who want to participate.

2) **What is hazard mitigation?**
Hazard mitigation is any action taken to reduce or eliminate long-term risk to life and property from a natural hazard.

3) **Why is this Plan being updated?**
Updating the 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 with emergency planning and response.

4) **Who is updating this Plan?**
The Montgomery County Multi-Jurisdiction Natural Hazards Mitigation Planning Committee is updating the Plan with assistance from technical experts in emergency planning, environmental matters, and infrastructure. The Committee includes members from agriculture, business and economic development, emergency services, municipal, county and state government, health care, insurance, law enforcement, schools, and institutions such as the American Red Cross.

5) **How can I participate?**
You are invited to attend public meetings of the Montgomery County Natural Hazards Mitigation Planning Committee. In addition you are encouraged to provide photographs, other documentation, and anecdotal information about damages you experienced with natural hazards in Montgomery County. Surveys will be available at participating municipalities and through Montgomery County to help gather specific information from residents. All of this information will be used to update the Plan. A draft of the updated Plan will be presented in a public forum for further public input.

More information can be obtained by contacting:

Diana Holmes, Coordinator
Montgomery County EMA
120 N. Main Street
Hillsboro, Illinois 62049
(217) 532-9560

PRINT MEDIA OUTLETS SERVING MONTGOMERY COUNTY

APPENDIX F

Print Media Outlets Serving Montgomery County

The Litchfield News-Herald (five times a week)
112 E. Ryder St.
P.O. Box 160
Litchfield, IL 62056
(217) 324-2121

The Journal-News (twice a week)
431 S. Main St.
Hillsboro, IL 62049
(217) 532-3933
www.thejournal-news.net

Free Press-Progress (once weekly)
112 W. State St.
Nokomis, IL 62075
(217) 563-2115
www.nokomisonline.com

Panhandle Press (once weekly)
Pentagon Plaza, N. Rte. 48
Raymond, IL 62560
(217) 229-4412
www.ggnews.net

Raymond News (once weekly)
327 E. Broad St.
Raymond, IL 62560
(217) 229-3421

PRESS RELEASES AND NEWS ARTICLES PUBLISHED

APPENDIX G

Diana Holmes
Coordinator
Office 217-532-9560
Cell 217-254-6437
Pager 1-800-412-8035
email dholmes@montgomeryco.com
Administrative Assistant
Cathy 532-9562
Fax 217-532-9608

Contact: Diana Holmes
(217) 532-9560

County Prepares For Natural Disasters

Hillsboro, IL (May 4, 2015)—Montgomery County will begin updating a countywide plan that will identify activities and projects to reduce the damages caused by natural hazards such as floods, snow storms, thunderstorms, tornadoes, and ice storms among others. The plan is called a Natural Hazard Mitigation Plan and will be funded through a grant from the Federal Emergency Management Agency (FEMA).

"Updating this Plan will help us be better prepared before severe weather strikes. The goal is to reduce the harm to property and residents. This Plan must be updated every five years so municipalities who were not part of the original planning process now have the opportunity to join and become eligible for federal funds," said Diana Holmes, Coordinator, Montgomery County Emergency Management Agency.

The first meeting of this Committee will be on Thursday, May 14 at the Montgomery County Public Health Department located at 11191 IL Route 185 in Hillsboro beginning at 7 p.m. The committee will meet periodically through the next several months to update this Plan.

A Montgomery County Hazard Mitigation Planning Committee has been created with representatives from each participating municipality along with technical partners and other stakeholders. Municipalities intending to participate include: Butler, Coalton, Coffeen, Donnellson, Farmersville, Harvel, Hillsboro, Irving, Litchfield, Nokomis, Ohlman, Panama, Raymond, Schram City, Taylor Springs, Waggoner, Walshville, Wenonah, and Witt. Meetings of this committee will be conducted as working sessions so that any interested resident can attend and ask questions. The purpose of these working sessions is to gather and discuss information that will be used to update the plan.

May 18, 2015

The Journal-News

County, FEMA Host Hazard Mitigation Meeting

Mayors, city council members, county board members, citizens and other public officials gathered to hear Greg Michaud and Andrea Bostwick explain the procedures communities and unincorporated areas must go through prior to a natural disaster (tornadoes, floods, blizzards, etc.) if the community wants to receive help from the Federal Emergency Management Agency (FEMA).

Michaud and Bostwick are the experts summoned by the county's EMA director, Diana Holmes. The approximately 50 people who gathered at the Health Department facilities along Rt. 185 Thursday, May 14, at 6:30 form a committee charged with updating the Montgomery County Multi-jurisdictional Natural Hazards Mitigation Plan first written five years ago.

Three more meetings will be held throughout the year; the next is on July 23. The purpose is to lessen damages by planning before a disaster occurs; if a city has a need for equipment that could help in an emergency, ask for it at one of the meetings. "No one receives a backhoe if they don't attend meetings to ask for one," Director Holmes says.

Attendance at one of the planning meetings will make a government unit (municipality, township, county) eligible for help if a natural disaster is declared. The mission of the committee is to "...develop a mitigation plan that can reduce the negative impacts of natural hazards on citizens, infrastructure, private property and initial facilities."

Local Students Graduate With Degrees From SIUE

Southern Illinois University Edwardsville completed 2015 spring commencement exercises for the 2,212 eligible graduates on Saturday, May 9, in the Vadalabene Center on campus. Local graduates and their degrees were:

Butler: Max Reitz, electrical engineering

Coffeen: Channing Fuller, early childhood education; Jared Kent, history; Evan Malloy, biological sciences

Hillsboro: Brad Cady, chemistry; Chase Fletcher, English; Kesenia Marten, sociology; Christina McNealy, art and design; Abigail Brohammer, nursing; Quinn Buerkett, business administration; Zachary Meyer, electrical engineering; Alex Holtschulte, business administration; Jenna Springer, public administration

Litchfield: Tanner Bergman, construction management; Katelin Feldmann, accountancy; Spencer Price, accountancy

Nokomis: Maggie Allen, health education; Meagan Bowers, health education; Emily Cearlock, exercise science; Tricia Havera, nursing (RN)

Ohlman: Evan Wilson, civil engineering

Raymond: Jacob Leonard, business administration; Lukas Leonard, business administration; Alisha Sinclair, speech communication

Sorento: Mollee Pezold, speech communication

Taylor Springs: Korenne Cleveland, nursing

Witt: Cody Harston, history; Shauna Horn, psychology

Summer Season For Pickleball Begins Tuesday

"We are now excited to play our open-court schedule, weather permitting, every Tuesday and Thursday from 5 p.m. until dark," Mark Mathews said of the re-purposed pickleball courts at Central Park in

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The Journal-News

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22 Pages

The Newspaper of Record For Montgomery County, Illinois

Hillsboro, IL 62049 | Volume 163, No. 99 | Monday, May 4, 2015

Litchfield Talks State Funding

by Kyle Herschelman

The members of the Litchfield City Council met on Thursday, April 30, at Corwin Hall for the city's monthly committee meetings.

Among the items on the agenda were two motions to rescind the previous votes on resolutions to urge Governor Bruce Rauner and the General Assembly to protect full funding of Local Government Distributive Fund (LGDF) reserves and to support Governor Rauner's "Turnaround Agenda" for local Government Empowerment and Reform.

Both motions to rescind would pass by a 5-2 margin with Alderman Tim Hancock absent. Final vote on the two rescinded motions will come on Tuesday at the full council meeting. During the discussion of the "Turnaround Agenda" resolution, Mayor Steve Dougherty asked the council to consider supporting the agenda, saying that he would rather have the governor think positively of the city than negatively.

Other items on the agenda elicited little discussion. In addition to the two rescinded votes, the administration agenda also included the purchase and installation of a server for an amount not to exceed $8,509.99 and to amend the contract with Kerber, Eck and Braeckel for services to complete the city's audits.

Alderman Robert Ostendorf asked if the vote on the KEB contract needed to be rescinded first. City Attorney Kit Hantla said it did not since the council was changing the contract, not the motion.

Continued on page 3A

Meet The Prom Queens And Kings

Hillsboro, Litchfield, and Lincolnwood High School all crowned royalty at proms on Saturday, May 2. In the photo at the left, seniors Carliesha Bowman and Bailey Saathoff were crowned at Hillsboro High School's Enchanted Forest themed dance, and the public was invited to attend the coronation. Litchfield High School seniors Bailey Fleming and Noah Wright, center, were crowned at the "All that Jazz" prom in Simmons Gym at Litchfield High School following the annual Prom Walk. At right, Hanna Poggenpohl and Tyler Maxwell were crowned queen and king of the "Black Tie Affair" themed Lincolnwood High School prom. See page 6A prom courts from all three. ***Journal-News Photos and HHS photo courtesy of Ken Meade Studio***

Montgomery County To Update Natural Disaster Plan

Montgomery County will begin updating a countywide plan that will identify activities and projects to reduce the damages caused by natural hazards such as floods, snow storms, thunderstorms, tornadoes and ice storms, among others.

The plan is called a Natural Hazard Mitigation Plan and will be funded through a grant from the Federal Emergency Management Agency (FEMA).

"Updating this plan will help us be better prepared before severe weather strikes. The goal is to reduce the harm to property and residents. This plan must be updated every five years so municipalities who were not part of the original planning process now have the opportunity to join and become eligible for federal funds," said Diana Holmes, coordinator, Montgomery County Emergency Management Agency.

The first meeting of this committee will be on Thursday, May 14, at the Montgomery County Public Health Department, located at 11191 IL Route 185 in Hillsboro, beginning at 7 p.m. The committee will meet periodically through the next several months to update this plan.

A Montgomery County Hazard Mitigation Planning Committee has been created with representatives from each participating municipality along with technical partners and other stakeholders. Municipalities intending to participate include: Butler, Coalton, Coffeen, Donnellson, Farmersville, Harvel, Hillsboro, Irving, Litchfield, Nokomis, Ohlman, Panama, Raymond, Schram City, Taylor Springs, Waggoner, Walshville, Wenonah and Witt.

Meetings of this committee will be conducted as working sessions so that any interested resident can attend and ask questions. The purpose of these working sessions is to gather and discuss information that will be used to update the plan.

Appendix G

The Journal-News

Committee Will Meet At Health Department

The frequency and damages caused by severe storms and other natural hazards in Montgomery County will be discussed when county and municipal representatives meet Thursday, July 23, at the Montgomery County Public Health Department on Route 185 in Hillsboro, beginning at 7 p.m.

This group, the Montgomery County Hazard Mitigation Committee, will meet through the next several months to update the plan to reduce damages caused by natural hazards. All committee meetings are open to the public.

"Identifying how often natural hazards occur and the kind of damages caused throughout our county is the goal at this committee meeting. Based on this information we will begin to develop lists of activities and projects to reduce damages caused by these events," said Diana Holmes, Montgomery County Emergency Management Agency coordinator.

The focus of this effort is on natural hazards, such as tornadoes, drought, severe storms, floods and earthquakes.

Interested persons can provide input at these Montgomery County Hazard Mitigation Committee meetings, or submit their comments and questions to their municipal or county representatives.

After a draft of the updated plan is prepared, a public forum will be held where the draft plan will be presented 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.

"This plan will be our best resource for determining how to prepare for storms and other natural hazards," Holmes added.

Contact us

thejournal-news.net

The Journal-News
Phone number: 217-532-3933
E-mail: thejournal-news@consolidated.net
Address: 431 S. Main St.
Hillsboro, IL 62049

Appendix G

The Litchfield
News-Herald
Community Daily Newspaper of Montgomery and Macoupin Counties
Founded in 1856

July 20, 2015

Planning for when storms, and blizzards hit county

Frequency and damages caused by severe storms and other natural hazards in Montgomery county will e discussed when county and municipal representatives meet at 7 p.m. Thursday, July 23, at the Montgomery County Public Health Department, 11191 Illinois Rt. 185, in Hillsboro.

This group, the Montgomery County Hazard Mitigation committee, will meet through the next several months to update the plan to reduce damages caused by natural hazards. All committee meetings are open to the public.

"Identifying how often natural hazards occur and the kind of damages caused throughout our county is the goal of this committee meeting," said Diana Holmes, Montgomery County Emergency Management Agency coordinator. "Based on this information we will begin to develop lists of activities and projects to reduce damages caused by these events.

The focus of this effort is on natural hazards - tornadoes, drought, severe storms, floods and earthquakes.

After a draft of the updated plan is prepared, a public forum will be held and the draft plan presented for review and comment. The draft plan will be revised based on comments from the public and the state and federal government agencies.

After revision, the plan will be presented for adoption at public meetings held by the county and each of the participating municipalities.

"This plan will be our best resource for determining how to prepare for storms and other natural hazards," Holmes said. "After this plan is updated, comprehensive information will be available in one document to help guide those who are making decisions about how to better protect Montgomery county residents."

The Journal-News Monday, July 27, 2015

The Journal-News
July 27, 2015

Mitigation Meeting Focuses On Disaster Preparedness

by Ron Deabenderfer

Almost 50 civic leaders from Montgomery County met with Greg Michaud, Andrea Bostwick (both with Johnson, Depp and Quisenberry (JDQ) and the county's EMA Director Diana Holmes Thursday evening, July 23, as a committee whose mission is to ". . . develop a mitigation plan that can reduce the negative impacts of natural hazards on citizens, infrastructure, private property and critical facilities," of the county.

According to Michaud, the planning, encouraged by the Federal Emergency Management Agency (FEMA), is designed to reduce the loss of life and dollar amount of damage to physical property and the consequent disruption of lives caused by flooding, tornadoes, severe summer storms (lightning strikes and hail), winter storms (blizzards and ice storms), drought, extreme heat and earthquakes. "This county has experienced a reported $5 million in damages, but probably the figure would be $10 or $15 million if everything were reported. Heat makes a highway buckle - that's an expense. Weekend blizzards require overtime for snow removal. It adds up quickly."

The county has a five-year mitigation plan in place; this committee's job is to update that plan. Any governmental body that asks for FEMA financial aid in case of an emergency in the future will have to be a part of this planning cycle before that consideration will happen. In addition, some funds are available for equipment that would help if a disaster occurred; this planning cycle is the time to ask for that equipment.

The July meeting dealt with checking and recording past events to use as evidence of need, reviewing and okaying the mission statement and the committee's nine goals, discussion of potential projects to reduce damages if a natural event would occur, and directions for identifying other mitigation needs.

The committee meets at no cost to the county; participants' time is viewed as "in-kind" contributions to FEMA. The next meeting is scheduled for Thursday, Oct. 23, at the Montgomery County Health Department on Route 185 in Hillsboro, beginning at 6 p.m. Anyone with questions should contact Holmes at 532-9560.

Diana Holmes
Coordinator
217-532-9560
Cell 217-254-6437
dholmes@montgomeryco.com
Cathy
Administrative Assistant
217-532-9562
FAX 217-532-9608

FOR IMMEDIATE RELEASE

Contact: Diana Holmes

(217) 532-9560

Projects to Reduce Damages Caused By Natural Disasters

Hillsboro, IL (OCTOBER 12, 2015)—Steps to prevent injuries and deaths while maintaining vital services for Montgomery County residents when floods and severe storms hit will be discussed when the Montgomery County Natural Hazard Mitigation Planning Committee meets at 7:00 p.m. on October 22, at the Montgomery County Public Health Department in Hillsboro. Committee meetings are open to the public.

This Committee began work in May to update a plan that will identify projects and activities to protect Montgomery County residents and property from storms and other natural disasters. This plan, unlike all other emergency plans, is aimed at identifying projects and activities that can be taken before these disasters occur.

“Other emergency plans are directed at responding after a storm or natural disaster hits. With this plan, we will identify actions that can reduce or eliminate damages caused by specific types of storms and other natural disasters for each participating municipality and unincorporated areas of the County,” said Diana Holmes, Montgomery County EMA Coordinator.

Butler, Coalton, Coffeen, Donnellson, Farmersville, Harvel, Hillsboro, Irving, Litchfield, Nokomis, Ohlman, Panama, Raymond, Schram City, Taylor Springs, Waggoner, Walshville, Wenonah, and Witt are the municipalities 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 Hazard Mitigation Plan.

“Updating this Plan will help assure each participating municipality that they receive all of the money for which they are due when a catastrophic storm—such as a tornado or flood occurs. In addition, obtaining FEMA’s approval of our updated Plan will make all of the participants eligible to receive federal grant money for mitigation projects” added Holmes.

Third Mitigation Planning Meeting Finalizes Goals

Posted: Monday, October 26, 2015 12:01 am

The third of four Montgomery County Multi-jurisdictional Natural Hazards Mitigation Planning Committee meetings, hosted by county EMA director Diana Holmes at the health department on Route 185 and featuring Grey Michaud as presenter, attracted county board members and community leaders on Thursday evening, Oct. 22.

Finalized goals for the county were presented as the committee reviewed mitigation plans prepared five years ago. Michaud pointed out that over $77 million worth of damages had occurred over the years in the county due to tornadoes, blizzards and other naturally occuring events; if planning could prevent 10 percent of those losses, it would help personal and community economics.

Nine goals were presented, including educating the citizenry about events before they occur, protecting lives during and after events, protecting infrastructure, infusing mitigation into county and municipal plans, protecting public services and buildings, protecting floodplanes, insuring that new developments (choosing, industrial or agricultural) don't create new exposures, protecting historic, cultural and natural resources, and insuring communication avenues exist between emergency services and government organizations to comply with natural regulations.

Maps of the flood plains of the county and a chart showing the parts of tornadoes that have struck here between 1957 and 2014 (inclusive) drew much interest from those in attendance.

Several represented bodies had charts showing projects their areas could use to lessen hazards. Grant money will meet some of those needs, but as Michaud reminded the participants, "If it's not on a request first, it can't be granted." Those towns or townships who hope to access IMEA or FEMA relief funds in case of an event will also be out of luck if they haven't participated in one of the four planning sessions. Attendance logs are kept.

The fourth and final meeting, one at which new proposals will be presented to the committee as a whole by Michaud, has been set for Thursday, Jan. 21, at the health department.

Interested parties may contact Holmes at the county EMA office by calling (217)532-9561 or emailing dholmes@montgomeryco.com.

Diana Holmes
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Cell 217-254-6437
dholmes@montgomeryco.com
Cathy
Administrative Assistant
217-532-9562
FAX 217-532-9608

FOR IMMEDIATE RELEASE

CONTACT: Diana Holmes
(217) 532-9560

Protecting Public Health and Property In Montgomery County

Hillsboro, IL (JANUARY 11, 2016)—Projects to protect residents and property from storms and other natural hazards will be discussed at the Montgomery County Natural Hazards Mitigation Planning Committee meeting on January 21 at the Montgomery County Public Health Department in Hillsboro. The meeting begins at 7 p.m. and is open to the public.

"Severe storms frequently damage buildings, crops, roads, and other critical infrastructure in this area. At least $77 million in damages have resulted from approximately 350 severe weather and other natural hazard events in the previous 60 years in Montgomery County. Consequently we are seeking to identify preventative steps that can reduce the dollar damages as well as protecting public health when severe weather strikes," according to Diana Holmes, Coordinator, Montgomery County Emergency Management Agency.

Projects identified by municipal representatives at this meeting will become part of the Montgomery County Natural Hazard Mitigation Plan. While the public has provided input on portions of the plan, the entire plan will be presented for public review and comment before it is submitted to the state and federal government for approval.

"A public forum will be conducted later this year for interested persons to review the plan and ask questions of Committee members. A two week 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 Holmes.

"In addition, a copy of the draft Plan will be placed on the County Web site for residents to view. We want to make it as easy as possible for all residents to view this draft Plan so that they can read about what type of storm damage reduction projects are being considered," she added.

Interested persons can submit questions and comments to the Committee members or directly to the Montgomery County Emergency Management Agency 532-9560.

The Journal-News
January 18, 2016

Fashion II.

Mr. Bell was a member of Me- ... by signing the online guestbook at *www.heinzfuneralhome.com.*

County Mitigation Planning Committee To Meet Jan. 21

Projects to protect residents and property from storms and other natural hazards will be discussed at the Montgomery County Natural Hazards Mitigation Planning Committee meeting on Thursday, Jan. 21, at the Montgomery County Public Health Department in Hillsboro. The meeting begins at 7 p.m. and is open to the public.

"Severe storms frequently damage buildings, crops, roads and other critical infrastructure in this area. At least $77 million in damages have resulted from approximately 350 severe weather and other natural hazard events in the previous 60 years in Montgomery County. Consequently we are seeking to identify preventative steps that can reduce the dollar damages as well as protecting public health when severe weather strikes," according to Diana Holmes, coordinator, Montgomery County Emergency Management Agency.

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Interested persons can submit questions and comments to the committee members or directly to the Montgomery County Emergency Management Agency at 532-9560.

Rep. Bourne Co-Sponsors "No Budget, No Pay" Bill

State Representative Avery Bourne (R-Raymond) is co-spon-

• Within 10 days of the Auditor General's certification that

complete, Sielschott i
back to college, where
sophomore at Southe
University in Carbond
she is majoring in
sciences-pre-physicia
tant, specializing in
gynecology. She will
her reign as Miss M
County Fair Queen
year's fair in June.
said they are current

National Promote

Jason Miller, VP of
ing at National Ban
announced that Luc
has been promoted to
She is headquarte
Vandalia branch and
employed with Nation
over three years wit
in the banking indust
rently resides in Fillm
husband and two chi
"In three short yea
moved up from telle
assistant to loan offi
developing the skills
become an excellent r
She has worked hard
high level of fast frie
to all her current cus
looks forward to reach
cultivating new rel
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For more informat
Slightom can help wit
lending needs, please
Vandalia branch at 61
National Bank, hea
in Hillsboro, has 1

Valentine

Founded in 1856

The Litchfield New Herald January 18, 2016

Will discuss better ways to protect Montgomery residents in bad weather

Montgomery County Natural Hazards Mitigation Planning committee will meet at 7 p.m. Thursday, Jan. 21 at the Montgomery County Public Health Department in Hillsboro. The public is welcome to attend.

Purpose of the meeting is to discuss projects to protect residents and property from storms and other natural hazards.

Diana Holmes, coordinator of the Montgomery County Emergency Management Agency, explained the importance of the planning session.

"Severe storms frequently damage buildings, crops, roads and other critical infrastructure in this area.

"At least $77 million in damages have resulted from approximately 350 severe weather and other natural hazard events in the previous 60 years in Montgomery county.

"Consequently we are seeking to identify preventative steps that can reduce the dollar damages as well as protecting public health when severe weather strikes."

Projects identified by municipal representatives at this meeting will become part of the Montgomery County Natural Hazard Mitigation Plan.

While the public has provided input on portions of the plan, the entire plan will be presented for public review and comment before it is submitted to the state and federal government for approval.

"A public forum will be conducted later this year for interested persons to review the plan and ask questions of committee members," Holmes said.

"A two-week 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."

"In addition, a copy of the draft plan will be placed on the county website for residents to view. We want to make it as easy as possible for all residents to view this draft plan so that they can read about what type of storm damage reduction projects are being considered," she said.

Interested persons can submit questions and comments to committee members or directly to the Montgomery County Emergency Management Agency, 532-9560.

The Journal-News
February 1, 2016

New Hazard Mitigation Plan Ready For Hearing

After a year of quarterly meetings, government officials from around the county have put a mitigation plan together to help with the consequences of any natural disasters (ice storms, tornadoes, blizzards) that may strike the county. The plan also qualifies the government units that participated for financial aide from IEMA (Illinois Emergency Management Agency) and FEMA (Federal Emergency Management Agency).

The most recent plan was finalized at a meeting held Thursday, Jan. 21, at the Montgomery County Health Department on Rt. 185. In charge of the meeting was Andrea Bostwick of Johnson, Depp & Quisenberry (JDQ), who gave each jurisdiction present a chance to add to its list of needs that would help or prevent damages from natural disasters.

A public hearing in the proposed updates of the plan has been scheduled for Thursday, April 21, at 6 p.m. at the Health Department. After that hearing, the plan will be presented to IEMA and FEMA for a three to four month review. Then each jurisdiction that participated in the planning process (the county was commended for "stellar participation") will adopt the plan *via* resolution.

Montgomery County
Emergency Management Agency
Diana Holmes
Coordinator
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Cathy Ulrici
Administrative Assistant
Office Phone 532-9560, 532-9562
Email: dholmes@montgomeryco.com

Public Forum About Storm Damages

Hillsboro, IL (APRIL 11, 2016)--Projects and activities to prevent injuries, deaths and property damage from severe storms will be presented for public comment in the Montgomery County Natural Hazards Mitigation Plan. The Plan will be available for review at a public forum on April 21 from 7:00 p.m. to 8 p.m. at the Montgomery County Public Health Department, 11191 IL Route 185, in Hillsboro. Members from the Montgomery County Natural Hazards Mitigation Planning Committee will be available to discuss this Plan.

“Persons can come and go at their convenience to review the plan and comment. If someone only has a few minutes to review the plan, ask a question, or comment, they can easily do so at any time during the forum. This forum is designed to accommodate busy schedules. Unlike some conventional meetings, there are no formal presentations forcing attendees to wait before they are allowed to speak,” according to Diana Holmes, Coordinator, Montgomery County Emergency Management Agency.

Approximately 180 projects and activities were identified to protect Montgomery County residents and property from storms and other natural disasters. This plan, unlike all other emergency plans, is aimed at identifying projects and activities that can be taken before a natural disaster occurs. This Committee has been conducting working meetings open to the public since May, 2015.

Coffeen, Donnellson, Farmersville, Hillsboro, Litchfield, Nokomis, Panama, Raymond, Schram City, Taylor Springs, Waggoner, and Witt are the municipalities participating in the planning process.

A public comment period will remain open until May 5. Comments can be directed to the Montgomery County Emergency Management Agency. Following the public comment period, any revisions that are needed will be made before the Plan is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for approval.

Contact: Diana Holmes at 532-9560 or Email dholmes@montgomeryco.com

The Journal-News
April 7, 2016

Public Forum Set For County Mitigation Plan

Posted: Thursday, April 7, 2016 12:01 am

Projects and activities to prevent injuries, deaths and property damage from severe storms will be presented for public comment in the Montgomery County Natural Hazards Mitigation Plan.

The plan will be available for review at a public forum on Thursday, April 21, from 7 to 8 p.m. at the Montgomery County Public Health Department, 11191 IL Route 185 in Hillsboro. Members from the Montgomery County Natural Hazards Mitigation Planning Committee will be available to discuss the plan.

"Persons can come and go at their convenience to review the plan and comment. If someone only has a few minutes to review the plan, ask a question or comment, they can easily do so at any time during the forum. This forum is designed to accommodate busy schedules. Unlike some conventional meetings, there are no formal presentations forcing attendees to wait before they are allowed to speak," said Diana Holmes, Montgomery County Emergency Management Agency.

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A public comment period will remain open until May 5. Comments can be directed to the Montgomery County Emergency Management Agency. Following the public comment period, any revisions that are needed will be made before the plan is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for approval.

Contact Diana Holmes at 532-9560 or email dholmes@montgomeryco.com.

The Journal-News
April 25, 2016

Mitigation Plan Meetings Finish–Comment Time Next

by Ron Deabenderfer

Greg Michaud, who worked in conjuction with Montgomery County Emergency Management Agency Director Diana Holmes to formulate the county's Multi-jurisdictional All Hazards Mitigation Plan, told attendees at the final mitigation planning meeting, held Thursday, April 21, three important concepts as the session concluded.

"Four million chemicals are in use in the United States, and every classification (from low risk to highly hazardous) travels through Montgomery County, either by rail or on I-55. That makes it a larger issue than we had imagined, but having that knowledge can help the county leverage grant money to prepare first responders for what they might find in case of a derailment or a truck accident." That was reflection point one.

"Secondly, because Montgomery County relies primarily on surface water collected in lakes, and because those lakes aren't near railroads or the interstate, this county's water supplies are safer than those in some neighboring counties relative to chemical spills."

His third point was to congratulate the county for at least partially solving the "Where do we put them?" problem that occurs when travelers are stranded on I-55 for weather or other reasons. "The involvement with Latter Rain Ministries and their facility in Litchfield gives you space to house travelers temporarily if the need arises," promised Michaud.

He also outlined what participants could expect over this summer. "We have a two week public comment period," he said. "Anyone with questions about the mitigation plan (by law it has to be reviewed every five years) can read a hard copy of it in Diana's office (in the newer courthouse), or we can provide it electronically. When the two weeks are over, we'll send it to the IEMA (Illinois Emergency Management Agency) and to FEMA (the federal agency) for their approval. Once their approval is confirmed -- in August or later -- government agencies can submit grants for equipment to help them deal with emergencies that might occur."

Government bodies (the county, cities, townships) have to adopt the plan by resolution in order to ever receive IEMA or FEMA assistance if a material disaster occurs.

Director Holmes handed certificates to those who participated in the majority of the meetings as the plan was completed in a year long plus process; a list of those who received certificates of appreciation will be published in a future *Journal-News*.

The Journal-News
April 28, 2016

Many Communities Attend Disaster Mitigation Meeting

by Ron Deabenderfer | Posted: Thursday, April 28, 2016 12:01 am

Many communities across Montgomery County sent representation to a series of disaster mitigation meetings that began in early 2015 and concluded last Thursday, April 21. The purpose of the committee was to review and improve the county's mitigation plan in order to make the governmental units who sent representation eligible for grants to buy equipment and to make those communities eligible for IEMA or FEMA relief should a disaster (tornado, ice storm, blizzard) occur.

Those who attended at least one of the five meetings were considered part of the committee and include Lester Hamlin, Audubon Twp.; Mary and Daryl Fuchs of Butler Grove Twp; Randy Singler and Phil Speiser of Irving Twp.; Ken Folkerts of Rountree Twp.; and Tony Krager of Pitman Twp.

From towns in the county came Carolyn Cooper and Sheila White of Coffeen; David Buckingham, Darrell Jett, Frances Jett, Sheryl Reynolds, and Jamie Welzbacher of Donnellson; Joe Tischkau and Greg Nimmo of Farmersville; Darin Beckman of Fillmore; Don Downs, Rich Hewitt, Michael Murphy, Gary Satterlee, and Brian Sullivan of Hillsboro; Steve Dougherty, Tonya Flannery, Dwayne Gerl, Marilyn Sisson and Sarah Waggoner of Litchfield; Tim Brookshire, Tim Chumley, Terry Hill, Kelly Johnston, Angela Keagy and Jeanne Voyles of Nokomis; Joe McCario, Deborah Hancock, and Leea Knight of Panama; Dennis Held of Raymond; Albert Oberle and Kelvin Stewart of Schram City; Dennis Jagodzinski, Lisa Hamilton, Cindy Laurent, Nancy Richardson, Patty Rufus and Elwin Saathoff of Taylor Springs;Ron Seaton of Waggoner; and Patsy Beasley and Kathy Tolle of Witt.

Three counties had people present; Kendra Craig and Kiley Depew were from Fayette County. Jim Pitchford traveled from Macoupin County. From the host county, Montgomery, were Bill Bergen, Ron Deabenderfer, Joe Gasparich, Chuck Graden, Roy Hertel, Tim Hopper, Glenn Savage, Mike Webb, Evan Young, Sandy Leitheiser, Chris Daniels, Will Shalter, Diana Holmes, Cassidy Younkers, Kevin Smith, Hugh Satterlee and Bruce Sanford.

Others in attendance at least once were Vito Passariello of Ameren Illinois; Mark Beaver and Jamie Davis from the American Red Cross; Matt Houser of Hearts United; Chris Henson, Amanda Payne and Mandy Sebeschak of Hillsboro Area Hospital; Scott Ferguson, Bill Giles and Dennis Schuette of Latter Rain Ministeries; Johny Leonard of the Litchfield Park District; Andy Rosentreter of Rosentreter Insurance; Brian Gunn and Aryn Hunter of St. Francis Hospital; and public representative Dolores Wheelhouse.

Conducting the meetings were Greg Michoud and Andrea Bostwick, environmentalists from the Springfield firm of the American Environmental Corporation.

Appendix G

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PUBLIC FORUM – PLANNING PROCESS SUMMARY HANDOUT

APPENDIX H

MONTGOMERY COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN PUBLIC FORUM – OPEN HOUSE

APRIL 21, 2016
MONTGOMERY COUNTY PUBLIC HEALTH DEPT., HILLSBORO
7:00 P.M. – 8:00 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 Montgomery County residents. Since 1965, Montgomery County has had three federally-declared disasters and over $76.1 million in recorded damages within the County.

In addition, between 2005 and 2014 there have been 41 thunderstorms with damaging winds, 30 severe storms with hail 1 inch in diameter or greater, 19 extreme heat events, 18 severe winter storms, 10 tornadoes, 9 recorded flash flood events, 3 recorded lightning strike events, 3 droughts, 2 recorded extreme cold events, and 1 earthquake felt by residents 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 an updated natural hazards mitigation plan?

By preparing and adopting an updated 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 updated Montgomery County Multi-Jurisdiction Natural Hazards Mitigation Plan?

Recognizing the benefits that could be gained from preparing an updated natural hazards mitigation plan, the Montgomery County Board Chair signed a Statement of Intent on July 17, 2014 agreeing to participate in the update of the Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan. The County invited all the local government entities within Montgomery County to participate. The following jurisdictions chose to participate in the Plan updated and development:

- Coffeen
- Donnellson
- Farmersville
- Hillsboro
- Hillsboro Area Hospital
- Litchfield
- Nokomis
- Panama
- Raymond
- ROE #3
- Schram City
- St. Francis Hospital
- Taylor Springs
- Waggoner
- Witt

MONTGOMERY COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

How was the Plan developed?

The Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan was developed through the Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee. The Planning Committee included representatives from each participating jurisdiction, as well as civic organizations, education, emergency services (fire, law enforcement, American Red Cross), healthcare, GIS, insurance, planning and development and utilities. The Planning Committee met five times between May, 2015 and April, 2016.

Which natural hazards are included in the Plan?

After discussing their options, the Planning Committee chose to include the following natural hazards in this updated Plan:

Natural Hazards:

- severe storms (thunderstorms, hail, lighting & heavy rain)
- severe winter storms (snow, ice & extreme cold)
- extreme heat
- tornadoes
- flood
- drought
- earthquakes
- dams

What is included in the updated Plan?

The updated 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; recommendations; and plan maintenance and adoption. The majority of the updated Plan is devoted to the risk assessment.

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 Montgomery County as well as the buildings, critical facilities and infrastructure located within the County.

What happens next?

Any comments received at tonight’s public forum will be are incorporated into the draft updated 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 updated Plan, it will be presented to the County and each participating jurisdiction for formal adoption. After adopting the updated Plan, each participating jurisdiction can apply for federal mitigation funds and begin implementation of the mitigation actions identified in the updated Plan.

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PUBLIC FORUM – PLAN COMMENT SHEET

APPENDIX I

Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan

Public Forum – April 21, 2016
Comment Sheet

The Montgomery 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 sheet should be used to provide feedback on the draft updated Plan.

What comments, concerns or questions do you have regarding the draft updated Plan? (Use additional sheets if necessary.)

____

Please Print Your Name, Address, and Phone Number Below

Name: ____ Phone: ____________________

Address: ____

____ Zip Code: ____________________

Comments will be accepted until May 6, 2016.

Place
Stamp
Here

Ms. Diana Holmes, Coordinator
Montgomery County EMA
120 N. Main St.
Hillsboro, IL 62049

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HAZARD MITIGATION PLANNING LETTER SENT TO ADJACENT COUNTIES

APPENDIX J

Montgomery County
Emergency Management Agency
Diana Holmes
Coordinator
Cell Phone: 254-6437
Cathy Ulrici
Administrative Assistant
Office Phone 532-9560, 532-9562
Email: dholmes@montgomeryco.com

TO: Bond County Allan Davis (Bond911@sbcglobal.net)
Christian County, Mike Crews (christiancoema@yahoo.com)
Fayette County, Kendra Craig (fcesda@yahoo.com)
Macoupin County, Jim Pitchford ema@macoupincountyil.gov
Madison County Larry Ringling (llringering@co.madison.il.us)
Sangamon County (DavidB@co.sangamon.il.us),
Shelby County Jared Rowcliffe (scema@consolidated.net)

FROM: Diana Holmes

SUBJECT: Hazard Mitigation Planning

DATE: April 4th 2016

The purpose of this memorandum is to let you know that Montgomery County is updating its countywide Natural Hazards Mitigation Plan. Since we share common boundaries, you are invited to review this draft updated Plan and provide comment at a public forum scheduled for:

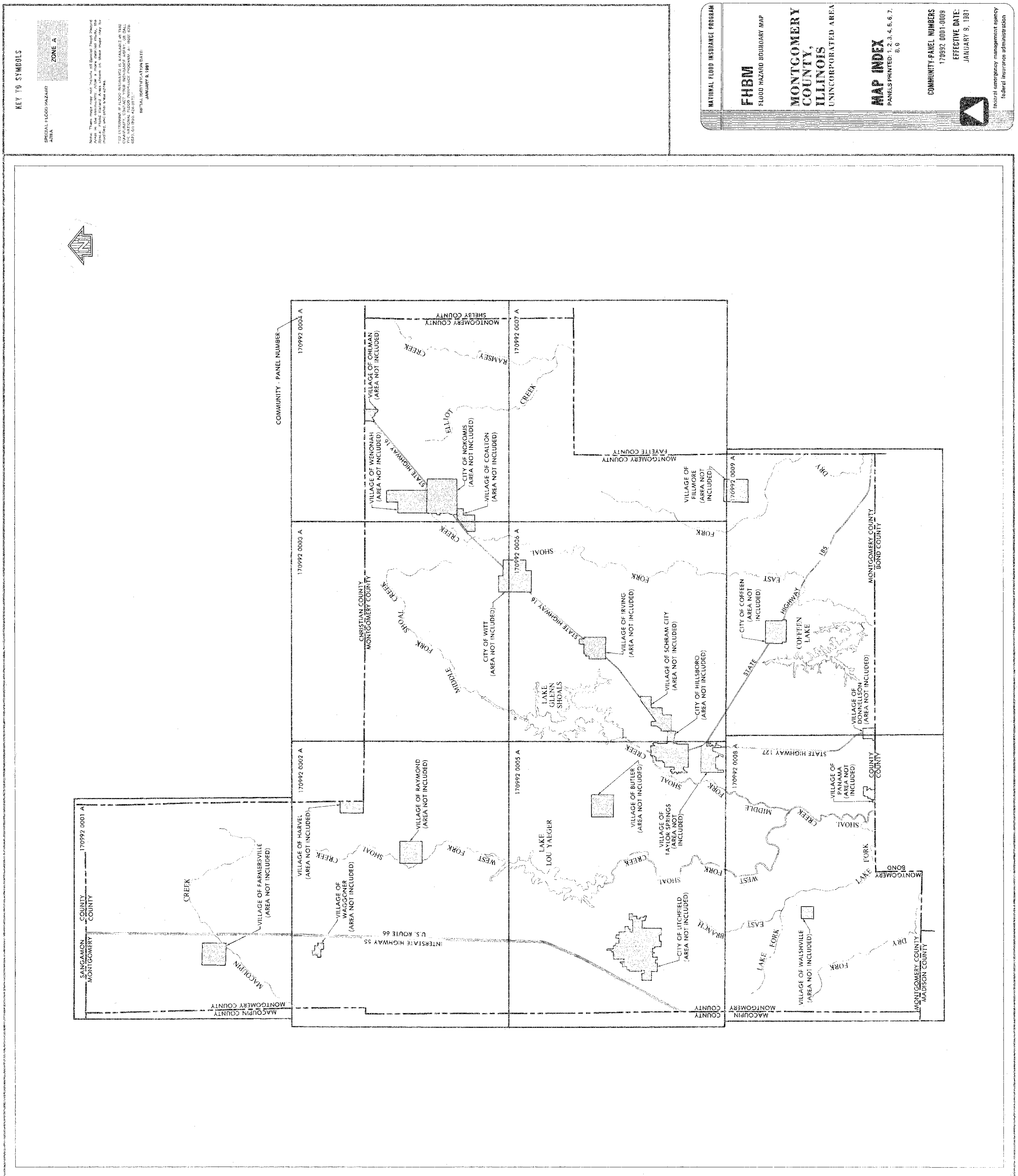
Thursday, April 21, 12016
7 p.m.
Montgomery County Public Health Department
11191 IL Route 185
Hillsboro, IL

Food will be provided at this event so please let me know if you plan to attend.

Greg Michaud, our mitigation planning consultant (Tel: 217/585-9517, Ext. 8) (E-mail: gmichaud@acespfld.com) can answer specific questions about the Plan.

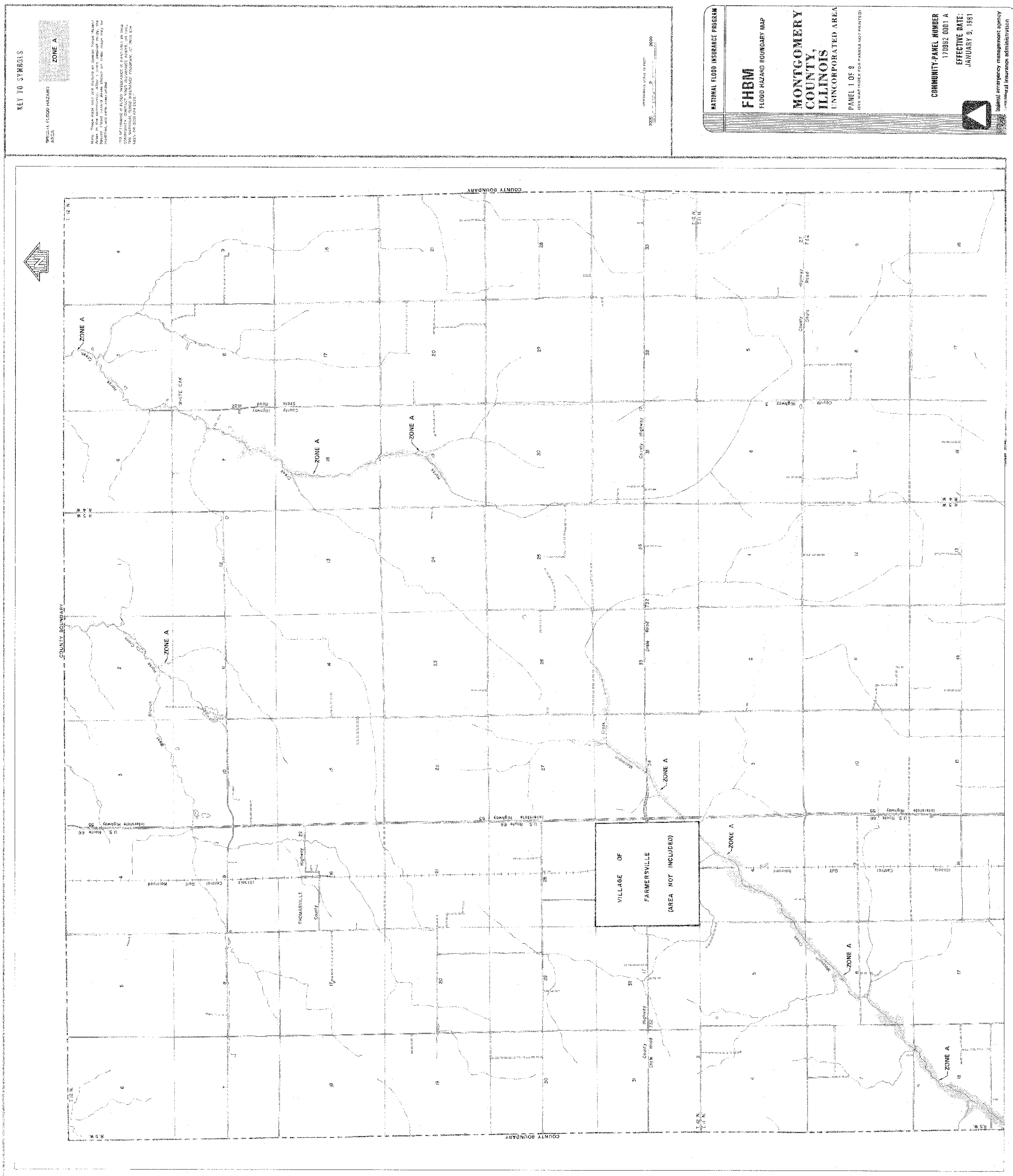
FLOODPLAIN MAPS FOR PARTICIPATING JURISDICTIONS

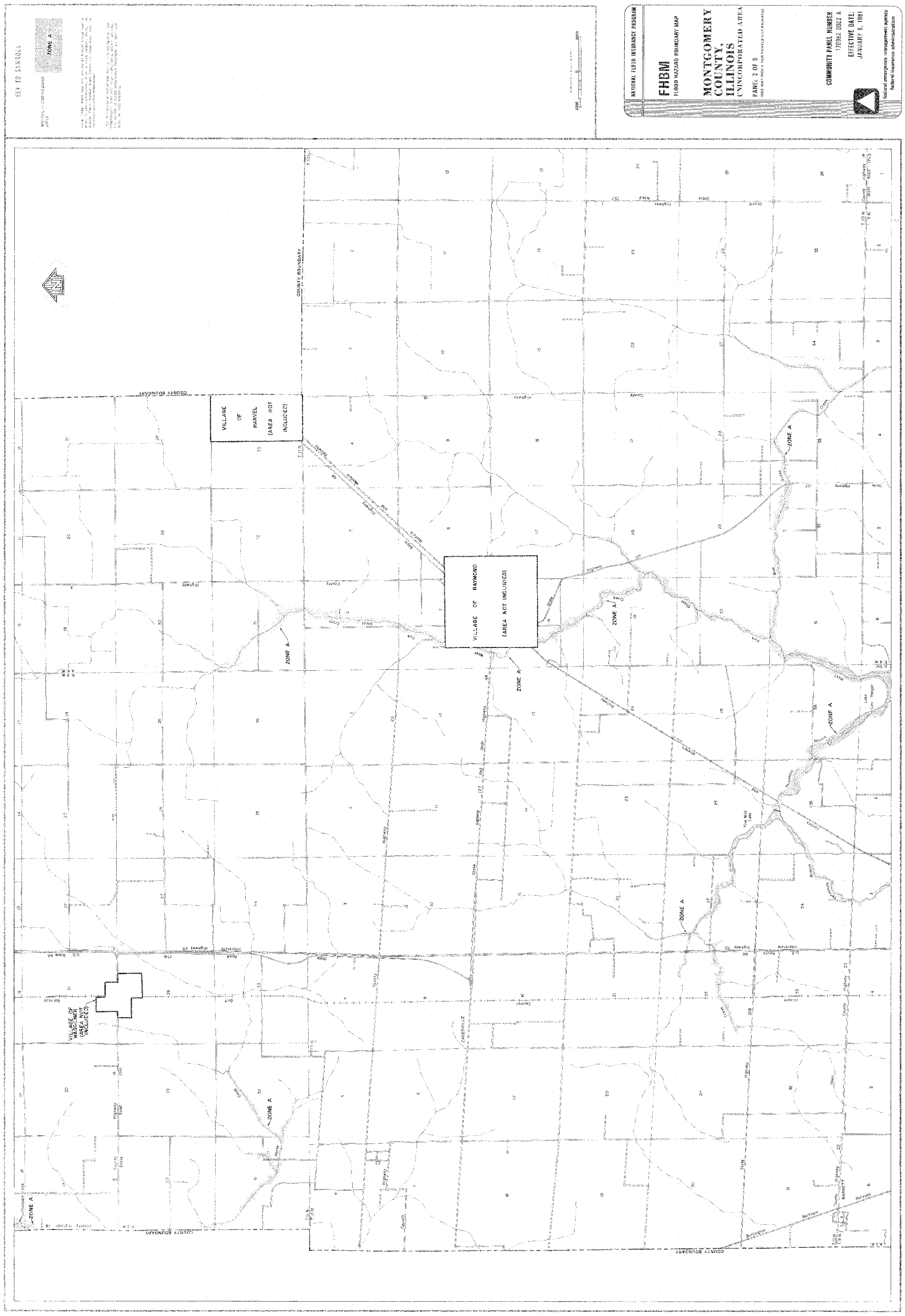
APPENDIX K



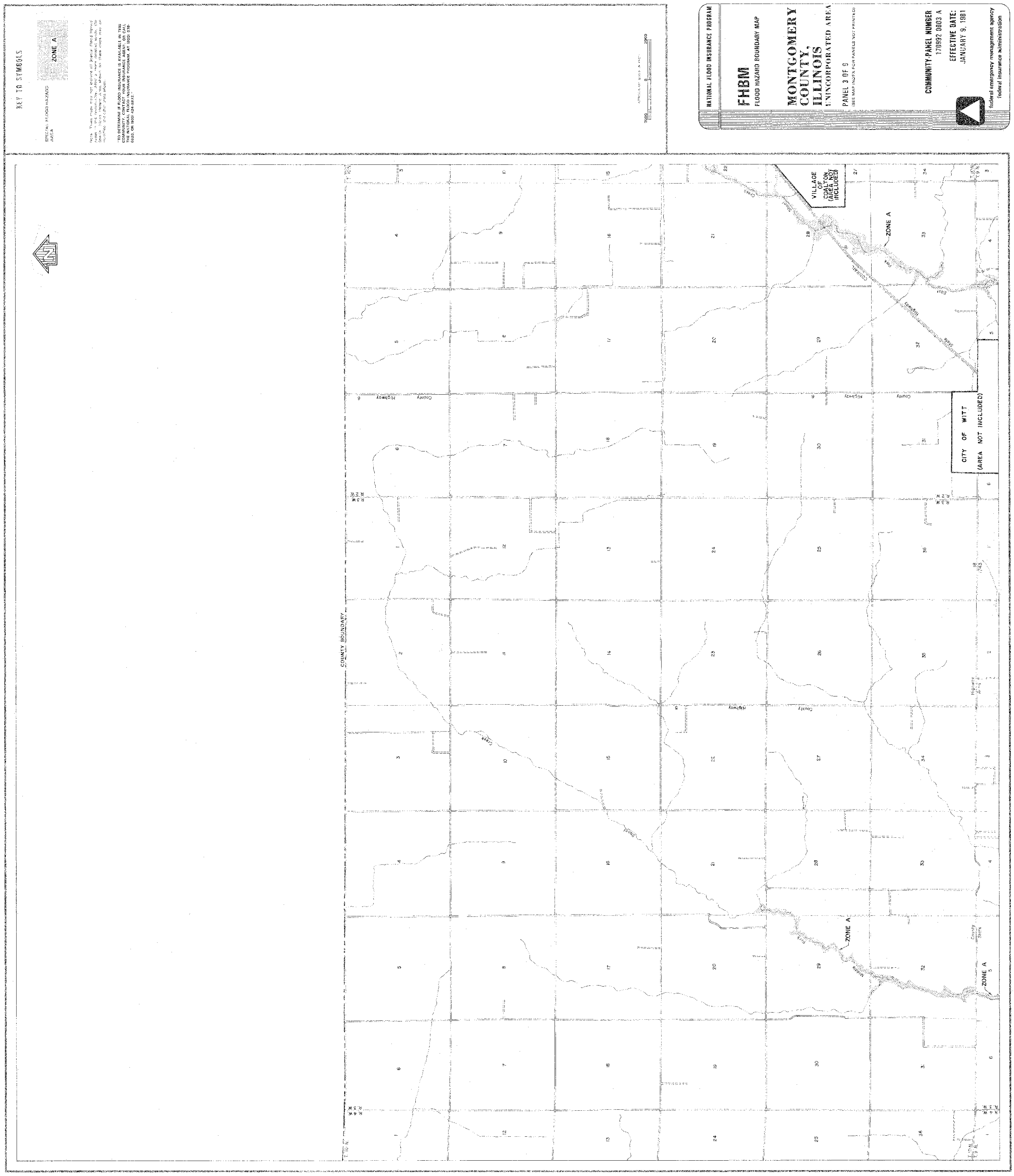
KEY TO SYMBOLS
SPECIAL FLOOD HAZARD AREA
ZONE A
INITIAL IDENTIFICATION DATE:
JANUARY 9, 1981
NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
MAP INDEX
PANELS PRINTED: 1, 2, 3, 4, 5, 6, 7, 8, 9
COMMUNITY-PANEL NUMBERS
170992 0001-0009
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration
COMMUNITY - PANEL NUMBER
170992 0001 A
170992 0002 A
170992 0003 A
170992 0004 A
170992 0005 A
170992 0006 A
170992 0007 A
170992 0008 A
170992 0009 A
SHELBY COUNTY
MONTGOMERY COUNTY
FAYETTE COUNTY
CHRISTIAN COUNTY
SANGAMON COUNTY
MACOUPIN COUNTY
MADISON COUNTY
BOND COUNTY
VILLAGE OF OHLMAN (AREA NOT INCLUDED)
VILLAGE OF WENONAH (AREA NOT INCLUDED)
CITY OF NOKOMIS (AREA NOT INCLUDED)
VILLAGE OF COALTON (AREA NOT INCLUDED)
VILLAGE OF FILLMORE (AREA NOT INCLUDED)
CITY OF WITT (AREA NOT INCLUDED)
VILLAGE OF IRVING (AREA NOT INCLUDED)
VILLAGE OF SCHRAM CITY (AREA NOT INCLUDED)
CITY OF HILLSBORO (AREA NOT INCLUDED)
CITY OF COFFEEN (AREA NOT INCLUDED)
VILLAGE OF DONNELLSON (AREA NOT INCLUDED)
VILLAGE OF PANAMA (AREA NOT INCLUDED)
VILLAGE OF RAYMOND (AREA NOT INCLUDED)
VILLAGE OF HARVEL (AREA NOT INCLUDED)
VILLAGE OF WAGGONER (AREA NOT INCLUDED)
VILLAGE OF FARMERSVILLE (AREA NOT INCLUDED)
VILLAGE OF BUTLER (AREA NOT INCLUDED)
VILLAGE OF TAYLOR SPRINGS (AREA NOT INCLUDED)
CITY OF LITCHFIELD (AREA NOT INCLUDED)
VILLAGE OF WALSHVILLE (AREA NOT INCLUDED)
LAKE GLENN SHOALS
LAKE LOU YAEGER
COFFEEN LAKE
STATE HIGHWAY 16
STATE HIGHWAY 127
STATE HIGHWAY 185
INTERSTATE HIGHWAY 55
U.S. ROUTE 66
RAMSEY CREEK
ELLIOT CREEK
SHOAL CREEK
MIDDLE FORK SHOAL CREEK
WEST FORK SHOAL CREEK
EAST FORK SHOAL CREEK
DRY FORK
LAKE FORK
EAST FORK BRANCH
MACOUPIN CREEK

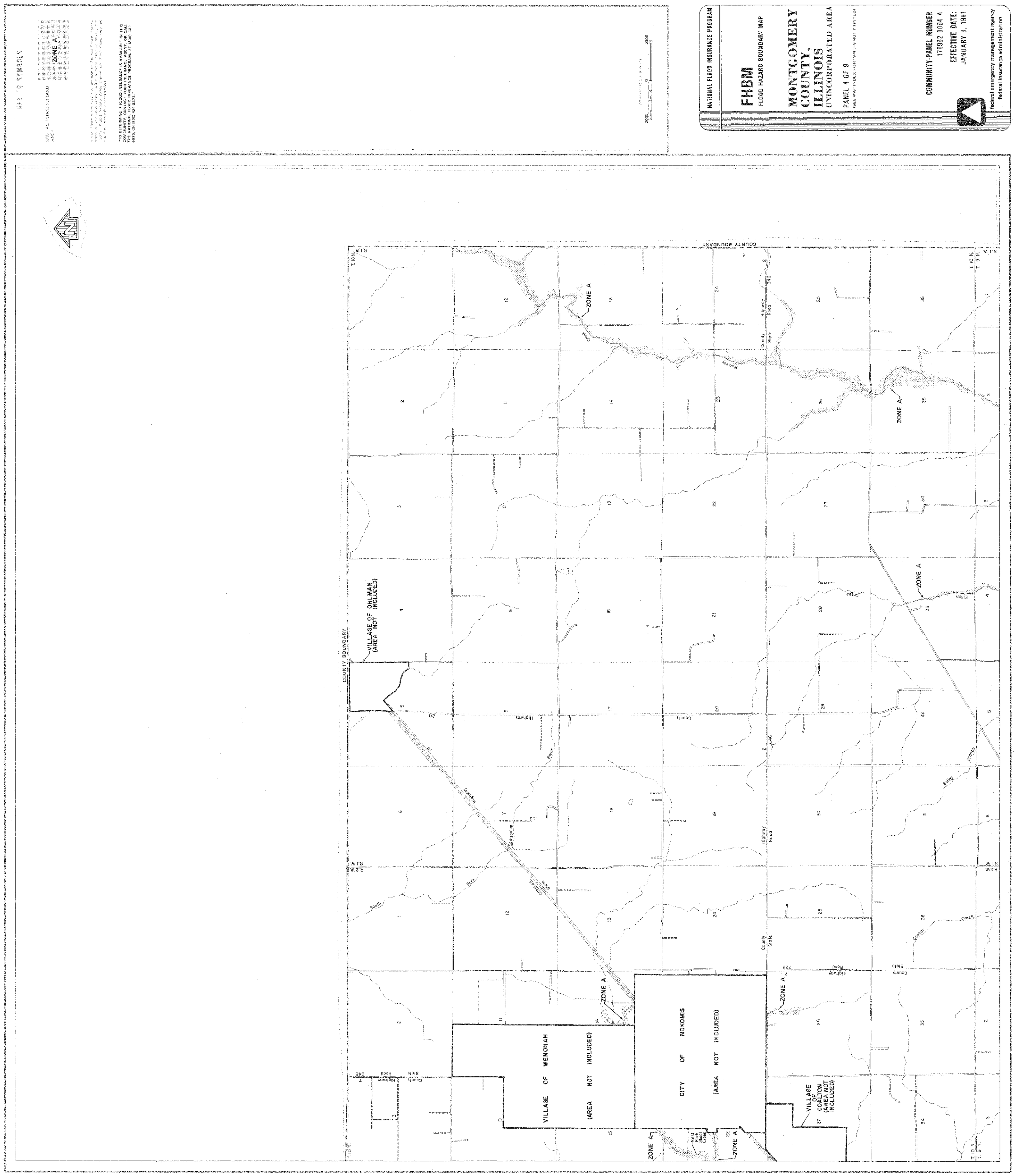
Appendix K


NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 1 OF 9
COMMUNITY-PANEL NUMBER
170992 0001 A
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration
KEY TO SYMBOLS
ZONE A
VILLAGE OF FARMERSVILLE
(AREA NOT INCLUDED)
COUNTY BOUNDARY
WHITE OAK
THOMASVILLE

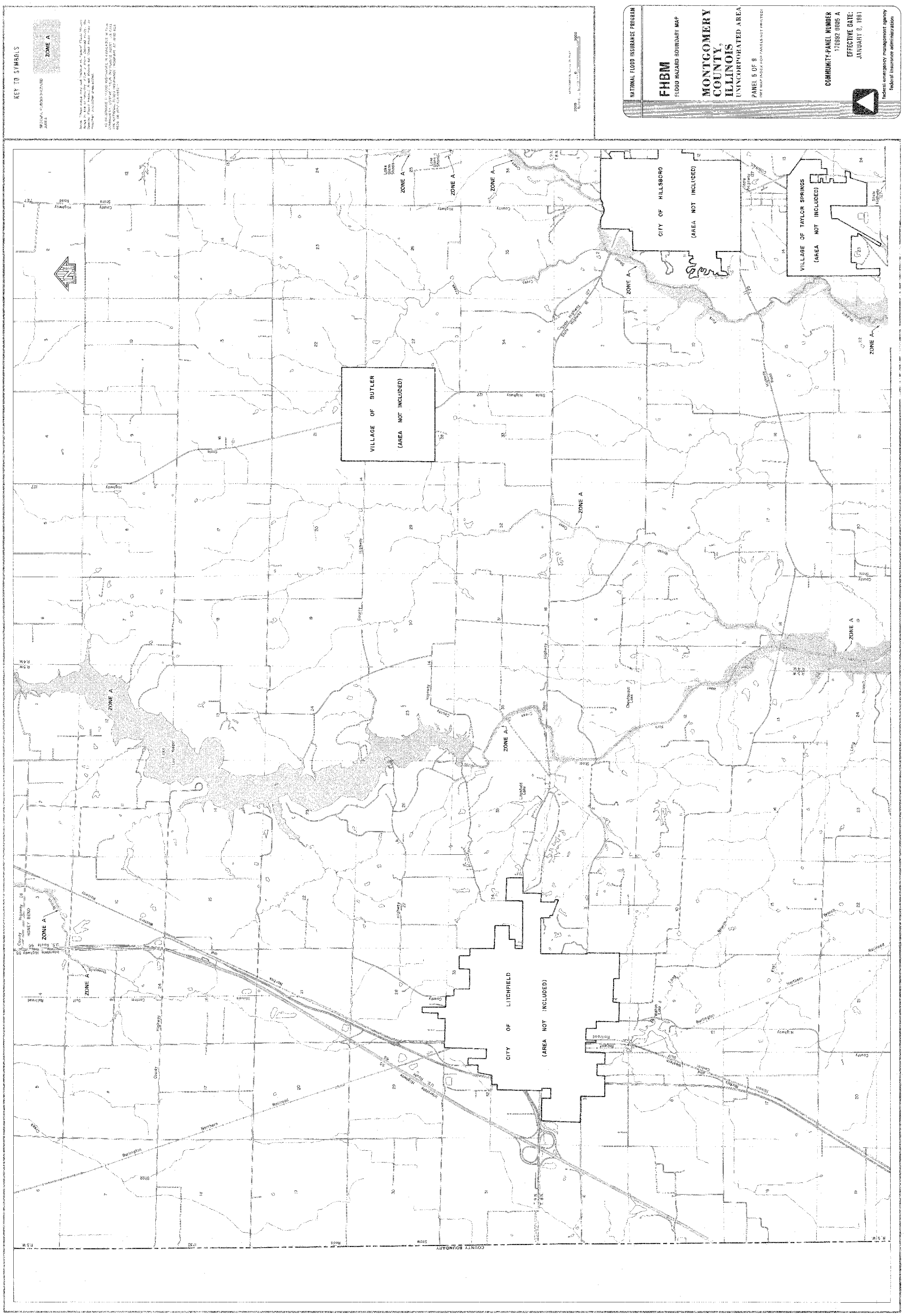

NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 2 OF 9
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
170992 0002 A
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration
KEY TO SYMBOLS
ZONE A
VILLAGE OF HARVEL (AREA NOT INCLUDED)
VILLAGE OF RAYMOND (AREA NOT INCLUDED)
VILLAGE OF WAGGONER (AREA NOT INCLUDED)
COUNTY BOUNDARY
ZONE A

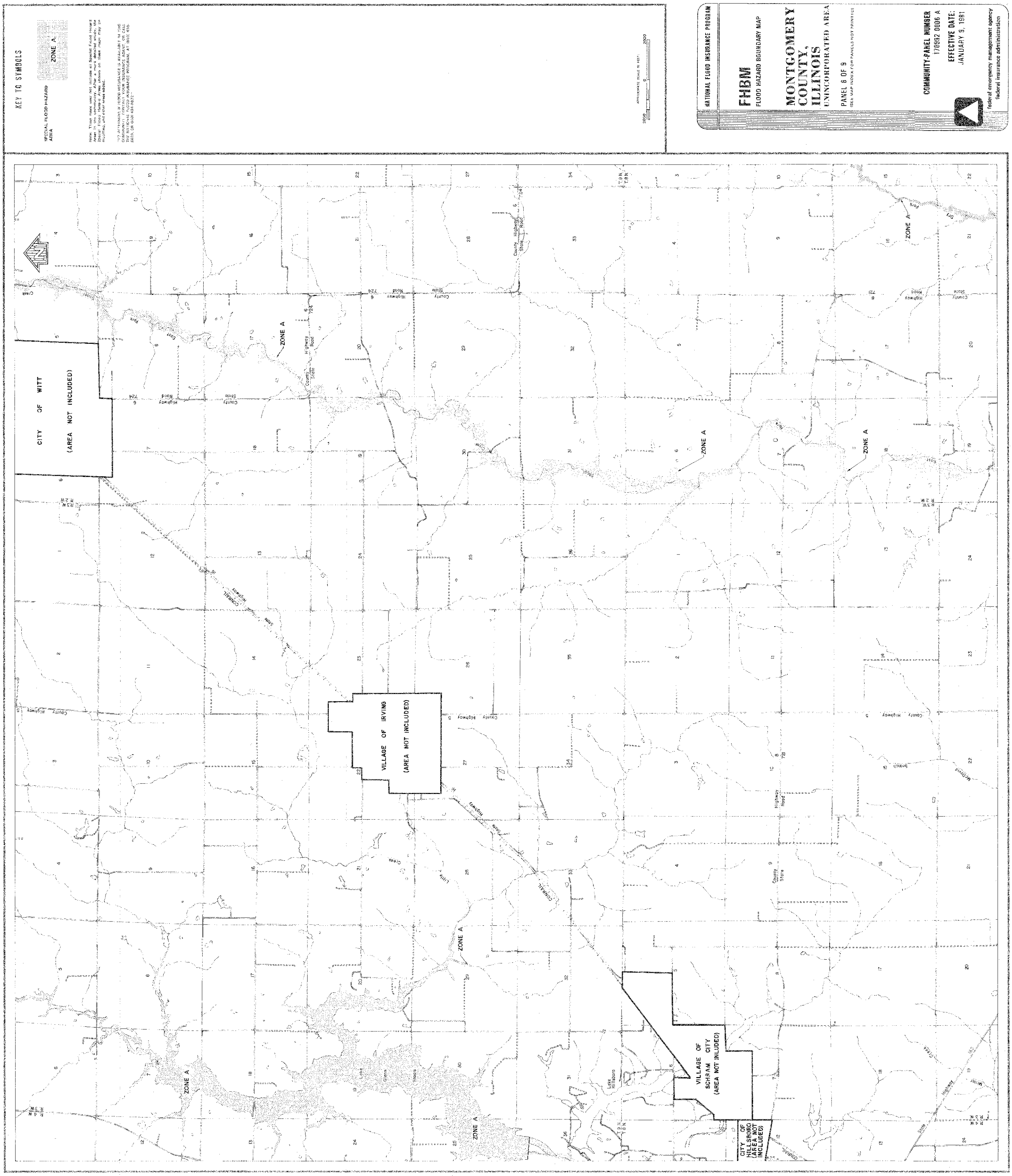
Appendix K

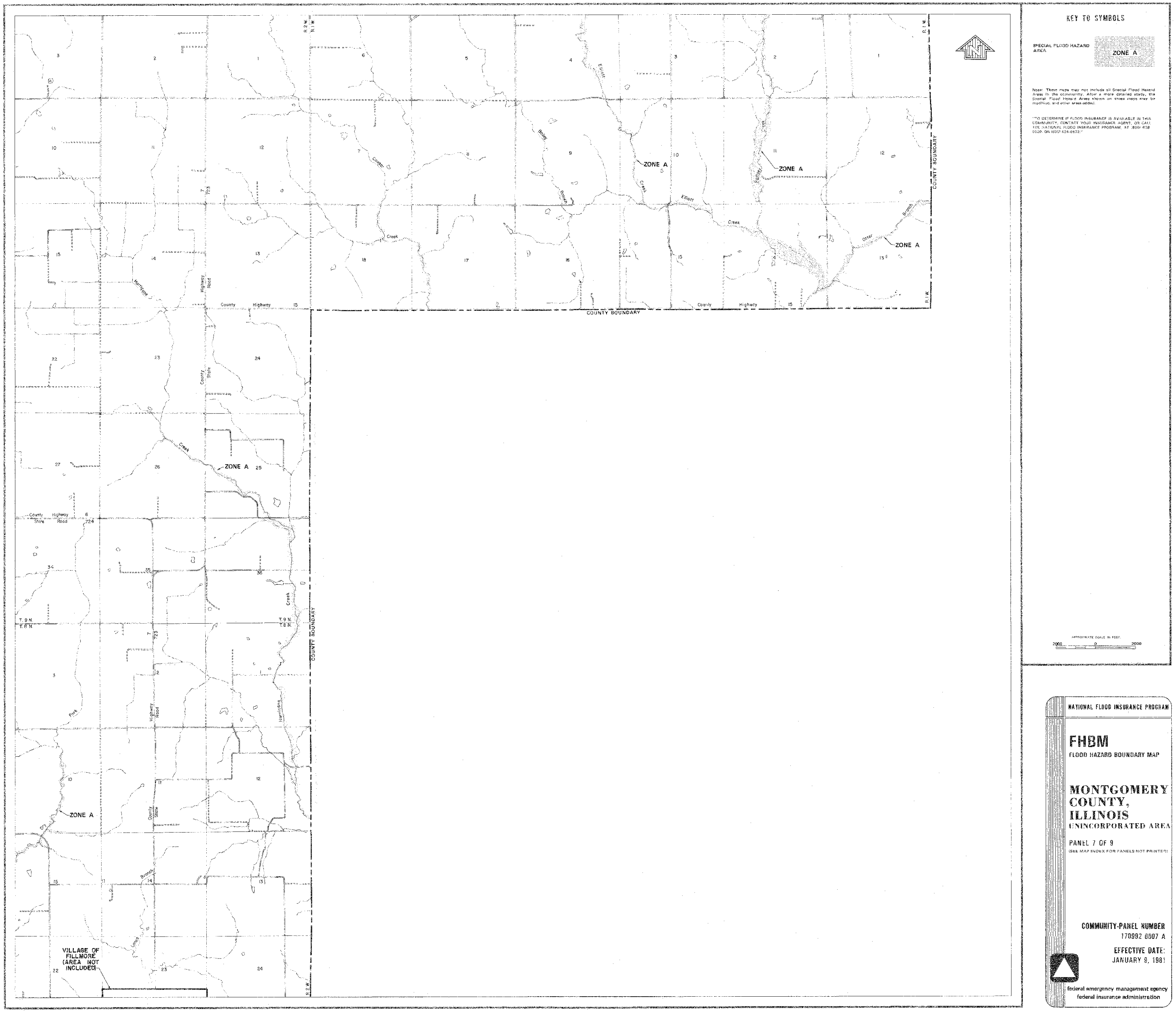

NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 3 OF 9
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
170992 0003 A
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration
KEY TO SYMBOLS
ZONE A
VILLAGE OF COALTON (AREA NOT INCLUDED)
CITY OF WITT (AREA NOT INCLUDED)
COUNTY BOUNDARY
ZONE A
ZONE A
ZONE A

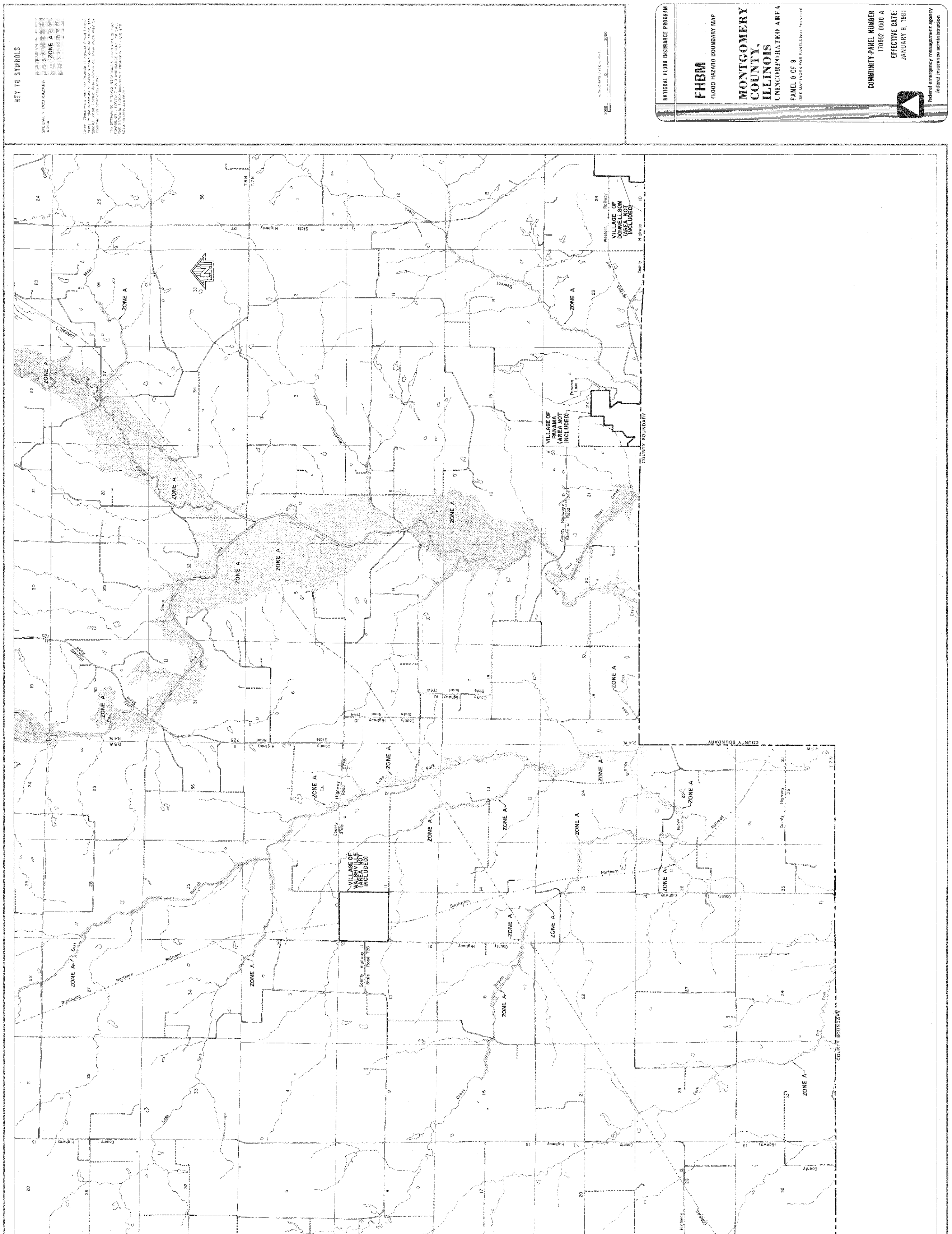


NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 4 OF 9
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
170992 0004 A
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration
KEY TO SYMBOLS
ZONE A
COUNTY BOUNDARY
VILLAGE OF OHLMAN (AREA NOT INCLUDED)
VILLAGE OF WENONAH (AREA NOT INCLUDED)
CITY OF NOKOMIS (AREA NOT INCLUDED)
VILLAGE OF COALTON (AREA NOT INCLUDED)

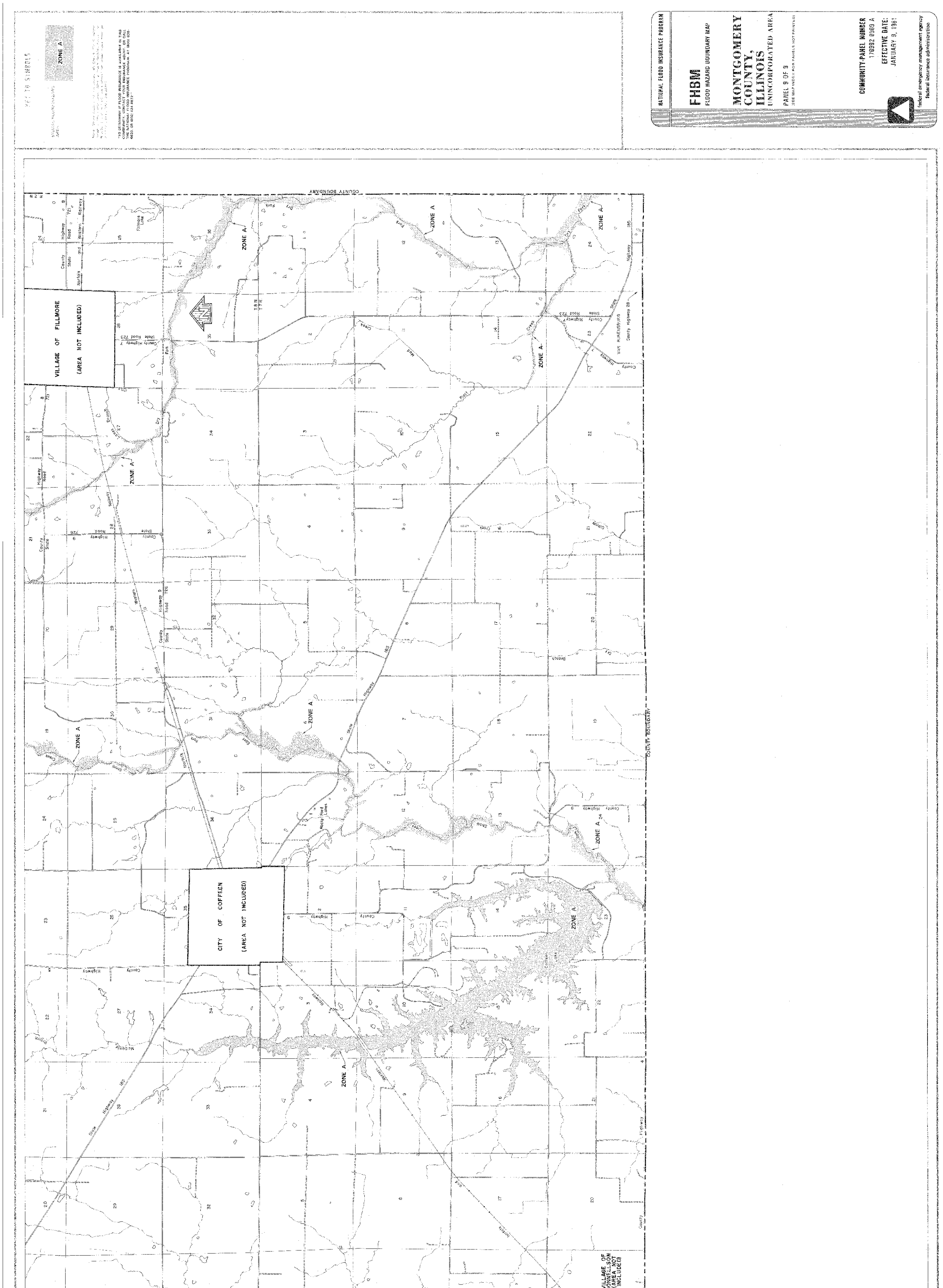

NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 5 OF 8
COMMUNITY-PANEL NUMBER
170592 0005 A
EFFECTIVE DATE:
JANUARY 9, 1981
Federal Emergency Management Agency
Federal Insurance Administration
KEY TO SYMBOLS
ZONE A
CITY OF HILLSBORO
(AREA NOT INCLUDED)
VILLAGE OF TAYLOR SPRINGS
(AREA NOT INCLUDED)
VILLAGE OF BUTLER
(AREA NOT INCLUDED)
CITY OF LITCHFIELD
(AREA NOT INCLUDED)
COUNTY BOUNDARY


NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 6 OF 9
COMMUNITY-PANEL NUMBER
170992 0006 A
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration
KEY TO SYMBOLS
ZONE A
CITY OF WITT
(AREA NOT INCLUDED)
VILLAGE OF IRVING
(AREA NOT INCLUDED)
VILLAGE OF SCHRAM CITY
(AREA NOT INCLUDED)
CITY OF HILLSBORO
(AREA NOT INCLUDED)

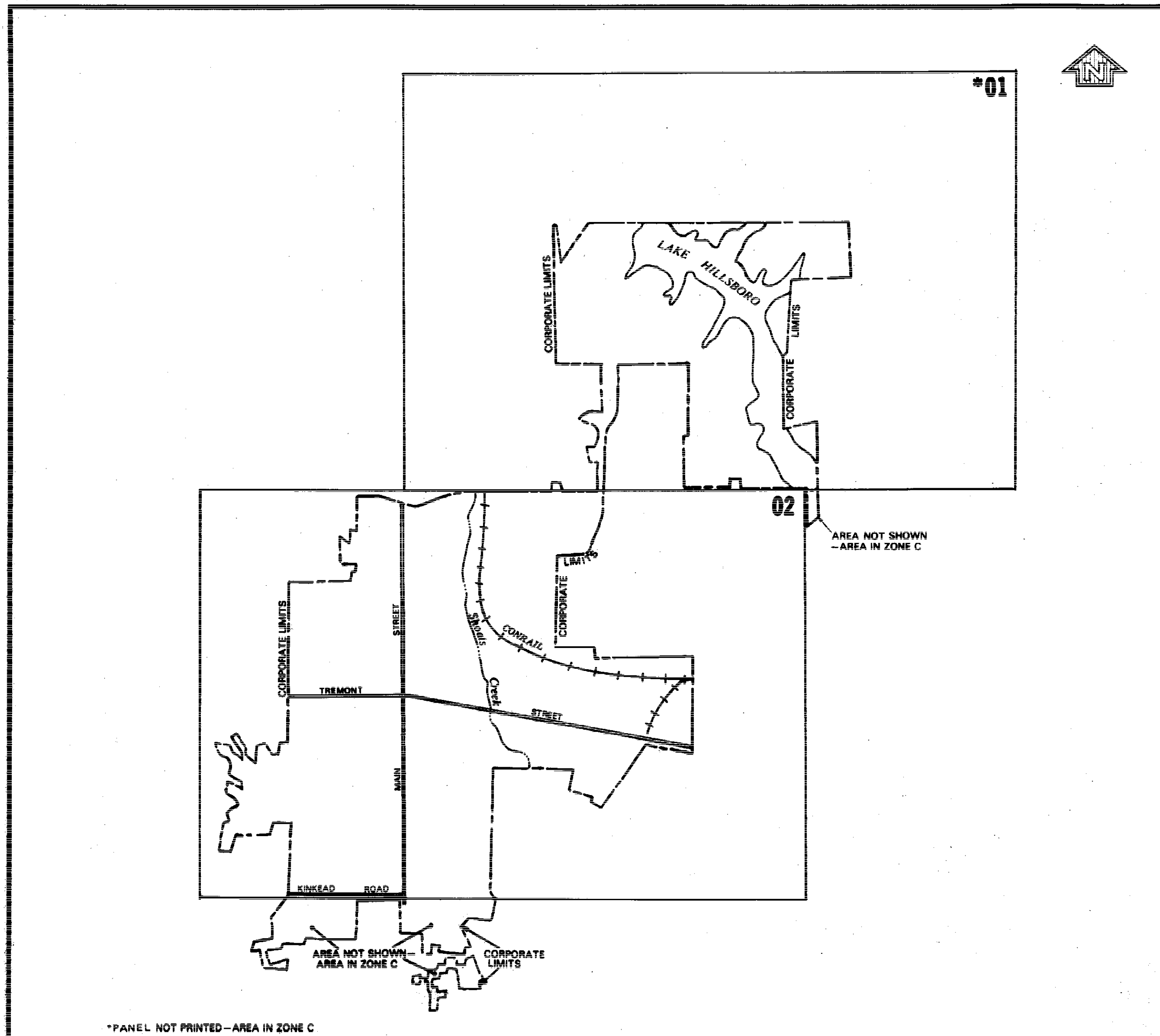

KEY TO SYMBOLS
SPECIAL FLOOD HAZARD AREA
ZONE A
NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 7 OF 9
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
170992 0007 A
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration
COUNTY BOUNDARY
ZONE A
VILLAGE OF FILLMORE (AREA NOT INCLUDED)
Elliott Creek
County Highway 15


NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 8 OF 9
COMMUNITY-PANEL NUMBER
170892 0008 A
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration
KEY TO SYMBOLS
ZONE A
VILLAGE OF DONNELLSON (AREA NOT INCLUDED)
VILLAGE OF PANAMA (AREA NOT INCLUDED)
VILLAGE OF WALSHVILLE (AREA NOT INCLUDED)
COUNTY BOUNDARY

Appendix K



NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 9 OF 9
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
170992 0009 A
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration
VILLAGE OF FILLMORE
(AREA NOT INCLUDED)
CITY OF COFFEEN
(AREA NOT INCLUDED)
VILLAGE OF DONNELLSON
(AREA NOT INCLUDED)
ZONE A
COUNTY BOUNDARY



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$_{\times}$
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: MAY 17, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS: AUGUST 6, 1976, FEBRUARY 17, 1978

FLOOD INSURANCE RATE MAP EFFECTIVE: AUGUST 19, 1986

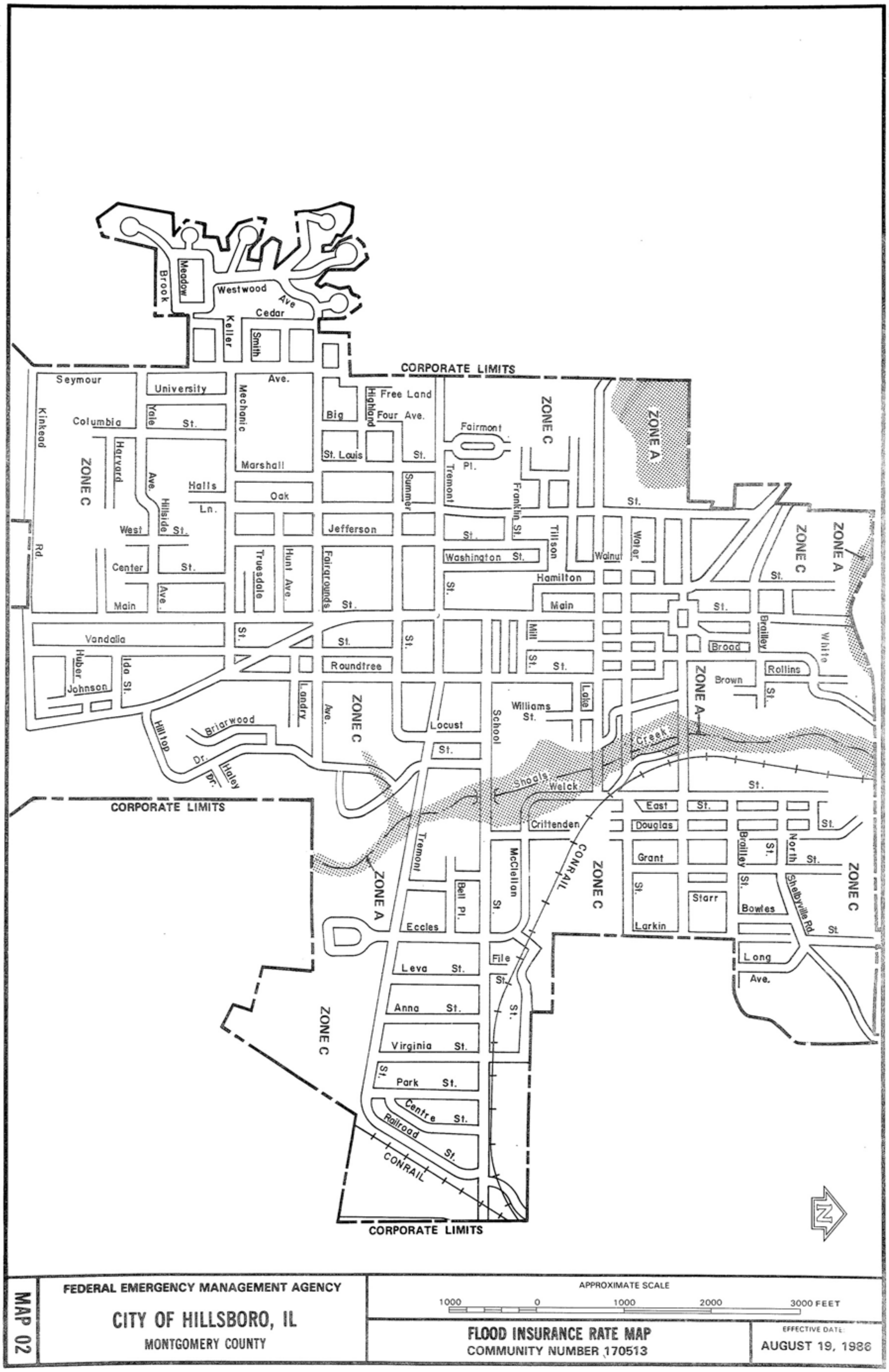
FLOOD INSURANCE RATE MAP REVISIONS:

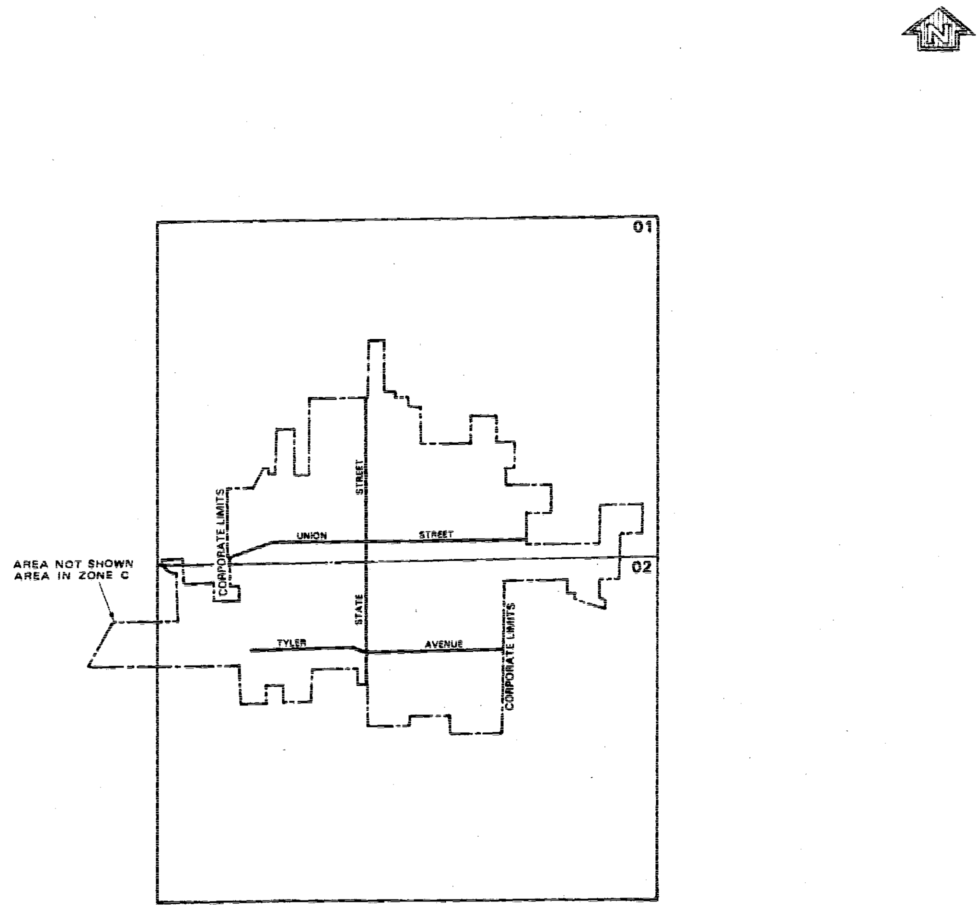
FEDERAL EMERGENCY MANAGEMENT AGENCY

FIRM

FLOOD INSURANCE RATE MAP 01-02
MAP INDEX
CITY OF HILLSBORO, IL
MONTGOMERY COUNTY

COMMUNITY NUMBER 170513 C


FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF HILLSBORO, IL
MONTGOMERY COUNTY
APPROXIMATE SCALE
1000 0 1000 2000 3000 FEET
FLOOD INSURANCE RATE MAP
COMMUNITY NUMBER 170513
EFFECTIVE DATE:
AUGUST 19, 1986
MAP 02
CORPORATE LIMITS
CORPORATE LIMITS
CORPORATE LIMITS
ZONE A
ZONE C
CONRAIL
Shoals Creek
Brook
Meadow
Westwood Ave
Cedar
Keller
Smith
Seymour
University
Ave.
Mechanic
Columbia
Yale St.
Kinkead Rd.
Harvard
Hillside Ave.
Halls Ln.
Marshall
Oak
Jefferson
West St.
Center St.
Main
Truesdale
Hunt Ave.
Fairgrounds St.
Vandalia
Huber
Johnson
Ida St.
Roundtree
Landry
Briarwood
Hilltop Dr.
Haley Dr.
Big Four Ave.
Highland
Free Land
St. Louis St.
Summer
Fairmont Pl.
Tremont
Franklin St.
Tillson
Walnut
Water
Washington St.
Hamilton
Mill St.
Locust St.
School
Williams St.
Lake
Welch
Crittenden
East St.
Douglas
Grant
Larkin
Starr
Broad
Brailley
Brown
Rollins
White
North St.
Bowles
Shelbyville Rd
Long Ave.
McClellan St.
Bell Pl.
Eccles
File St.
Leva St.
Anna St.
Virginia St.
Park St.
Centre St.
Railroad St.



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×
River Mile	•M1.5

*EXPLANATION OF ZONE DESIGNATIONS

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A1-A30	Areas of 100-year flood, base flood elevations and flood hazard factors determined
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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: MAY 17, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS: JULY 18, 1975

FLOOD INSURANCE RATE MAP EFFECTIVE: AUGUST 19, 1985

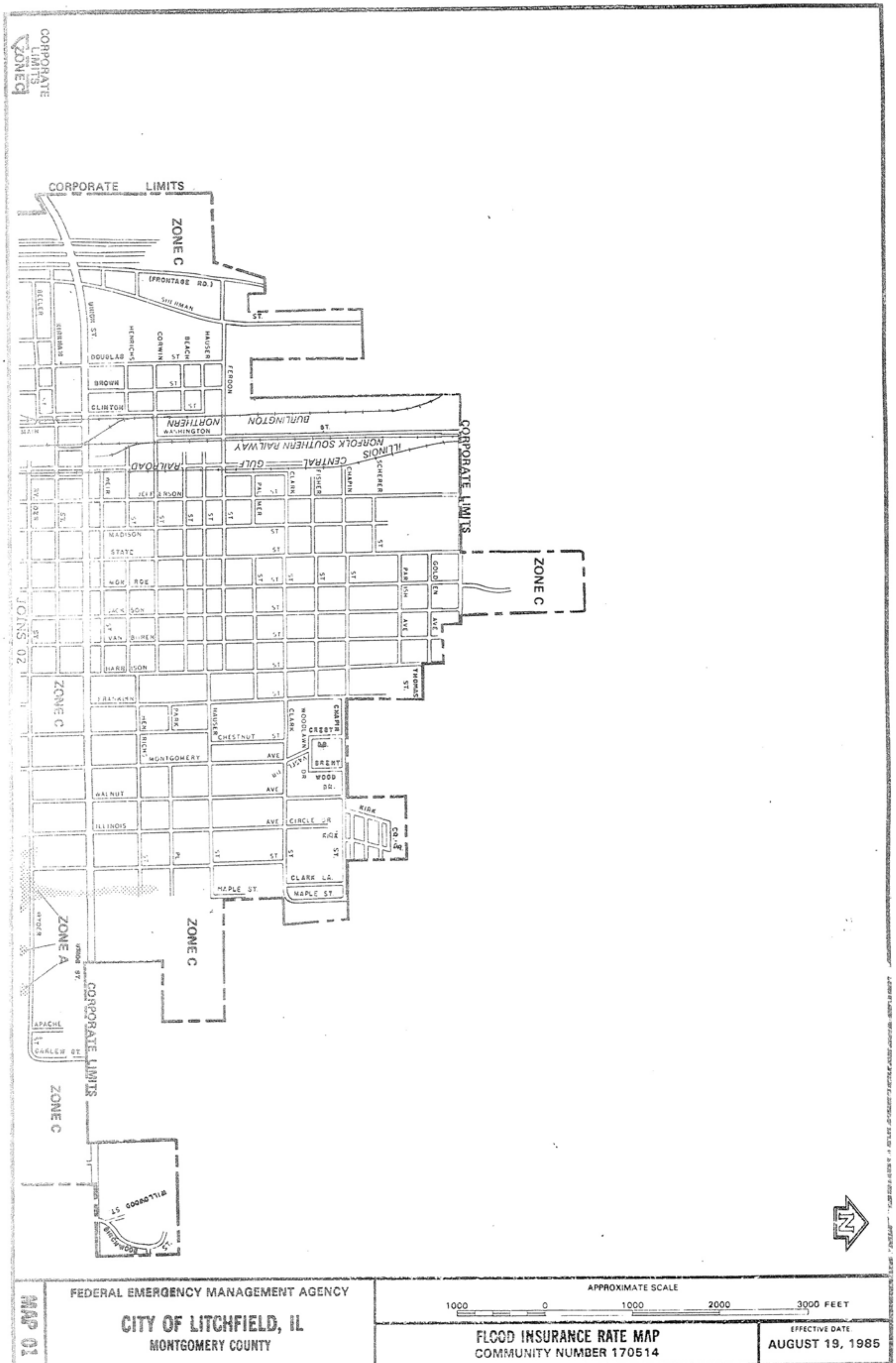
FLOOD INSURANCE RATE MAP REVISIONS:

FEDERAL EMERGENCY MANAGEMENT AGENCY

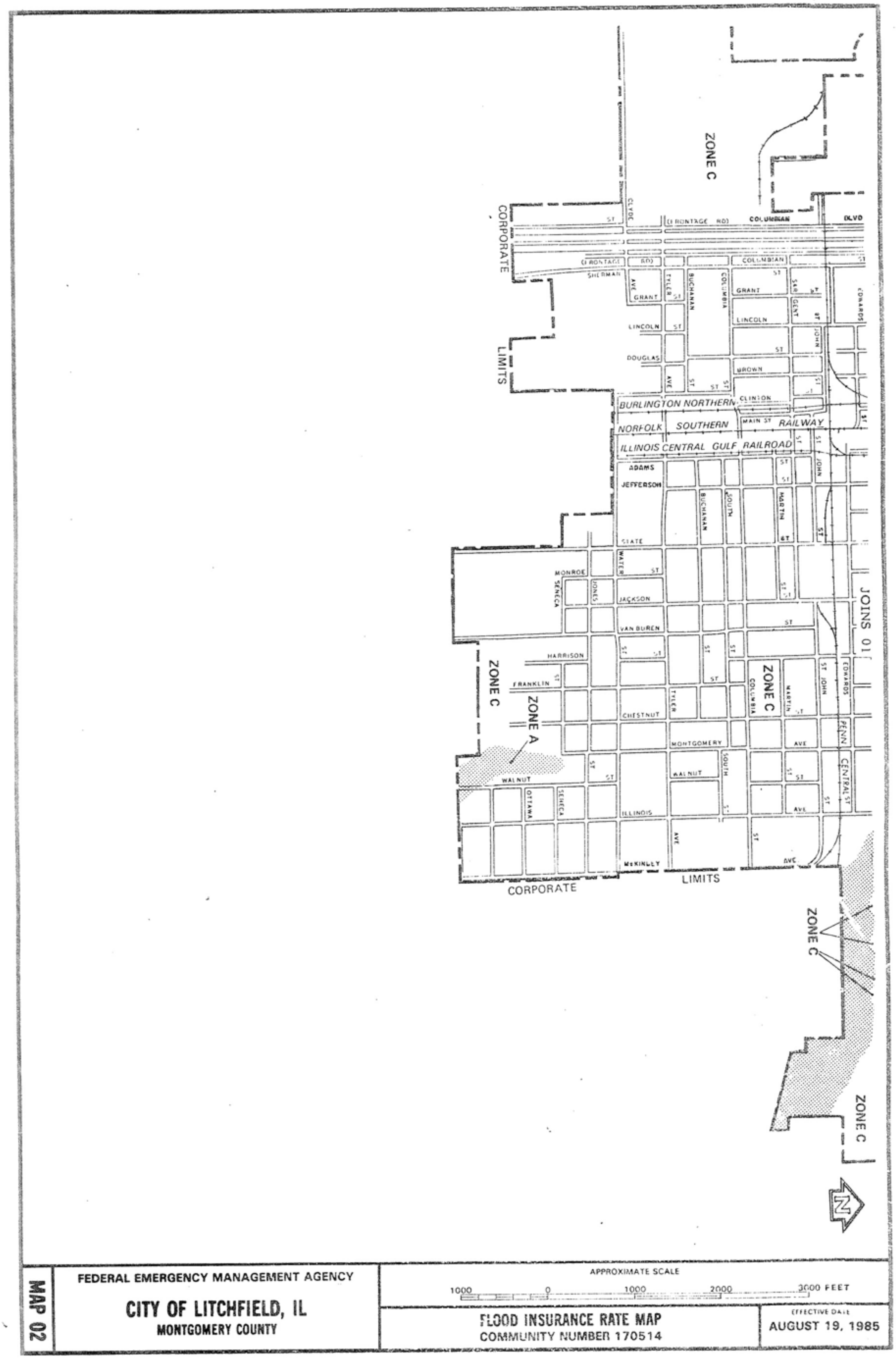
FIRM

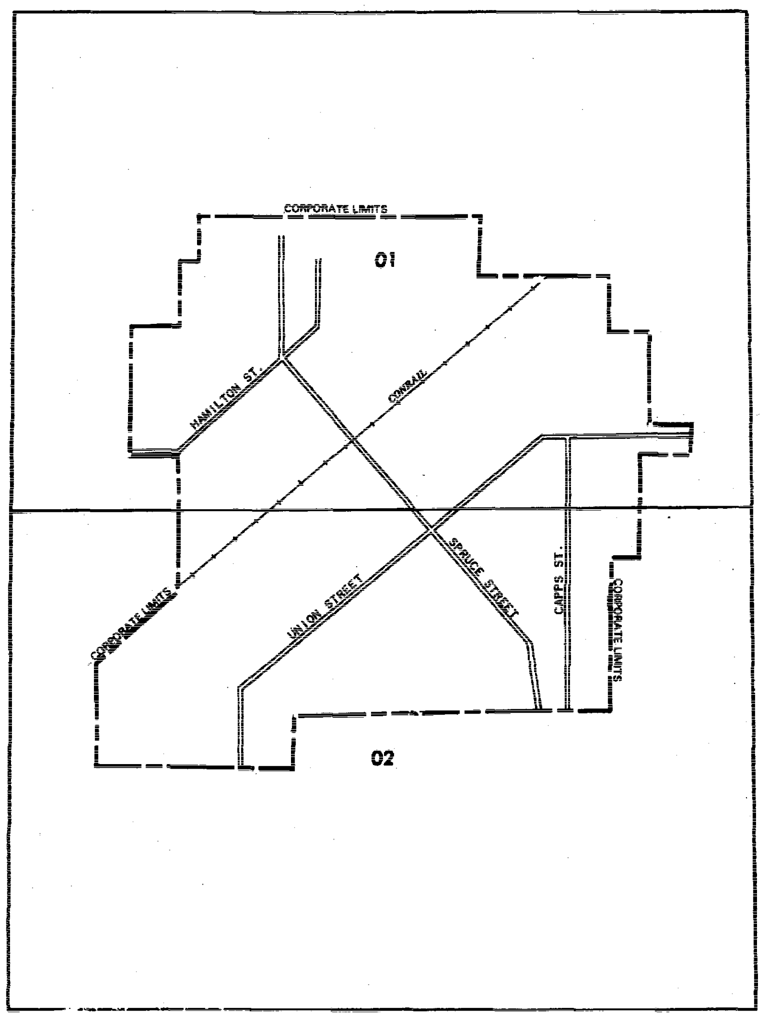
FLOOD INSURANCE RATE MAP 01-02
MAP INDEX
CITY OF LITCHFIELD, IL
MONTGOMERY COUNTY

COMMUNITY NUMBER 170514 B


CORPORATE LIMITS
ZONE C
ZONE A
FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF LITCHFIELD, IL
MONTGOMERY COUNTY
APPROXIMATE SCALE
1000 0 1000 2000 3000 FEET
FLOOD INSURANCE RATE MAP
COMMUNITY NUMBER 170514
EFFECTIVE DATE
AUGUST 19, 1985
MAP 01

Appendix K


FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF LITCHFIELD, IL
MONTGOMERY COUNTY
MAP 02
APPROXIMATE SCALE
1000 0 1000 2000 3000 FEET
FLOOD INSURANCE RATE MAP
COMMUNITY NUMBER 170514
EFFECTIVE DATE
AUGUST 19, 1985
ZONE C
ZONE A
CORPORATE LIMITS
JOINS 01
BURLINGTON NORTHERN
NORFOLK SOUTHERN RAILWAY
ILLINOIS CENTRAL GULF RAILROAD



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

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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
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NOTES TO USER

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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 29, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS: MAY 28, 1976

FLOOD INSURANCE RATE MAP EFFECTIVE: AUGUST 19, 1987

FLOOD INSURANCE RATE MAP REVISIONS:

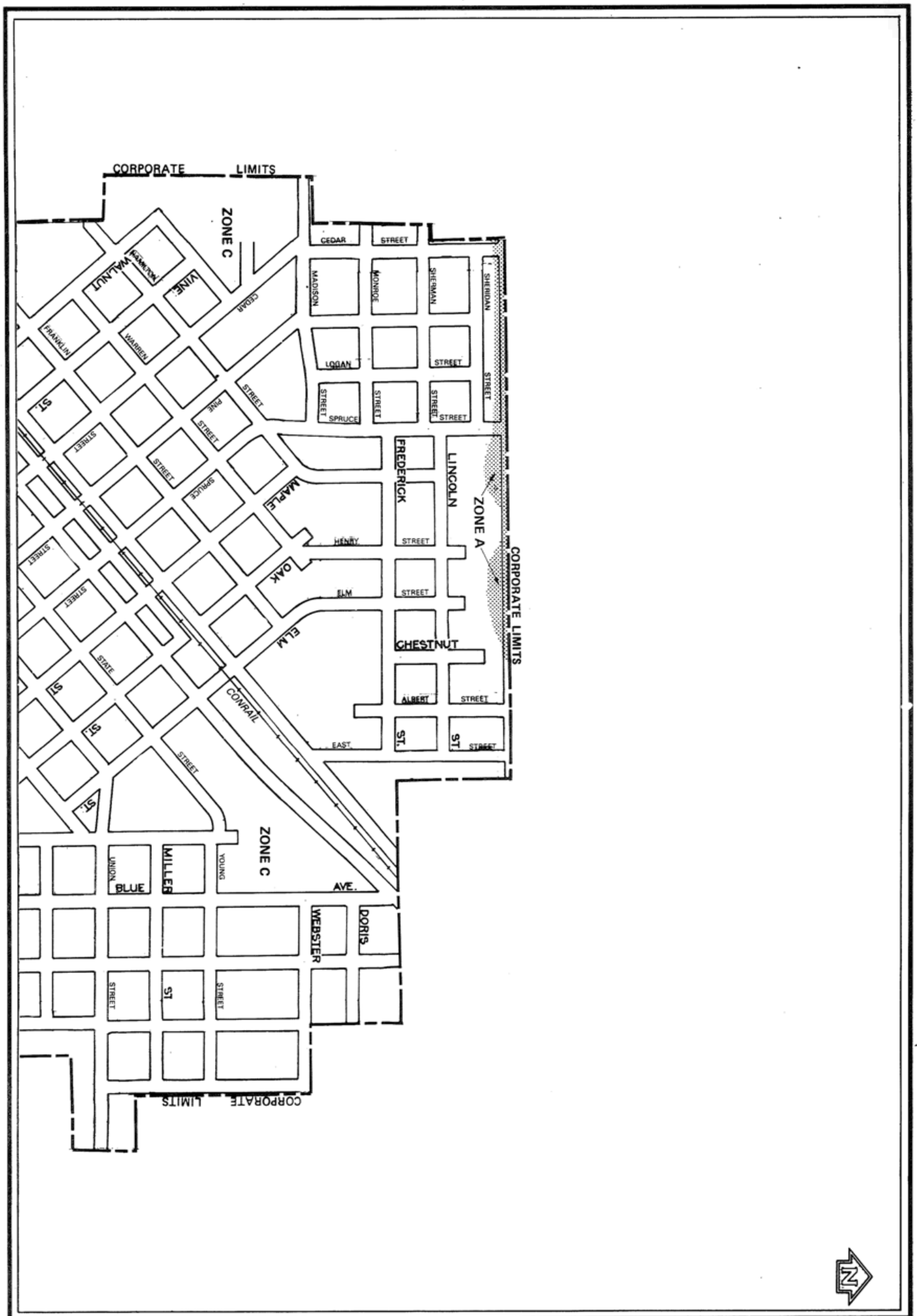
FEDERAL EMERGENCY MANAGEMENT AGENCY

FIRM

FLOOD INSURANCE RATE MAP 01-02
MAP INDEX

CITY OF NOKOMIS, IL
MONTGOMERY COUNTY

COMMUNITY NUMBER 170516 B



MAP 01

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF NOKOIMIS, IL

MONTGOMERY COUNTY

APPROXIMATE SCALE

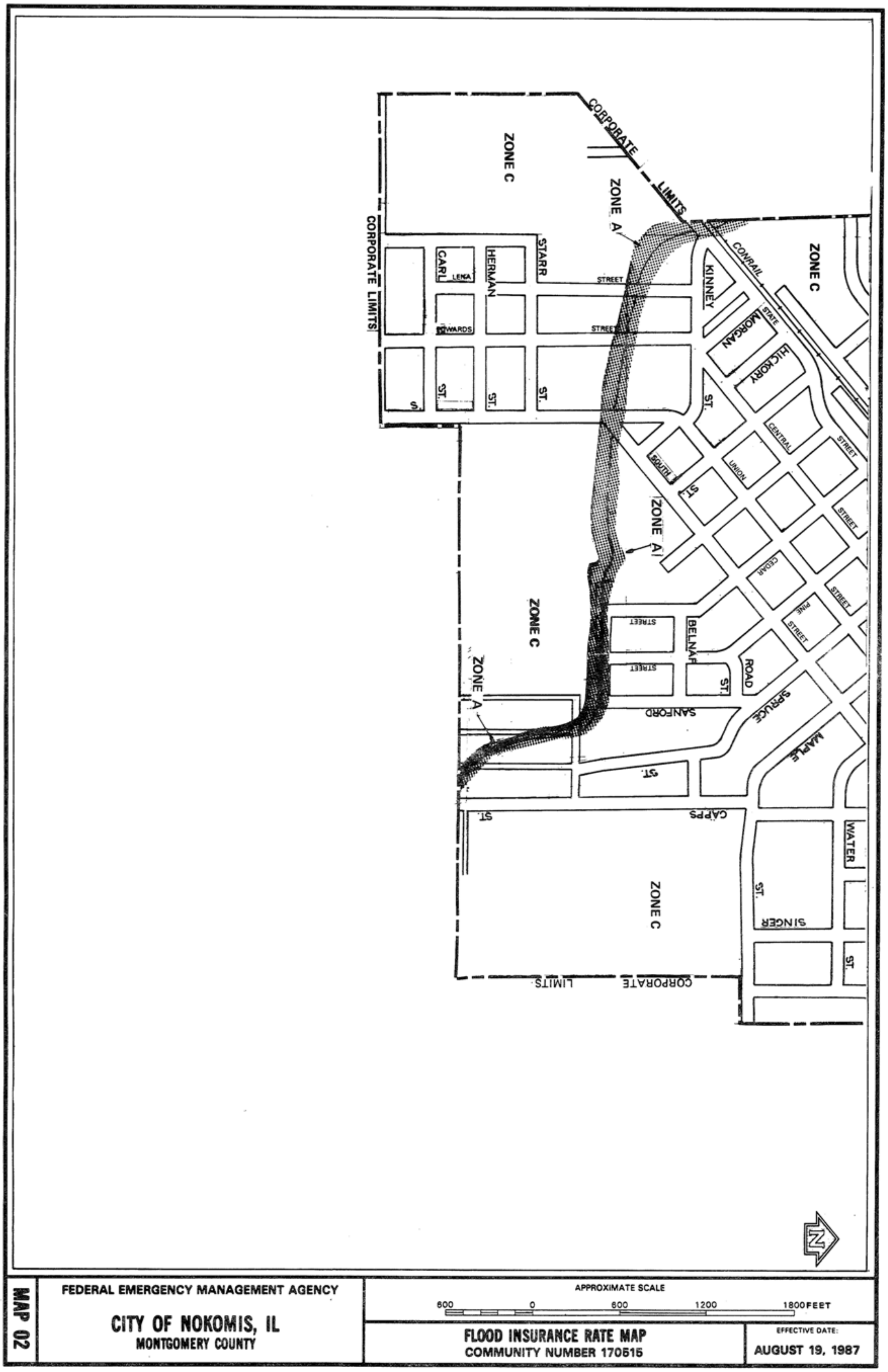
600 0 600 1200 1800 FEET

FLOOD INSURANCE RATE MAP

COMMUNITY NUMBER 170515

EFFECTIVE DATE:

AUGUST 19, 1987



FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF NOKOMIS, IL
MONTGOMERY COUNTY
MAP 02
APPROXIMATE SCALE
600 0 600 1200 1800 FEET
FLOOD INSURANCE RATE MAP
COMMUNITY NUMBER 170515
EFFECTIVE DATE:
AUGUST 19, 1987
ZONE C
ZONE A
CORPORATE LIMITS
CONRAIL
CARL
LENA
HERMAN
STARR
STREET
EDWARDS
ST.
KINNEY
MORGAN
STATE
HICKORY
CENTRAL
UNION
SOUTH
CEDAR
PINE
BELNAP
ROAD
SANFORD
SPRUCE
MAPLE
CAPPS
WATER
SINGER
N

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PLAN ADOPTION RESOLUTIONS

APPENDIX L

Village of Raymond , Illinois
Resolution of Adoption
of the
Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, Village Of Raymond is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the Village Of Raymond desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, Village Of Raymond has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the Village Of Raymond hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of Village Of Raymond ; and
2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on September 6, 2016

CERTIFIED by ____________________ (SEAL)

Name;
Title:

ATTESTED by Yvonne Martin clerk

Name:
Title:

Resolution #05-2016

Village of Schram City, Illinois
Resolution of Adoption
of the
Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, the Village of Schram City is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the Village of Schram City desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, the Village of Schram City has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the Village of Schram City hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of the Village of Schram City; and
2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on 09/12/2016

CERTIFIED by W. Albert Oberle
W. Albert Oberle
Village President

ATTESTED by Janet K. Stewart
Janet Stewart
Village Clerk

2016–10

City of Hillsboro, Illinois
Resolution of Adoption
of the
Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, City of Hillsboro is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the City of Hillsboro desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, City of Hillsboro has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the City of Hillsboro hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of City of Hillsboro; and

2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on 09/13/16

CERTIFIED by ______________
Brian Sullivan Mayor

ATTESTED by Cory Davidson
Cory Davidson City Clerk

Montgomery County, Illinois
Resolution of Adoption
of the
Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, Montgomery County is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, Montgomery County desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, Montgomery County has participated in updating the Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the Montgomery County Board hereby:

1. Adopts the updated Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of Montgomery County, Illinois; and
2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on September 13th, 2016

CERTIFIED by ______________
Chairman, Montgomery County Board

ATTESTED by Sandy Leitheiser
Montgomery County Clerk

City of Litchfield, Illinois
Resolution 13-16
Adoption of the
Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, City of Litchfield, Illinois is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the City of Litchfield, Illinois desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, City of Litchfield, Illinois has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the City of Litchfield, Illinois hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of City of Litchfield, Illinois and
2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on September 15, 2016

CERTIFIED by Steve Dougherty
Steve Dougherty, Mayor

Seal

ATTESTED by Carol E. Burke
Carol Burke, City Clerk

Resolution 2016-05

City of Coffeen, Coffeen, Illinois
Resolution of Adoption
of the
Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, City of Coffeen is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the City of Coffeen desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, City of coffeen has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the City of Coffeen hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of City of Coffeen; and
2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on September 19, 2016

CERTIFIED by Sheila White
Sheila White, Mayor

(SEAL)

ATTESTED by Carolyn Cooper
Carolyn Cooper, City Clerk

(VILLAGE OF TAYLOR SPRINGS), Illinois
Resolution of Adoption
of the
Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, (VILLAGE OF TAYLOR SPRINGS) is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the (VILLAGE OF TAYLOR SPRINGS desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, (VILLAGE OF TAYLOR SPRINGS) has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the (VILLAGE OF TAYLOR SPRINGS)hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of (VILLAGE OF TAYLOR SPRINGS); and
2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on (SEPT 20 2016)

CERTIFIED by Elwin J. Saathoff SEAL
ELWIN SAATHOFF,
PRESIDENT

ATTESTED by Cindy Laurent
(CINDY LAURENT,
CLERK

City of Nokomis, Illinois

Resolution 2016-02

Adoption of the
Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, the City of Nokomis is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the City of Nokomis desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, the City of Nokomis has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the City of Nokomis hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of the City of Nokomis, Montgomery County; and
2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on September 26, 2016

CERTIFIED by Terry Hill
Terry Hill, Mayor

(SEAL)

ATTESTED by Angela Keagy
Angela Keagy, City Clerk

Resolution #525

CITY OF WITT, ILLINOIS
Resolution of Adoption
of the
Montgomery Multi-Jursdictional Natural Hazards Mitigation Plan

WHEREAS, CITY OF WITT is subject to natural hazards including floods, tornades, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the CITY OF WITT desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA: and

WHEREAS, CITY OF WITT has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the CITY OF WITT, hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of CITY OF WITT; and

2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on 9-27-16

CERTIFIED by [signature] - MAYOR

ATTESTED by Angela R Lynch - City Clerk

Village of Waggoner, Illinois
Resolution of Adoption
of the
Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, Village of Waggoner is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the Village of Waggoner desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, Village of Waggoner has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the Village of Waggoner hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of Village of Waggoner; and
2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on October 10, 2016

CERTIFIED by Ronald H Seaton (SEAL)
Ronald Seaton
Village President

ATTESTED by Tammie Eliason
Tammie Eliason
Village Clerk

Village of Donnellson, Illinois
Resolution of Adoption
of the
Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, Village of Donnellson is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the Village of Donnellson desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, Village of Donnellson has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the Village of Donnellson hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of Village of Donnellson; and
2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on November 14th, 2016

CERTIFIED by Darrell Jett
Darrell Jett, Mayor

ATTESTED by Sheryl D. Reynolds
Sheryl Reynolds, Clerk

VILLAGE OF PANAMA, ILLINOIS
RESOLUTION OF ADOPTION
OF THE
MONTGOMERY MULTI-JURISDITIONAL NATURAL HAZARDS MITIGATION PLAN

WHEREAS, Village of Panama is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the Village of Panama desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, Village of Panama has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THEREFORE, be it resolved that the Village of Panama hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of Village of Panama; and

2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on November 15, 2016

CERTIFIED by Joseph McCann (SEAL)

ATTESTED by Deborah Hancock, Village Clerk

(Village of Farmersville), Illinois
Resolution of Adoption
of the
Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan

WHEREAS, (Village of Farmersville) is subject to natural hazards including floods, tornadoes, severe winter storms, severe thunderstorms, and drought among others, that pose risks to public health and property; and

WHEREAS, the (Village of Farmersville) desires to prepare and mitigate for such natural hazards; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan was updated in accordance with the regulations of the Disaster Mitigation Act of 2000 and the guidance provided by FEMA; and

WHEREAS, (Village of Farmersville) has participated in updating the Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan covering member jurisdictions of Montgomery County:

NOW THERFORE, be it resolved that the (Village of Farmersville) hereby:

1. Adopts the updated Montgomery Multi-Jurisdictional Natural Hazards Mitigation Plan as the official Hazard Mitigation Plan of (Village of Farmersville); and
2. Agrees to participate in the annual and 5-year updates to this updated Plan.

ADOPTED on (December 5, 2016)

CERTIFIED by Joe Tischkau
Joe Tischkau, Mayor

(SEAL)

ATTESTED by Jill A Hayes Clerk
Jill A Hayes, Clerk