Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan

Participants

Coffeen, City of
Farmersville, Village of
Hillsboro, City of
Litchfield, City of
Montgomery County
Nokomis, City of
Raymond, Village of
Witt, City of

July 2010

ACKNOWLEDGEMENT

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. It is the County's hope that those who participated in the development of this Plan, as well as individual County residents, will continue to demonstrate the commitment necessary to protect current and future generations from ongoing damages caused by natural hazards by working to implement the mitigation actions identified in Section 4.

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 Greg R. Michaud, Andrea J. Bostwick and Philip D. Ruiz
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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 2002, Montgomery County has had three presidentially-declared disasters. In addition, in the past decade alone, there have been over 25 severe storms (thunderstorms, high winds, hail, heavy rain etc.), 18 severe winter storms, 15 extreme heat events, six tornadoes and one 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 municipalities 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 hazard mitigation plan?

By preparing and adopting a natural hazard 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 provide federal aid for mitigation projects, but only if the local government entity has a Federal Emergency Management Agency approved hazard mitigation plan.

How is this plan different from other emergency plans?

A natural hazard 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 natural disaster after it occurs. This is the first time that Montgomery County has prepared a plan that describes 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 that could be gained from preparing a natural hazard mitigation plan, the Montgomery County Board passed a resolution on April 8, 2008 authorizing the development of the Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan (hereto referred to as the Plan). **Appendix A** contains a copy of the resolution. The County then invited all the municipalities within Montgomery County to participate. **Figure 1** identifies the jurisdictions

that are represented in the Plan. The Montgomery County Highway Department and the Montgomery County Emergency Management Agency jointly administered the Plan.

Figure 1 **Jurisdictions Represented in the Plan**	
City of Coffeen	Montgomery County
Village of Farmersville	City of Nokomis
City of Hillsboro	Village of Raymond
City of Litchfield	City of Witt

1.2 DEMOGRAPHICS

Montgomery County is located in central Illinois and covers approximately 704 square miles. The topography is generally flat to gently sloping. The County seat is located in Hillsboro. Farming is an important enterprise in Montgomery County. According to the 2007 Census of Agriculture, there were 1,029 farms in Montgomery County occupying approximately 77% (347,765 acres) of the total acreage in the County. Manufacturing in the County is concentrated primarily in Litchfield, where such items as PVC pipe, auto parts, sports equipment and construction components are produced. In the southern portion of the county, a coal-fired power plant near Coffeen supplies much of the surrounding area with power.

Figure 2 provides demographic data on each of the participating jurisdictions along with information on housing units and assessed values. The assessed values are only for residential structures (including farm homes). The assessed value of a residence in Montgomery County is approximately one-third of the market value.

Figure 2
Demographic Data by Participating Jurisdiction

Participating Jurisdiction	Population (2000)	Projected Population (2020)	Land Area (Sq. Miles)	Number of Housing Units (2000)	Housing Unit Density (Units per Sq. Mile)	Total Assessed Value of Housing Units
Coffeen	709	730	1	320	320	$4,391,791
Farmersville	768	794	1	350	350	$7,888,419
Hillsboro	4,359	4,508	5.3	1,944	367	$41,895,508
Litchfield	6,815	7,047	5.1	3,011	590	$59,041,208
Montgomery County (unincorporated)	13,694	14,190	687.6	4,856	7.5	$100,432,962
Nokomis	2,389	2,476	1.3	1,130	869	$19,709,144
Raymond	927	952	1.3	434	334	$11,361,762
Witt	991	1,047	1.4	480	343	$5,528,261

Sources: Durston, Ray. Montgomery County Chief County Assessment Officer. "RE: Assessed Residential Values." E-mail to Greg R. Michaud. April 21, 2010.
Illinois Department of Commerce and Economic Opportunity, Illinois Census Profile System, Data Facts Database, 2010.
Illinois Department of Commerce and Economic Opportunity, Population Projects, Project Summary by County, 2010.

1.3 LAND USE AND DEVELOPMENT TRENDS

Land use changes are largely driven by population growth and economic development. Montgomery County is largely rural with a population that has remained fairly stable and has not experienced any major growth trends. Between 1960 and 2000, the population of Montgomery County declined by 2%. Participating municipalities have experienced little or no population growth during this same period. The Department of Commerce and Economic Opportunity projects that Montgomery County's population will increase by approximately 3% between 2000 and 2020.

While there are no large-scale economic development initiatives underway in the County, several small economic development efforts have resulted in land use changes on the west side of Litchfield between Route 66 and Interstate 55. Further economic development is anticipated to occur at the industrial park in Litchfield because of its 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, open 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. Development trends will soon be examined in greater detail as Montgomery County begins developing its first comprehensive plan anticipated to be completed in 2011.

2.0 PLANNING PROCESS

2.0 PLANNING PROCESS

The Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan (the Plan) was developed 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 3** provides a brief description of the process utilized to prepare this Plan.

Figure 3
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 preparing 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. (This task incorporated two of FEMA's steps: assessing the hazard and assessing the problem.)
Task Five: Goal Setting	After reviewing existing plans and completing the risk assessment, the consultant assisted the Planning Committee in establishing goals and objectives for the Plan.
Task Six: Mitigation Activities	The participating jurisdictions were asked to identify mitigation actions based on the results of the risk assessment. These actions were then analyzed, categorized and prioritized.
Task Seven: Draft Plan	The draft Plan summarized the results of Tasks One through Six. In addition, a section was added that describes the responsibilities to monitor, evaluate and update the Plan. The draft Plan was reviewed by the participants and a public forum was held to give the public an additional opportunity to provide input. Any comments received were incorporated into the draft Plan submitted to the Illinois Emergency Management Agency (IEMA) and FEMA for review and approval.
Task Eight: Final Plan	Comments received from IEMA and FEMA were incorporated in to the final Plan. The final Plan was then submitted to the County and participating municipalities for adoption. The Plan will be reviewed periodically and updated every five years. (This task incorporated two of FEMA's steps: adopt the plan and implement, evaluate and revise the plan.)

The plan development was led at the staff level by Ruben Boehler, the County Highway Engineer, and Diana Holmes, the Emergency Management Agency Coordinator. Johnson, Depp & Quisenberry, 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.

Participation in the planning process, especially by the County and municipal representatives, was crucial to the development of the Plan. To ensure that all participating jurisdictions took

part in the planning process, participation requirements were established. Each participating jurisdiction agreed to satisfy the following requirements in order to be included in the Plan. All of the participating jurisdictions met the participation requirements.

- Attend at least of two of 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 development of mitigation goals.
- Submit a list of mitigation actions.
- Review and comment on the draft Plan.
- Formally adopt the Plan.
- Where applicable, incorporate the Plan into existing planning efforts.
- Participate in the plan maintenance.

2.1 PLANNING COMMITTEE

As previously mentioned, at the start of the planning process, the Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee was formed. The Planning Committee included representatives from each participating jurisdictions, the general public as well as agriculture, business, education, emergency services (ambulance, fire and law enforcement), healthcare, GIS, and insurance.

Figure 4 details the entities represented on the Planning Committee and the individuals who attended on their behalf. The Planning Committee was jointly chaired by the Montgomery County Highway Department and the Montgomery County Emergency Management Agency.

Additional technical expertise was provided by 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, and the University of Illinois.

Two subcommittees were formed to help with the development of the risk assessment and the mitigation strategy. Members of the subcommittees were provided information in advance of the Planning Committee to obtain their input. Once their input was incorporated, the appropriate sections of the Plan were presented to the entire Planning Committee for discussion and comment. All communication with the subcommittees was handled via email and phone conferences.

Figure 4
Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee Member Attendance Record

Entity	Representative	5/7/2009	6/25/2009	9/17/2009	1/14/2010	6/17/2010
Ameren	Bodi, Jake	X	X		X	
American Red Cross	Belz, Kyle	X	X			
Coffeen	White, Sheila		X	X	X	X
Farmersville	Nimmo, Greg		X	X		
Hillsboro	Baran, Bill		X			
	Satterlee, Gary		X	X	X	X
Hillsboro Area Ambulance Service	Schmedeke, Barb	X	X		X	
Illinois Dept. of Central Management Services	Hoots, Diane	X	X	X	X	
Litchfield	Ritchie, Andy	X	X	X	X	X
Montgomery Co. Board	Blankenship, George	X				
Montgomery Co. Board - Buildings & Grounds	Branum, Bonnie	X				
Montgomery Co. Board - Roads & Bridges	Bone, Terry	X	X	X	X	X
Montgomery Co. - Clerk / Public Information Officer	Leitheiser, Sandy	X		X	X	X
Montgomery Co. - Emergency Mgmt. Coordinator	Holmes, Diana	X		X		X
Montgomery Co. - GIS	Purcell, Mary	X	X	X	X	X
Montgomery Co. - Highway Department	Boehler, Ruben	X	X	X	X	X
Montgomery Co. - Public Health Dept.	Satterlee, Hugh	X	X	X	X	
Montgomery Co. - Public Health Dept.	Wheelhouse, Dolores	X	X	X	X	X
Montgomery Co. - Sheriff's Office	Robbins, Rick	X	X	X	X	
Montgomery Co. - 911	Simmons, Betty		X	X		
Montgomery Co. Economic Development Corp.	Cole, Amanda	X				
Montgomery Co. Soil & Water Conservation District	Reynolds, Kris	X	X			
Nokomis	Gasparich, Joe	X	X			X
Public Representative	Dees, Bill	X	X	X		X
Raymond	Battin, Emily	X			X	
	Engelman, Jim			X	X	
	Held, Dennis		X			
Christian-Montgomery Regional Office of Education #10	Millburg, Monica		X			
State Farm Insurance	Fenton, Dennis	X	X			
Witt	Beasley, Frank			X	X	X

Mission Statement

Over the course of the first two meetings, the Planning Committee developed a mission statement they felt best described their objectives for the Plan.

"The mission of the Montgomery County Multi-Jurisdictional Natural Hazards 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 2009 and June 2010. **Figure 4** identifies the representatives present at each meeting. **Appendices B** and **C** contain copies of the sign-in

sheets and meeting minutes for each meeting. The purpose of each meeting, including the topics discussed, is provided below.

First Planning Committee Meeting – May 7, 2009

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 hazard mitigation plan is and why one should be prepared. Drafts of the mission statement and mitigation goals were presented. Representatives for the County and the participating municipalities were asked to complete the form entitled "List of Documents Relevant to the Natural Hazard Mitigation Plan" and return it at the next meeting.

Second Planning Committee Meeting – June 25, 2009

At the second Planning Committee meeting the risk assessment section was presented for review. The Planning Committee continued their discussions on the mission statement and mitigation goals and finalized both. Ideas for potential mitigation projects were presented. Representatives for the County and the participating municipalities were asked to complete the forms entitled "Critical Facilities" and "Natural Hazard Mitigation Plan Projects" and return them at the next meeting. Copies of the citizen questionnaire were also distributed.

Third Planning Committee Meeting – September 17, 2009

The purpose of the third Planning Committee meeting was to review the mitigation actions identified by the participating jurisdictions and discuss the mitigation strategy. The mitigation strategy discussion focused on the project prioritization methodology and categories of mitigation actions.

Fourth Planning Committee Meeting – January 14, 2010

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

Fifth Planning Committee Meeting – June 17, 2010

The purpose of the fifth Planning Committee meeting was to provide the public an opportunity to provide comments on the draft 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 Plan's development; and
- nurture ownership of the Plan, thus increasing the likelihood of adoption by the participating jurisdictions.

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

Citizen Questionnaire

A citizen questionnaire was created to gather facts and gauge public perceptions about natural hazards. The questionnaire was made available on the County's website, at community events hosted by the Montgomery County Public Health Department, at the government offices of participating jurisdictions, and at the information kiosk located at the Historic Montgomery County Courthouse. A copy of the questionnaire is contained in **Appendix D**.

A total of 113 questionnaires were completed and returned to the Planning Committee. Questionnaires were filled out by residents from unincorporated Montgomery County as well as all of the participating municipalities. The questionnaires were reviewed and the results indicated the following:

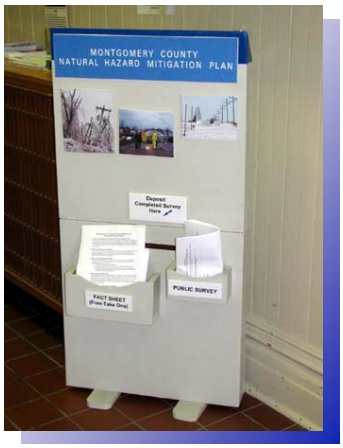
- Severe storms and severe winter storms were identified by respondents as the most frequently experienced natural hazards in Montgomery County. Special mention of ice storms also appeared often on the questionnaires. Respondents also experienced tornadoes, extreme heat and floods; however, these natural hazards were mentioned less frequently than severe storms and severe winter storms.
- Radio, television and newspapers were identified as the most effective ways to disseminate information about natural hazard mitigation efforts in the County. The internet was mentioned as a way to disseminate information; however, it came in a distant fourth.
- Fire and law enforcement departments were recognized as effective distributors of safety information regarding natural hazards. Respondents also acknowledged the schools within the County for their effectiveness in distributing information on natural hazard safety to youth and the Montgomery County Public Health Department for its public outreach efforts on natural hazard mitigation.
- Most respondents indicated that they had flashlights, batteries, water and food set aside in their households in preparation for a natural disaster.

FAQ Fact Sheet

A "Frequently Asked Questions" fact sheet was created to explain what a natural hazard mitigation plan is and briefly explain the planning process. The fact sheet was made available at the government offices of participating jurisdictions and at the information kiosk located at the Historic Montgomery County Courthouse. A copy of the fact sheet is contained in **Appendix E**.

Information Kiosk

An information kiosk was placed in the Historic Montgomery County Courthouse to dispense fact sheets and citizen questionnaires and serve as a depository for the public to submit comments, questions and completed questionnaires. The kiosk remained in the Courthouse throughout the planning process.



County Website

Information was placed on the County's website that outlined the planning process and described the various ways that residents could participate in the development of the Plan.

News Releases

News releases were prepared and submitted to local print media prior to each Planning Committee meeting. The releases announced the purpose of the meetings and how the public could become involved in the Plan's development. **Appendix F** contains a list of the newspapers that received the new releases and copies of the news articles that were printed.

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 community 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 June 17, 2010, 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 summer activities. At the forum, residents could review the draft Plan; meet with representatives from the County, the participating municipalities and the consultant to discuss the Plan; ask any questions; and provide comments on the 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 Plan. **Appendices G** and **H** contain copies of these materials.

After the public forum, the draft Plan was made available for public review and comment at the Montgomery County Clerk's Office through July 2, 2010. 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 resulted in many benefits a few of which are highlighted below.

- *Discovered previously unidentified documentation about natural hazard events and property damage and shared that information with the Planning Committee.* Examples include damages sustained during severe winter storms and lightning strikes that were not available in state or federal databases; information on the dam failure at Walton Park Lake Dam and the repairs that are still needed; and identification of areas in Nokomis and Hillsboro where there are recurring drainage problems.
- *Increased awareness about the less frequently occurring natural hazards that have the potential to cause significant damage in the County.* The Planning Committee had a lengthy discussion on the potential impacts a major earthquake would have on the County and what mitigation options should be considered. In addition, the County and several of the participating municipalities were made aware of the steps and activities that need to be taken to remain in compliance with the National Flood Insurance Program (NFIP). For one municipality who had been suspended from the NFIP, the planning process provided the momentum to complete the steps required to renew its participation in the Program.
- *Greater understanding of the natural hazard events that impact the County and the mitigation actions needed to reduce the risk to the participating jurisdiction.* This process has improved awareness, both at the county and municipal level, about the need for mitigation and should lead to greater cooperation, further reducing the damages caused by natural hazards.

2.3 PARTICIPATION OPPORTUNITIES FOR INTERESTED PARTIES

Neighboring communities, agencies, businesses, academia, nonprofits and other interest parties were given several opportunities to participate in the planning process. Examples include: sending out letters to adjacent counties informing them of Montgomery County's intention to prepare a natural hazard mitigation plan and extending an invitation to attend Planning Committee meetings (see **Appendix I** for a copy of the letter); directly inviting communities, agencies, businesses, etc to serve on the Planning Committee; and through the many public involvement activities listed previously.

2.4 INCORPORATION OF 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 Plan. **Figure 5** summarizes the availability of existing planning documents by participating jurisdiction. These documents were reviewed and incorporated into the Plan whenever applicable. At the time this document was completed, Montgomery County did not have a

comprehensive plan. However, the County was in the process of developing one and anticipates having it completed in 2011.

Figure 5
Existing Planning Documents by Participating Jurisdictions

Existing Planning Documents	Participating Jurisdictions							
	Coffeen	Farmersville	Hillsboro	Litchfield	Montgomery County	Nokomis	Raymond	Witt
Plans								
Comprehensive Plan				X				
Emergency Management Plan					X	X	X	
Land Use Plan								
Codes & Ordinances								
Building Codes			X	X		X		
Drainage Ordinances				X				
Historic Preservation Ordinance								
Subdivision Ordinance(s)	X	X	X	X	X		X	
Zoning Ordinances		X	X	X			X	
Maps								
Existing Land Use Map					X		X	
Infrastructure Map		X	X	X	X	X	X	
Zoning Map		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								

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 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 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 of Montgomery County 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 which natural hazards to include in the Plan. Over the course of the first two Planning Committee meetings, the Planning Committee members discussed their experiences with natural hazard events and reviewed risk assessment information about various natural hazards. After much discussion, they chose to include the following natural hazards in this Plan:

- dam failures
- drought
- earthquakes
- extreme heat
- flood
- severe storms (thunderstorms, hail, lighting & heavy rain)
- severe winter storms (snow & ice)
- tornadoes

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. Each section is broken into three parts: identifying the hazard, profiling the hazard and assessing vulnerability.

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

IDENTIFYING THE HAZARD

What is the definition of a severe storm?

The National Weather Service (NWS) defines a "severe storm" as any thunderstorm that produces one or more of the following elements:

- winds with gust of 50 knots (58 mph) or greater;
- hail that is at least ¾ inch in diameter (penny 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. For the purposes of this report, tornadoes and flooding are categorized as separate hazards and are not discussed under severe storms.

Thunderstorms affect relatively small areas when compared to winter storms or hurricanes. The typical thunderstorm is approximately 15 miles in diameter and lasts an average of 30 minutes at a single location. They may occur singly, in clusters or in lines. Despite their size, all thunderstorms are dangerous and capable of threatening life and property. Thunderstorms can bring heavy rain, damaging winds, hail, lightning and tornadoes. 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 a term used to define any wind produced by a thunderstorm that is not associated with rotation. Straight-line winds are responsible for most thunderstorm wind damage. There are several types of straight-line winds including downdrafts, downbursts and microbursts. Straight-line wind speeds can exceed 87 knots (100 mph) and can cause damage equivalent to a strong tornado. These winds can also be extremely dangerous for aircrafts.

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 6** shows conversions from knots to miles per hour for various wind speeds.

Figure 6
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 and how is it formed?

Hail is precipitation in the form of spherical or irregular-shaped pellets of ice. It forms within a thunderstorm when strong rising currents of air (updrafts) carry raindrops into extremely cold areas of the atmosphere where freezing occurs. As the hail grows in size they become heavier and begin to fall. Depending on the strength of the updraft, the hail may be caught up and re-circulated through the storm clouds many times. Eventually the hail becomes too heavy to be supported by the thunderstorm's updrafts and falls to the ground. The size of an individual hailstone depends on how many times it is drawn back up into the upper levels of the storm cloud before finally falling to the ground.

In the United States, hail annually causes more than $1 billion in damage to property and crops. It damages buildings and homes by perforating holes in roofs and shingles, breaking windows and denting siding and damages automobiles by denting panels and breaking windows. Hail rarely causes any deaths; however, several dozen people are injured each year in the United States.

How are hail events measured?

The magnitude or severity 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 7** provides descriptions for various hail sizes.

Figure 7
Hail Size Descriptions

Hail Diameter (inches)	Description	Hail Diameter (inches)	Description
0.25 in.	pea	1.75 in.	golf ball
0.50 in.	marble	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, Storm Prediction Center, Converting Traditional Hail Size Descriptions, Table.

Hail size can vary widely. Hailstones may be as small as ¼ inch in diameter (pea-sized) or, under extreme circumstances, as large as 4 ½ inches in diameter (softball-sized). Typically hail that is ¾ inch in diameter (penny-sized) or larger is considered severe.

Hail events 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 8** 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.

Figure 8
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 / marble	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.

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 typical used (i.e., whether roofing materials are predominately shingle, slate or concrete, etc.).

What is lightning?

Lightning, a component of all thunderstorms, is an electrical discharge that results from the buildup of charged ions. 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 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 80 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. While it is difficult to quantify lightning-related losses, NOAA's National Severe Storms Laboratory estimates that lightning causes $4 to $5 billion in damages each year.

Are alerts issued for severe storms?

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

- **Severe Thunderstorm Watch.** A severe thunderstorm watch is issued when conditions are favorable for a storm to develop. The watch will tell individuals when and where a severe thunderstorm is likely to occur.
- **Severe Thunderstorm Warning.** A severe thunderstorm warning is issued when severe weather has been reported by spotters or indicated by 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?

Tables 1, 2, 3 and **4** summarize the previous occurrences as well as the extent or magnitude of severe storms in Montgomery County. The severe storm events are broken down into four categories: thunderstorm and high wind events, hail events, lightning events and heavy rain events. Severe storms are the most frequently occurring natural hazard in Montgomery County.

THUNDERSTORMS AND HIGH WINDS

The National Oceanic and Atmospheric Administration's Storm Events Database records show 124 reported occurrences of thunderstorms and high winds in Montgomery County between 1956 and 2008. Of the 124 reported occurrences, 80 had wind speeds of 50 knots or greater. There were, however, 41 reported occurrences of thunderstorms and high winds where the wind speed was not recorded.

Damage sustained in Hillsboro from a thunderstorm accompanied by high winds.

Thunderstorms with high winds have impacted every municipality within the County on multiple occasions. **Figures 9** and **10** chart the reported occurrences of thunderstorm and high wind events by month and hour. Seventy-nine of the 124 events took place between May and July, making this the peak period for thunderstorms and high wind in Montgomery County. Eighty of the 124 events took place between 3 p.m. and 10 p.m.

HAIL

The Storm Events Database records show 83 reported occurrences of hail in Montgomery County between 1968 and 2008. Of the 83 reported occurrences, 41 produced hailstones one inch or larger in diameter. The largest hail recorded in Montgomery County measured 2.75 inches in diameter (baseball size) and fell on August 23, 2000 near Irving.

Figure 9
Montgomery County Thunderstorm & High Wind Events by Month – 1956 through 2008

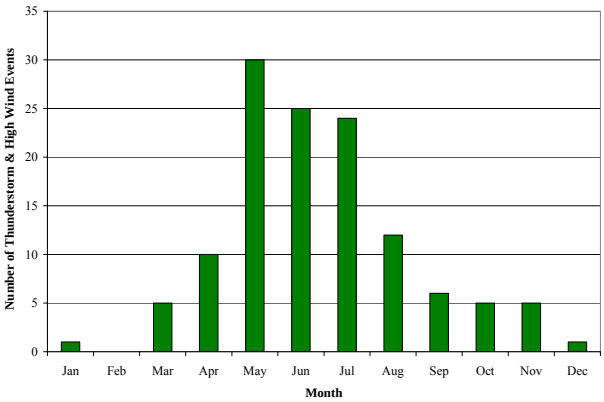
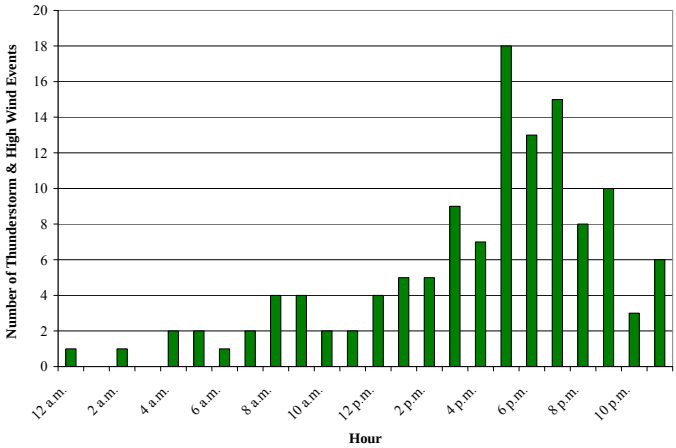


Figure 10
Montgomery County Thunderstorm & High Wind Events by Hour – 1956 through 2008



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

Figures 11 and **12** chart the reported occurrences of hail by month and hour. Forty of the 83 events took place in April and May, making this the peak period for hail events in Montgomery County. May is the peak month for both thunderstorms and high wind events and hail events. Approximately 92% of all hail events occurred during the p.m. hours, with 40 events taking place between 1 p.m. and 5 p.m.

Figure 11
Montgomery County Hail Events by Month 1968 through 2008

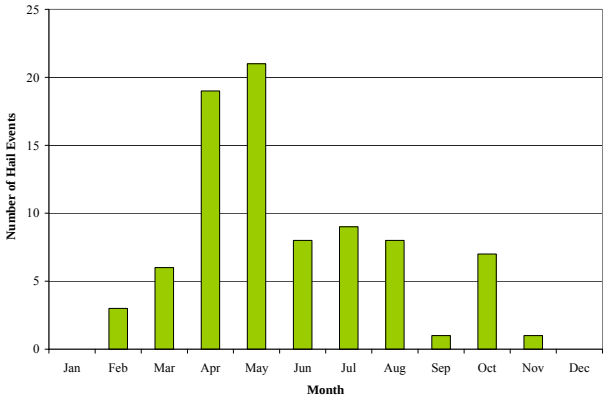
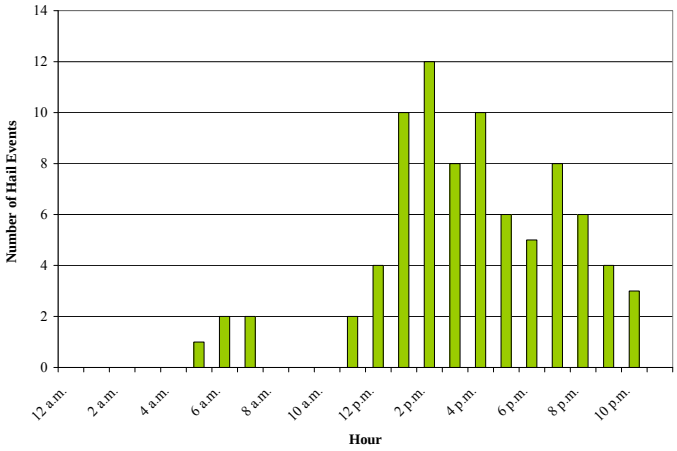


Figure 12
Montgomery County Hail Events by Hour 1968 through 2008



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

LIGHTNING

The Storm Events Database and community records show four reported occurrences of lightning strikes in Montgomery County between 1996 and 2008. Three of the four events led to extensive property damage.

HEAVY RAIN

The Storm Events Database and community records show two reported occurrences of heavy rain in Montgomery County between 2003 and 2008. Both events led to flooding countywide.

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 *2007 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency (IEMA) classifies Montgomery County's hazard rating for severe storms as "high." (IEMA's hazard rating system has five levels: low, guarded, elevated, high and severe.)

What is the probability of future severe storm events occurring?

Montgomery County has had 124 verified occurrences of thunderstorms and high wind events between 1956 and 2008. With 124 occurrences over the past 53 years, Montgomery County should expect to experience at least two thunderstorm and high wind events each year. There were 13 years over the last 53 years where multiple (three or more) thunderstorm and high wind events occurred. This indicates that the probability that multiple thunderstorm and high wind events may occur during any given year within Montgomery County is 25%.

There have been 83 verified occurrences of hail between 1968 and 2008. With 83 occurrences over the past 41 years, the County should expect to experience at least two hail events each year. There were 11 years over the last 41 years where two or more hail events occurred. This indicates that the probability that more than one hail event may occur during any given year within the County is 27%.

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 through central and southern Illinois. Since 2000, Montgomery County has experienced 113 severe storm events. Of the participating municipalities, Litchfield and Hillsboro have had substantially more recorded occurrences of thunderstorm and high wind events and hail events than any of the other municipalities. This difference may be due to the fact that these two municipalities are the largest in the County; thus, resulting in more storm reports. **Figure 13** details the number of thunderstorm and high wind events and hail events by participating municipality.

This planning process has helped to raise awareness among Montgomery County residents about natural hazards. As a result of raising awareness, reporting of severe storm events should

improve. As the plan is updated, additional information may help to determine whether Litchfield and Hillsboro are more vulnerable to severe storms because of frequency or whether the larger populations in these two municipalities are more likely to report a severe storm.

Figure 13
Verified Thunderstorm & High Wind Events and Hail Events by Participating Municipality

Participating Municipality	Number of Verified Thunderstorm & High Wind Events	Number of Verified Hail Events
Coffeen	7	5
Farmersville	9	4
Hillsboro	23	11
Litchfield	24	31
Nokomis	11	8
Raymond	12	4
Witt	4	3

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

What impacts resulted from the recorded severe storms?

Severe storms as a whole have caused an estimated $57,000 in crop damage and $9.75 million in property damages and resulted in two injuries. A breakdown of impacts by category is provided below.

While severe summer storms frequently occur in Montgomery County, the number of injuries and deaths is relatively low. Both of the hospitals located in the County have backup generators and are thus equipped to provide continuous care to those injured during a severe storm. Consequently, the risk or vulnerability to public health and safety from severe storms is relatively low.

THUNDERSTORMS AND HIGH WINDS

The data provided by the Storm Events Database and community records indicate that between 1956 and 2008, ten thunderstorm & high wind events caused approximately $7,000 in crop damage and $1,524,040 in property damage. It should be noted, however, that the property damage total of $400,000 for the high wind event on April 18, 1995 represents losses sustained by 16 counties (including Montgomery County). A breakdown by county of this total was not available. Damage information was either unavailable or none was recorded for 114 of the reported occurrences.

In addition to the property damages reported by the Storm Events Database and community records, local insurance experts believe that an additional $2.8 million in damages can be attributed to thunderstorms and high wind events in Montgomery County. These additional property damages are not included in the aforementioned table because they represent an estimate that was not available for specific locations. This information indicates that the total property damage figure for thunderstorms and high wind events is closer to $4.3 million.

The Storm Events Database has only one recorded report of an injury resulting from a thunderstorm and/or high wind event. On November 27, 1994 a mobile home near Witt was blown over during a thunderstorm injuring a man inside.

HAIL

Of the 83 reported hail occurrences, damages were only recorded for one event. On August 23, 2000, hail measuring 2.75 inches in diameter (baseball size) caused $50,000 in crop damage near Irving. In addition to the property damages reported by the Storm Events Database, local insurance experts believe that an additional $5 million in damages can be attributed to hail in Montgomery County. These additional property damages are not included in the aforementioned table because they represent an estimate that was not available for specific locations. This information indicates that the total property damage figure for hail events is closer to $5 million. No injuries or deaths were reported as the result of a hail event.

LIGHTNING

The data provided by the Storm Events Database and community records indicate that between 1996 and 2008, four lightning events caused approximately $230,000 in property damage. On May 3, 1996 lightning struck and started a fire that destroyed a home near Waggoner. Total damages were estimated at $80,000. On July 9, 2002, a lightning strike caused approximately $150,000 in property damage. On January 3, 2006, lightning struck the communication tower at the Montgomery County Sheriff's Office in Hillsboro, damaging the tower and disrupting the communication network, resulting in $260,000 in property damage. On August 5, 2008, lightning struck the Hillsboro Police Department causing approximately $3,200 in property damage.

The Storm Events Database has only one recorded report of an injury resulting from a lightning event. In addition to causing property damage, the July 9, 2002 lightning event resulted in a Hillsboro man being treated for burns at a local hospital.

HEAVY RAIN

The data provided from community records show that both heavy rain events led to flooding countywide that caused approximately $100,000 property damage for each incident. No injuries or deaths were reported for either heavy rain event.

What other impacts can result from severe storms?

While only two injuries were reported by the Storm Events Database for the recorded severe storm events in Montgomery County, severe storms do have the ability to impact health and safety. Severe storms have caused multiple injuries and death elsewhere in Illinois.

In Montgomery County, vehicle accidents are the largest risk to health and safety from severe storms. Hazardous driving conditions resulting from severe storms (i.e., wet pavement, poor visibility, high winds, etc.) can contribute to accidents that result in injury and death. Traffic accident data assembled by the Illinois Department of Transportation between 2004 and 2008 indicates that wet road surface conditions were present for 12.1% to 14.1% of all crashes recorded annually in Montgomery 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 14** provides a breakdown by year of the number of crashes and corresponding injuries and deaths that occurred when treacherous road conditions caused by wet road surface conditions were present as well as the total number of crashes that occurred in the County for comparison.

Figure 14
Severe Weather Crash Data for Montgomery County

Year	Total # of Crashes	Presence of West Road Surface Conditions		
		# of Crashes	# of Injuries	# of Deaths
2004	823	116	27	1
2005	825	104	48	1
2006	765	106	42	2
2007	858	104	27	1
2008	844	114	35	2

Source: Illinois Department of Transportation, Illinois Crash Data, County Crash Summaries, Montgomery County, 2004-2008.

Severe storms are unique in that they can pose several different health and safety hazards during a single event. Individuals who are outdoors during a severe storm are at risk of being struck by lightning, hit by flying debris and hailstones and if the conditions are just right, caught in flash flooding.

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

Damage sustained at Beckemeyer Grade School in Hillsboro during a thunderstorm accompanied by high winds.

Photo by 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. Both the Montgomery County Sheriff's Office and the Hillsboro Police Department have experienced recurring damages to communications equipment from lightning strikes.

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 jurisdictions acknowledged the need for gas-powered emergency generators to allow continued operation of critical facilities such as emergency shelters, drinking water facilities and towers, lift stations and communication towers. While the two hospitals in Montgomery County do have backup power generators, most of the critical facilities and infrastructure within the County as well as in the participating municipalities do not.

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. Only three municipalities (Hillsboro, Litchfield and Nokomis) have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from severe storms. Infrastructure such as new communication and power lines also will continue to be vulnerable to severe storms. 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. There is very little that can be done to reduce or eliminate the vulnerability of new critical facilities.

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

Unlike other hazards, such as flooding, there are no standard loss estimation models or methodologies for severe storms. With only 16 of the 213 recorded events listing property damage numbers for severe storms, there is no way to accurately estimate future potential dollar losses. Since all structures within Montgomery County are vulnerable to damage it is likely that there will be future dollar losses to severe storms.

3.2 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.

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, injury and death. 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.

How are tornadoes rated?

Tornadoes are rated using the Fujita Scale, which measures the intensity of a tornado based on its wind speed and the damage sustained by structures and vegetation. The Fujita Scale identifies six different categories of tornadoes, F0 through F5. **Figure 15** gives a brief description of each category.

Figure 15
Fujita Tornado Measurement Scale

Category (F-Scale #)	Intensity Phase / Wind Speed	Description
F0	Gale Tornado 40 – 72 mph	Light damage – some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; damage to sign boards
F1	Moderate Tornado 73 – 112 mph	Moderate damage – peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads
F2	Significant Tornado 113 – 157 mph	Considerable damage – roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated
F3	Severe Tornado 158 – 206 mph	Severe damage – roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown
F4	Devastating Tornado 207 – 260 mph	Devastating damage – well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated
F5	Incredible Tornado 261 – 318 mph	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: FEMA, "State and Local Mitigation Planning How-To Guide: Understanding Your Risks," August 2001.

On February 1, 2007 use of the original Fujita Scale was discontinued in favor of the Enhanced Fujita Scale. The Enhanced Fujita Scale continues to use the F0 through F5 categories, but is based on additional damage indicators and revised wind speeds. **Figure 16** depicts the Enhanced Fujita Scale. While the Enhanced Fujita Scale is currently in use, the historical data presented in this report is based on the original Fujita Scale.

Figure 16
Enhanced Fujita Tornado Measurement Scale

Category (EF Scale #)	Wind Speed
EF0	65 – 85 mph
EF1	86 – 110 mph
EF2	111 – 135 mph
EF3	136 – 165 mph
EF4	166 – 200 mph
EF5	Over 200 mph

Source: NOAA, Storm Prediction Center, Online Tornado FAQ: Frequently Asked Questions about Tornadoes.

Are alerts issued for tornadoes?

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

- **Tornado Watch.** A tornado watch is issued when conditions are favorable for a tornado and other kinds of severe weather 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.
- **Tornado 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.

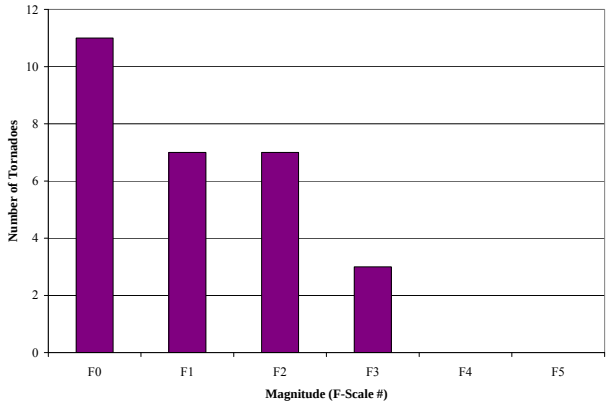
PROFILING THE HAZARD

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

Table 5 summarizes the previous occurrences as well as the extent or magnitude of tornado events recorded in Montgomery County. The National Weather Service Weather Forecast Office in St. Louis, Missouri's Tornado Climatology Listing and the Storm Events Database records show 28 reported occurrences of tornadoes in Montgomery County between 1950 and 2008. In comparison, Illinois has averaged 36 tornadoes annually since 1950. Tornadoes have occurred every decade in Montgomery County since 1950. Only 19 of the 102 counties in Illinois have had as many or more tornadoes than Montgomery County.

Figure 17 charts the reported occurrences of tornadoes by magnitude. Of the 28 reported occurrences, three were classified as F3 tornadoes, seven were classified as F2 tornadoes, seven were classified as F1 tornadoes and eleven were classified as F0 tornadoes. These 28 reported tornadoes were produced by 23 weather events. There were three single weather events where two or more tornadoes were produced.

Figure 17
Montgomery County Tornadoes by Magnitude
1950 through 2008



NOAA, NESDIS, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.
National Weather Service, Weather Forecast Office St. Louis, Missouri, Tornado Climatology Listing, Montgomery County, Illinois, 2009.

Figures 18 and **19** chart the reported occurrences of tornadoes by month and hour. Twenty-one of the 28 events took place between March and June. This four-month period has the highest frequency of tornado occurrences not only in Montgomery County but statewide as well. Approximately 82% of all tornadoes occurred during the p.m. hours, with 14 of the 28 events taking place between 4 p.m. and 7 p.m.

Figure 18
Montgomery County Tornadoes by Month
1950 through 2008

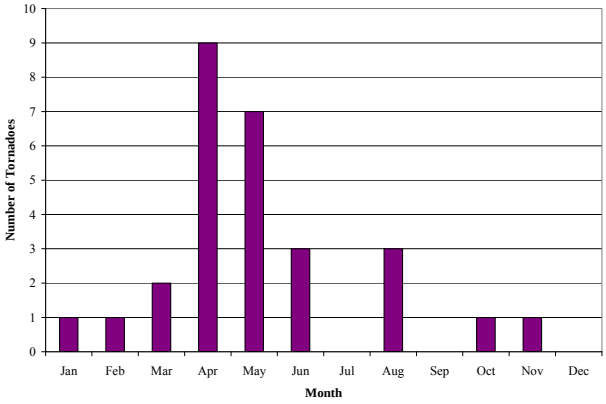
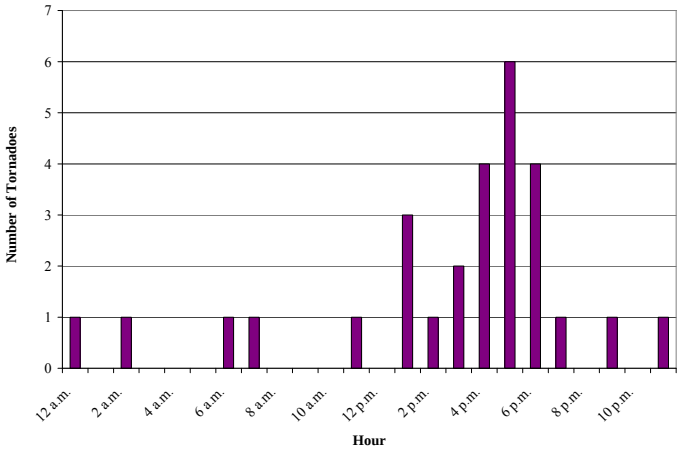


Figure 19
Montgomery County Tornadoes by Hour
1950 through 2008



NOAA, NESDIS, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.
National Weather Service, Weather Forecast Office St. Louis, Missouri, Tornado Climatology Listing, Montgomery County, Illinois, 2009.

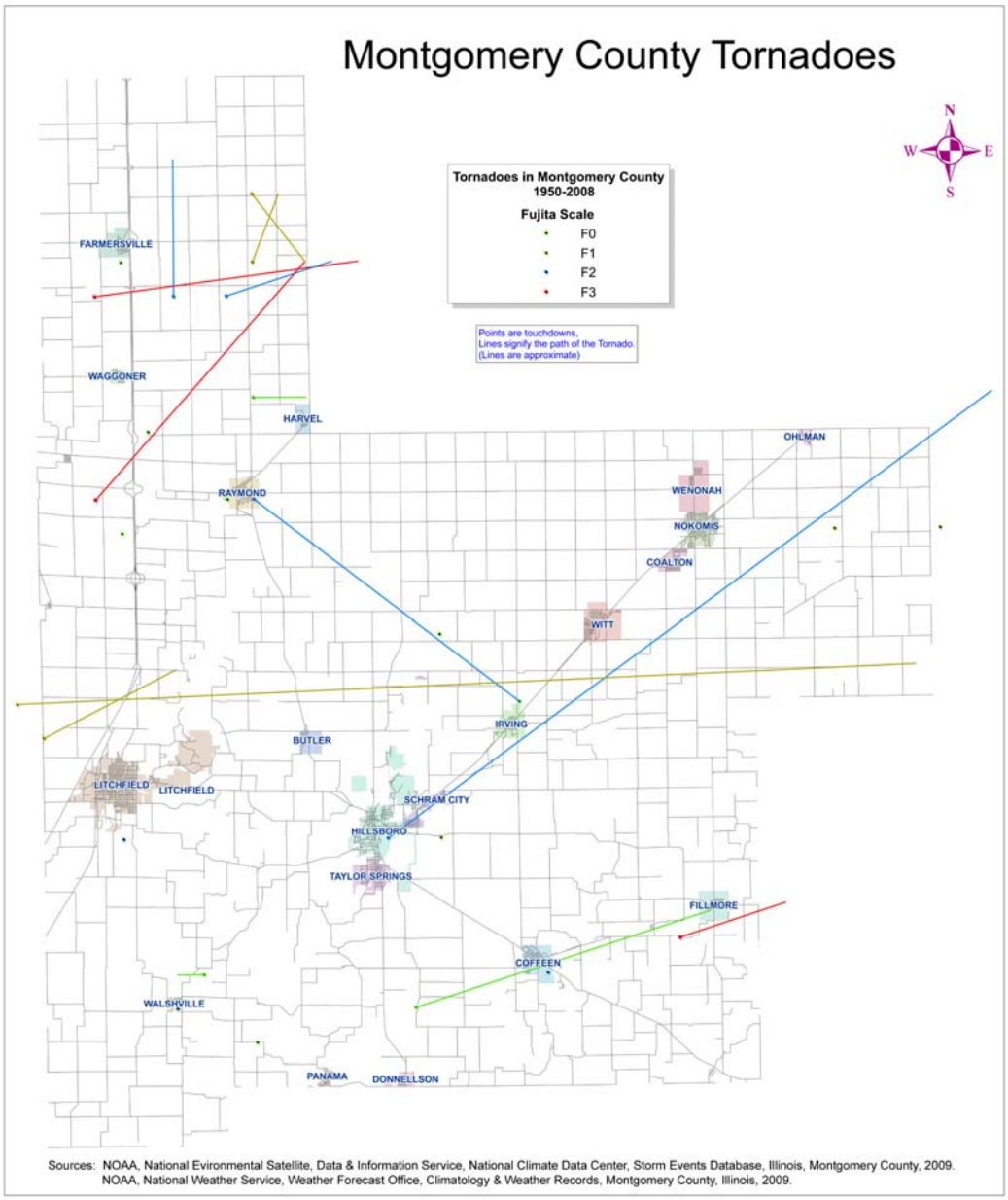
The recorded tornadoes varied in length from the touchdown point to 20 miles long and in width from 10 yards to 200 yards wide. The average length of a tornado in Montgomery County is 3.96 miles, the average width is 65 yards and the average damage pathway is 0.16 square miles. The longest and widest tornado recorded in Montgomery County occurred on April 2, 2006. This F2 tornado, measuring 200 yards wide, touched down just southeast of Hillsboro and headed northeast for 20 miles before dissipating two miles southwest of Pana in Christian County. The damage pathway of this tornado covered approximately 2.3 square miles.

What locations are affected by tornadoes?

Tornadoes have the potential to affect the entire County. The *2007 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency classifies Montgomery County's hazard rating for tornadoes as "elevated."

All of the participating municipalities have had reported occurrences of tornadoes in or near their locations. **Figure 20** shows the pathway each reported tornado took. Records indicate that most of these tornadoes moved from west to east across the County. 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.

Figure 20
Tornado Touchdowns in Montgomery County: 1950 – 2008



What is the probability of future tornadoes occurring?

Montgomery County has had 28 verified occurrences of tornadoes between 1950 and 2008. With 28 occurrences over the past 59 years, the probability or likelihood of a tornado hitting somewhere in Montgomery County in any given year is 47%. There were four years over the last 59 years where more than one tornado occurred. This indicates that the probability that more than one tornado may occur during any given year within Montgomery County is 7%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to tornadoes?

Yes. All of Montgomery County is vulnerable to the dangers presented by tornadoes. Municipalities located closer to the western boundary of the County (Farmersville, Raymond and Litchfield) have experienced more tornadoes and appear to be more vulnerable than those located in the central and eastern portions of the County. **Figure 21** lists the verified tornadoes that have touched down in or near each participating municipality.

Figure 21
Verified Tornado Touchdowns by Participating Municipality

Participating Municipality	Number of Verified Tornadoes	Year Tornado Touchdown
Coffeen	1	1959
Farmersville	7	1964, 1976, 1978, 1996, 1999, 2006 (2)
Hillsboro	1	2006
Litchfield	4	1956, 1961, 1974, 1993
Nokomis	3	1961, 1987, 1995
Raymond	4	1959, 1988, 1997, 1999
Witt	1	1998

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

NOAA, National Weather Service, Weather Forecast Office, Climatology & Weather Records, Montgomery County, Illinois, 2009.

What impacts resulted from the recorded tornadoes?

The data provided by the Tornado Climatology Listing and the Storm Events Database indicates that between 1950 and 2008, tornadoes caused approximately $1,711,000 in property damage, with the average property damage loss around $62,000. Property damages for five of the occurrences totaled $250,000 or more. There were, however, seven occurrences where the amount of the property damage was unknown.

In addition to the property damages reported by the Tornado Climatology Listing and the Storm Events Database, local insurance experts believe that an additional $1 million in damages can be attributed to tornadoes within Montgomery County. The additional property damages are not included in the aforementioned table because they represent an estimate that was not available

for specific locations. This information indicates that the total property damage figure is closer to $3 million.

Sixteen injuries and three deaths were reported as a result of six separate incidents between 1950 and 2008. In comparison, Illinois averages approximately four tornado fatalities annually; however, this number varies widely from year to year. Detailed information was only available for one of the incidents in Montgomery County. On June 1, 1999 an F3 tornado formed one mile southwest of I-55 near Raymond. The tornado moved northeast hitting a rest area along I-55. Six tractor-trailer trucks were overturned, killing one driver and injuring four others.

While more injuries and deaths have been attributed to tornadoes in Montgomery County than to all the other natural hazards combined, the numbers are still low. The recorded tornadoes have historically touched down in rural areas away from concentrated populations. Assuming that both of the hospitals in the County are not directly impacted by a single tornado event, each have backup generators and are equipped to provide continuous care to those injured during a tornado. As a result, the risk or vulnerability to public health and safety has been relatively low. However, if a tornado were to touchdown in any of the municipalities, the risk or vulnerability for that location would be elevated to high.

What other impacts can result from tornadoes?

In addition causing damage to buildings and properties, tornadoes can damage infrastructure and critical facilities such as roads, bridges, railroad tracks, drinking water treatment plants, water towers, communication towers and antenna and 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 an extended period of time).

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

Yes. All existing buildings, infrastructure and critical facilities located in Montgomery County and the participating jurisdictions are vulnerable to damage from tornadoes. Buildings, infrastructure and critical facilities located aboveground in the path of a tornado are the most vulnerable and 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 caused by 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. Several of the participating municipalities have indicated a need for tornado shelters.

As with severe storms, infrastructure and critical facilities tend to be just as vulnerable to tornadoes as buildings. 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.

A simple way to assess the vulnerability of buildings is to determine the average housing unit density within the County. This can be done by taking the number of housing units within the

County (12,525) and dividing that number by the total land area of the County (704 square miles). The result suggests that there is an average of 18 housing units per square mile in Montgomery County. While this method provides an adequate assessment of the buildings that may be potentially damaged in a densely populated county, it does not provide a realistic assessment for more sparsely populated counties such as Montgomery County.

In Montgomery County, and many other downstate counties, differences in housing density must be considered when assessing the vulnerability of buildings to tornado damage. Approximately 70% of all housing units within Montgomery County are located in five of the County's 19 townships (East Fork, Hillsboro, Nokomis, North Litchfield and South Litchfield). **Figure 22** provides a breakdown of housing units by township. Consequently, tornado damage to buildings, infrastructure and critical facilities in these more densely populated townships is likely to be greater than in the rest of Montgomery County. In addition, over half of the mobile home units (which are more vulnerable to tornadoes) within the County are located in four of these five townships (East Fork, Hillsboro, North Litchfield and South Litchfield).

Figure 22
Potential Tornado Damage to Housing Units in Montgomery County by Township

Township	Land Area (Sq. Miles)	Total Number of Housing Units (2000)	Number of Mobile Homes (2000)	Housing Unit Density (Units per Sq. Mile)	Number of Potentially Damaged Housing Units (Units per 0.16 Sq. Mile Area)
Audubon	53.9	185	39	3	1
Bois D'Arc	54.6	477	38	9	1
Butler Grove	35.7	306	32	9	1
East Fork	58	1,088	153	19	3
Fillmore	36.4	264	38	7	1
Grisham	24.4	299	56	12	2
Harvel	18	100	8	6	1
Hillsboro	36.2	2,400	120	66	11
Irving	34.3	441	51	13	2
Nokomis	36.5	1,420	48	39	6
North Litchfield	36.1	2,282	115	63	10
Pitman	36.4	201	61	6	1
Raymond	36.1	532	19	15	2
Rountree	35.8	99	2	3	1
South Fillmore	24.1	112	3	5	1
South Litchfield	37.2	1,412	310	38	6
Walshville	36.8	167	44	5	1
Witt	36.8	574	57	16	3
Zanesville	36.7	166	15	5	1

Source: Illinois Department of Commerce and Economic Opportunity, Census 2000 Data for Illinois.

To more accurately assess building vulnerability in Montgomery County, the average housing unit density for each township was calculated. **Figure 22** illustrates the substantial differences in housing unit density between the various townships in Montgomery County. By comparing the average county housing unit density calculated above (18 housing units per square mile) to the township housing unit densities listed in **Figure 22**, the shortcomings of using a countywide

average housing unit density for counties such as Montgomery becomes apparent. For 14 of the 19 townships, the average county housing unit density is greater (in some cases considerably) than the density numbers calculated for the townships. Furthermore, the average county housing unit density is less than half of the housing unit densities calculated for the four most populated townships.

Since the housing unit density has been calculated for each township, it is relatively simple to provide an estimate of the number of housing unit that could potentially be damaged by a tornado in Montgomery County. This can be done by taking the housing unit density for each township and multiplying that by the land area impacted by a tornado. For this scenario a land area of 0.16 square miles was chosen, the average damage pathway recorded for a tornado in Montgomery County. **Figure 22** provides a breakdown of the number of potentially damaged housing units by township.

It is important to note that the five townships with the greatest number of total housing units, the potential damage estimates would only be reached if tornado's pathway included the major municipality within the township. If the tornado pathway remained in the rural portion of the township, then the number of potentially damaged housing units would be considerably lower.

The fact that Montgomery County ranks among the top 20 counties in Illinois in terms of tornado frequency coupled with the lack of uniform building codes among most participating jurisdictions, suggests that the overall risk or vulnerability to buildings, infrastructure and critical facilities from tornadoes would be high. However, if population distribution, the absence of high risk living accommodations (such as high rise buildings, etc.) and the largely rural pathway of the previously recorded tornadoes are taken into consideration, the overall risk is relatively low. While the risk to the County is relatively low, if a tornado were to touchdown in any of the municipalities, the risk or vulnerability for that location would be elevated to high.

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

Yes. Only three communities (Hillsboro, Litchfield and Nokomis) have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from tornadoes. Infrastructure such as new communication and power lines also will continue to be vulnerable to tornadoes. Steps to bury all new lines would eliminate the vulnerability, but this action would be cost prohibitive in most areas. There is very little that can be done to reduce or eliminate the vulnerability of critical facilities constructed in the future other than enacting building codes where none exist and enforcing existing building codes.

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 vulnerable structures located within each participating municipality can be calculated if several assumptions are made. 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 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 from a tornado in Montgomery County.

Step 1: Determining the Number of Impacted Housing Units

First, an estimate of the number of residential housing units impacted by a tornado needs to be calculated. In order to accomplish this, the size of the impacted area must be determined. While the worst tornado recorded in Montgomery County could be used to estimate the area impacted; it was decided that the area impacted should be based on an average of the tornadoes that have been recorded in Montgomery County. The average area impacted by a tornado in Montgomery County was calculated and found to cover 0.16 square miles. This approach offers a reasonable alternative to using the worst tornado since the size and area impacted by the average of the recorded tornadoes is more likely to recur. In many cases damage estimates are ignored when the scenario is extreme or when the estimates appear to overstate the damages.

There are two ways in which the average area impacted by a tornado can be used to help determine the estimated number of impacted housing units. The first method involves overlaying the average tornado on a map of each municipality to determine whether the average impacted area would fall within the municipal limits. If the area impacted is less than the average because of the size and shape of the municipality, then additional calculations would be required to determine what portion of the average area would fall within the municipality. Once the portion within the municipality is calculated, then that area would be used to help estimate the number of impacted housing units. This method is more precise; however, it requires that future updates to the Plan use the exact same layouts of the average tornado for each municipality since changes may produce differences in the number of impacted housing units.

The second method assumes that the entire average impacted area would fall within the municipal limits; therefore, no additional calculations would be necessary in order to determine the number of impacted housing units. This method is quicker and easier and is more likely to produce consistent results when the Plan is updated. There is, however, a greater likelihood that the number of impacted housing units will be overestimated for those municipalities that occupy less than one square mile or have irregular shaped boundaries.

Both methods were applied to selected municipalities within Montgomery County and the areas compared. While the two methods did produce different results, the differences were not significant. Therefore, it was decided that the second method would be used since it is quick and much easier to duplicate.

Next, the issue of housing density must be examined. While the number of impacted housing units could be determined by overlaying the average impacted area on a municipality and then physically counting the number of housing units within the area, this approach is time consuming and will provide a different estimate depending on the layout of the average impacted area. A more practical approach is to use the average housing unity density to help calculate the number of impacted housing units. The use of this approach is appropriate, in part, because the housing unit densities within the municipalities in Montgomery County do not substantially change between the center of the municipality and the edges. This is not true for all municipalities in Illinois, especially those in and around Chicago.

To determine the average housing unit density for a municipality, the number of housing units within the municipality is divided by the land area occupied by the municipality. **Figure 23**

provides the average housing unit density for each participating municipality. Now that both the area impacted and average housing unit densities have been determined, the number of impacted residential buildings can be calculated. This is done by taking the average housing unit density for each participating municipality and multiplying that by the land area impacted (0.16 square miles). **Figure 23** provides a breakdown of the number of impacted housing units by municipality.

Figure 23
Estimated Number of Residential Housing Units Impacted by a Tornado

Participating Jurisdiction	Land Area (Sq. Miles)	Number of Housing Units (2000)	Housing Unit Density (Units per Sq. Mile)	Housing Units Impacted (Units per 0.16 Sq. Miles)
Coffeen	1	320	320	51
Farmersville	1	350	350	56
Hillsboro	5.3	1,944	367	59
Litchfield	5.1	3,011	590	94
Nokomis	1.3	1,130	869	139
Raymond	1.3	434	334	53
Witt	1.4	480	343	55

Source: Illinois Department of Commerce and Economic Opportunity, Illinois Census Profile System, Data Facts Database, 2010.

Step 2: Determining Potential Dollar Losses to Impacted Housing Units

Once the number of impacted housing units has been determined, the potential dollar losses can be estimated. In order to determine the potential dollar losses, the average assessed value must first be determined for each municipality. The average assessed value for each municipality was calculated from the 2009 tax assessment information provided by the Montgomery County Supervisor of Assessments. The average assessed value is important because it establishes the average market value which will be used to estimate the potential dollar losses. To determine the average market value for each municipality, the average assessed value for that jurisdiction is multiplied by three (the assessed value of a structure in Montgomery County is approximately one-third of the market value). **Figure 24** provides the average assessed value and average market value for each participating municipality.

The potential dollar loss estimates must be calculated for both the damage done to the housing unit and the contents. To determine the potential dollar losses to the housing units, start by taking the average market value and multiplying that by the percent damage. For the purposes of this scenario, it is assumed that the expected damage to the housing units is 100%; in other words, the housing units are completely destroyed. While it is unlikely that each and every housing unit would sustain the maximum percent damage, this assumption represents the worst case for each jurisdiction.

Next, the potential dollar losses to the content of the housing units must be estimated. Based on FEMA guidance, it is assumed that the value of a residential housing unit's content is approximately 50% of its market value. Therefore, to determine the potential dollar losses to the

content, start by taking half of the average market value and multiply by the percent damage. As with the potential dollar losses to structures, it is assumed that the expected damage to the content is 100% (the content is completely destroyed). Then multiply the average market value number by the number of impacted housing units to calculate the estimated content damage.

Finally, the total potential dollar losses may be calculated by adding together the potential dollar losses to the impacted housing units and the potential dollar losses to the content of the impacted housing units. **Figure 24** lists the total potential dollar losses by municipality.

Figure 24
Estimated Potential Dollar Losses to Impacted Residential Housing Units from a Tornado

Participating Jurisdiction	Housing Units Impacted	Average Assessed Value	Average Market Value	Potential Dollar Losses		Total Potential Dollar Losses
				Housing Unit	Content	
Coffeen	51	$13,724	$41,172	$2,099,772	$1,049,886	$3,149,658
Farmersville	56	$22,538	$67,614	$3,786,384	$1,893,192	$5,679,576
Hillsboro	59	$21,551	$64,653	$3,814,527	$1,907,264	$5,721,791
Litchfield	94	$19,609	$58,827	$5,529,738	$2,764,869	$3,161,106
Nokomis	139	$17,442	$52,326	$7,273,314	$$3,636,657	$7,273,314
Raymond	53	$26,179	$78,537	$4,162,461	$2,081,231	$6,243,692
Witt	55	$11,517	$34,552	$1,900,360	$950,180	$2,850,540
County*	3	$20,682	$62,046	$186,138	$93,069	$279,207
County†	1	$20,682	$62,046	$62,046	$31,023	$93,069

* Uses the generic average housing unit density (18 housing units per square mile)
† Uses the average housing unit density for the 14 least populated townships (8 housing units per square mile)

Source: Durston, Ray. Montgomery County Chief County Assessment Officer. "RE: Assessed Residential Values." E-mail to Greg R. Michaud. April 21, 2010.

To provide an estimate of potential dollar losses from tornadoes within the County, it becomes necessary to revisit the issue of average housing unit density discussed previously. If the generic average housing unit density of 18 housing units per square mile is used for the County and it is assumed that the tornado impacts a 0.16 square mile area, then the total number of housing units impacted would be three. However, as discussed earlier, the average housing unit density for the County does not take into consideration the differences in housing density in the County. If an average housing unit density is calculated for the 14 least populated townships (3,923 housing units divided by 500 square miles equals approximately eight housing units per square mile) and multiplied by the area impacted by the tornado (0.16 square miles), then the total number of housing units impacted is reduced to one. This difference in housing units leads to a substantial difference in the total potential dollar losses estimated for the County.

This assessment illustrates why potential residential dollar losses should be considered when municipalities are deciding which mitigation projects to pursue. Potential dollar losses caused by an average tornado in Montgomery County would be expected to exceed $2 million in any of the participating municipalities. Although Litchfield is the largest municipality in Montgomery County, residential dollar losses are potentially higher in other municipalities because of housing

density. An average size tornado that hits Nokomis may cause more dollar losses than in Litchfield because Nokomis has a higher density of housing units. If, however, a tornado equivalent to the worst recorded in Montgomery County were to hit both Nokomis and Litchfield, the dollar damages would be expected to be larger in Litchfield because more homes would be impacted.

3.3 SEVERE WINTER STORMS (SNOW & ICE)

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 blizzard conditions with blinding wind-driven snow, sleet and/or ice and extreme cold that lasts several days. The amount and extent 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. The following provides a brief description of each type.

- **Blizzards.** Blizzards are characterized by low temperatures and strong winds of at least 35 miles per hour. In addition to extreme temperatures and life-threatening wind chills, a blizzard is also characterized by falling or blowing snow that reduces visibility to ¼ mile or less for at least three hours. They are by far the most dangerous of all winter storms.
- **Heavy Snow Storms.** A heavy snow storm is any winter storm that produces six inches or more of snow within a 48 hour period or less.
- **Ice Storms.** Ice storms occur when precipitation (i.e., freezing rain, sleet, etc.) falls to the ground and freezes immediately on impact. Generally in Illinois an ice storm is considered severe if there is an accumulation of ¼ inch or more of freezing rain or ½ inch or more of sleet.

What is snow and how is it formed?

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 and how is it formed?

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 that is wedged between two masses of colder 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 and how is it formed?

Freezing rain is precipitation that falls in the form of rain, but freezes into a glaze upon contact with the ground or other hard surfaces. The rain is formed when snowflakes completely melt while falling through a layer of warmer air situated between two masses of colder air. The rain drops do not have time to refreeze before they reach the ground because the layer of cold air just above the surface is thin. The rain drops do become supercooled as they pass through this layer of colder air and instantly refreeze upon contact with anything that is at or below 32°F (i.e., the ground, trees, power lines, etc.).

What is the Wind Chill Index?

The Wind Chill Index is a measure of the rate of heat loss from exposed skin caused by the combined effects of wind and cold. 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. Exposures to extreme wind chills can be life threatening. **Figure 25** shows the Wind Chill Index as it corresponds to various temperatures and wind speeds. As an example, if the air temperature is 5°F and the wind speed is 10 miles per hour, then the wind chill would be -10°F. As wind chills edge toward -19°F and below, there is an increased likelihood that continued exposure will lead to individuals developing cold-related illnesses.

Figure 25
Wind Chill Index Chart

Wind (mph) \ Temperature (°F)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81

Frostbite Times

30 minutes | 10 minutes | 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.615T - 35.75(V^{0.16}) + 0.4275(V^{0.16})$$

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

Source: National Weather Service

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

Frostbite and hypothermia are both cold-related illnesses that result when individuals are exposed to extreme temperatures and wind chills, in many cases, as a result of severe winter storms. The following describes 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. See 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 begins to lose heat faster than it can produce it. As a result, the body's temperature begins to fall. 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.

- **Winter Storm Watch.** A winter storm watch is issued when severe winter conditions, such as heavy snow and/or ice, may affect an area within the next 12 to 48 hours.
- **Advisories.** Winter advisories are issued for lesser winter weather events that while presenting an inconvenience, do not pose an immediate threat of death, injury 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 snowfall 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.
- **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.

If an event is expected to produce only one type of precipitation, say snow, then the warning or advisory will be specific: Heavy Snow Warning or Snow Advisory. If a mixture of precipitation types is expected, say snow and sleet, then the generic Winter Storm Warning or Winter Weather Advisory will be used.

PROFILING THE HAZARD

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

Table 6 summarizes the previous occurrences as well as the extent or magnitude of severe winter storm events in Montgomery County. The Storm Events Database records show 26 reported occurrences of severe winter storms in Montgomery County between 1995 and 2008, making this one of the most frequently occurring hazards. Of the 26 reported occurrences, there were 14 snow events, seven ice and sleet events and five events that were a combination of ice, sleet and snow. Since 1995, at least one severe winter storm has occurred each year in Montgomery County with the exception of 1996. Anecdotal information shared by long-time residents suggests that severe winter storms occurred with similar frequency between 1950 and 1994. In comparison, Illinois has averaged at least two severe winter storms annually between 1900 and 2000 where six inches or more of snow falls within a 48 hour period.

Damage sustained during the December 1, 2006 winter storm in Hillsboro.

Photo by the Hillsboro Journal-News

The largest accumulation of snow from a single recorded storm event occurred on January 1, 1999 when 14 inches of snow fell on Montgomery County. Since then, there have been four additional storm events that have produced snow accumulations of 10 inches or greater. According to the Illinois State Water Survey, the coldest temperature recorded in Montgomery County over the last 110 years was -22°F on February 14, 1905.

Figures 26 and **27** chart the reported occurrences of severe winter storm events by month and hour. Nineteen of the 26 events took place in December and January. Approximately 54% of all severe winter storm events began during the a.m. hours.

Figure 26
Montgomery County Severe Winter Storm Events by Month – 1995 through 2008

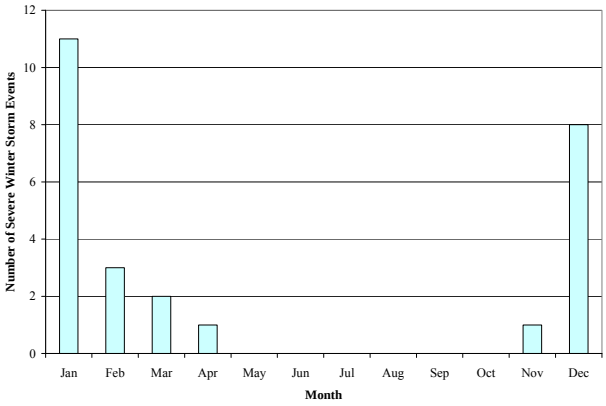
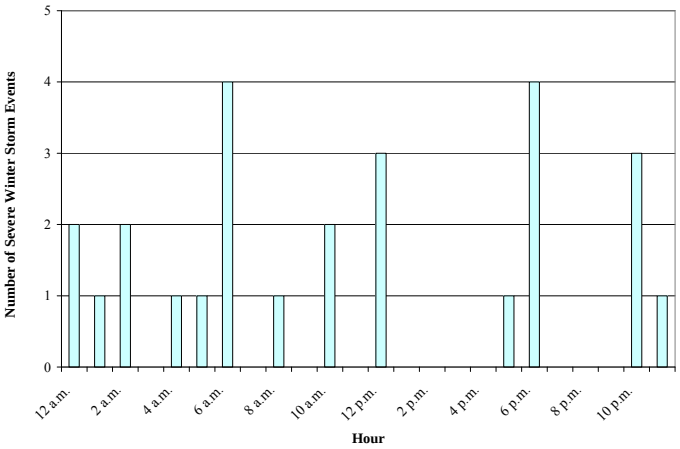


Figure 27
Montgomery County Severe Winter Storm Events by Hour – 1995 through 2008



NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

What locations are affected by severe winter storms?

Severe winter storms affect the entire County. All communities in Montgomery County have been affected by severe winter storms. The *2007 Illinois Natural Hazard Mitigation Plan* prepared by the Illinois Emergency Management Agency classifies Montgomery County's hazard rating for severe winter storms as "high."

What is the probability of future severe winter storms occurring?

Montgomery County has had 26 verified occurrences of severe winter storms between 1995 and 2008. With 26 occurrences over the past 14 years, Montgomery County may experience at least one to two severe winter storms each year.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to severe winter storms?

Yes. All of Montgomery County, including the participating jurisdictions, is vulnerable to the dangers presented by severe winter storms. Severe winter storms are among the most frequently occurring natural hazards in Illinois.

Damages sustained during the December 1, 2006 winter storm in Hillsboro.

Photo by the Hillsboro Journal-News

Montgomery County has had at least one severe winter storm every year since 1997. During eight of these years, the County has experienced multiple storm 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?

Of the 26 reported occurrences, damages were only recorded for three events. On January 6, 1995, a glaze ice event caused approximately $4,500 in property damage. It should be noted, however, that the property damage total represented losses sustained by eight counties (including Montgomery County). A breakdown by county of this total was not available. The second event, a winter storm, occurred over a period of three days from November 29, 2006 through December 1, 2006 and caused approximately $455,000 in property damage. The property damages reported were for government entities only and do not include any totals for damages sustained by residents and businesses.

The final incident, an ice storm, occurred on January 12, 2007 and caused approximately $500,000 in property damage. Damage information was either unavailable or none was recorded for the rest of the reported occurrences. In comparison, 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.

No injuries or deaths were reported as a result of any of the recorded severe winter storms in Montgomery County. In comparison, Illinois averages six deaths per year as a result of severe winter storms.

While severe winter storms occur regularly in Montgomery County, the number of injuries and deaths is relatively low. The combination of treacherous road conditions and a temporary loss of power can make individuals who are not able to reach emergency shelters more vulnerable to hypothermia and other common winter-related injuries. However, even taking into consideration the increased impacts from a power outage, the risk to public health and safety from severe winter storms is relatively low.

What other impacts can result from severe winter storms?

While no injuries or deaths were reported by the Storm Events Database for the recorded severe winter storm events in Montgomery County, severe winter storms do have the ability to impact health and safety.

In Montgomery County, vehicle accidents are the largest risk to health and safety from severe winter storms. Hazardous driving conditions (i.e., reduced visibility, icing road conditions, strong winds, etc.) contribute to the increase in accidents that result in injury and death. A majority of all severe winter storm injuries result from vehicle accidents. Traffic accident data assembled by the Illinois Department of Transportation between 2004 and 2008 indicates that treacherous road conditions caused by snow and ice were present for 5.0% to 14.3% of all crashes recorded annually in Montgomery County. **Figure 28** provides a breakdown by year of the number of crashes and corresponding injuries and deaths that occurred when treacherous road conditions caused by snow and ice were present as well as the total number of crashes that occurred in the County for comparison.

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 Deaths
2004	823	53	10	0
2005	825	74	30	2
2006	765	38	11	0
2007	858	95	34	0
2008	844	121	30	1

Source: Illinois Department of Transportation, Illinois Crash Data, County Crash Summaries, Montgomery County, 2004-2008.

Persons who are outdoors during and immediately following severe winter storms 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, especially to the elderly, including fractures and broken bones. 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?

Yes. All existing buildings, infrastructure and critical facilities located in Montgomery County and the participating jurisdictions are vulnerable to damage from severe winter storms. Structural damage to buildings caused by severe winter storms 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 communication and power lines often lead to disruptions in communication and create power outages. Depending on the damage, it can take anywhere from several hours to several days to restore service.

In addition to affecting communication and power lines, snow and ice accumulations on state and local roads hampers travel and can cause dangerous driving conditions. Blowing and drifting snow can lead to road closures and increases the risk of automobile accidents. Even small accumulations of ice can be extremely dangerous to motorists since bridges and overpasses freeze before other surfaces. When transportation is disrupted, schools close, emergency and medical services are delayed, some businesses close and government services can be affected.

Snow accumulations along Niemanville Trail South during historic winter storm.

When a severe winter storm hits there is also an increase in cost to the County and municipalities for snow removal and de-icing. The County Highway Department spends approximately $28,500 for snow removal and de-icing for an average snow storm in Montgomery County. (An average snow storm is defined as requiring 12 hours of work each day for two days, consuming approximately 40 tons of salt and 600 gallons of fuel to maintain the county roads.) Road resurfacing and pothole repairs are additional costs incurred each year as a result of severe winter storms.

Based on the frequency with which severe winter 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 winter storms is medium to high.

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

Yes. Only three communities (Hillsboro, Litchfield and Nokomis) have building codes in place that will likely help lessen the vulnerability of new buildings and critical facilities to damage from severe winter storms. Infrastructure such as new communication and power lines also will

continue to be vulnerable to severe winter storms. Ice accumulations on power lines can disrupt power service. 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. There is very little that can be done to reduce or eliminate the vulnerability of new critical facilities such as roads and bridges to severe winter storms.

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

Unlike other hazards, such as flooding, there are no standard loss estimation models or methodologies for severe winter storms. With only three available recorded events listing property damage numbers for severe winter storms, there is no way to accurately estimate future potential dollar losses. Since all structures within Montgomery County are vulnerable to damage it is likely that there will be future dollar losses to severe winter storms.

3.4 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 several days to several weeks. In comparison, a heat wave is generally defined as a period of at least three consecutive days above 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 1,500 people die in the United States each year from extreme heat. This number is greater than the 30-year mean annual number of deaths due to tornadoes, hurricanes, floods and lightning combined. In an effort to raise the public's awareness of the hazards of extreme heat, the National Weather Service has devised the "Heat Index".

What is 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.

Figure 29
Heat Index Chart

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	128	136					
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: National Weather Service

- **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 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.

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" brochure.

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.

- **Excessive Heat Outlook.** An excessive heat outlook is issued when the potential exists for an excessive heat event to occur within the next three to seven days.
- **Excessive Heat Watch.** An excessive heat watch is issued when conditions are favorable for an excessive heat event to occur within the next 12 to 48 hours.
- **Excessive Heat Advisory.** An excessive heat advisory is issued when the heat index is expected to reach 105°F, or when the heat index will range from 100°F to 104°F for at least four consecutive days.
- **Excessive Heat Warning.** An excessive heat warning is issued when the heat index is expected to equal or exceed 110°F for two consecutive days or when the heat index will be around 105°F for at least four consecutive days.

PROFILING THE HAZARD

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

Table 7 summarizes the previous occurrences as well as the extent or severity of extreme heat events in Montgomery County. The Storm Events Database records show 19 reported extreme heat events in Montgomery County between 1995 and 2008. All of the extreme heat events recorded occurred in July and August, with 13 of the 19 events taking place in July. Extreme

heat events have lasted from one day to two weeks. There were five years where two or more extreme heat events were recorded. The highest heat index recorded occurred in July 2005 when the combination of relative humidity and temperature pushed the heat index up to 121°F.

What locations are affected by extreme heat?

Extreme heat events affect the entire County. A single extreme heat event will generally extend across an entire region and affect multiple counties. The *2007 Illinois Natural Hazard Mitigation Plan* classifies Montgomery County's hazard rating for extreme heat as "high."

What is the probability of future extreme heat events occurring?

Montgomery County has experienced 19 verified extreme heat events between 1995 and 2008. With 19 occurrences over the past 14 years, Montgomery County may experience at least one extreme heat event each year.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to extreme heat?

Yes. All of Montgomery County is vulnerable to extreme heat. Extreme heat events were recorded in nine of the past fourteen years. There is one official cooling center located in Montgomery County at the Illinois Department of Human Services Office in Hillsboro.

What impacts resulted from the recorded extreme heat events?

Of the 19 reported occurrences, property damages were only recorded for two events and crop damages were only recorded for three events. The July 11, 1995 to July 17, 1995 extreme heat event caused $50,000 in property damage (primarily to roads) and $200,000 in crop damage. The July 28, 1995 to July 31, 1995 extreme heat event caused $5,000 in property damage and $10,000 in crop damage while the August 9, 1995 to August 24, 1995 extreme heat event caused $200,000 in crop damage. The property and crop damage totals detailed above represent losses sustained by 21 counties (including Montgomery County). A breakdown by county was not available.

Heat-related injuries and deaths were reported for eight of the recorded extreme heat events; however, none occurred in Montgomery County. The data provided by the Storm Event Database for extreme heat events covers multiple counties. All of the heat-related injuries and deaths took place in St. Clair and Madison Counties (St. Louis metropolitan area). While heat-related injuries and deaths were only reported for eight of the recorded extreme heat events, the heat indices were sufficiently high for all 19 events to produce heat cramps or heat exhaustion with the possibility of heat stroke in cases of prolonged exposure or physical activity.

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.

Other impacts of extreme heat include early school dismissals and school closings. Of the 19 reported occurrences, early dismissals were recorded for two events and school closings were

recorded for one event. The August 15, 2003 to August 21, 2003 event caused prompted early dismissals at some schools and closings at others, while the August 5, 2007 to August 16, 2007 event prompted only early school dismissals.

While extreme heat events occur regularly in Montgomery County, no injuries or deaths have been reported. This does not mean, however, that none have 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. However, even if injuries and death due to extreme heat are under reported in Montgomery County, the risk or vulnerability to public health and safety from extreme heat is relatively low for the general population. The risk or vulnerability is elevated to medium for sensitive populations such as the elderly, small children, chronic invalids, those on certain medications and persons with weight or alcohol problems who are more susceptible to heat reactions.

What other impacts can result from extreme heat events?

Extreme heat events can also lead to an increase in water usage which has the potential to impact municipal water supplies, especially those that obtain their water from surface water bodies.

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

No. In general, existing buildings, infrastructure and critical facilities located in Montgomery County and the participating jurisdictions are not vulnerable to extreme heat events. Unlike other natural hazards such as floods, earthquakes or tornadoes, extreme heat events in Montgomery County typically do not cause damage to buildings, infrastructure or critical facilities. The true concern is for the health and safety of those living in the County.

While buildings are do not typically sustain damage from extreme heat events, in rare cases infrastructure and critical facilities may be directly or indirectly damaged by an event. While uncommon, extreme heat events have 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 events have 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 events is low, even taking into consideration the potential for disruptions to the electrical grid.

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

No. Future buildings, infrastructure and critical facilities with the County 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 events.

Infrastructure and critical facilities may, in rare cases, be damaged by extreme heat, but very little can be done to prevent this damage.

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

Unlike other natural hazards that affect the County, extreme heat events do not typically damage buildings. The primary concern associated with extreme heat is the health and safety of those living in the County, especially vulnerable populations such as the elderly, infants, young children and those with medical conditions.

Unlike other counties within the region, 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 deaths and injuries during extreme heat events because air-conditioning units, fans and cooling centers are unavailable.

3.5 FLOOD

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 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.

What types of floods occur in Montgomery County?

Floods can be classified under two categories: flash floods and general floods. Flash floods are generally produced when heavy localized precipitation falls over an area in a short amount of time. 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. There is generally very little, if any, warning associated with flash floods.

In Montgomery County, general flooding can fall into two subcategories: river floods and area or overland floods. River floods are generally caused by a gradual increase in the water levels of a river or creek. These floods occur when winter or spring rains, coupled with melting snow, fill river basins with too much water too quickly or when torrential rains associated with tropical storms enter the area. Low lying areas near rivers, streams, lakes and reservoirs are susceptible to this type of flooding. Area or overland floods occur outside a defined stream or river and are generally the result of previous precipitation events that have left the ground saturated. Additional rainfall leads to surface runoff which causes ponding to occur in low-lying areas such as open fields. Area floods can also occur when a levee is breached.

On average, flooding causes more than $2 billion in property damage 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.

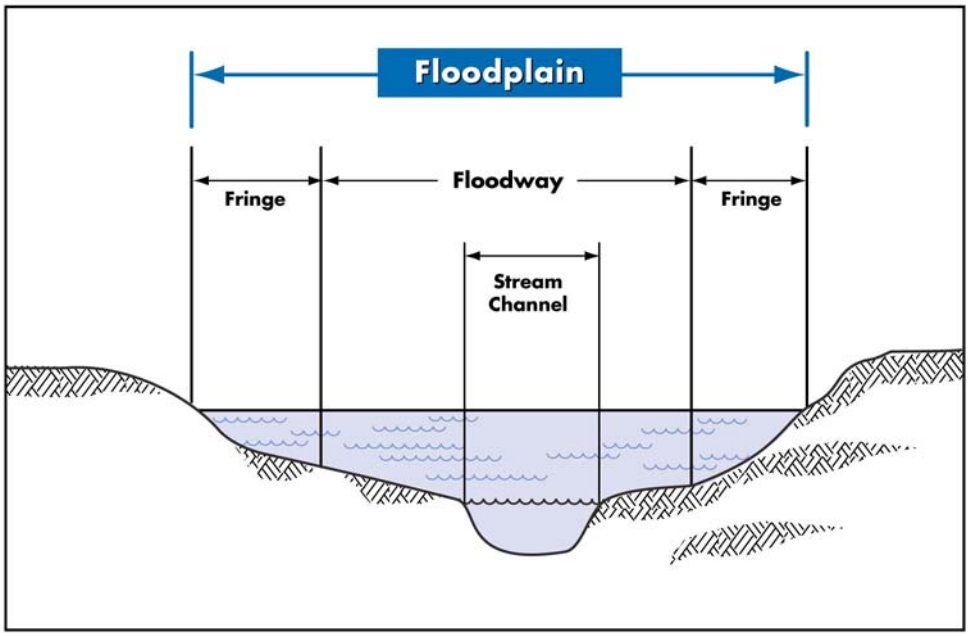
What is a floodplain?

There are several ways to define the term "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 floodplain is the land area that is subject to a 1% or greater chance of flooding in any given year. It is also known as the 100-year floodplain. This definition is utilized by the FEMA to administer the National Flood Insurance Program and by the State of Illinois to regulate construction activities within a floodplain. Regulating floodplains is important because when individuals build within a floodplain, property damage and even loss of life can occur. It is this second definition that is generally most familiar to people and the one that will be used when discussing floodplains from this point forward.

A regulatory floodplain is divided into two parts: the floodway and the flood fringe. **Figure 31** illustrates the various components of a regulatory floodplain.

Figure 31
Floodplain Illustration



Source: Illinois Department of Natural Resources, Office of Water Resources, "Floodplain Management in Illinois: Quick Guide," 2001.

The floodway is the channel of a river or other watercourse and the adjacent land area 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 floodwater downstream and is usually the area where water velocities and forces are the greatest. 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 regulatory floodplain, outside of the floodway, that is subject to shallow inundation and low velocity flows or standing water. 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. However, any development will require protection

from the floodwaters through the elevation of the buildings above the base flood or by flood-proofing buildings so that water can not enter the structures.

What is a base flood?

A base flood refers to any flood having a 1% chance of being equaled or exceeded in any given year. It is also known as the 100-year flood or the one percent chance flood. The base flood has been adopted by the National Flood Insurance Program as the basis for mapping, insurance rating and regulating new construction.

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. It is generally deeper than a 100-year flood and covers a greater amount of area; however, it is statistically less likely to occur.

What is the National Flood Insurance Program?

The National Flood Insurance Program (NFIP) is a federal program administered by FEMA enabling property owners in participating communities to purchase insurance protection against losses from flooding. It was established by the U.S. Congress 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. This approach did not reduce losses, nor did it discourage unwise development practices. In the face of mounting 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 (regulatory floodplain), then the government will make flood insurance available within the community as a financial protection against flood losses.

However, if a community chooses not to participate, then flood insurance under the NFIP will not be made available within that community. (Flood insurance can still be obtained through a private insurance broker, but the premiums are likely to be higher.) In addition, federal agencies would be prohibited from approving any financial assistance for acquisition or construction purposes within Special Flood Hazard Areas (42 U.S.C. 4106). For example, this would prohibit loans guaranteed by the Department of Veteran Affairs, insured by the Federal Housing Administration or secured by Rural Housing Services. Also, if a presidentially-declared disaster occurs as a result of flooding in a non-participating community, no federal financial assistance can be provided for the permanent repair or reconstruction of insurable buildings within Special Flood Hazard Areas.

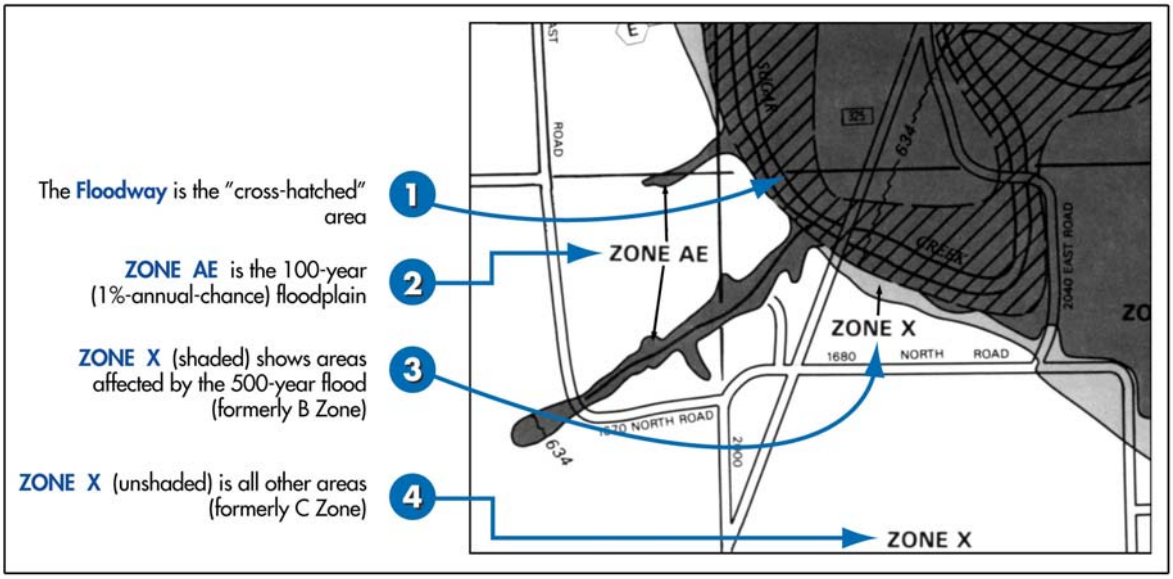
What is a Special Flood Hazard Area?

A Special Flood Hazard Area (SFHA) is the floodplain area that is subject to a 1% or greater chance of flooding in any given year. (This area is also referred to as a regulatory floodplain as discussed previously.) The term SFHA is most commonly used when referring to the Flood Insurance Rate Maps (FIRM) produced by FEMA. Special Flood Hazard Areas are delineated on the Flood Insurance Rate Maps and may be designated as Zones A, AO, AH, A1-30, AR, AE or A99.

What are Flood Insurance Rate Maps?

Flood Insurance Rate Maps (FIRMs) are maps that identify flood hazard areas as well as risk premium zones within 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 32** shows an example of a FIRM.

Figure 32
Example of a Flood Insurance Rate Map (FIRM)



Source: Illinois Department of Natural Resources, Office of Water Resources, "Floodplain Management in Illinois: Quick Guide," 2001.

A FIRM will generally show 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 surface runoff.

What are flood zones?

Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk. These zones are depicted on a community's FIRM. Each zone reflects the severity or type of flooding in the area. The following provides a brief description of each of the flood zones that may appear on a community's FIRM.

- **Zone A.** Zone A, also know as a Special Flood Hazard Area (SFHA) or regulatory floodplain, is defined as the floodplain area that is subject to a 1% or greater 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. A home located with Zone A has a 26% chance of suffering flood damage over the life of a 30 year mortgage. In communities that participate in the NFIP, structures located with Zone A 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 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. In communities that participate in the NFIP, structures located with Zone X (shaded) are not required to purchase flood insurance, but it is made available to 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 at a low risk for flooding. In communities that participate in the NFIP, structures located with Zone X (unshaded) are not required to purchase flood insurance, but it is made available to all property owners and renters.

What is a Repetitive Loss Structure or Property?

The Federal Emergency Management Agency 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. These structures account for approximately one-third of the nation's flood insurance claim payments. Identifying these structures and working with local jurisdictions to implement the appropriate mitigation measures to eliminate or reduce the damages caused by repeated flooding to these structures is important to FEMA and the NFIP. These structures not only increase the NFIP's annual losses, they drain funds needed to prepare for catastrophic events.

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. CRS discounts on flood insurance premiums range from 5% up to 45%. Those discounts provide an incentive for new flood mitigation, planning and preparedness 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, Missouri is responsible for issuing flood watches or warnings for Montgomery County depending on the weather conditions. The following provides a brief description of each type of alert.

- **Flash Flood / Flood Watch.** A flash flood or flood watch is issued when current or developing hydrologic conditions are favorable for flash flooding or 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.
- **Flash Flood / Flood 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?

Table 8 summarizes the previous occurrences as well as the extent or magnitude of the flood events in Montgomery County. Records obtained from the Storm Events Database and the Montgomery County Highway Department identified ten reported flash flood events in Montgomery County between 1994 and 2008. For seven of the ten events, flash flooding was reported at multiple locations within the County.

South Main Street in downtown Hillsboro is flooded as a result of a flash flood event.

Photo by the Hillsboro Journal-News

Seven of the ten events took place between April and August, with four of the events occurring in May. Approximately 90% of all flash flood events occurred during the p.m. hours, with seven of the ten events taking place between 3 p.m. and 7 p.m.

What locations are affected by floods?

While flooding can affect the entire County, it is more often felt at specific locations. Less than 3% of the area in Montgomery County is designated as being within the regulatory floodplain and susceptible to river floods. A large portion of the flood-prone area is in the unincorporated portion of the County, although several communities also are vulnerable to flooding. To review the Flood Insurance Rate Maps for Montgomery County see **Appendix J. Figure 33** identifies the bodies of water by participating municipality that have FEMA-designated Special Flood Hazard Areas and are known to cause flooding. The *2007 Illinois Natural Hazard Mitigation*

Plan prepared by the Illinois Emergency Management Agency classifies Montgomery County's hazard rating for floods as "elevated."

Municipal and County officials have reported overland flooding problems outside of the regulatory floodplain in Farmersville, Nokomis, Raymond, Waggoner and Witt. This overland flooding is known to impair travel. Prior to the 1960s, flooding more often occurred in Litchfield and Hillsboro, the two largest municipalities in the County. However, federally-funded projects helped to create Lake Lou Yeager in Litchfield and Lake Glenn Shoals in Hillsboro. The creation of these two bodies of water substantially reduced the impacts flooding had on these two communities.

Figure 33
Bodies of Water Subject to Flooding

Participating Jurisdiction	Water Bodies
Coffeen	Coffeen Lake
Farmersville	Macoupin Creek
Hillsboro	Middle Fork Shoal Creek, Shoal Creek, Lake Glenn Shoals, Old Lake Hillsboro
Litchfield	Lake Lou Yaeger, Litchfield City Lake, Walton Park Lake
Nokomis	East Fork Shoal Creek
Raymond	West Fork Shoal Creek
Witt	East Fork Shoal Creek
Unincorporated Montgomery County	Bearcat Creek, Blue Grass Creek, Brush Creek, Caesar Creek, Dry Fork, East Fork Shoal Creek, Elliott Creek, Five Mile Lake, Grove Branch, Horse Creek, Hurricane Creek, Lake Fork, Lanes Branch, Little Creek, Macoupin Creek, Middle Fork Shoal Creek, Miller Creek, Ramsey Creek, Shop Creek, Three Mile Branch, Waveland Creek, West Branch Horse Creek, West Fork Shoal Creek

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

Yes. Montgomery County, Hillsboro, Litchfield, Nokomis and Witt all participate in the NFIP. **Figure 34** provides additional information about each jurisdiction, including the date each participant joined the NFIP. Coffeen, Farmersville and Raymond have no identified flood hazard boundaries within their corporate limits and are not required to participate.

Figure 34
NFIP Participating Communities

Government Entity	Participation Date	FIRM Adoption Date	CRS Participation	Most Recently Adopted Floodplain Zoning Ordinance
Montgomery County	2/3/2000	Adopted FHBM 1/9/1981	No	1999
Hillsboro	8/19/1986	8/19/1986	No	1994
Litchfield	8/19/1985	8/19/1985	No	1998
Nokomis	7/2010*	7/12/2010	No	2010
Witt	6/15/1998	NA	No	1998

* Anticipated date pending application processing by FEMA.

Sources: FEMA, National Flood Program, Community Status Book Report – Illinois, September 17, 2009.
Osmon, Paul. "Re: Montgomery County." E-mail to Greg R. Michaud. October 5, 2009.

What is the probability of future flood events occurring?

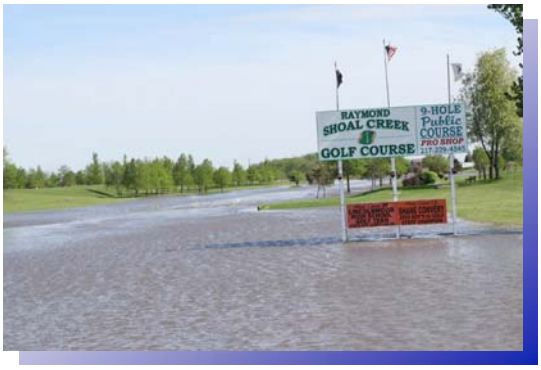
Montgomery County has had ten verified occurrences of flooding between 1994 and 2008. With ten occurrences over the past 15 years, the probability or likelihood of a flood event occurring somewhere in Montgomery County in any given year is 66%.

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. All of Montgomery County, including the participating jurisdictions, is vulnerable to the dangers presented by flooding. Despite the fact that there are no major rivers in or adjacent to Montgomery County, the relatively flat topography that covers a majority of the County leaves it susceptible to flooding. Flooding within the County tends to be localized, occurring primarily in low-lying areas near small streams and creeks and at specific locations, usually outside of the floodplain, where drainage problems occur due to culverts or drainage ditches that need improvement or proper maintenance. Since less than 3% of the area within Montgomery County lies within a floodplain and the topography is relatively flat, a majority of the flooding experienced within the County is related to flash flood events.



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

Photo by the Hillsboro Journal-News

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, Lake Glenn Shoals 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.

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: 1) evaluating the causes and

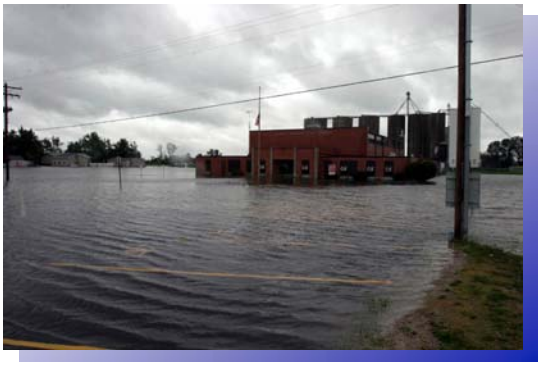
remedies for alleviating drainage problems throughout the City; 2) creating a drainage plan; and 3) requiring all new developments to have a stormwater management plan.

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 discussed 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 sizeable increases in residential or commercial/industrial developments are expected within the next five years.

What impacts resulted from the recorded flash floods?

Of the ten reported flash flooding events, damages were only recorded for four events. On April 11, 1994 a flash flood event caused $50,000,000 in property damage. It should be noted, however, that the property damage total represented losses sustained by eight counties (including Montgomery County). A breakdown by county for this total was not available. The second event occurred on May 9, 1995 and caused approximately $800 in property damage, while the third event occurred on June 3, 2008 and caused approximately $1,000 in property damage.

The final event occurred on September 13, 2008 and was included in Presidential Disaster Declaration 1800. This event caused approximately $1,000,000 in property damage within the County and was the most severe flash flooding event to occur in terms of property damage in recent memory. Damage information was either unavailable or none was recorded for the rest of the reported occurrences. In comparison, Illinois has average an estimated $257 million annually in property damage losses from flooding since 1983, making flooding the most economically-damaging natural hazard.



A flash flood event occurring on September 13, 2008, caused flooding at the Litchfield Armory and the OK Grain Elevator in Litchfield.

Photo by the Hillsboro Journal-News

The Storm Events Database has only one recorded report of death resulting from a flood event. On April 11, 1994 a man was traveling north near White Oak in Montgomery County when his car went off the road into Horse Creek. In comparison, Illinois averages four deaths per year from flooding.

Based on the fact that less than 3% of the area with the County lies within a floodplain and the number of injuries and deaths is very low, the risk or vulnerability to public health and safety from general flooding is relatively low. However, all of the recently recorded flood events in Montgomery County were a result of flash flooding. Since there is very little warning associated

with flash flooding, the risk to public health and safety from flash flooding is elevated to medium.

What other impacts can result from flooding?

As mentioned previously, one of the primary threats from flooding is drowning. Nearly half of all flash flood deaths occur in vehicles as they are swept downstream. Most of these deaths 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. In recent years, individuals have drowned in nearby counties while crossing roads partially covered by moving water.

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 be pose a health hazard, especially for small children, the elderly and those with specific allergies.

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

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

No. According to the file information provided by the Illinois Emergency Management Agency's Mitigation Section, there are no reported repetitive loss structures/properties within the participating municipalities or the unincorporated areas of Montgomery County. Local government and insurance industry representatives confirm this finding.

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

Yes. While less than 3% of the area in Montgomery County is designated as being within the regulatory floodplain and susceptible to river floods, most of the County is vulnerable to flash floods. A majority of the buildings, infrastructure and critical facilities that may be impacted by flooding are located outside of the regulatory floodplain. An accurate count of the number of buildings and critical facilities within the floodplain could not be calculated at this time. As the County's GIS capabilities expand and digitized Flood Insurance Rate Maps are developed for Montgomery County, a precise count of buildings and critical facilities will be developed.

Structural damage, such as cracks forming in foundations, can result from flooding. In most cases, however, the damage sustained from a flood is not to the structure, but to the contents of a building. Infrastructure and critical facilities are also vulnerable to flooding. Roadways, culverts and bridges can be weakened by floodwaters and have been known to collapse under the weight of a vehicle. Buried power and communication lines are also vulnerable to flooding. Water can get into the lines and cause disruptions in power and communications.

Based on the fact that most of the County is vulnerable to flash flooding, a majority of the buildings, infrastructure and critical facilities that may be impacted are located outside of the regulatory floodplain and the amount of property damage previously reported; the vulnerability of buildings, infrastructure and critical facilities to flooding varies from medium to high.

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

Yes and No. The participating jurisdictions that are subject to flooding (Hillsboro, Litchfield, Nokomis and unincorporated Montgomery County) take part in the National Flood Insurance Program (NFIP) and have adopted floodplain ordinances. Enforcement of these ordinances provides protection to any new building, infrastructure or critical facility built within a flood-prone area.

While new buildings, infrastructure and critical facilities should be protected from normal flooding, they will still be vulnerable to flash flooding depending on the amount of precipitation that is received, the topography and land use changes.

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

Residential

As mentioned previously, Montgomery County does not maintain mapping of buildings located within the floodplains. As the County's GIS capabilities expand and digitized Flood Insurance Rate Maps are developed for Montgomery County, a precise count of structures or buildings that are vulnerable to flooding should be developed. While a precise count of residential buildings vulnerable to flooding and drainage issues is not available, discussions with municipal leaders, law enforcement officials, public works staff and the Montgomery County Emergency Management Coordinator provided residential building estimates for each participating municipality. **Figure 35** lists the estimated number of vulnerable buildings for each municipality.

Figure 35
Potential Dollar Losses to Vulnerable Residential Buildings from Flooding

Municipality	Estimated Number of Vulnerable Residential Buildings	Average Assessed Value	Average Market Value	Potential Dollar Losses		Total Potential Dollar Losses
				Housing Unit	Content	
Coffeen	0	$13,724	$41,172	$0	$0	$0
Farmersville	0	$22,538	$67,614	$0	$0	$0
Hillsboro	25	$21,551	$64,653	$323,265	$484,898	$808,163
Litchfield	1,690	$19,609	$58,827	$19,883,526	$29,825,289	$49,708,815
Nokomis	12	$17,442	$52,326	$125,583	$188,374	$313,957
Raymond	2	$26,179	$78,537	$31,415	$47,122	$78,537
Witt	0	$11,517	$34,552	$0	$0	$0

Sources: Durston, Ray. Montgomery County Chief County Assessment Officer. "RE: Assessed Residential Values." E-mail to Greg R. Michaud. April 21, 2010.

In order to begin calculating the total potential dollar losses to vulnerable residential buildings, the average assessed value must be determined. The average assessed value for each

municipality was calculated from the 2009 tax assessment information provided by the Montgomery County Supervisor of Assessments. The average assessed value was then multiplied by three to determine the average market value (the assessed value of a structure in Montgomery County is approximately one-third of the market value). The average market value was then used to calculate the damage or potential dollar loss to both the vulnerable housing units and their contents.

To determine the potential dollar losses to the vulnerable housing units, start by taking the average market value and multiplying by the percent damage. For the purposes of this scenario, let's assume that the vulnerable residential buildings are one or two story homes with basements that are flooded with two feet of water. Based on FEMA guidance, the expected damage to these vulnerable housing units would be 20%. After calculating the adjusted average market value number, multiply it by the number of vulnerable housing units.

Next, calculate the potential dollar losses to the content of the vulnerable housing units. This is determined in the same manner as the potential dollar losses to the vulnerable housing units. Take the average market value and multiply by the percent damage. Using the same assumption as above, the FEMA guidance estimates that the expected damage to the content of the vulnerable housing units would be 30%. After determining the adjusted average market value number, multiply it by the number of vulnerable housing units.

Finally, the total potential dollar losses may be calculate by adding together the potential dollar losses to the vulnerable housing units and the potential dollar losses to the content of the vulnerable housing units. **Figure 35** provides an estimate of the total potential dollar losses by municipality.

Infrastructure & Critical Facilities

Aside from the two vulnerable residential structures identified in Raymond, the wastewater treatment plant has also experienced flooding issues. The potential dollar loss to replace this facility is estimated at $8 million. No other above-ground infrastructure or critical facilities within the municipalities were identified as being vulnerable to flooding.

3.6 DROUGHT

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, the National Oceanic and Atmospheric Administration 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 utilized one or both of these indices to identify previous drought events recorded in Montgomery 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 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.

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 36** shows the classification system utilized by the Palmer Drought Severity Index.

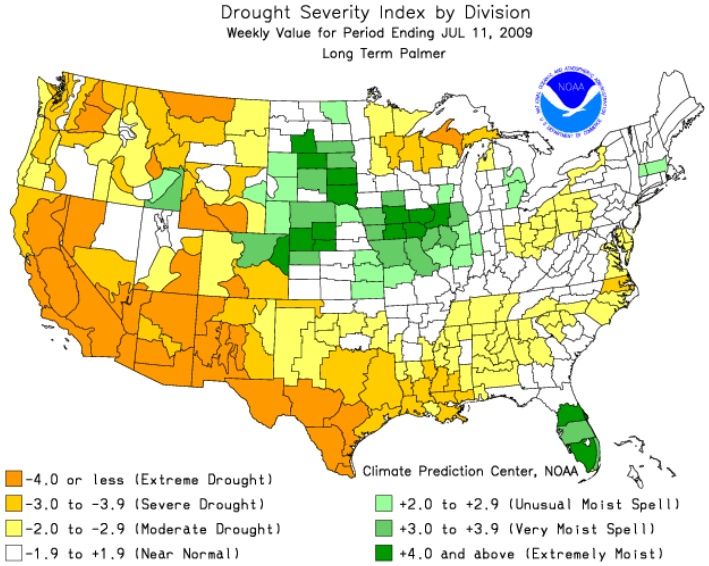
Calculations of the PDSI are made for 350 climate divisions in the United States and Puerto Rico. PDSI values have typically been calculated on a monthly basis. The National Climate Data Center has records on the monthly PDSI values for every climate division in the United States dating back to 1895.

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 37** shows an example of this map.

Figure 36 Palmer Classification System	
Index Value	**Description**
4.0 or more	extremely wet
3.0 to3.99	very wet
2.0 to 2.99	moderately wet
1.0 to 1.99	slightly wet
0.5 to 0.99	incipient wet spell
0.49 to -0.49	near normal
-0.5 to -0.99	incipient dry spell
-1.0 to -1.99	mild drought
-2.0 to -2.99	moderate drought
-3.0 to -3.99	severe drought
-4.0 or less	extreme drought

Source: National Drought Mitigation Center, University of Nebraska – Lincoln, "What is Drought? – Drought Indices", Dr. Michael J. Hayes, Climate Impacts Specialist, 2006.

Figure 37
Palmer Drought Severity Index Map



Source: National Oceanic and Atmospheric Administration, Climate Prediction Center, Drought Monitoring.

U.S. Drought Monitor

A relatively new tool 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 Drought Monitor is produced by a rotating group of authors from the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration and the National Drought Mitigation Center located at the University of Nebraska - Lincoln. It incorporates reviews from a group of 250 climatologists, extension agents and others across the nation.

The Drought Monitor utilizes five drought intensity categories, D0 through D4, to identify areas of drought. **Figure 38** provides a brief description of each category.

Figure 38
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: National Integrated Drought Information System, U.S. Drought Portal, "Drought Monitor: State-of-the-Art Blend of Science and Subjectivity," U.S. Drought Monitor, January 2008.

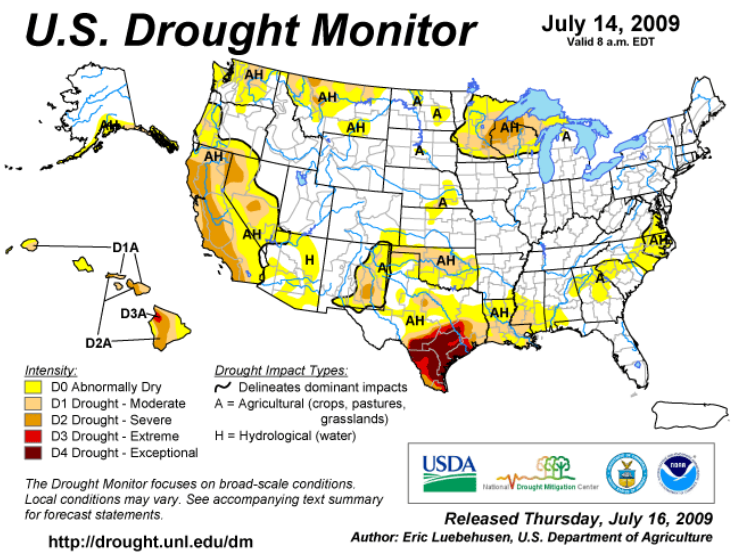
The drought intensity categories are based on five key indicators and numerous supplementary indictors. The five key indicators include the Palmer Drought Severity Index, Climate Prediction Center's Soil Moisture Model (percentiles), United States Geological Survey Weekly Streamflow (percentiles), Standardized 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. 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. While the maps are based in part on the key indices and other measures of moisture, they also incorporate real-world conditions as reported by numerous experts throughout the country, providing a more comprehensive approach to identifying and monitoring drought conditions.

In addition to identifying and categorizing general areas of drought, the weekly map also identifies whether a drought's impacts are agricultural (crops, pastures and grasslands) and/or hydrological (rivers, groundwater and reservoirs). **Figure 39** shows an example of the U.S. Drought Monitor weekly map. A summary also accompanies the map outlining the general conditions by regions.

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 39
U.S. Drought Monitor Map



Source: National Integrated Drought Information System, U.S. Drought Portal, U.S. Drought Monitor.

PROFILING THE HAZARD

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

The following summarizes the previous occurrences as well as the extent or severity of the drought events in Montgomery County. Information obtained from the Storm Events Database and the Illinois Emergency Management Agency show three reported drought events in Montgomery County between 1983 and 2008.

- In 1983, all 102 Illinois counties were proclaimed state disaster areas because of high temperatures and insufficient precipitation beginning in mid-June.
- In 1988, approximately half of the counties in Illinois (including Montgomery County) were impacted by drought conditions, although none of the counties were proclaimed state disaster areas.

- In 2005-2006, drought conditions impacted much of the state, including Montgomery County. Dry conditions reached a historic level of severity in some parts of Illinois and ranked as one of the three most severe droughts in Illinois based on 112 years of data.

For each event lower than normal precipitation levels were recorded between April and June and unusually dry weather conditions persisted throughout the summer months. While extreme heat does not always accompany drought, one extreme heat event was recorded during the 2005 drought.

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. All communities in Montgomery County have been affected by drought. Droughts, like extreme heat and severe winter storms, tend to impact large areas, extending beyond county boundaries. The *2007 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 experience three droughts between 1983 and 2008. With three occurrences over 26 years, the probability or likelihood that Montgomery County may experience a drought in any given year is 11.5%. 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%.

ASSESSING VULNERABILITY

Are the participating jurisdictions vulnerable to drought?

Yes. All of Montgomery County is vulnerable to drought. Neither the amount nor distribution of precipitation, soil types, topography, or water table conditions provides protection for any area within Montgomery County from drought.

What impacts resulted from the recorded drought events?

Comprehensive damage information was either unavailable or none was reported for any of the three recorded events. Disaster relief payment information was only available for one of the recorded events. Landowners and farmers were paid in excess of $382 million in disaster relief payments for the 1988 drought.

No injuries or deaths were reported as a result of any of the recorded drought events in Montgomery County. Consequently, 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 severe drought events in Illinois include reductions in crop yields and drinking water shortages. Even though no drought-related impact information was provided for Montgomery County, information gathered from County residents indicates the impacts experienced during the recorded drought events were similar to those seen statewide.

Crop Yield Reductions

Farming is an important enterprise in Montgomery County. According to the 2007 Census of Agriculture, there were 1,029 farms in Montgomery County occupying 347,765 acres. Farm land accounts for approximately 77% of all the land in Montgomery County. Of the 347,765 acres of farm land, approximately 90% or 314,991 acres of this land was in crop production. Less than one percent of this land is irrigated. Crop sales accounted for $125,096,000 in revenue while livestock sales accounted for $24,933,000. A severe drought would have a 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 and 2005 droughts. **Figure 40** illustrates the reduction in yields seen for corn and soybeans during the three recorded drought events. Records obtained from the United States Department of Agriculture's National Agricultural Statistics Service show that the 1983 drought resulted in corn yield reductions of 56% and soybean yield reductions of 37%. In 1983, 58 bushels per acre were harvested for corn and 23.5 bushels per acre for soybeans in contrast to 132 bushels per acres of corn and 37.5 bushels per acres of soybeans the previous year.

Figure 40
Crop Yield Reductions Due To Drought in Montgomery County

Year	Corn		Soybeans	
	Yield (bushel)	% Reduction from Previous Year	Yield (bushel)	% Reduction from Previous Year
1982	132	---	37.5	---
1983	**58**	**56%**	**23.5**	**37%**
1987	128	---	34	---
1988	**80**	**38%**	**25**	**26%**
2004	181	---	50	---
2005	**159**	**12%**	**45**	**10%**
2006	**139**	**13%**	**47**	**0%**

Source: United States Department of Agriculture, National Agricultural Statistics Service, Quick Stats - Crops, Montgomery County, Illinois

Corn yield reductions were nearly 38% and soybean yield reductions were nearly 26% as a result of the 1988 drought when only 80 bushels per acre of corn and 25 bushels per acre of soybeans were harvested in contrast to 128 bushels per acre of corn and 34 bushels per acre of soybeans harvested the previous year. The 2005-2006 drought resulted in lesser reductions than the 1983

and 1988 drought. There was only a 12% reduction in corn yields and a 10% reduction in soybean yields between 2004 and 2005 and only a 13% reduction in corn yields between 2005 and 2006. Soybean yields between 2005 and 2006 actually rose by 4%. According to the Montgomery County Farm Bureau, these modest reduction in yields was due, in part, to the use of hybrid seeds that have a greater resistance to drought.

Drinking Water Shortages

While most drinking water supplies in Montgomery County obtain water from deep underground wells, there are two municipal water supplies, Hillsboro and Litchfield, which rely on surface water sources. As a result, the water supplies for these two municipalities are more vulnerable to shortages as a result of a prolonged drought or a series of droughts in close succession. In addition to impacting drinking water supplies, drought can also impact recreational activities. Low water levels can adversely affect fishing and boating activities on lakes and ponds.

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 jurisdictions are not vulnerable to drought. As with extreme heat events, droughts typically do not cause damage to buildings, infrastructure or critical facilities. The true concern centers on the financial impacts that result from loss of crop yields.

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 damage caused to roadways. 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 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 with 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 that affect the County, drought does not typically damage buildings. The primary concern associated with drought is loss of crop yield and the potential impacts to drinking water supplies. With no comprehensive damage information available for previous

occurrences there is no way to accurately estimate future potential dollar losses. However, since a major portion 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 subsequent water conservation measures enacted will most likely impact businesses and industries that are water-dependent (i.e., car washes, landscapers etc.).

3.7 EARTHQUAKE

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.

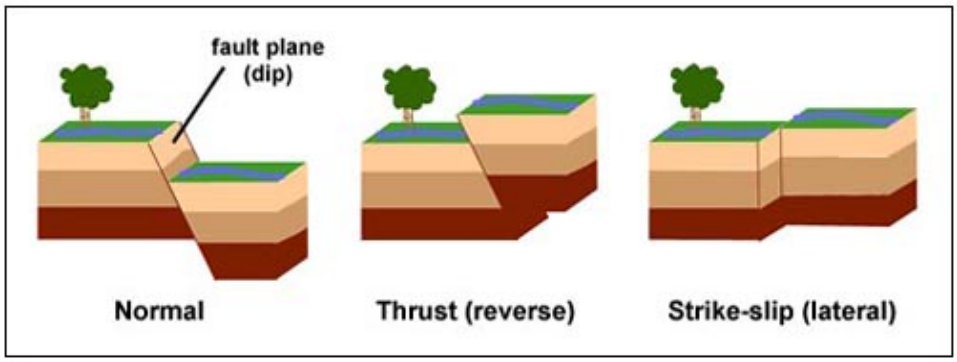
The destruction caused by an earthquake may range from light to catastrophic depending on a number of factors including the magnitude of the earthquake, the distance from the epicenter, the local geologic conditions as well as construction standards and time of day (i.e., rush hour). Earthquake damage 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.

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

Figure 41
Fault Illustration



Source: U. S. Geological Survey, Earthquake Hazards Program, "Visual Glossary – fault."

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 42** 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 on March 28, 1964 and registered a 9.2 on the Richter Scale.

Figure 42
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: U.S. Geological Survey, Earthquake Hazards Program, "What are the earthquake magnitude classes?" FAQ – Measuring Earthquakes.

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 43** 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.

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 Himalayas, the Mediterranean and out into the

Figure 43
Comparison of Richter Scale and Modified Mercalli Scale

Richter Scale	Modified Mercalli Scale		Level of Damage
≤ 4.3	I-IV	Instrumental to Moderate	No damage.
4.4 – 4.8	V	Rather Strong	Damage negligible. Small, unstable objects displaced or upset; some dishes and glassware broken.
4.9 – 5.4	VI	Strong	Damage slight. Windows, dishes, glassware broken. Furniture moved or overturned. Weak plaster and masonry cracked.
5.5 – 6.1	VII	Very Strong	Damage slight-moderate in well-built structures; considerable in poorly-built structures. Furniture and weak chimneys broken. Masonry damaged. Loose bricks, tiles, plaster and stones will fall.
6.2 – 6.5	VIII	Destructive	Structure damage considerable, particularly to poorly built structures. Chimneys, monuments, towers, elevated tanks may fail. Frame houses moved. Trees damaged. Cracks in wet ground and steep slopes.
6.6 – 6.9	IX	Ruinous	Structural damage severe; some will collapse. General damage to foundations. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground; liquefaction.
7.0 – 7.3	X	Disastrous	Most masonry and frame structures/foundations destroyed. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Sand and mud shifting on beaches and flat land.
7.4 – 8.1	XI	Very Disastrous	Few or no masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Rails bent. Widespread earth slumps and landslides.
> 8.1	XII	Catastrophic	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted.

Source: FEMA for Kids: The Disaster Area – Intensity Scales, "Earthquakes – The Modified Mercalli Scale & The Richter Scale."

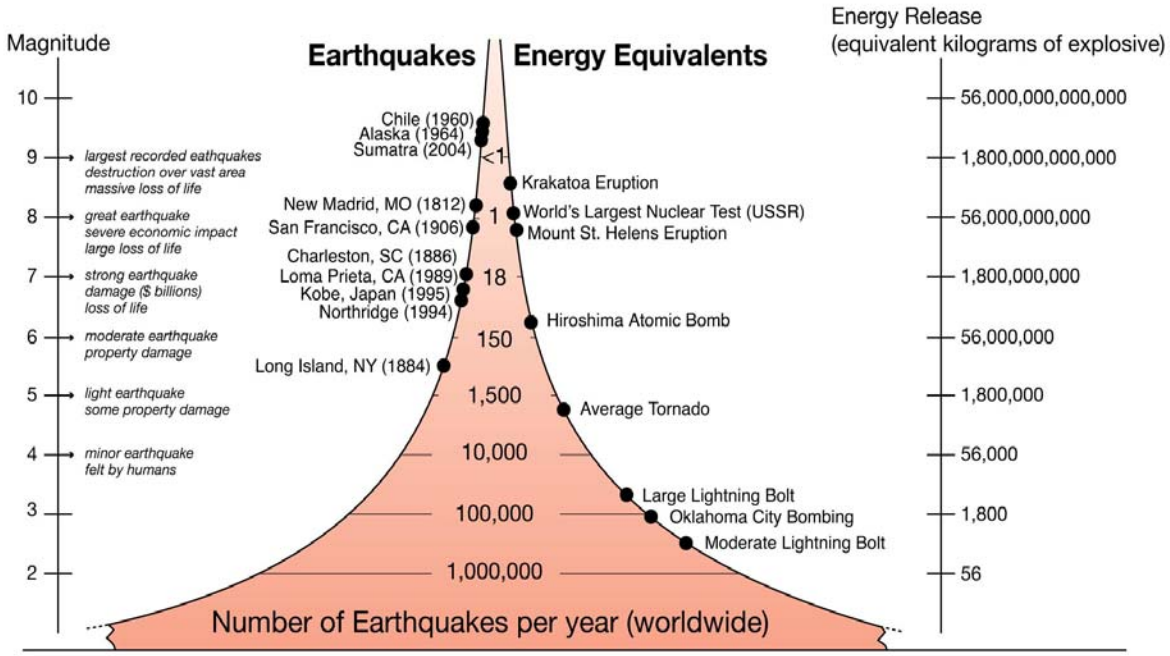
Atlantic. It accounts for about 17 percent of the world's largest earthquakes, including those in Iran, Turkey and Pakistan. The third belt follows the submerged mid-Atlantic Ridge, the longest mountain range in the world, nearly splitting the entire Atlantic Ocean north to south.

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 everyday. Worldwide, small earthquakes, such as magnitude 2 earthquakes, occur several hundred 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 more than one a month. **Figure 44** 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 44
Approximate Number of Earthquakes Recorded Annually



Source: "How Often Do Earthquakes Occur?," Education and Outreach Series Guide No. 3, Incorporated Research Institutions for Seismology.

PROFILING THE HAZARD

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

The *Earthquakes of Illinois: 1795 – 2008 Map* prepared by the Illinois State Geological Survey indicates that two micro and two minor earthquakes originated in Montgomery County sometime during the last 200 years although dates were not provided and there are no known geologic faults within the County. These earthquakes were small enough that they would not have caused any damage and probably were not felt by many people.

In more recent years, Montgomery County has felt ground shaking caused by several earthquakes that have originated outside of the county. On April 18, 2008, a magnitude 5.2 earthquake was reported in southeastern Illinois near Bellmont in Wabash County. The earthquake was located along the Wabash Valley seismic zone. Minor structural damage was reported in several towns in Illinois and Kentucky. Ground shaking was felt over all or parts of 18 states in the central United States and southern Ontario, Canada.

On June 10, 1987 another magnitude 5.2 earthquake was reported 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 5.3 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.

One of the most seismically active areas of the United States east of the Rockies occurs along the New Madrid seismic zone which lies within the central Mississippi Valley, extending from northeast Arkansas, through southeast Missouri, western Tennessee, western Kentucky and southern Illinois. Since 1974 more than 4,000 earthquakes have been recorded within this seismic zone, most of which were too small to be felt.

Two of the three largest earthquakes ever recorded within the continental United States took place along the New Madrid seismic zone in 1811 and 1812 with magnitudes of 8.1 and 8.0 respectively. These great earthquakes, centered near the town of New Madrid, Missouri, devastated the surrounding region and rang church bells 1,000 miles away in Boston. The quakes locally changed the course of the St. Francis and Mississippi Rivers and created Reelfoot Lake, which covers an area of more than 10 square miles in northwestern Tennessee. Houses throughout the region experienced varying degrees of damage, approximately 150,000 acres trees were snapped, split or uprooted and the town of New Madrid, Missouri was abandoned temporarily.

What locations are affected by earthquakes?

Earthquake events affect the entire County. Earthquakes, like drought and extreme heat, impact large areas, extending beyond county boundaries. Montgomery County's proximity to two earthquake fault zones (the New Madrid and the Wabash Valley) makes all of Montgomery County likely to be affected by a major earthquake. The *2007 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 Illinois State Geological Survey, 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 great 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 United States Geological Survey and the Center for Earthquake Research and Information 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 on the Modified Mercalli Intensity Scale.

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

What impacts resulted from the recorded earthquake events?

While residents of Montgomery County 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.

The risk or vulnerability to public health and safety from an earthquake is dependent on the intensity 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 chances for catastrophic damages. Any impacts that are felt by Montgomery County residents will most likely originate from outside of the County, either from the Wabash Valley or New Madrid faults. As a result, the risk or vulnerability to public health and safety from a moderate earthquake such as the one that occurred on April 18, 2008 is low. However, if a great earthquake similar to those experienced in 1811 and 1812 were to occur, then the risk or vulnerability to public health and safety would be elevated to medium/high.

What other impacts can result from earthquakes?

Earthquakes can impact human life, health and public safety. **Figure 45** details the potential impacts that may be experienced by the County should a magnitude 6.0 or greater earthquake occur in the region. If an earthquake similar to the 1811-1812 New Madrid earthquakes were to recur today, the effects would be devastating. The central Mississippi Valley is home to millions of people, including the populations of large cities, such as St. Louis and Memphis. There would be widespread loss of life and billions of dollars in property damage.

Figure 45
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 I-55 (especially if the quake originates along the New Madrid fault) as residents move north 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 damage and disruption of service at the coal-fire 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 Montgomery 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., southern Illinois) • Depending on the seasonal conditions present, more displacements may be expected as those who may have enough water and food supplies seek alternate shelter due to temperature extremes that make their current housing uninhabitable.

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 jurisdictions are vulnerable to damage from 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. Wood buildings with proper foundation ties have rarely collapsed in earthquakes.

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 strong 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 seven 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 of the event. The risk to buildings, infrastructure and critical facilities from a moderate earthquake is likely to be low, while the risk from a great earthquake is likely to be high.

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 jurisdictions are vulnerable to damage from earthquakes. While three municipalities (Hillsboro, Litchfield and Nokomis) have building codes in place, these codes do not contain seismic provisions that address structural vulnerability for earthquakes. As a result, future buildings, infrastructure and critical facilities face the same vulnerabilities as those of existing buildings, infrastructure and critical facilities described previously.

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

With no reports of property damage associated with the recorded earthquake events, there is no way to accurately estimate future potential dollar losses to vulnerable structures in Montgomery County. Sufficient information was not available to make useful predictions regarding potential earthquake damage through the use of computer modeling. Since all structures within Montgomery County are vulnerable to damage, it is likely that there will be future dollar losses from a strong earthquake. As a result, participating jurisdictions were asked to develop mitigation projects that could provide wide ranging benefits for reducing the impacts or damages associated with earthquakes.

3.8 DAM FAILURE

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 82,642 dams in the United States and Puerto Rico, with 1,463 dams located in Illinois. (The NID is maintained by the U.S. Army Corps of Engineers and is updated approximately every two years, with the last update occurring in 2007.) Ninety-five percent of the dams in Illinois 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. Dam failures can result from natural events such as earthquakes or landslides, human-induced events such as improper maintenance, or a combination of both. In the event of a dam failure, the people, property and infrastructure downstream could be subject to devastating damage.

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" failures and "sunny day" failures. A "flood" 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.

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 46** 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 46
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. Title 17: Conservation. Chapter I: Department of Natural Resources. Subchapter h: Water Resources. Part 3702: Construction and Maintenance of Dams. Section 3702.30 Applicability.

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

Yes. Litchfield and Hillsboro both own classified dams. **Figure 47** provides a brief description of each dam. While the Coffeen Lake Dam is not owned by a participating entity, it is included

in the list of classified dams because it is owned by a public utility and has the potential to inundate a large area should a dam failure ever occur.

Figure 47
Publicly-Owned Classified Dams Located in Montgomery County

Name	Owner	Type	Purpose	Completion Date	Classification
Lake Lou Yaeger Dam	Litchfield	Earth	Water Supply, Recreation	1966	Class I
Litchfield City Lake Dam	Litchfield	Earth	Recreation	1925	Class I
Shoal Creek Structure 5 Dam	Hillsboro	Earth	Flood Control	1973	Class I
Lake Glenn Shoals Dam	Hillsboro	Earth	Water Supply, Flood Control and Storm Water Management	1978	Class II
Coffeen Lake Dam	Ameren	Earth	Other	1964	Class II
Shoal Creek Structure 2 Dam	Litchfield	Earth	Flood Control & Storm Water Management, Recreation	1963	Class II
Lake Hillsboro Dam	Hillsboro	Earth	Water Supply, Recreation	1917	Class II
Walton Park Lake Dam	Litchfield	Earth	Recreation	1870	Class III

Sources: Illinois Department of Natural Resources, Office of Water Resources, Classified Dams in Montgomery County, September 24, 2009.
U.S. Army Corps of Engineers, National Inventory of Dams Interactive Report, Illinois, Montgomery County, April 5, 2010.

PROFILING THE HAZARD

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

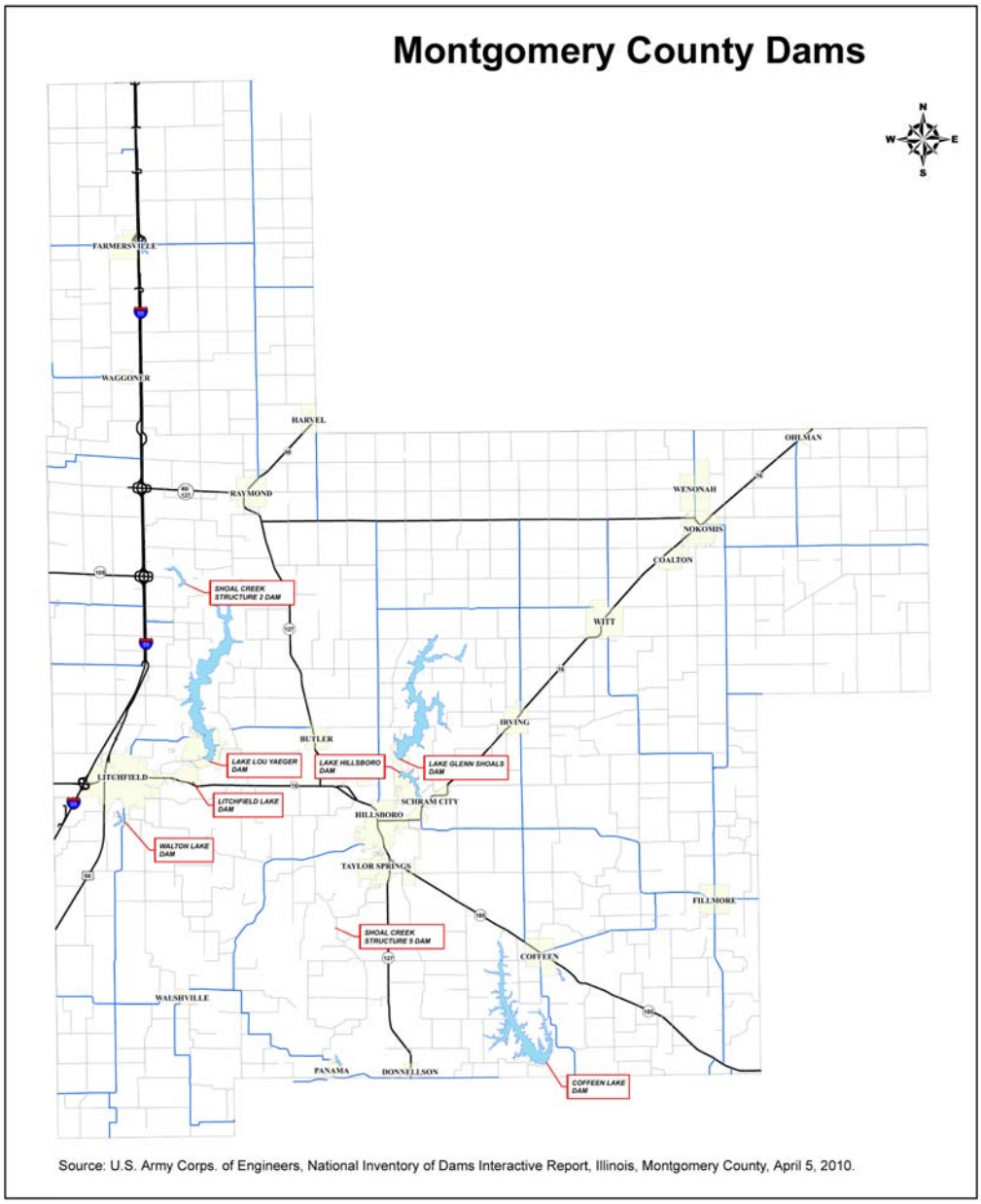
There has only been one recorded dam failure in Montgomery County. On September 8, 2008 the Walton Park Lake Dam in Litchfield experienced a partial dam failure as the result of approximately six inches of rain within a two hour period. The excess precipitation and runoff caused overtopping of the dam.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

Walton Park Lake Dam after experiencing a partial dam failure on September 8, 2008.

What locations are affected by dam failure?

Dam failures have the potential to affect Hillsboro, Litchfield, and portions of unincorporated 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 48** shows the locations of the eight publicly-owned classified dams in Montgomery County.

Figure 48
Locations of Publicly-Owned Classified Dams in Montgomery County



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

What is the probability of future dam failure events occurring?

Montgomery County has only experienced one dam failure during the life of all eight publicly-owned classified dams. Based on the age of the Walton Park Lake Dam and the fact that it has only experienced one recorded dam failure during its life, the probability that it will experience another dam failure depends on accurate assessments and proper maintenance. 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 and portions of unincorporated Montgomery County are vulnerable to the dangers presented by dam failures.

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, which runs over the dam. Erosion and cracking of the trail has resulted in closure to vehicle traffic. While the dam is currently holding water, repairs are needed. The City of Litchfield is in discussions with the Illinois Department of Natural Resources regarding the necessary repairs.

Damage caused by the September 8, 2008 partial dam failure at Walton Park Lake.

The risk or vulnerability to public health and safety from a dam failure 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. In general, the risk from a partial dam failure similar to the one experienced at Walton Park Lake Dam is low. However, if a full dam failure were to occur at one of the larger lakes, the risk would be elevated to medium/high.

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 and property damage. Depending on the type of dam failure, there may be little, if any warning that an event is about to occur, similar to flash flooding. As a result, one of the primary threats to individuals is from drowning. Motorists who choose to drive over flooded roadways run the risk of have their vehicles swept off the road and downstream.

In addition, 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 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 be 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 49** outlines the buildings, infrastructure and critical facilities that are vulnerable to dam failures. 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 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 critical facility.

In addition, to impacting structures, a dam failure has the ability to 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.

Figure 49
Buildings, Infrastructure and Critical Facilities Vulnerable to Dam Failures

Name	Owner	Classification	Number and Type of Vulnerable Structures
Lake Lou Yaeger Dam	Litchfield	Class I	2 residential buildings
Litchfield City Lake Dam	Litchfield	Class I	2 residential buildings
Shoal Creek Structure 5 Dam	Hillsboro	Class I	none
Lake Glenn Shoals Dam	Hillsboro	Class II	2 residential buildings; 3 businesses; Hillsboro wastewater treatment plant; Central Park
Coffeen Lake Dam	Ameren	Class II	unspecified number of residential buildings in and adjacent to the floodplain along East Fork Shoal Creek and Shoal Creek
Shoal Creek Structure 2 Dam	Litchfield	Class II	none
Lake Hillsboro Dam	Hillsboro	Class II	2 businesses; Hillsboro wastewater treatment plant
Walton Park Lake Dam	Litchfield	Class III	none

Sources: Booher, John. City of Hillsboro Dam Operator. Telephone Interview with Greg Michaud regarding Glenn Shoals Lake and Lake Hillsboro. June 1, 2010.
Caldwell, Jim. City of Litchfield Lake Superintendent. Telephone Interview with Greg Michaud regarding Walton Park Lake Dam Failure. October 7, 2009.
Hanson Professional Services Inc. Coffeen Lake Dam Emergency Action Plan. 2008.

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. In general, the risk to buildings, infrastructure and critical facilities from a dam failure is relatively low since none of the dams would impact a great number of buildings. However, the risk for the Lake Glenn Shoals Dam and Lake Hillsboro Dam may be elevated to medium/high since a failure of either dam would most likely impact the wastewater treatment plant, potentially affecting the entire city. The risk for the Coffeen Lake Dam may also be elevated to

medium/high since the emergency action plan specified potential impacts crossing the Montgomery County line into Bond and Clinton Counties.

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

Yes. All future buildings, infrastructure and critical facilities located within the flood path of one of the publicly-owned classified dams are vulnerable to damage from a dam failure. While Hillsboro and Litchfield have building codes in place, these codes do not contain provisions that address flooding vulnerability due to dam failures. 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?

With no information available on the property damage associated with the one recorded dam failure, there is no way to accurately estimate future potential dollar losses to vulnerable structures in Montgomery County at this time.

4.0 MITIGATION STRATEGY

4.0 MITIGATION STRATEGY

This section focuses on determining how 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. In order to accomplish this objective, the Planning Committee developed a mitigation strategy that included the following steps:

- formulating mitigation goals to reduce or eliminate long-term vulnerabilities to natural hazards;
- identifying, analyzing and prioritizing a comprehensive range of specific mitigation actions including those related to continued compliance with the National Flood Insurance Program; and
- describing how each jurisdiction will implement the mitigation actions identified.

Provided below is a detailed discussion of each mitigation strategy step.

4.1 HAZARD MITIGATION GOALS

The first step outlined in the mitigation strategy is to develop mitigation goals that aim to reduce or eliminate long-term vulnerabilities to the natural hazards identified. The mitigation goals are general guidelines that explain what the participants want to achieve in terms of hazard and loss prevention.

A preliminary list of eight hazard mitigation goals was developed and distributed to the Planning Committee members at the May 7, 2009 meeting. Members were asked to review the list before the next meeting and consider whether any changes needed to be made or if additional goals should be included. At the Planning Committee's June 25, 2009 meeting, the group discussed the preliminary list of hazard mitigation goals and decided to add an additional goal. **Figure 50** identifies the nine hazard mitigation goals approved by the Planning Committee.

Figure 50
Hazard 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, 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.

4.2 IDENTIFYING, ANALYZING & PRIORITIZING MITIGATION ACTIONS

The second step outlined in the mitigation strategy involves identifying, analyzing and prioritizing a comprehensive range of specific mitigation actions. Mitigation actions include any projects, plans, activities or programs identified by participants that helps achieve one or more of the goals identified above.

4.2.1 Identification and Analysis

After developing hazard mitigation goals and reviewing the results of the risk assessment, Committee members representing the County and participating municipalities were asked to consult with their respective government entities to identify a comprehensive range of mitigation actions specific to the hazards and vulnerabilities associated with their jurisdiction. The representatives of Montgomery County, Hillsboro, Litchfield and Nokomis were asked to pay special attention to identifying mitigation actions that ensure their continued compliance with the National Flood Insurance Program.

The compiled lists were reviewed to assure the appropriateness and suitability of each mitigation action. Actions that were not deemed appropriate and/or suitable were either reworded or eliminated. Next, each mitigation action was assigned to one of six broad categories which allowed Committee members to compare and consolidate similar actions. **Figure 51** identifies each category and provides a brief description.

Figure 51
Mitigation Action Categorization

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 in on the elderly/disabled during hazard events such as storms and extreme heat events, etc.).
Studies (S)	Studies are used to identify activities that can be undertaken to reduce the impacts associated 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, foundation elevation, insurance (i.e., flood, homeowners, etc.) and retrofitting (i.e., impact resistant windows, etc.).

Finally, each mitigation action was analyzed to determine:

- which hazard(s) is being mitigated for;
- whether the impacts associated with a particular hazard(s) would be reduced or eliminated;
- the general size of the population affected by the action (i.e., small, medium or large);
- what goal or goals would be fulfilled;
- whether the effects on new or existing buildings and infrastructure would be reduced; and
- continued compliance with the National Flood Insurance Program.

4.2.2 Prioritization

After reviewing and analyzing the identified mitigation actions, the Planning Committee members worked together to develop a methodology to prioritize each action. **Figure 52** identifies and describes the four-tiered prioritization methodology 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 projects is useful and does provide the participants with additional information, it is important to keep in mind that the implementation of all the mitigation actions identified is desirable regardless of which prioritization category an action falls under.

Figure 52
Mitigation Action Prioritization Methodology

Category	Description
HM	Eliminates damages and/or significantly reduces the probability of deaths and injuries from the most significant hazards.
LM	Has the potential to reduce damages, deaths and/or injuries from the most significant hazards.
HL	Eliminates damages and/or significantly reduces the probability of deaths and injuries from less significant hazards.
LL	Has the potential to reduce damages, deaths and/or injuries from less significant hazards

4.3 IMPLEMENTING MITIGATION ACTIONS

The final step outlined in the mitigation strategy involves describing how each jurisdiction will implement the mitigation actions identified. For each of mitigation action identified previously, the appropriate government entity was asked to:

- identify the party or parties responsible for oversight and administration;
- determine what funding source(s) are available or will be pursued; and
- describe the time frame for completion.

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 eliminate or reduce 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. The 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 is understood that when a grant application is submitted for a specific action, a detailed cost/benefit analysis will most likely be required to receive funding.

4.4 MITIGATION STRATEGY RESULTS

Figures 53 through **60** summarize the results of the mitigation strategy. The mitigation actions identified by the County and each participating municipality are ordered by prioritization category.

Figure 53
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
							New	Existing				
LM	Remove and dispose of trees and brush adjacent to highways.	F, SS, SWS	MP	Reduces	Medium	2, 3, 5	NA	Yes	Montgomery County Highway Department	Ongoing	County	Medium/Medium
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	Montgomery County Highway Department	1 year	75% Federal 25% Local	Medium/Medium
HM	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.	EQ, F, SS, SWS	SP	Eliminates	Large	2, 3, 5	NA	Yes	Montgomery County Highway Department	Ongoing	75% Federal 25% Local	High/High
LM	Evaluate existing Highway Department administrative, maintenance, equipment storage buildings and radio transmitter to identify natural hazard vulnerabilities	EQ, F, SS, SWS, T	S	Reduces	Large	2, 3, 5	Yes	Yes	Montgomery County Highway Department	1 year	75% Federal 25% Local	Medium/Medium
HM	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.	EQ, F, SS, SWS, T	SP	Reduces	Large	2, 3, 5	NA	Yes	Montgomery County Highway Department	2 years	75% Federal 25% Local	High/High

Acronyms

Hazard(s) to be Mitigated:

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

Type of Mitigation Activity:

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

Figure 53
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
							New	Existing				
LM	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.	DF, DR, EQ, EH, F, SS, SWS, T	PI	Reduces	Large	1, 2, 9	Yes	Yes	Montgomery County Highway Department	2 years	75% Federal 25% Local	Low/High
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	3, 5	NA	NA	Montgomery County Highway Department	3 years	TBD	Medium/High
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	Montgomery County Highway Department	1 year	TBD	Low/High
HL	Retrofit the Simpson Bridge against seismic and flood damage.	EQ, F	SP	Eliminates	Medium	2, 3, 5	NA	Yes	Montgomery County Highway Department	2 years	75% Federal 25% Local	High/Medium
LM	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.	EQ, F, SS, SWS, T	MP	Eliminates	Large	5, 8	NA	NA	Montgomery County Clerk/Recorder	1 year	TBD	Medium/High
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	NA	NA	Montgomery County Clerk/Recorder	1 year	TBD	Medium/High

Acronyms

Hazard(s) to be Mitigated:

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

Type of Mitigation Activity:

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

Figure 53
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
							New	Existing				
HM	Establish a Montgomery County Sheriff's Office (MCSO) Building/Jail Emergency Operating Center (in case the main facility is destroyed or unfeasible to operate).	EQ, T	SP	Reduces	Large	2, 5	Yes	Na	Montgomery County Sheriff's Office	1 year	75% Federal 25% Local	High/High
LM	Purchase all terrain vehicles to respond to victims/incidents associated with natural hazards.	EQ, F, SS, SWS, T	MP	Reduces	Small	2	NA	NA	Montgomery County Sheriff's Office	1 year	75% Federal 25% Local	Medium/Medium
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	NA	NA	Montgomery County Sheriff's Office	Ongoing	75% Federal 25% Local	Low/High
HM	Purchase a reverse 911 system to notify public/responders of emergency information.	DF, EH, EQ, F, SS, SWS, T	MP	Reduces	Large	2, 9	NA	NA	Montgomery County 911	2 years	75% Federal 25% Local	Medium/High
LM	Improve lightning protection for file repeater and store forward radio sites.	SS	MP	Reduces	Large	2, 5, 9	NA	NA	Montgomery County 911	2 years	75% Federal 25% Local	Medium/High
HM	Purchase stand alone generators for each repeater/store forward tower site in the County (seven total).	EQ, SS, SWS, T	MP	Reduces	Large	2, 5, 9	NA	NA	Montgomery County 911	3 years	75% Federal 25% Local	Medium/High
HM	Purchase a repeater system for backup needs in main system failure during emergencies.	EQ, SS, SWS, T	MP	Reduces	Large	2, 5, 9	NA	NA	Montgomery County 911	4 years	75% Federal 25% Local	Medium/High
LM	Evaluate existing 911 facilities/tower sites for potential natural hazard vulnerabilities.	DF, EQ, F, SS, SWS, T	S	Reduces	Large	2, 5, 9	Yes	Yes	Montgomery County 911	4 years	75% Federal 25% Local	Low/High
HM	Alternate tower site for primary communications systems during primary system failure.	EQ, T, SS, SWS	SP	Eliminates	Large	2, 5, 9	NA	NA	Montgomery County 911	5 years	75% Federal 25% Local	High/High

Acronyms

Hazard(s) to be Mitigated:

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

Type of Mitigation Activity:

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

Figure 53
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
							New	Existing				
LM	Alternate paging system for public safety agencies to enhance the ability to page agencies during reduced operations during an emergency.	DF, EQ, F, SS, SWS, T	MP	Reduces	Large	2, 5, 9	NA	NA	Montgomery County 911	6 years	75% Federal 25% Local	Medium/High
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, EQ, F, SS, SWS, T	MP	Reduces	Large	2, 5, 9	Yes	Yes	Montgomery County 911	6 years	75% Federal 25% Local	High/High
LL	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Small	6, 7	Yes	Yes	Montgomery County Emergency Management Agency	TBD	County	Low/Medium
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 these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Small	1, 6, 7	Yes	Yes	Montgomery County Emergency Management Agency	TBD	County	Low/Medium
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	Montgomery County Emergency Management Agency	TBD	County	Low/Medium

* 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.)
EQ	Earthquake	SWS	Severe Winter Storms (Snow, etc.)
EH	Extreme Heat	T	Tornado

Type of Mitigation Activity:

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

Figure 54
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
							New	Existing				
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	Ongoing	TBD	Medium/High
HM	If needed, replace existing water tower.	EQ, SS, SWS, T	SP	Reduces	Large	2, 3, 5	Yes	NA	Water Department	Ongoing	75% Federal 25% Local	High/High
HM	Purchase emergency generator for city-owned water tower/pump station located on IL Rte. 185 northwest of Coffeen.	EQ, SS, SWS, T	MP	Reduces	Large	2, 3, 5	NA	Yes	Water Department	Ongoing	75% Federal 25% Local	Low/High
HM	Purchase emergency generator for water tower/pump station located on Maple Street in Coffeen.	EQ, SS, SWS, T	MP	Reduces	Large	2, 3, 5	NA	Yes	Water Department	Ongoing	75% Federal 25% Local	Low/High
HM	Purchase emergency generator for wastewater treatment facility.	EQ, SS, SWS, T	MP	Reduces	Large	2, 3, 5	NA	Yes	Water Department	Ongoing	75% Federal 25% Local	Low/High
HM	Designate an emergency shelter within Coffeen.	EQ, EH, SS, SWS, T	MP	Reduces	Large	2, 3, 5	NA	NA	City Council	1 year	Local	Low/High
HM	Purchase emergency generators for designated emergency shelter.	EQ, SS, SWS, T	MP	Eliminates	Large	2, 3, 5	NA	Yes	City Council	Ongoing	75% Federal 25% Local	Low/High
LM	Purchase backhoe for use in debris removal and repairs following a natural hazard event.	EQ, SS, SWS, T	MP	Reduces	Medium	2, 3, 5	NA	NA	Street Department	Ongoing	Local	Medium/Medium

Acronyms

Hazard(s) to be Mitigated:

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

Type of Mitigation Activity:

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

Figure 55
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		Organization / Department Responsible for Implementation & Administration	Time Frame to Complete Activity	Funding Source(s)	Cost/Benefit Analysis
							New	Existing				
HM	Bury power lines to prevent power outages.	SS, SWS, T	MP	Reduces	Large	2, 3, 5	Yes	Yes	City	3 years	75% Federal 25% Local	Medium/Medium
HM	Install emergency generator at critical facilities/shelter for power outages.	EQ, SS, SWS, T	MP	Reduces	Large	2, 3, 5	NA	Yes	City	3 years	75% Federal 25% Local	Low/High
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	City	3 years	75% Federal 25% Local	Medium/Medium
LM	Improve road drainage to prevent flooding of residential areas.	F, SS, SWS	SP	Reduces	Medium	2, 3, 5	NA	Yes	City	3 years	75% Federal 25% Local	High/High
LM	Upgrade wastewater treatment facility to prevent down time during natural hazards.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	City	8 year	75% Federal 25% Local	High/High
LM	Upgrade drinking water treatment facilities to prevent down time during natural hazards.	F, SS, SWS	SP	Reduces	Large	2, 3, 5	Yes	Yes	City	8 years	75% Federal 25% Local	High/High

Acronyms

Hazard(s) to be Mitigated:

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

Type of Mitigation Activity:

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

Figure 56
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
							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	NA	Yes	City	Ongoing	75% Federal 25% Local	Medium/High
HM	Purchase four new warning sirens.	SS, T	MP	Reduces	Large	2, 3, 5, 9	NA	NA	City	Ongoing	TBD	Medium/High
LM	Purchase 80-foot portable manlift to provide access when repairing elevated storm damage.	SS, SWS, T	MP	Reduces	Medium	2, 3, 5	NA	NA	City	Ongoing	TBD	Medium/Medium
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, 6	Yes	Yes	City	Ongoing	75% Federal 25% Local	Medium/Medium
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	Ongoing	City	Low/Medium
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 county officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Small	1, 6, 7	Yes	Yes	City	Ongoing	City	Low/Medium
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	City	Ongoing	City	Low/Medium

* 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.)
EQ	Earthquake	SWS	Severe Winter Storms (Snow, etc.)
EH	Extreme Heat	T	Tornado

Type of Mitigation Activity:

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

Figure 57
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
							New	Existing				
HM	Construct storm water drainage system.	F, SS, SWS	SP	Reduces	Medium	2, 3, 4, 5	NA	NA	City Council	1 year	75% Federal 25% Local	High/High
HM	Bury power supply lines to critical facilities.	SS, SWS, T	MP	Reduces	Large	2, 3, 5	Yes	Yes	City Council	1 year	75% Federal 25% Local	Medium/Medium
HL	Seismic upgrades to critical facilities.	EQ	SP	Reduces	Large	2, 3, 5	Yes	Yes	City Council	1 year	75% Federal 25% Local	High/High
HL	Seismic bridge upgrade across Lake Yeager Dam.	DF, EQ	SP	Eliminates	Medium	2, 3, 5, 8	Yes	Yes	City Council	2 years	75% Federal 25% Local	High/High
HL	Seismic upgrade to upstream face of Lake Yeager Dam.	DF, EQ	SP	Eliminates	Medium	2, 3, 5, 8	Yes	Yes	City Council	2 years	75% Federal 25% Local	High/High
HM	Construct bad weather (including extreme heat & cold)/seismic shelters.	EH, EQ, F, SS, SWS, T	SP	Reduces	Large	2	NA	NA	City Council	2 years	75% Federal 25% Local	Medium/High
HL	Seismic upgrade to upstream face of Lake Litchfield.	DF, EQ	SP	Eliminates	Medium	2, 3, 5, 8	Yes	Yes	City Council	3 years	75% Federal 25% Local	High/High
HL	Mine subsidence protection for Litchfield High School.	---	SP	Reduces	Small	2, 3, 5	NA	Yes	City Council	3 years	TBD	High/High
LL	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Large	6, 7	Yes	Yes	City Council	TBD	City	Low/High
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 county officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Large	1, 6, 7	Yes	Yes	City Council	TBD	City	Low/High
LL	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 6, 7	Yes	Yes	City Council	TBD	City	Low/High

* 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.)
EQ	Earthquake	SWS	Severe Winter Storms (Snow, etc.)
EH	Extreme Heat	T	Tornado

Type of Mitigation Activity:

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

Figure 58
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
							New	Existing				
LM	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.	F, SS, SWS	S	Reduces	Large	2, 3, 5	Yes	Yes	Nokomis Public Works / Nokomis Emergency Services and Disaster Agency	1-2 years	75% Federal 25% Local	Medium/High
HM	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.	F, SS, SWS	MP	Reduces	Large	2, 3, 5, 6, 8	NA	Yes	Nokomis Public Works / Nokomis Emergency Services and Disaster Agency	2-3 years	75% Federal 25% Local	High/High
HM	Modify/correct storm sewers to increase capacity and efficiency in areas of Nokomis south of the UPRR tracks.	F, SS, SWS	SP	Eliminates	Large	2, 3, 5	NA	Yes	Nokomis Public Works / Nokomis Emergency Services and Disaster Agency	3-5 years	75% Federal 25% Local	High/High
LL	Review and present for adoption the revised Flood Insurance Rate Maps when they become available.*	F	RA	Reduces	Large	6, 7	Yes	Yes	Nokomis Emergency Services and Disaster Agency	TBD	City	Low/High
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 county officials aware of these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Large	1, 6, 7	Yes	Yes	Nokomis Emergency Services and Disaster Agency	TBD	City	Low/High

* 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.)
EQ	Earthquake	SWS	Severe Winter Storms (Snow, etc.)
EH	Extreme Heat	T	Tornado

Type of Mitigation Activity:

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

Figure 58
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
							New	Existing				
LL	Make information materials available to the public about the National Flood Insurance Program's voluntary Community Rating System.*	F	PP	Reduces	Large	1, 6, 7	Yes	Yes	Nokomis Emergency Services and Disaster Agency	TBD	City	Low/High

* 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.)
EQ	Earthquake	SWS	Severe Winter Storms (Snow, etc.)
EH	Extreme Heat	T	Tornado

Type of Mitigation Activity:

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

Figure 59
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
							New	Existing				
HM	Cleanup Shoal Creek to prevent flooding of cemetery and Wastewater Plant.	F, SS	MP	Reduces	Large	2, 3, 5, 6, 8	NA	Yes	Village Board	2 years	75% Federal 25% Local	Medium/High
HM	Repair/replace Southworth storm tile to prevent flooding of residential properties/Village streets.	F, SS	SP	Eliminates	Large	2, 3, 5	NA	Yes	Village Board	2 years	75% Federal 25% Local	Medium/High
LM	Conduct a study of Springfield Road to identify the best corrective action to prevent flooding.	F, SS	S	Eliminate	Large	2, 3, 5	Yes	Yes	Village Board	3 years	75% Federal 25% Local	Medium/High

Acronyms

Hazard(s) to be Mitigated:

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

Type of Mitigation Activity:

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

Figure 60
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
							New	Existing				
LM	Conduct hydraulic/drainage study(s) to identify how to correct chronic drainage problems associated with several areas within Witt.	F, SS, SWS	S	Reduces	Large	2, 3, 5	Yes	Yes	City Council	TBD	75% Federal 25% Local	Medium/High
HM	Purchase emergency generator for designated emergency shelter.	EQ, SS, SWS, T	MP	Reduces	Large	2, 3, 5	NA	Yes	City Council	TBD	75% Federal 25% Local	Low/High
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
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 these maps and issues related to construction in a floodplain.*	F	RA	Reduces	Small	1, 6, 7	Yes	Yes	City Council	TBD	City	Low/Medium
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

* 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.)
EQ	Earthquake	SWS	Severe Winter Storms (Snow, etc.)
EH	Extreme Heat	T	Tornado

Type of Mitigation Activity:

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

5.0 RECOMMENDATIONS

5.0 RECOMMENDATIONS

The following recommendations came about as a result of the planning process. They should be reviewed periodically as the Plan is evaluated and updated to determine if appropriate actions should be taken.

SEVERE STORMS/SEVERE WINTER STORMS

Severe storms and severe winter storms frequently cause utility disruptions throughout Montgomery County. Residents in rural parts of the County report prolonged loss of power from ice and wind storms. Tree trimming near power lines, back-up generators, and burying power lines are some of the steps that should be evaluated and possibly added as mitigation actions to reduce the number of power disruptions.

FLOODING

Countywide:

- Flood Insurance Rate Maps (FIRM) are being revised to reflect changes in floodplain boundaries across the state. Funding to update the Montgomery County FIRM maps has not been yet been secured. However, when funding becomes available and the FIRM maps are updated, those jurisdictions who participate in the National Flood Insurance Program will need to adopt the revised maps and most likely update their floodplain ordinance.
- When the digitized versions of the new Flood Insurance Rate Maps are made available, the County GIS Office should procure them to begin identifying the number and location of those buildings present in the 100 year floodplain.

Litchfield:

- The Litchfield Comprehensive Plan (November 2007) 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 an assessment of stormwater management; and
  - c.) require all new developments to have stormwater management plans.

Nokomis:

- During the plan development, Nokomis began discussions with the Illinois Department of Natural Resources Office of Water Resources regarding their participation in the National Flood Insurance Program (NFIP). Nokomis was suspended from the NFIP in 1987. By the end of the process, Nokomis had completed the necessary steps required to renew its participation in the NFIP.

DROUGHT

For Hillsboro and Litchfield, who rely on surface water sources to provide residents with a sufficient quantity of safe drinking water, the capacity of their surface water impoundments should be monitored closely and necessary steps taken to assure that adequate capacity exists. 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 there is enough water to meet fire protection and drinking water needs.

EARTHQUAKES

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 levels to protect infrastructure from damage. One suggested option is the adoption and enforcement of building codes. Building codes have proven successful in reducing damages from earthquakes.

GENERAL

Notification

Early warning of impending storms provides residents with valuable time needed to take protective measures. The continued use of warning sirens and updating and maintenance of existing County and municipal communication systems is vital for reducing impacts to health and property.

Shelters

The number of shelters available for residents to make use of in case of tornadoes, extreme heat and cold weather should be expanded. While existing structures may be utilized in some areas, new structures are be needed in other areas.

Public Information

Promoting awareness about natural hazards and the steps that individuals can take to protect their health and property should be ongoing. Local organizations should take the lead in disseminating information to Montgomery County residents. Newspapers, web sites, libraries, and the County and municipal offices should be used to convey free state and federal hazard mitigation publications.

6.0 PLAN MAINTENANCE

6.0 PLAN MAINTENANCE

This section outlines the Federal Emergency Management Agency (FEMA) requirements for maintaining and updating the Plan. 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 will help to ensure that the Plan remains an effective and relevant document. Provided below is detailed discussion of the plan maintenance approach.

6.1 MONITORING, EVALUATING & UPDATING THE PLAN

Establishing a method and schedule for monitoring, evaluating and updating the Plan allows the participating jurisdictions to review the plan, the planning process and the results of the implemented mitigation actions and make changes as necessary.

6.1.1 Monitoring and Evaluating the Plan

The Plan will be monitored and evaluated by the Plan Maintenance Subcommittee on a semi-annual basis. The Plan Maintenance Subcommittee will include key members of the Planning Committee (i.e., representatives from each of the participating County entities as well as representatives from each of the participating municipalities). The Subcommittee will be co-chaired by the Montgomery County Highway Department and the Montgomery County Emergency Management Agency. 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 entities for their review and use in the plan update.

The Montgomery County Highway Department and the Montgomery County Emergency Management Agency will be jointly responsible for monitoring the status of mitigation actions identified in the Plan. It will be the responsibility of each participating government entity to provide the Highway Department and Emergency Management Agency with a semi-annual progress report detailing the status of their identified mitigation actions at the Subcommittee meetings.

The Plan Maintenance Subcommittee will also evaluate the Plan on a semi-annual basis to determine the effectiveness of both the planning process and the mitigation actions implemented and to assess whether any changes need to be made. As part of the evaluation, the Subcommittee will review the goals to determine whether they are still relevant or if new goals need to be added; assess whether other natural hazards need to be addressed or included in the plan and review any new hazard data that may affect the Risk Assessment portion of the Plan. The Subcommittee will also evaluate whether other county departments should be invited to participate.

In terms of evaluating the effectiveness of 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 government entities will be given an opportunity to add new mitigation actions to the Plan and modify or discontinue mitigation actions already identified. In some cases a project may need to be removed from the list of mitigation actions because of unforeseen problems with implementation.

6.1.2 Updating the Plan

The Plan must be updated within five years of the date the first participating government entity adopts the Plan. This ensures that all the participating government entities 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 semi-annual monitoring and evaluation meetings. In addition, any non-participating municipality that wishes to participate may be added during the update. These entities will be responsible for providing all of the information needed to be integrated into the Plan. A public meeting will be held to present the updated Plan to the public for review and comment. The comments received at public meeting will be reviewed and incorporated into the updated Plan.

The Subcommittee will then present the updated Plan to the participating government entities for approval. Once the Subcommittee has received approval from all of the participating entities, it will submit the updated Plan to the Illinois Emergency Management Agency and FEMA for review. After FEMA has approved the updated Plan, each of the participating government entities will again be required to formally adopt the Plan.

6.2 INCORPORATING THE MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS

As part of the planning process, the Planning Committee identified current plans, programs, policies/ordinances and maps that will supplement or help support mitigation planning efforts. **Figure 5** identifies the existing planning mechanism available by jurisdiction. It will be the responsibility of each participating government entity to incorporate, where applicable, the mitigation strategy and other information contained in the Plan into the planning mechanisms identified for their jurisdiction. At the time this Plan was prepared, only one participating jurisdiction, Litchfield, had an approved comprehensive plan. The County is in the process of developing a comprehensive plan and anticipates having the plan completed by 2011.

6.3 CONTINUED PUBLIC INVOLVEMENT

The County and participating municipalities understand the importance of continued public involvement and will seek public input on the Plan throughout the plan maintenance process. A copy of the approved Plan will be maintained and available for review on the Montgomery County Emergency Management Agency website and individuals will be encouraged to provide feedback and submit comments for the Plan update by contacting the Montgomery County Highway Department or the Montgomery County Emergency Management Agency.

The comments received will be compiled and presented at the semi-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 meeting 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 formal adoption of the approved Plan by each participating jurisdiction. Each entity must formally adopt the Plan to be eligible for federal grant money to implement mitigation actions identified in this Plan.

7.1 PLAN ADOPTION PROCESS

Before each of the participating jurisdictions could formally adopt the Plan, the County had to submit it to the Illinois Emergency Management Agency (IEMA) and the Federal Emergency Management Agency (FEMA) for their review and approval. After receiving IEMA and FEMA approval, Montgomery County forwarded the Plan to each participating jurisdiction for formal adoption. Signed copies of these resolutions are located in **Appendix K**. **Figure 61** identifies the participating jurisdictions and the date each formally adopted the Plan.

Figure 61
Multi-Jurisdictional Plan Adoption Dates

Participating Jurisdiction	Adoption Date
Coffeen	
Farmersville	
Hillsboro	
Litchfield	
Montgomery County	
Nokomis	
Raymond	
Witt	

8.0 REFERENCES

8.0 REFERENCES

Provided below is a listing, by section, of the resources utilized to create this document.

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6.0 PLAN MAINTENANCE

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9.0 TABLES

Table 1
Thunderstorm & High Wind Events Reported in Montgomery County
1956 through 2008

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
7/28/1956	2:30 p.m.	Hillsboro	0 kts	0	0	$0	$0
10/10/1959	5:45 p.m.	Taylor Springs	0 kts	0	0	$0	$0
9/30/1961	1:46 p.m.	Farmersville	52 kts	0	0	$0	$0
5/10/1962	8:23 p.m.	Butler	0 kts	0	0	$0	$0
8/18/1965	4:45 a.m.	Witt	0 kts	0	0	$0	$0
4/20/1966	4:30 p.m.	Walshville	0 kts	0	0	$0	$0
10/10/1969	11:20 p.m.	Walshville	0 kts	0	0	$0	$0
10/11/1969	12:15 a.m.	Fillmore	0 kts	0	0	$0	$0
3/29/1974	1:40 p.m.	Raymond	0 kts	0	0	$0	$0
7/14/1974	8:30 p.m.	Raymond	0 kts	0	0	$0	$0
5/19/1975	4:35 p.m.	Litchfield	0 kts	0	0	$0	$0
3/26/1976	9:30 p.m.	Nokomis	0 kts	0	0	$0	$0
4/10/1978	2:30 p.m.	Hillsboro	0 kts	0	0	$0	$0
9/7/1980	12:00 p.m.	Irving	0 kts	0	0	$0	$0
9/16/1980	5:50 p.m.	Hillsboro	0 kts	0	0	$0	$0
6/15/1982	1:50 p.m.	Litchfield	0 kts	0	0	$0	$0
7/21/1982	5:00 p.m.	Hillsboro	0 kts	0	0	$0	$0
3/15/1984	7:08 p.m.	Raymond	0 kts	0	0	$0	$0
6/23/1985	2:05 p.m.	Hillsboro	56 kts	0	0	$0	$0
11/19/1985	3:33 p.m.	Walshville	52 kts	0	0	$0	$0
9/29/1986	3:45 p.m.	Coffeen	57 kts	0	0	$0	$0
9/29/1986	4:10 p.m.	Donnellson	57 kts	0	0	$0	$0
6/2/1987	3:55 p.m.	Litchfield	0 kts	0	0	$0	$0
7/6/1987	3:10 p.m.	Litchfield	0 kts	0	0	$0	$0
3/24/1988	10:49 p.m.	Irving	0 kts	0	0	$0	$0
4/5/1988	7:00 p.m.	Raymond	52 kts	0	0	$0	$0
5/9/1990	6:15 p.m.	Irving	0 kts	0	0	$0	$0
6/22/1990	8:00 p.m.	Irving	0 kts	0	0	$0	$0
7/1/1991	6:15 p.m.	Nokomis	0 kts	0	0	$0	$0
7/1/1991	6:15 p.m.	Litchfield	0 kts	0	0	$0	$0
7/2/1992	6:00 p.m.	Litchfield	0 kts	0	0	$0	$0
7/2/1992	7:45 p.m.	Litchfield	56 kts	0	0	$0	$0
9/9/1992	6:49 p.m.	Nokomis	0 kts	0	0	$0	$0

Table 1
Thunderstorm & High Wind Events Reported in Montgomery County
1956 through 2008

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
8/19/1993	5:55 p.m.	Litchfield	0 kts	0	0	$0	$0
8/19/1993	6:15 p.m.	Hillsboro	0 kts	0	0	$0	$0
8/19/1993	6:35 p.m.	Hillsboro	0 kts	0	0	$0	$0
4/26/1994	8:40 p.m.	Hillsboro	0 kts	0	0	$0	$0
4/26/1994	9:18 p.m.	Litchfield/ Hillsboro	0 kts	0	0	$0	$0
4/26/1994	9:40 p.m.	Nokomis	0 kts	0	0	$0	$0
11/20/1994	7:40 p.m.	Hillsboro	0 kts	0	0	$0	$0
11/27/1994	1:04 p.m.	Witt	0 kts	1	0	$3,000	$0
4/18/1995	9:30 a.m.	countywide	52 kts*	0	0	$400,000†	$0
5/27/1995	5:17 p.m.	Hillsboro	0 kts	0	0	$10,040	$0
6/8/1995	7:07 a.m.	Raymond	0 kts	0	0	$0	$0
6/8/1995	7:13 a.m.	Harvel	61 kts	0	0	$0	$0
7/22/1995	11:30 a.m.	Walshville	0 kts	0	0	$3,000	$0
7/22/1995	11:48 a.m.	Coffeen	0 kts	0	0	$8,000	$0
7/25/1995	9:15 p.m.	Raymond	0 kts	0	0	$0	$0
7/25/1995	9:24 p.m.	Raymond	0 kts	0	0	$0	$0
12/19/1995	2:00 a.m.	Litchfield	0 kts*	0	0	$0	$5,000
1/18/1996	9:55 a.m.	Nokomis	50 kts	0	0	$0	$0
5/25/1996	7:00 p.m.	Waggoner	55 kts	0	0	$0	$0
10/22/1996	2:00 p.m.	Coffeen	50 kts	0	0	$0	$0
4/30/1997	1:00 p.m.	countywide	45 kts*	0	0	$0	$0
5/22/1998	8:30 a.m.	Farmersville	55 kts	0	0	$0	$0
6/14/1998	6:10 a.m.	Hillsboro	55 kts	0	0	$0	$0
6/14/1998	7:00 p.m.	Farmersville	60 kts	0	0	$0	$0
6/18/1998	8:14 p.m.	Waggoner	52 kts	0	0	$0	$0
6/18/1998	8:30 p.m.	Litchfield	52 kts	0	0	$0	$0
6/18/1998	8:53 p.m.	Raymond	52 kts	0	0	$0	$0
6/18/1998	9:00 p.m.	Butler	55 kts	0	0	$0	$0
6/18/1998	9:00 p.m.	Farmersville	55 kts	0	0	$0	$0
6/18/1998	9:00 p.m.	Waggoner	55 kts	0	0	$0	$0
6/29/1998	5:00 p.m.	Farmersville	55 kts	0	0	$0	$0
6/29/1998	5:20 p.m.	Hillsboro	55 kts	0	0	$0	$0

* Denotes High Wind Event.

† The property damage total of $400,000 for the high winds on April1 18, 1995 represents losses sustained in 16 counties (including Montgomery County). A breakdown by county was not available.

Table 1
Thunderstorm & High Wind Events Reported in Montgomery County
1956 through 2008

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
11/10/1998	4:55 a.m.	Farmersville	58 kts	0	0	$0	$0
11/10/1998	5:03 a.m.	Hillsboro	56 kts	0	0	$0	$0
4/8/1999	9:22 p.m.	Walshville	60 kts	0	0	$0	$0
4/8/1999	9:25 p.m.	Panama	60 kts	0	0	$0	$0
7/5/2000	4:50 p.m.	Hillsboro	52 kts	0	0	$0	$0
7/5/2000	4:50 p.m.	Raymond	52 kts	0	0	$0	$0
8/22/2000	10:05 p.m.	Coffeen	55 kts	0	0	$0	$0
8/22/2000	10:30 p.m.	Coffeen	55 kts	0	0	$0	$0
3/13/2001	9:00 a.m.	countywide	45 kts*	0	0	$0	$0
7/17/2001	5:40 p.m.	Irving	51 kts	0	0	$0	$0
7/17/2001	6:08 p.m.	Hillsboro	55 kts	0	0	$0	$0
7/17/2001	6:15 p.m.	Panama	52 kts	0	0	$0	$0
8/2/2001	6:50 p.m.	Hillsboro	52 kts	0	0	$0	$0
10/24/2001	12:45 p.m.	Hillsboro	55 kts	0	0	$0	$0
5/1/2002	12:20 p.m.	Litchfield	61 kts	0	0	$0	$0
5/1/2002	12:28 p.m.	Panama	55 kts	0	0	$0	$0
6/11/2002	3:35 p.m.	Litchfield	55 kts	0	0	$0	$0
6/11/2002	3:39 p.m.	Hillsboro	55 kts	0	0	$0	$0
7/9/2002	5:45 p.m.	Hillsboro	55 kts	0	0	$0	$0
7/9/2002	5:47 p.m.	Taylor Springs	55 kts	0	0	$0	$0
7/9/2002	5:50 p.m.	Nokomis	55 kts	0	0	$0	$0
7/9/2002	5:55 p.m.	Coffeen	55 kts	0	0	$0	$0
7/9/2002	6:00 p.m.	Fillmore	55 kts	0	0	$0	$0
5/18/2004	3:35 p.m.	Litchfield	55 kts	0	0	$0	$0
5/24/2004	11:34 p.m.	Litchfield	52 kts	0	0	$0	$0
5/24/2004	11:35 p.m.	Raymond	55 kts	0	0	$0	$0
5/24/2004	11:40 p.m.	Harvel	55 kts	0	0	$0	$0
5/24/2004	11:50 p.m.	Nokomis	55 kts	0	0	$0	$0
5/24/2004	11:50 p.m.	Witt	55 kts	0	0	$0	$0
5/30/2004	4:57 p.m.	Litchfield	70 kts	0	0	$0	$0
5/31/2004	7:05 p.m.	Litchfield	61 kts	0	0	$0	$0
5/31/2004	7:20 p.m.	Nokomis	55 kts	0	0	$0	$0
5/31/2004	7:30 p.m.	Nokomis	55 kts	0	0	$0	$0
7/5/2004	9:35 a.m.	Witt	55 kts	0	0	$0	$0
8/25/2004	5:45 p.m.	Raymond	55 kts	0	0	$0	$0

* Denotes High Wind Event.

Table 1
Thunderstorm & High Wind Events Reported in Montgomery County
1956 through 2008

Date	Time	Location	Magnitude (Knots)	Injuries	Death	Property Damage	Crop Damage
5/11/2005	7:20 p.m.	Taylor Springs	51 kts	0	0	$0	$0
5/11/2005	7:27 p.m.	Litchfield	51 kts	0	0	$0	$0
5/11/2005	7:40 p.m.	Donnellson	51 kts	0	0	$100,000	$0
5/11/2005	7:40 p.m.	Hillsboro	51 kts	0	0	$100,000	$0
5/11/2005	7:40 p.m.	Taylor Springs	51 kts	0	0	$75,000	$0
5/11/2005	7:45 p.m.	Coffeen	51 kts	0	0	$75,000	$0
6/10/2005	8:15 p.m.	Litchfield	50 kts	0	0	$0	$0
6/13/2005	5:10 p.m.	Litchfield	55 kts	0	0	$0	$0
6/13/2005	5:30 p.m.	Butler	55 kts	0	0	$0	$0
6/13/2005	5:30 p.m.	Raymond	55 kts	0	0	$0	$0
6/13/2005	6:00 p.m.	Irving	55 kts	0	0	$0	$0
6/13/2005	6:15 p.m.	Nokomis	55 kts	0	0	$0	$0
5/24/2006	3:05 p.m.	Farmersville	56 kts	0	0	$0	$0
5/24/2006	4:00 p.m.	Nokomis	52 kts	0	0	$0	$0
6/17/2006	2:28 p.m.	Litchfield	50 kts	0	0	$0	$0
8/16/2007	10:20 a.m.	Farmersville	52 kts	0	0	$0	$0
8/16/2007	10:30 a.m.	Litchfield	61 kts	0	0	$0	$0
5/2/2008	8:15 a.m.	Farmersville	52 kts	0	0	$0	$0
5/2/2008	8:15 a.m.	Litchfield	56 kts	0	0	$0	$0
5/2/2008	8:40 a.m.	Hillsboro	52 kts	0	0	$0	$0
5/11/2008	5:00 a.m.	countywide	43 kts*	0	0	$750,000	$2,000
7/12/2008	3:35 p.m.	Hillsboro	52 kts	0	0	$0	$0
8/5/2008	5:45 p.m.	Litchfield	61 kts	0	0	$0	$0
8/5/2008	5:55 p.m.	Walshville	65 kts	0	0	$0	$0
Totals:				**1**	**0**	**$1,524,040†**	**$7,000**

* Denotes High Wind Event.

† The property damage total of $400,000 for the high winds on April1 18, 1995 represents losses sustained in 16 counties (including Montgomery County). A breakdown by county was not available.

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

Dennis Fenton, State Farm Insurance Agent, property damage estimates for select thunderstorm & high wind events, provided on June 25, 2009.

Table 2
Hail Events Reported in Montgomery County
1968 through 2008

Date	Time	Location	Magnitude (Diameter)	Injuries	Death	Property Damage	Crop Damage
6/15/1968	3:00 p.m.	Walshville	1.75 in.	0	0	$0	$0
7/14/1974	8:30 p.m.	Raymond	0.75 in.	0	0	$0	$0
3/20/1976	12:32 p.m.	Litchfield	0.75 in.	0	0	$0	$0
6/7/1982	6:25 p.m.	Fillmore	1.75 in.	0	0	$0	$0
7/10/1986	2:33 p.m.	Litchfield	0.75 in.	0	0	$0	$0
7/6/1987	4:30 p.m.	Litchfield	2.00 in.	0	0	$0	$0
5/25/1989	12:53 p.m.	Litchfield	2.50 in.	0	0	$0	$0
6/17/1990	7:00 p.m.	Litchfield	0.75 in.	0	0	$0	$0
5/6/1993	2:15 p.m.	Raymond	1.75 in.	0	0	$0	$0
8/19/1993	5:17 p.m.	Raymond	0.75 in.	0	0	$0	$0
8/19/1993	6:15 p.m.	Hillsboro	0.75 in.	0	0	$0	$0
6/20/1994	3:15 p.m.	Litchfield	1.00 in.	0	0	$0	$0
6/23/1995	2:06 p.m.	Coffeen	0.88 in.	0	0	$0	$0
7/25/1995	9:05 p.m.	Hillsboro	0.88 in.	0	0	$0	$0
4/18/1997	9:30 p.m.	Harvel	0.75 in.	0	0	$0	$0
5/12/1998	7:45 p.m.	Farmersville	0.75 in.	0	0	$0	$0
5/12/1998	9:30 p.m.	Nokomis	0.75 in.	0	0	$0	$0
5/12/1998	10:02 p.m.	Litchfield	1.75 in.	0	0	$0	$0
5/12/1998	10:16 p.m.	Hillsboro	1.75 in.	0	0	$0	$0
6/18/1998	8:53 p.m.	Raymond	1.00 in.	0	0	$0	$0
10/29/1998	6:47 p.m.	Litchfield	1.00 in.	0	0	$0	$0
4/20/2000	7:52 a.m.	Litchfield	0.75 in.	0	0	$0	$0
5/12/2000	4:44 p.m.	Litchfield	0.75 in.	0	0	$0	$0
5/12/2000	5:00 p.m.	Litchfield	1.75 in.	0	0	$0	$0
5/12/2000	5:01 p.m.	Hillsboro	1.00 in.	0	0	$0	$0
8/22/2000	9:39 p.m.	Litchfield	0.75 in.	0	0	$0	$0
8/23/2000	8:10 p.m.	Witt	0.88 in.	0	0	$0	$0
8/23/2000	8:20 p.m.	Irving	2.75 in.	0	0	$0	$50,000
8/23/2000	8:45 p.m.	Chapman	1.75 in.	0	0	$0	$0
8/23/2000	8:47 p.m.	Fillmore	1.75 in.	0	0	$0	$0
9/3/2000	2:50 p.m.	Nokomis	1.75 in.	0	0	$0	$0
8/18/2001	3:05 p.m.	Farmersville	0.88 in.	0	0	$0	$0
4/12/2002	1:19 p.m.	Nokomis	0.88 in.	0	0	$0	$0
4/12/2002	1:25 p.m.	Nokomis	0.88 in.	0	0	$0	$0

Table 2
Hail Events Reported in Montgomery County
1968 through 2008

Date	Time	Location	Magnitude (Diameter)	Injuries	Death	Property Damage	Crop Damage
4/24/2002	1:32 p.m.	Litchfield	1.00 in.	0	0	$0	$0
4/24/2002	1:40 p.m.	Litchfield	0.75 in.	0	0	$0	$0
4/24/2002	1:54 p.m.	Hillsboro	0.75 in.	0	0	$0	$0
4/24/2002	1:55 p.m.	Taylor Springs	0.75 in.	0	0	$0	$0
4/24/2002	2:07 p.m.	Coffeen	1.00 in.	0	0	$0	$0
5/1/2002	12:20 p.m.	Litchfield	1.75 in.	0	0	$0	$0
5/1/2002	12:41 p.m.	Coffeen	1.00 in.	0	0	$0	$0
5/1/2002	2:12 p.m.	Farmersville	1.00 in.	0	0	$0	$0
4/4/2003	2:34 p.m.	Litchfield	0.88 in.	0	0	$0	$0
4/4/2003	2:36 p.m.	Hillsboro	0.75 in.	0	0	$0	$0
4/4/2003	4:14 p.m.	Litchfield	0.75 in.	0	0	$0	$0
5/9/2003	7:55 p.m.	Farmersville	0.75 in.	0	0	$0	$0
5/10/2003	7:35 a.m.	Litchfield	0.75 in.	0	0	$0	$0
5/18/2004	3:30 p.m.	Hillsboro	0.75 in.	0	0	$0	$0
5/30/2004	3:40 p.m.	Hillsboro	1.75 in.	0	0	$0	$0
5/30/2004	3:45 p.m.	Donnellson	1.25 in.	0	0	$0	$0
7/22/2004	1:45 p.m.	Nokomis	0.88 in.	0	0	$0	$0
10/18/2004	1:55 p.m.	Litchfield	1.00 in.	0	0	$0	$0
10/18/2004	2:05 p.m.	Litchfield	1.75 in.	0	0	$0	$0
10/18/2004	5:10 p.m.	Walshville	0.75 in.	0	0	$0	$0
10/18/2004	5:20 p.m.	Hillsboro	1.75 in.	0	0	$0	$0
10/18/2004	5:33 p.m.	Litchfield	1.75 in.	0	0	$0	$0
3/31/2005	4:34 p.m.	Donnellson	0.88 in.	0	0	$0	$0
3/31/2005	4:40 p.m.	Witt	0.88 in.	0	0	$0	$0
3/31/2005	4:45 p.m.	Nokomis	1.00 in.	0	0	$0	$0
3/31/2005	4:45 p.m.	Witt	0.75 in.	0	0	$0	$0
5/11/2005	7:20 p.m.	Litchfield	1.00 in.	0	0	$0	$0
5/11/2005	7:25 p.m.	Honey Bend	1.00 in.	0	0	$0	$0
5/11/2005	7:45 p.m.	Irving	0.88 in.	0	0	$0	$0
5/11/2005	7:50 p.m.	Irving	1.00 in.	0	0	$0	$0
11/5/2005	10:20 p.m.	Litchfield	0.75 in.	0	0	$0	$0
2/16/2006	3:40 p.m.	Hillsboro	1.50 in.	0	0	$0	$0
2/16/2006	4:15 p.m.	Fillmore	1.00 in.	0	0	$0	$0

Table 2
Hail Events Reported in Montgomery County
1968 through 2008

Date	Time	Location	Magnitude (Diameter)	Injuries	Death	Property Damage	Crop Damage
4/16/2006	1:45 p.m.	Taylor Springs	1.00 in.	0	0	$0	$0
4/16/2006	1:55 p.m.	Fillmore	0.75 in.	0	0	$0	$0
4/16/2006	2:35 p.m.	Coffeen	0.88 in.	0	0	$0	$0
4/30/2006	2:40 p.m.	Irving	1.00 in.	0	0	$0	$0
7/18/2006	5:35 a.m.	Nokomis	1.00 in.	0	0	$0	$0
7/18/2006	6:40 a.m.	Litchfield	1.00 in.	0	0	$0	$0
7/18/2006	6:50 a.m.	Litchfield	0.88 in.	0	0	$0	$0
3/1/2007	11:51 a.m.	Litchfield	1.00 in.	0	0	$0	$0
4/3/2007	11:05 a.m.	Hillsboro	0.75 in.	0	0	$0	$0
6/1/2007	7:18 p.m.	Litchfield	0.75 in.	0	0	$0	$0
10/18/2007	3:40 p.m.	Nokomis	1.00 in.	0	0	$0	$0
2/3/2008	4:25 p.m.	Litchfield	1.00 in.	0	0	$0	$0
4/25/2008	6:15 p.m.	Litchfield	0.88 in.	0	0	$0	$0
4/25/2008	6:25 p.m.	Litchfield	0.75 in.	0	0	$0	$0
6/27/2008	2:06 p.m.	Coffeen	0.75 in.	0	0	$0	$0
7/11/2008	4:50 p.m.	Litchfield	1.50 in.	0	0	$0	$0
Totals:				**0**	**0**	**$0**	**$50,000**

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

Table 3
Lightning Events Reported in Montgomery County
1996 through 2008

Date	Time	Location	Injuries	Death	Property Damage	Crop Damage
5/3/1996	10:30 p.m.	Waggoner	0	0	$80,000	$0
7/9/2002	5:45 p.m.	Hillsboro	1	0	$150,000	$0
1/3/2006	NA	Hillsboro	0	0	$260,000	$0
8/5/2008	NA	Hillsboro	0	0	$3,200	$0
Totals:			**1**	**0**	**$493,200**	**$0**

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

Dennis Fenton, State Farm Insurance Agent, property damage estimate for July 9, 2002 lightning event, provided on June 25, 2009.

Gary Satterlee, Hillsboro Police Chief, Hillsboro property damage insurance claim amount from August 5, 2008 lightning strike, provided January 27, 2010.

Terry Bone, County Board Member, Montgomery County property damage insurance claim from January 3, 2006 lightning strike, provided January 27, 2010.

Table 4
Heavy Rain Events Reported in Montgomery County
2003 through 2008

Date	Time	Location	Injuries	Death	Property Damage	Crop Damage
11/17/2003	7:00 a.m.	countywide	0	0	$100,000	$0
1/5/2005	10:00 a.m.	countywide	0	0	$100,000	$0
Totals:			**0**	**0**	**$200,000**	**$0**

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

Dennis Fenton, State Farm Insurance Agent, property damage estimates for select heavy rain events, provided on June 25, 2009.

Table 5
Tornadoes Reported in Montgomery County
1950 through 2008

Date	Time	Location	Magnitude (Fujita Scale)	Injuries	Deaths	Property Damage
1/3/1950	11:55 a.m.	Fillmore*	F3	3	0	$250,000
11/15/1955	3:35 p.m.	Schram City*	F1	0	0	$25,000
4/28/1956	11:30 p.m.	Litchfield*	F1	0	2	$25,000
8/4/1959	6:15 a.m.	Raymond Irving*	F2	0	0	unknown
10/10/1959	5:15 p.m.	Coffeen	F2	0	0	unknown
3/6/1961	2:05 a.m.	Litchfield* Irving* Nokomis*	F1	1	0	$500,000
4/2/1964	7:45 p.m.	Farmersville*	F2	4	0	$25,000
8/10/1974	1:50 p.m.	Litchfield	F2	0	0	$3,000
3/20/1976	12:05 a.m.	Farmersville*	F3	4	0	$250,000
5/12/1978	4:20 p.m.	Farmersville*	F2	0	0	$250,000
4/13/1987	7:30 a.m.	Nokomis*	F1	0	0	$25,000
4/22/1988	5:39 p.m.	Raymond	F0	0	0	$0
5/12/1990	5:05 p.m.	Walshville	F2	0	0	$250,000
8/19/1993	5:12 p.m.	Litchfield*	F0	0	0	$0
5/9/1995	5:38 p.m.	Old Ripley*	F0	0	0	$0
5/9/1995	6:00 p.m.	Irving	F0	0	0	$0
5/9/1995	6:15 p.m.	Nokomis*	F1	0	0	$8,000
2/26/1996	6:15 p.m.	Farmersville	F0	0	0	unknown
4/30/1997	2:05 p.m.	Raymond*	F0	0	0	$0
5/12/1998	9:16 p.m.	Witt*	F0	0	0	$0
6/1/1999	5:58 p.m.	Farmersville* Raymond*	F3	4	1	unknown
6/1/1999	6:11 p.m.	Harvel*	F0	0	0	$0
6/20/2000	1:40 p.m.	Donnellson* Fillmore	F0	0	0	unknown
4/12/2005	1:07 p.m.	Waggoner*	F0	0	0	$0
4/2/2006	4:41 p.m.	Walshville*	F0	0	0	$0
4/2/2006	4:50 p.m.	Hillsboro	F2	0	0	unknown
4/2/2006	4:56 p.m.	Farmersville*	F1	0	0	unknown
5/24/2006	3:05 p.m.	Farmersville*	F1	0	0	$100,000
Totals:				**16**	**3**	**$1,711,000**

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

Sources: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

NOAA, National Weather Service, Weather Forecast Office, Climatology & Weather Records, Montgomery County, Illinois, 2009.

Table 6
Severe Winter Storm Events Reported in Montgomery County
1995 through 2008

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
1/6/1995	2:00 a.m.	Glaze Ice ice accumulations ranged from ¼ & ¾ inch	0	0	$4,500*
1/8/1997	6:00 p.m.	Winter Storm 5” – 8” snow; blowing snow, low temperatures & very low wind chills	0	0	$0
1/15/1997	11:00 p.m.	Winter Storm freezing rain & sleet, 3” – 7” snow	0	0	$0
4/10/1997	8:00 a.m.	Winter Storm 4” – 6” heavy, wet snow	0	0	$0
1/12/1998	2:00 a.m.	Winter Storm freezing drizzle	0	0	$0
12/21/1998	12:00 a.m.	Winter Storm freezing drizzle, sleet & snow, low temperatures	0	0	$0
1/1/1999	6:00 p.m.	Winter Storm 1” freezing rain & sleet, 6” – 14” snow, low temperatures	0	0	$0
1/13/1999	4:30 a.m.	Ice Storm ≤ ¼” coating of ice	0	0	$0
1/28/2000	6:00 p.m.	Winter Storm 3” – 5” snow	0	0	$0
3/11/2000	5:00 a.m.	Winter Storm 3” snow	0	0	$0
12/13/2000	6:00 a.m.	Heavy Snow 6” – 10” snow, low temperatures & very low wind chills	0	0	$0
1/26/2001	1:00 a.m.	Winter Storm freezing rain	0	0	$0
3/25/2002	6:00 p.m.	Winter Storm 1” sleet, 3” – 4” snow	0	0	$0
12/24/2002	6:00 a.m.	Winter Storm 4” – 8” snow	0	0	$0
2/23/2003	5:00 p.m.	Winter Storm 3” – 6” snow	0	0	$0

* The property damage total of $4,500 for the glaze ice event on January 6, 1995 represents losses sustained in 8 counties (including Montgomery County). A breakdown by county was not available.

Table 6
Severe Winter Storm Events Reported in Montgomery County
1995 through 2008

Date	Time	Event (Magnitude)	Injuries	Death	Property Damage
12/13/2003	12:00 p.m.	Winter Storm 2” – 3” snow	0	0	$0
1/25/2004	6:00 a.m.	Winter Storm ¼” to ½” freezing rain, 1” – 2” sleet, 1” – 2” snow	0	0	$0
12/8/2005	10:00 a.m.	Winter Storm 2” – 5” snow	0	0	$0
11/29/2006 thru 12/1/2006	10:00 p.m.	Winter Storm 12” snow	0	0	$455,000
1/12/2007	10:00 p.m.	Ice Storm low temperatures, ice accumulations ranged from ¼” to ½”	0	0	$500,000
2/13/2007	12:00 a.m.	Heavy Snow 6” – 10” snow	0	0	$0
12/6/2007	12:00 p.m.	Winter Storm 2” – 4” snow	0	0	$0
12/8/2007	11:00 p.m.	Winter Storm freezing rain; ice accumulations ranged from ⅛” to ¼”	0	0	$0
12/15/2007	6:00 a.m.	Heavy Snow 8” snow	0	0	$0
1/31/2008 thru 2/1/2008	12:00 p.m.	Heavy Snow 11” snow	0	0	$0
2/11/2008	10:00 a.m.	Winter Storm freezing rain & sleet	0	0	$0
Totals:			**0**	**0**	**$959,500***

* The property damage total of $4,500 for the glaze ice event on January 6, 1995 represents losses sustained in 8 counties (including Montgomery County). A breakdown by county was not available.

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

Dennis Fenton, State Farm Insurance Agent, property damage estimates for select severe winter storm events, provided on June 25, 2009.

Diana Holmes, Montgomery County Emergency Management Agency Coordinator, damage estimates for select severe winter storm events, provided on July 1, 2009.

Table 7
Extreme Heat Events Reported in Montgomery County
1995 through 2008

Date	Temperature (°F)	Heat Index (°F)	Impacts (Severity)
7/11/1995 thru 7/17/1995	near 100°F	approx. 120°F	2 heat-related deaths and 95 heat-related injuries*; roads buckling; crop damage
7/28/1995 thru 7/31/1995	unavailable	110°F	30 heat-related injuries*; property damage and crop damage
8/9/1995 thru 8/24/1995	near 100°F	≥ 110°F	2 heat-related deaths and 97 heat-related injuries*; crop damage
7/18/1999 thru 7/31/1999	middle to upper 90s with a few days topping 100°F	105°F - 115°F	8 heat-related deaths and 119 heat-related injuries*
7/7/2001 thru 7/10/2001	middle to upper 90s	105°F – 110°F	
7/17/2001	lower to middle 90s	110°F - 115°F	
7/29/2001 thru 8/2/2001	lower to middle 90s	105°F – 110°F	
8/7/2001 thru 8/9/2001	lower to upper 90s	102°F – 110°F	
8/21/2001 thru 8/22/2001	middle 90s to 100°F	105°F – 110°F	
7/8/2002 thru 7/9/2002	middle to upper 90s	105°F – 110°F	
7/20/2002 thru 7/22/2002	middle to upper 90s	105°F - 115°F	
7/26/2002 thru 8/6/2002	middle to upper 90s	105°F - 115°F	

* The heat-related deaths and injuries reported did not occur in Montgomery County. The data provided for each event covers multiple counties. The injuries and deaths reported took place in St. Clair and Madison Counties (St. Louis metropolitan area).

Table 7
Extreme Heat Events Reported in Montgomery County
1995 through 2008

Date	Temperature (°F)	Heat Index (°F)	Impacts (Severity)
8/15/2003 thru 8/21/2003	middle to upper 90s	105°F – 110°F	early school dismissals and school closings
8/24/2003 thru 8/28/2003	middle 90s to 100°F	105°F – 110°F	1 heat-related death†
7/20/2004 thru 7/22/2004	lower to middle 90s	105°F – 110°F	
7/20/2005 thru 7/26/2005	upper 90s to 100°F	105°F – 121°F	1 heat-related death†
7/17/2006 thru 7/21/2006	middle 90s to 100°F	100°F – 110°F	
7/30/2006 thru 8/2/2006	upper 90s to 100°F	105°F – 110°F	1 heat-related death†
8/5/2007 thru 8/16/2007	middle 90s to 100°F	105°F – 110°F	3 heat-related deaths†; early school dismissals

† The heat-related deaths reported did not occur in Montgomery County. The data provided for each event covers multiple counties. The deaths reported took place in either St. Clair or Madison Counties (St. Louis metropolitan area).

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

Table 8
Flash Flooding Events Reported in Montgomery County
1994 through 2008

Date	Time	Location	Magnitude (inches)	Injuries	Death	Property Damage
4/11/1994	5:00 p.m.	countywide	1.40" – 5.28"	0	1	$50,000,000*
5/9/1995	6:44 p.m.	Nokomis/ Witt	not available	0	0	$800
8/4/1998	8:30 p.m.	countywide	3" – 7"	0	0	$0
5/7/2002	3:30 p.m.	countywide	2" – 4"	0	0	$0
5/12/2002	6:00 p.m.	countywide	not available	0	0	$0
5/27/2004	4:30 p.m.	countywide	2" – 3"	0	0	$0
2/5/2008	5:45 p.m.	Raymond	2" – 3"	0	0	$0
6/3/2008	6:07 p.m.	Waggoner	2"	0	0	$1,000
9/13/2008	11:00 p.m.	countywide	3"	0	0	$1,000,000
12/28/2008	9:00 a.m.	countywide	2"	0	0	$0
Totals				**0**	**1**	**$51,001,800***

* The property damage total of $50,000,000 for the flash flooding on April 11, 1994 represents losses sustained in eight counties (including Montgomery County). A breakdown by county was not available.

Source: NOAA, National Environmental Satellite, Data & Information Service, National Climatic Data Center, Storm Events Database, Illinois, Montgomery County, 2009.

Ruben Boehler, Montgomery County Highway Engineer, damage estimates for select flood events, provided on June 17, 2009.

APPENDIX A

RESOLUTION #08- 08

RESOLUTION FOR PURSUIT OF THE PREPARATION OF A NATURAL HAZARD MITIGATION PLAN

WHEREAS; Montgomery County, Illinois would like to obtain grant money through the Disaster Mitigation Act of 2000, as money is available for Planning and Projects that can reduce or eliminate the damages caused by Natural Hazards such as; rain, snow, wind, ice storms, floods, drought and earthquakes; and

WHEREAS; Montgomery County, Illinois must prepare a Natural Hazard Mitigation Plan, before money can be released for projects; and

WHEREAS; this plan will include a listing of potential projects that can help reduce the damages caused by these storms; and

WHEREAS; Montgomery County will follow the next step in this process, which will be to prepare a grant application for the preparation of this plan.

NOW THEREFORE, BE IT RESOLVED; that the MONTGOMERY COUNTY BOARD does hereby pass this resolution to pursue the preparation of a Natural Hazard Mitigation Plan.

Passed this 8 th day of April, 2008.

Mike Plunkett, County Board Chairman

ATTEST:

Sandy Leitheiser, County Clerk and Recorder

APPENDIX B

Attendance Sheet
Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee
May 7, 2009

Signature	Organization/Entity
1. Barbara A Schmedeke	Hillsboro Area Ambulance Service
2. Emily L Botto	Village of Raymond
3. Diana Kohne	Montgomery Co EMA
4. George L Blankenship	Mont. Co. Bd.
5. Rick Robbins	Montgomery CO Sheriff's Office
6. Bill Deeds	Litchfield
7. Mike Reynolds	Montgomery County SWCD
8. [illegible]	City of Nokomis
9. Mary Purcell	Montgomery Co. GIS
10. Diane Hoots	CUS
11. Sandy Leitheiser	Montgomery County Clerk/Recorder/Public Info Officer
12. [illegible]	Montgomery County Health Dept.
13. Jacob Back	AMEREN
14. Dennis [illegible]	State Farm Ins - Hillsboro
15. ANDY RITCHIE	CITY OF LITCHFIELD/ADMINISTRATOR
16. KYLE BELZ	AMERICAN RED CROSS
17. JARED OWEN	IEMA
18. Terry Bone	Montgomery County Board - Coffeen Fire
19. BONNIE BRANUM	MONTGOMERY COUNTY BOARD
20. Ruben V. Boehler	Mont. Co. Hwy. Dept.
21. Dolores Wheelhouse	Mont County Health Dept
22. Amanda Cole	MCEDC/ U of I Extension
23. Andrea Bostwick	Johnson, Depp & Quisenberry
24. Greg R. Michaud	Johnson, Depp & Quisenberry

Attendance Sheet
Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee
June 25, 2009

	Signature	Organization/Entity
1.	Dolores Wheelhouse	Health Dept
2.	Terry Box	County Board / Coffeen Fire
3.	Allan Davis	Bond Co 9-1-1 / EMA
4.	Dennis Fenton	State Farm Ins
5.	[illegible]	City of Coffeen
6.	Mary Purcell	Montgomery Co. GIS
7.	Kyle Belz	Red Cross
8.	Ruben Boehler	Montgomery Co. Hwy
9.	Bill Deen	Litchfield
10.	Joe Gasparich	Noicomis
11.	Diane Hoots	State of IL - CMS
12.	Dennis Hild	Village of Raymond
13.	Kris Reynolds	MC SWCD
14.	Bill Baram	City of Hillsboro
15.	Jacob Bodi	AmerEn
16.	Betty Simmons	Montgomery Co 911
17.	Monica Millburg	RDE #10
18.	Peggy D. Nemmers	Mont Co 911 / Farmersville
19.	Barbara Schmedeke	Hillsboro Ambulance
20.	Rick Robbins	Montgomery Co Sheriff's office
21.	Linda Ritchie	Litchfield - administrator
22.	[illegible]	MCHD
23.	Gary Sattler	HPD
24.	Andrea Bostwick	JDQ
25.	Guy R. Michaud	JDQ

Attendance Sheet
Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee
September 17, 2009

	Signature	Organization/Entity
1.	Diane Hoots	State of Illinois - CMS
2.	Ruben Boehler	Montgomery County Hwy
3.	GERALD LANE	MONTGOMERY AMATURE RADIO
4.	FRANK E BEASLEY	WFTT FIRE DEPT
5.	Jim Engelman	Raymond PD
6.	Greg Nummer	Mont Co 911 / Farmersville
7.	Betty Simmons	Montgomery Co 911
8.	Terry Bone	Montgomery Co.
9.	Shelia D. White	City of COFFEEN
10.	Sandy Gieselhaver	County Clerk Recorder
11.	Mary Purcell	Mont. Co. GIS
12.	[illegible]	MCHD Hugh Saaterle
13.	[illegible]	MCSO Rick Robbins
14.	RITCHIE	LITCHFIELD
15.	Delores Wheelhouse	H.D
16.	Bill Dean	Litchfield
17.	Gary Sutherlen	Hillsboro Police Dept
18.	Diane Hahn	MCEMA
19.	Andrea Bostwick	JDQ
20.	Guy Michael	JDQ
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22.		
23.		
24.		

Attendance Sheet
Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee
January 14, 2010

	Signature	Organization/Entity
1.	Diane Hoots	CMS, State IL
2.	Eric Bath	Village of Raymond
3.	Dolores W Roelhoum	Health Dept
4.	Frank Beasley	WCTT
5.	[illegible] D. White	City of COFFEEN
6.	Jacob Bodi	AMEREN Illinois Utilities
7.	[illegible]	Montgomery Co.
8.	[illegible]	MCHD
9.	Jim Angelman	Raymond PD
10.	Sandy Lethman	Mont. Co.
11.	Andy Ritchey	Litchfield
12.	Gary Satterlee	Hillsboro P.D
13.	Barbara A Schmedeke	Hillsboro Ambulance
14.	Terry Bow	Montgomery County Board
15.	[illegible]	Montgomery county S.O.
16.	Mary Purcell	Montgomery Co. GIS
17.	Andrea Baturick	JDQ
18.	Guy R. Michaud	JDQ
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Attendance Sheet
Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee

Public Formum
June 17, 2010

Name (Please Print)	Organization/Entity
1. Diana Volmer	Montgomery Co EMA
2. Dolores Wheelhouse	Montgomery Co HEALTH Dept.
3. Andy Ritchie	Litchfield, Montgomery Co. / City Administrator
4. Bill Dees	" " " / Council
5. FRANK BEASLEY	Mitt Vol Fire Dept
6. SHEILA D. WHITE	COFFEEN COMMISSIONER
7. Mary Purcell	Montgomery County
8. Terry Bowe	Montgomery County
9. Ruben Boehler	Montgomery County
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Attendance Sheet
Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee

Public Formum
June 17, 2010

	Name (Please Print)	Organization/Entity
1.	Sandy Leitheiser	Montgomery County
2.	Gary Satterlee	Hillsboro Police
3.	JOE GASPARICH	NOKOMIS
4.	GREG MICHAUD	JCQ
5.	Andrea Bostwick	HRQ
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APPENDIX C

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

May 7, 2009
Montgomery County Public Health Department
10:00 a.m.

Meeting Minutes

Committee Members

Ameren
American Red Cross
Farmersville, Village of
Hillsboro Area Ambulance Service
IL Dept. of Central Management Services
IL Emergency Management Agency
Johnson, Depp & Quisenberry
Litchfield, Village of
Montgomery Co.
- Building & Grounds
- County Clerk
- Economic Development Corp.
- Emergency Management Agency
- Highway Dept.
- Geographic Information Systems
- Public Health Dept.
- Road & Bridges
- Sheriff's Office

Nokomis, Village of
Public Representatives
- Raymond
- Litchfield

Raymond, Village of
Soil & Water Conservation District
State Farm Insurance

Welcome and Introductions

Ruben Boehler, Chairman of the Montgomery County Multi-jurisdictional Natural Hazards Mitigation Planning Committee, welcomed attendees and asked the Committee members to introduce themselves by providing their name and who they represent.

Handout materials were distributed to each member.

What Is A Natural Hazard Mitigation Plan and Why Should We Prepare It?

Jared Owen, Hazard Mitigation Planner, for the Illinois Emergency Management Agency (IEMA) provided a power point presentation. He began his presentation by defining mitigation as an ongoing effort to lessen the impact disasters have on people and property from natural and man-made disasters. He noted that during the 1990s' over $25 billion was spent responding to damages caused by natural disasters. Jared discussed mitigation projects and activities and he emphasized that they can take many forms, such as:

Public Information Efforts
Flood Insurance
Land and property acquisition in flood prone areas (Since 1993, over 3,500 flood damaged homes have been purchased by IEMA.)
Building Codes
Land Use Planning
Structural Retrofits such as making bridges less vulnerable to earthquakes

Developing a Natural Hazard Mitigation Plan that is approved by IEMA and the Federal Emergency Management Agency (FEMA) will make Montgomery County and all participating municipalities eligible for funds to finance mitigation projects and activities.

The Mitigation Plan that will be prepared by the Montgomery County Mitigation Committee should 1) determine the natural risks to be addressed, 2) analyze ways to mitigate these risks, and 3) prioritize the mitigation projects and activities that are included in the Plan.

Jared stressed that the Committee should use this planning process to brainstorm potential mitigation projects and activities. While the costs and benefits of each mitigation project and activity should be considered, the planning process should primarily focus on how to prevent problems.

This planning process should not be viewed as a competition. There will be different ways to categorize the various projects and activities included in the Plan, but the municipalities are not competing with the County for mitigation funding.

The Planning Process

Greg Michaud, from Johnson, Depp & Quisenberry (an environmental and engineering consulting firm) commended the Committee members for committing their time to help prevent damages to life and property for the current and future residents of Montgomery County by participating in this process.

The purpose of the Committee meetings is to develop a Plan that can be adopted by the County and each participating municipality. Specific activities for the Committee meetings include:

1st Committee meeting	Orientation to the Planning Process Establish Risk Assessment Subcommittee

2nd Committee meeting	Discuss the Risk Assessment Develop the Mission Statement Establish Goals for the Plan
3rd Committee meeting	Develop Mitigation Strategy Identify Mitigation Projects and Activities
4th Committee meeting	Identify Mitigation Projects and Activities Draft Plan
5th Committee meeting	Final Plan

Natural hazards identified in the Plan include severe storms, flooding, tornados, severe winter storms, drought, extreme heat and earthquakes. When the Committee has completed the final version of the Plan, the County and each participating municipality will have the opportunity to formally adopt the Plan by resolution. After the County and each participating municipality adopts the Plan, they will become eligible for funding to implement the mitigation projects and activities identified in the Plan. Copies of each resolution will be appended to the Plan. The Plan will be monitored annually and updated every five years. Municipalities who decline to participate in the planning process may choose to participate when the Plan is updated.

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, Greg added that substitute representatives are acceptable. He pointed out that a mayor who wants to participate may not be able to attend because of other obligations; however, a substitute representative can be designated to participate in the Committee meetings.

Mission Statement

In the packet of materials distributed by Andrea Bostwick, there is a draft Mission Statement and examples of typical goals that can be found in these types of Plans. The draft Mission Statement can be changed. Committee members were asked to review this Statement and submit their comments to Greg or Andrea via e-mail or bring their comments to the next committee meeting.

What Happens Next?

Ruben reminded Committee members that risk assessment, goal setting, and the mission statement would be the main topics of the next committee meeting. Andrea and Greg are trained environmental risk assessors who will lead the risk assessment. Ruben asked for volunteers to work with Andrea and Greg on the risk assessment subcommittee. Dennis Fenton, Diana Holmes, Andy Ritchie and Bill Dees will work on this subcommittee.

The second meeting of the Committee was set for:

Thursday, June 25
10 a.m.
Montgomery County Public Health Department

In addition to considering the mission statement and potential goals for this Plan, committee members have the following three assignments:

1.) Repetitively-Flood Damaged Property. Greg directed committee members to the handout page titled "Tasks To Be Completed Before the 2nd Meeting." Although no repetitively-damaged flood properties are identified in IEMA files for Montgomery County, members are asked to report any properties that they are aware of that have suffered repeated flood damage.

2.) Public Displays. In addition to the use of news releases, information kiosks, and other methods to inform the public about this planning process, information will be displayed in various government offices. Members are asked to find out if display information about this planning process can be posted or made available where they work.

3.) Other Planning Documents. A one page form titled "List of Documents Relevant to the Natural Hazard Mitigation Plan," identifies over ten documents that should be reviewed as part of the process to prepare this Plan. Members are asked to fill out this form and, if appropriate, provide copies of any of the listed documents that may exist.

Public Comment

Although public notice of this committee meeting clearly invited public attendance, no other members of the general public outside of the designated public attended. Consequently, the meeting was adjourned.

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

June 25, 2009
Montgomery County Public Health Building
10:00 a.m.

Meeting Minutes

Committee Members

Ameren
American Red Cross
Coffeen, Village of
Farmersville, Village of
Hillsboro Area Ambulance Service
IL Dept. of Central Management Services
Johnson, Depp & Quisenberry
Litchfield, Village of
Montgomery Co.
- Building & Grounds
- Highway Dept.
- Geographic Information Systems
- Public Health Dept.
- Sheriff's Office
- 911

Nokomis, Village of
Public Representatives
- Bond County EMA
- Litchfield

Regional Office of Education
Raymond, Village of
Soil & Water Conservation District
State Farm Insurance

Welcome and Introductions

Ruben Boehler, Chairman of the Montgomery County Multi-jurisdictional Natural Hazards Mitigation Planning Committee, welcomed attendees and asked the Committee members to introduce themselves by providing their name and who they represent.

Handout materials were distributed to each member.

Review of Meeting Minutes

Meeting minutes from the May 7th Committee Meeting were distributed. Members reviewed the meeting minutes and no changes were requested.

Mission Statement

At the previous committee meeting, members were asked to evaluate a draft mission statement and bring their comments and suggestions to this meeting. Ruben Boehler asked if there were any changes or discussion about the mission statement. Hearing none, a motion was made to approve the mission statement. The committee unanimously agreed to approve the draft mission statement.

Risk Assessment

Andrea Bostwick and Greg Michaud, risk assessment specialists with Johnson, Depp & Quisenberry, worked with the Risk Assessment Subcommittee to prepare the natural hazards profile and frequency of occurrence materials for the Committee to review. The Risk Assessment Subcommittee consisted of Bill Dees, Dennis Fenton, Diana Holmes, and Andy Ritchie.

Greg provided a summary of these findings. The most frequently occurring natural hazard is severe storms which include thunderstorm, hail, lightening and heavy rain. Criterion used to determine whether these events are classified as "Severe" are described in the handout material. Two hundred and eleven of these storms were verified as impacting Montgomery County between 1956 and the beginning of 2009. Two Presidential declarations were made since 1980, the first in June, 1983, and the second in May, 2002. One injury, related to lightening, has been recorded in Montgomery County as a result of severe storms. Not deaths have been caused. Litchfield and the immediate vicinity have the largest number of recorded severe storms during this period at 55. One injury related to lightening was recorded.

Tornadoes, which can be spawned from severe storms, are classified as a separate natural hazard. Tornadoes appear to have caused the most deaths (3) and injuries (16) in Montgomery County along with the potential to cause the most property damage. Twenty-eight tornadoes have been recorded between 1950 and the beginning of 2009. One Presidential declaration was made since 1980 and it occurred in June, 1983.

Greg noted that a high incidence for one type of natural hazard impacting one area does not mean that there will be a similar high incidence for a related hazard. He noted that approximately 25% of all severe storms (55 of the 211) hit the Litchfield area while only about 6% of all severe storms (13 of the 211) hit the Farmersville area. Since tornadoes are often spawned as a result of a severe storm, one might conclude that the frequency of tornado occurrences for Litchfield and Farmersville would be similar to the frequency of severe storms. However, approximately 20% of all tornadoes (6 of the 28) hit the Farmersville area while approximately 10% of all tornadoes (3 of the 28) hit the Litchfield area.

Twenty-six severe winter storms have been verified. However, Greg cautioned that records for severe winter storms are lacking. Reported occurrences in the National Weather Service storm

event database only go back to 1995. No death and no injuries were reported, but there were probably unreported cases of frost bite and hypothermia. One Presidential declaration occurred in February, 2007. The Montgomery County EMA will be providing additional information about severe winter storms that will be added to these tables.

Occurrences of extreme heat, as with severe winter storms, are lacking between 1950 and the early 1990's. Nineteen events have been verified causing an unverified number of deaths, injuries, property and crop damage. Specific numbers of death caused by heat cannot be obtained because heat is not usually listed as the primary cause of death on death certificates. Health professionals recognize that heat can be an underlying cause. 1995 and 1999 were two of the worst years for this hazard.

Although no major river goes through or adjacent to the County, ten major events have been recorded, and one death caused by a flood has been verified. Property damages have exceeded 1 million and may be as high as 6 million. Crop damage estimates are still being researched by Kris Reynolds. Dennis Fenton provided additional damage estimates during the meeting that will be added to the tables. As other members provide any information they have, it will be added to the risk assessment and a revised risk assessment will be distributed to the Committee.

Before the vulnerability assessment can be completed, Committee members were asked to complete the **Critical Facilities Form**. A form for municipalities and a form for the county were provided. These forms should be completed and returned before the next committee meeting.

While no reported breaches of dams have been found for Montgomery County, Greg asked the Committee if they wanted this hazard included in their Plan. Three of the participating municipalities noted that they prepare reports on dams and they feel that this information should be included. The Committee concurred that dams should be included in the Plan.

Goals

Greg Michaud facilitated the group discussion about the goals for the Montgomery County Natural Hazards Mitigation Plan. Eight goals had been distributed at the previous meeting for the Committee's consideration. Rick Robbins suggested that an additional goal be established regarding communication between emergency services and other government offices. Greg Nimmo suggested that a conditional phrase relating to the National Incident Management System (NIMS) regulations be added to this additional goal. (NIMS is the national template to enable all government, private sector, and nongovernmental organizations to work together during domestic emergencies.) The Committee did not want any community that is not "NIMS certified" to be unintentionally excluded. Consequently, the phrase was adjusted and this new goal was added.

A motion was made to approve all nine goals. The Committee unanimously agreed to approve all nine goals (copy attached).

What Happens Next?

Greg announced that the purpose of the next committee meeting is to bring ideas for mitigation projects. Andrea included a Natural Hazard Mitigation Projects form along with examples in the handout materials that should help stimulate discussion about the types of projects that might be included. In response to a question about timeframes, Greg replied that there is no penalty if a project is not completed in the anticipated time nor is there penalty to the County or the participating municipalities if projects are not completed.

When developing mitigation projects and activities, Joe Gasparich cautioned the committee to carefully consider the aging infrastructure throughout Montgomery County. He also noted that while widespread flooding does not frequently occur, drainage issues negatively impact portions of roads. Water and blowing snow are frequent concerns that make road travel hazardous, and these concerns should be addressed through appropriate mitigation projects.

Dennis Fenton added that one of the primary causes of property damage that he sees is inadequate building construction. Compliance with building codes is an activity that can help substantially reduce property damage. Bill Dees supported this assertion by adding that adoption of building codes and enforcement must both occur or else the full benefit will not be gained. Andy Ritchie added that the International Building Code has unintended consequences, and that in our zeal to assemble lists of mitigation projects we should identify these consequences before submitting the lists for inclusion.

A project prioritization method is required by FEMA before the Plan can be approved. Andrea noted that this method calls for a categorization of the various projects. The County as well as each participating municipality will have to assign a priority for the projects they submit, but this prioritization method does not pit municipalities against each other or the County. A prioritization method will be drafted before the next meeting by the Prioritization Subcommittee. Volunteers for this Subcommittee include Joe Gasparich, Dolores Wheelhouse, Rick Robbins, and Andy Ritchie. Andrea and Greg will contact these members and work with them to help develop the method.

A citizen survey is available online at the County website, at the kiosk located on the first floor of the historic County courthouse, and through the Montgomery County Public Health Department. Dolores Wheelhouse noted that these surveys were first administered at the Litchfield Earth Day on May 16. The survey is also available at the Public Health Department and is being taken to Senior BP clinics through the Services for the Elderly program. Participation at other community events is likely but funding issues may reduce the number of community activities where the Public Health Department participates this year. Survey results will be tabulated by Johnson, Depp & Quisenberry and the results will be included in the Plan.

The third meeting of the Committee was set for:

Thursday, September 17
10 a.m.
Montgomery County Public Health Department

Public Comment

Although public notice of this committee meeting clearly invited public attendance, only one other member of the general public outside of the designated public attended and he did not have any question or comment. Consequently, the meeting was adjourned.

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee

Hazard Mitigation Goals

1. Educate people about the (natural) hazards they face and the ways they can protect themselves, their homes, and their businesses from those hazards.

2. Protect the lives, health, and safety of the people and animals in the County from the dangers of natural hazards.

3. Protect existing infrastructure and design new infrastructure (roads, bridges, utilities, water supplies, sanitary sewer systems, etc.) to be resilient to the impacts of natural hazards.

4. Incorporate natural hazard mitigation into community plans and regulations.

5. Place a priority on protecting public services, including critical facilities, utilities, roads and schools.

6. Preserve and protect the rivers and floodplains in our County.

7. Ensure that new developments do not create new exposures to damage from natural hazards.

8. Protect historic, cultural, and natural resources from the effects of natural hazards.

9. Ensure proper communication between emergency services and government organizations that comply with NIMS regulations.

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

September 17, 2009
Montgomery County Public Health Building
10:00 a.m.

Meeting Minutes

Committee Members

Coffeen, City of
Farmersville, Village of
Hillsboro, City of
IL Dept. of Central Management Services
Johnson, Depp & Quisenberry
Litchfield, City of
Montgomery Co.
- Roads & Bridges
- Clerk
- Emergency Management Agency
- Highway Dept.
- Geographic Information Systems
- Public Health Dept.
- Sheriff's Office
- 911

Public Representatives
- Litchfield
- Gerado Lane

Raymond, Village of
Witt, City of

Welcome and Introductions

Ruben Boehler, Chairman of the Montgomery County Multi-jurisdictional Natural Hazards Mitigation Planning Committee, welcomed attendees.

Handout materials were distributed to each member.

Review of Meeting Minutes

NOTE: In an effort to streamline committee meetings, Chairman Boehler had asked at the previous committee meeting that members submit any additions or corrections to the meeting minutes to Andrea Bostwick or Greg Michaud. No additions or corrections to the meeting

minutes from the previous committee meeting were provided. Consequently, those meeting minutes will be added to the Plan.

Critical Facilities and the Vulnerability Assessment

Greg Michaud thanked the Committee members for their work since the previous meeting. In addition to the work compiling the list of critical facilities and mitigation projects, Greg noted that Mary Purcell has been working on Geographic Information System compatible maps. These maps are required by FEMA to be included in the Plan. He held up a map showing the location of recorded tornadoes in Montgomery County since 1950. He also described the public surveys that measure public perceptions of natural hazards being gathered by Dolores Wheelhouse and Diana Holmes. The results of these surveys will be included in the Plan.

After summarizing the goals of today's meeting, Greg talked about the two forms needed before the rest of the Plan can be drafted. These are:

1. The handout titled "**Critical Facilities**" was distributed to the municipalities and the County at the previous committee meeting so that it could be completed and returned at this meeting. This form needs to be completed so that the Vulnerability Assessment can be prepared for the Plan.

2. A form titled "**Natural Hazard Mitigation Plan Projects**" was also distributed at the previous committee meeting. This form is needed so that the projects and activities that the municipalities and county are considering can be included in the Plan.

Mitigation Projects

Andrea Bostwick asked attendees to provide the Mitigation Projects forms distributed at the previous meeting.

Andrea announced a new FEMA requirement relating to the National Flood Insurance Program (NFIP). The requirement calls for mitigation activities to be conducted by those municipalities already in the NFIP so that they can remain in compliance. One of these activities is the municipalities' intention to adopt to the new Flood Insurance Rate Maps once they are developed. The other two activities involve making NFIP information that is downloadable from their website available to:

- municipal officials so that they will become more knowledgeable and consequently be better informed to help the public, and
- the public who contact their municipality with questions when they want to construct or renovate a building.

Andrea emphasized that each municipality should have at least one mitigation project. Mitigation projects can be added to the Plan after it is adopted. The Plan is a living document.

Project Prioritization Method

Greg began this part of the meeting by describing how a method had been developed based on experiences in other counties. A project prioritization method had been presented to the Montgomery County Prioritization Subcommittee following the previous committee meeting. He pointed out that two questions help determine which category to place a project or activity:

1. Does the project or activity ***eliminate*** or ***reduce*** impacts from a hazard?
2. Is the hazard considered ***more*** significant or ***less*** significant in Montgomery County?

Andy Richey noted that while the impacts of earthquakes are less frequent in Montgomery County than the other natural hazards identified in the risk assessment, the impacts of earthquakes are expected to be as severe if not more so than the impacts from these other natural hazards. Diane Hoots added that while the main impacts from a major earthquake may not be as severe in Montgomery County as they are expected to be in southern counties, hospitals in Montgomery County may be utilized to treat injuries and I-55 is expected to be a major transportation artery for moving persons away from the epicenter as well as bringing aid to where it is needed. Greg responded by explaining that Montgomery County will be ahead of other counties by placing projects in their Plan that are aimed at mitigating earthquakes. Even those projects and activities aimed at "less significant hazards" can be, and often are, implemented ahead of other projects.

He added that because of the concern expressed by other committee members, language will be added to the Plan that reflects the Committee's concern for the relative importance of earthquake projects. He cautioned that members of the general public will probably not share the Committee members' view that earthquake projects should be considered "priority" projects. Although the general public may express ambivalence or even disdain for earthquake mitigation projects, these projects can be included and implemented as part of Montgomery County's Plan because of the facts provided in the Risk Assessment.

Andrea showed how the Mitigation Projects will be entered into the Plan. Using a large-sized chart, she entered information using a project submitted by the Highway Department to demonstrate how each project and activity would be portrayed according to the goals, degree of mitigation, prioritization method, and other requirements. In response to a question, she responded that each project and activity submitted by the participating municipalities and county would be entered into this chart as part of the Plan.

What Happens Next?

Greg outlined the following activities:

- Draft Plan will be prepared for Committee Review at the next meeting (Meeting #4).
- Once the Committee provides their comments, and the Plan is revised, a Public Forum (Meeting #5) will be held to gather public comment. This meeting should be held in the evening.

- If needed, the Plan will be revised based on these public comments. In addition, comments from IEMA and FEMA will be incorporated into the Plan.
- The County and each participating municipality adopts the Plan by resolution.

Mitigation projects were submitted by Montgomery County; however, none of the participating municipalities submitted their lists. After discussing how much additional time the municipalities might need to get their mitigation project lists approved for submittal, the next Mitigation Committee meeting was scheduled for:

Thursday, January 14, 2010
10 a.m.
Montgomery County Public Health Department

Public Comment

Although public notice of this committee meeting clearly invited public attendance, only one other member of the general public outside of the designated public attended and he did not have any question or comment. Consequently, the meeting was adjourned.

Montgomery County Multi-Jurisdictional
Natural Hazards Mitigation Planning Committee Meeting

January 14, 2010
Montgomery County Public Health Building
10:00 a.m.

Meeting Minutes

Committee Members

Ameren
Coffeen, Village of
Hillsboro, City of
Hillsboro Area Ambulance Service
IL Dept. of Central Management Services
Johnson, Depp & Quisenberry (JDQ)
Litchfield, Village of
Montgomery Co.
- Board – Buildings & Grounds
- Clerk
- Highway Dept.
- Geographic Information Systems
- Public Health Dept.
- Sheriff's Office

Regional Office of Education
Raymond, Village of
Witt, City of

Welcome and Introductions
Ruben Boehler, Chairman of the Montgomery County Multi-jurisdictional Natural Hazards Mitigation Planning Committee, welcomed attendees and asked the Committee members to introduce themselves by providing their name and who they represent.

Handout materials were distributed to each member.

Review of Meeting Minutes
Meeting minutes from the September 17th Committee Meeting were distributed. As with previous meeting minutes, Ruben Boehler asked that any changes be submitted directly to Andrea Bostwick or Greg Michaud at JDQ.

Progress Recap
Greg Michaud provided an overview of the progress made since the Committee's third meeting in September.

- Numerous discussions have taken place among the participating municipalities and various County departments to clarify details of the mitigation projects submitted.
- Critical Facilities lists were used to complete the Vulnerability Assessment.

Mitigation Project Submittal & Action Table
With the materials distributed today, the Committee has now seen all of the key components of the Mitigation Plan.

The Montgomery Hazard Mitigation Actions were presented to the Committee for discussion.

Greg summarized how the risk assessment information, the critical facilities forms completed by the County and municipalities, and the mitigation prioritization strategy were used assemble the Mitigation Project Action Tables. The vulnerability assessment and the goals developed by the Committee at previous meetings are used to justify each mitigation action submitted by the County and participating municipalities.

Since this Plan is a living document, projects can be added after the Plan is adopted.

Any changes should be provided to Andrea and Greg so that they can prepare the draft Plan to be presented at a public forum later this spring.

Vulnerability Assessment
The Committee reviewed the Risk Assessment during the second Committee meeting on June 25, 2009. Today the Committee received the Vulnerability Assessment which utilizes the Critical Facilities information provided by the County and each participating municipality.

Since tax assessment/building information will not be available from the County Tax Assessor's office until at least March, one of the tables is yet to be completed. When this information becomes available, Andrea and Greg will complete the table along with the appropriate additions to the narrative.

Highlights of the Vulnerability Assessment included:

<u>Severe Storms</u>
- Additional research revealed that property damages were closer to $10 million.
- The highest number of these storms (thunderstorms, hail storms, lightning) occur in May.
- The number of verified storms in Litchfield and Hillsboro were about double the number of storms reported in other municipalities.
- From 12% to 14% of vehicle crashes are, in part, attributed to wet pavement.

Tornadoes

- Property damages were close to $3 million.
- April and May is when most Tornadoes occur.
- The Farmersville area had the highest number of verified tornadoes.

Severe Winter Storms

- From 5% to 14% of vehicle crashes are, in part, attributed to snowy and icy pavement.

Drought

- Hillsboro and Litchfield are the only two municipalities who rely on surface water to provide residents with their drinking water. Consequently, these are the only two municipalities with a higher vulnerability during drought.
- Crop yields were apparently reduced by the three most recent droughts.

Diane Hoots, Central Management Services, confirmed that no state facilities in Montgomery County have had flood or tornado damage during the last 50 years. Greg noted that damage to municipal and county facilities had not been identified in the surveys or during previous meetings other than the Walton Park Lake Dam. He asked if other critical facilities owned by local government have been damaged?

Committee members identified at least six instances when critical facilities had been impacted by storms. Several members will provide dates and the dollar damages to these facilities so that this information can be added to the Plan. Raymond representatives will further investigate damages in their town and forward information they find to Andrea and Greg.

When Greg asked about the availability of photos that show storm damage, the Hillsboro newspaper was suggested as a possible source. Several committee members who have photos will submit them for inclusion.

Bob Lentz at the Montgomery County Farm Bureau was suggested as a possible source of information on decreased crop yields that occurred during recent droughts.

Plan Review

The final Committee meeting will be conducted as a public forum where the entire Plan will be presented for public comment and review. This public forum will be conducted in an open-house style format. Residents can come and go at their convenience during the two-hour forum to ask questions and provide comment. The County, participating municipalities and JDQ will be represented.

Public comments will be used to make revisions to the Plan before it is submitted for formal review to IEMA/FEMA. Once these agencies approve the Plan, the municipalities can adopt it through resolution. Only those government participants who adopt the Plan can become eligible for state/federal funding. If any participant chooses not to adopt the Plan, it does not impair others who adopt the Plan from receiving grant money.

GIS compatible maps of Critical Facilities will be provide to IEMA/FEMA for their review. However, because of security concerns these maps will not be included in copies of the Plan that are publicly available. Andrea will provide a notation in the copies as a reminder of what can be copied in response to a public request.

What Happens Next?
Greg summarized the major milestones yet to be completed:

- Awaiting property tax information which is expected by the end of March. This information will be used to complete the vulnerability assessment.
- Once the Committee provides their comments, and the Plan is revised, a public forum (Meeting #5) will be held to gather public comment. The Committee members who want to see the rest of the Plan before it is presented to the public should contact Andrea or Greg and they will provide an electronic copy.
- If needed, the Plan will be revised based on these public comments. In addition, comments from IEMA and FEMA will be incorporated into the Plan.
- To become eligible for mitigation project funds, each participation municipality and the County must adopt the approved Plan through a resolution. These resolutions should be sent to Andrea and Greg.
- Anyone who wants to begin preparing grant applications may do so, but they should withhold submittal until after the Plan is adopted.

Ruben Boehler reminded the municipalities to provide their comments on the GIS compatible maps to him so that any necessary revisions can be made.

Meeting Schedule
The next (and final) meeting of the Committee will be a public forum where residents will be invited to review the entire Plan. This forum will be held:

Thursday, June 17
Montgomery County Public Health Department
5:00 to 7:00 p.m.

Public Comment
Although public notice of this committee meeting clearly invited public attendance, no member of the general public attended. Consequently, the meeting was adjourned.

APPENDIX D

Questionnaire
Montgomery County Natural Hazard Mitigation Plan

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:
   __ Unincorporated area of Montgomery County
   __ Butler
   __ Chapman
   __ Coalton
   __ Coffeen
   __ Farmersville
   __ Fillmore
   __ Honey Bend
   __ Hillsboro
   __ Irving
   __ Litchfield
   __ Nokomis
   __ Raymond
   __ Schram City
   __ Taylor Springs
   __ Waggoner
   __ Walshville
   __ Witt
   __ Other—please specify_____

2. In approximately the past 10 years, have you or someone in your household experienced a natural disaster within Montgomery County such as severe storms, tornadoes, extreme heat, winter storms, flood, earthquake, drought or other natural disaster?
   __ Yes
   __ No

   2a. If you answered yes to question #2, which of the following types of natural hazards have you or someone in your household experienced? (Please check all that apply)

   __ Severe Weather
   __ Floods
   __ Winter Storms
   __ Extreme Heat
   __ Tornadoes
   __ Earthquakes
   __ Drought
   __ Other—please specify _____

3. Using the scale below, check how prepared you feel for natural hazards likely to occur within Montgomery County.
   __ 1. Not at all prepared
   __ 2. Somewhat prepared
   __ 3. Adequately prepared
   __ 4. Well prepared
   __ 5. Very well prepared

4. What steps have you or someone in your household taken to prepare for a natural disaster? (Check all that apply)
   __ Food
   __ Water
   __ Flashlight
   __ Batteries
   __ Battery-powered radio
   __ Medical supplies (First Aid Kit)
   __ Practiced a fire escape plan
   __ Received First Aid/CPR training
   __ Fire extinguisher
   __ Discussed utility shutoffs
   __ Other—please specify_____

5. What are the most effective ways for you to receive information about how to make your household and property safer from natural disasters? (Check all that apply)
   __ Newspapers
   __ Television
   __ Radio
   __ Internet
   __ Schools
   __ Mail
   __ Fact sheet/brochure
   __ Extension Service
   __ Public Workshops/Meetings
   __ Fire Department/Law Enforcement
   __ Public Health Department
   __ Municipal/County Government
   __ Other—please specify_____

THANK YOU.

APPENDIX E

Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Planning Committee

Frequently Asked Questions

1) What is the Montgomery County Natural Hazard Mitigation Plan?
The Montgomery County Natural Hazard 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 who want to participate.

2) What is natural hazard mitigation?
Natural hazard mitigation is any action taken to reduce or eliminate long-term risk to life and property from a natural hazard. Storms are the most frequently occurring natural hazards, but other natural hazards being considered in this Plan include drought and earthquakes.

3) Why is this Plan being developed?
The Plan fulfills federal planning requirements of Section 104 of the Disaster Mitigation Act of 2000 and the Stafford Act. Three key benefits this plan will provide Montgomery County are:

a) Funding following declared disasters.
b) Funding for mitigation projects and activities before disasters occur.
c) Increased awareness about natural hazards and closer cooperation among the various organizations and political jurisdictions involved with emergency planning and response.

4) Who is developing this Plan?
The Montgomery County Natural Hazard Mitigation Planning Committee is preparing 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, and institutions such as the American Red Cross.

5) What happens after the Plan is developed?
The Plan will be presented to Montgomery County and each participating municipality for formal adoption by resolution. After the Plan is adopted, work can begin on those mitigation projects and activities identified in the Plan.

More information can be obtained by contacting:

Ruben Boehler
County Highway Department
1215 Seymour Avenue
Hillsboro, IL 62049
Tel: 217/532-6109

Diana Holmes
County Emergency Mgmt. Agency
120 N. Main Street
Hillsboro, IL 62049
Tel: 217/532-9560

APPENDIX F

The Journal-News

Volume 157, No. 96 Thursday, April 30, 2009

nor L. Brown, 90

aduate Of Litchfield Schools

es for Eleanor L. Brown, erly of Litchfield were 1 a.m. Monday, April 27, rst Presbyterian Church c. The Rev. Lucia Oerter Rev. Ronald McDugle of- Burial was in South Side y.

Brown, of Pontiac, died at Thursday, April 23, 2009, low Tjardes Health Care here. She was 90 years in. 14.

was a homemaker, a of the First Presbyterian of Pontiac and a 50-year of the Order of the East-

vas born in Reddick, a r of George and Hannah (Cummins) McDugle, and graduated from Litchfield schools. She married John E. Shane on March 21, 1940, in Bowling Green, MO; he died Aug. 31, 1980. She married Elwin Brown Oct. 19, 1985, in Pontiac; he died Sept. 16, 2002.

Mrs. Brown leaves daughters, Marilyn Kaye Humbert of Washburn, Karen L. Branz (husband Paul, of Odell; brother, Earl McDugle of Pontiac; four grandchildren and four great-grandchildren.

Preceding her in death were four sisters and three brothers.

Condolences may be sent online at *www.martin-burkefuneralhome.com.*

tsy Smith Takes ril Honors At S.A.

Hillsboro Salvation Army es Patsy Smith is the vol- f the month for April.

has been a big help run- cash register on Monday sday afternoons. She is a lp with hanging and tag- hing and shoes during the ne week, as well.

Salvation Army is fortunate to have had Patsy as an active volunteer for the past five years. She is a member of St. Agnes Church, loves golfing and going to yard sales in the summer.

If you would be interested in volunteering at the Salvation Army thrift store, or know anyone who is, call 532-5059.

THANK YOU

family of Don Webb wishes to express our deepest ude and appreciation for all of the love, kindness and htful gestures during Don's illness and at our time of Ve appreciate the prayers, cards, flowers, memorials, words of kindness and your presence during Don's

FEMA Grant Helps County Prepare For Natural Hazards

Montgomery County and participating municipalities will begin preparing a countywide plan that will identify activities and projects to reduce the damages caused by natural hazards such as tornadoes, floods, snow storms, thunderstorms and ice storms.

The Natural Hazard Mitigation Plan will be funded through a grant from the Federal Emergency Management Agency (FEMA).

Developing this plan will help the county be better prepared before storms hit as well as making the county eligible for federal funding to construct projects that can reduce damages for communities and families.

This mitigation plan will focus on prevention, not responses to a disaster, thus it does not duplicate or replace any emergency response plans already developed.

Any county or community that has a hazard mitigation plan compliant with the Disaster Mitigation Act of 2000 is eligible for grants from FEMA.

A county Hazard Mitigation Committee is being created with representatives from each municipality that chooses to participate along with technical partners and other stakeholders.

Meetings of this committee will be conducted as working sessions so that any interested resident can attend and ask questions. The purpose is to gather and discuss information that will be used to prepare the plan.

The first meeting will be held at 10 a.m. on Thursday, May 7, at the Montgomery County Public Health Department, 11191 IL Route 185.

For more information, visit *montgomeryco.com/news/11-5.html* or call Ruben Boehler, county engineer, at 532-6109.

Agencies Must Act Fast To Apply For Food Funds

Montgomery County will receive $13,249 to supplement emergency food and shelter programs. These funds have been made available through the American Recovery and Reinvestment Act.

A local board made up of representatives from government, Salvation Army, United Way, Catholic Charities and a former homeless person serve on the Montgomery County Emergency Food and Shelter Board. The local board will determine how the funds will be distributed among the local social service agencies.

Under the grant terms, local agencies chosen to receive funds must: 1) be a private not-for-profit organization or a unit of local government, 2) be eligible to receive federal funds, 3) have an accounting system, 4) practice food and/or shelter programs, and 6) if they are a private voluntary organization, they must have a voluntary board. Qualifying agencies are encouraged

LITCHFIELD CARNEGIE PUBLIC LIBRARY

and minor dizziness.

"I really thought I was just having sinus problems," Kirn said. "By the end of the day (Oct. 1) my vision was blurred and I started getting worried."

The next day, Kirn visited Hillsboro Medical Center and was referred to Memorial Medical Center in Springfield for further tests.

The diagnosis - both of his kidneys had failed.

Kirn was immediately put in intensive care where his heart and blood pressure were closely monitored.

"My blood pressure was very high at 180

have a transplant as soon as a match could be found; a person needs at least one functioning kidney to survive.

On Oct. 7, after a week at Memorial, Kirn was discharged and began his dialysis schedule at the Davita Center in Litchfield. All the while, he maintained a 30-plus hour work week at Enertech Manufacturing in Greenville.

On Saturday, Oct. 11, Kirn and Stephanie married.

"I don't know how he made it through the wedding and the entire reception without collapsing from exhaustion," Stephanie said. "The medication he was on made him more

joined him in his new mandatory die in treatment. Kirn was allowed no s potassium, calcium, or phosphorus.

"He was allowed to have two grams and a cup of cheese or milk a day, b was it," said Stephanie.

While the strict diet was a challeng the couple did it together, thanks in a homemade cookbook of recipes Ste printed off the Internet.

"She was my secretary and my die Kirn said of his wife. "There were some I just stopped eating."

Continued on p

County Disaster Damage Control Plan Continues

Representatives from Montgomery County and local municipalities will meet Thursday, June 25, at the Montgomery County Public Health Department at 10 a.m. to continue working on a plan to reduce damage from natural disasters. This group, called the Montgomery County Natural Hazard Mitigation Committee, will meet at various times through the rest of the year to prepare this plan. The committee meetings are open to the public.

This meeting will focus on Montgomery County weather based on data from the National Weather Service and state and national climatologic reports from the past 50 years. By identifying those areas most vulnerable to damage from natural disasters in the county, a better strategy can be developed to reduce damages caused by these events.

Designing roads, bridges, water supplies and other services to better withstand natural disasters, improving communications throughout the county, building storm shelters, and developing public information about how to protect against these disasters are some examples of the kind of projects and activities that might be included in the Natural Hazard Mitigation Plan.

While the plan is being developed, the public will have multiple opportunities to provide input. In addition to attending meetings of the committee, citizen surveys are being administered at community events, through the county web site, and through the municipal offices of participating communities. Interested persons can submit questions and comments to the committee members or directly to the Montgomery County Emergency Management Agency. A draft plan will be prepared for public review and comment before it is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency.

Once the state and federal emergency management agencies approve it, Montgomery County and the participating municipalities can adopt the plan making them eligible for hazard mitigation funds.

Father Ted Will C

by Steve McLaughlin

"I'm a happy priest," said Father Theodosius "Ted" Schelich who will be celebrating his 50th year in the priesthood on Wednesday, June 24. For Father Ted, it will just be another day of following God's plan for him.

"I have no plans to retire and will continue working as long as I'm able," said Father Ted who is completing his twentieth year as Chaplain at the St. Francis Hospital in Litchfield.

"I knew I wanted to become a priest back when I was a grade school student," he said.

He entered the seminary beginning in high school at St. Joseph's Seminary in the Oakbrook, IL area. He completed six years of training there and another eight years of theology and philosophy in Teutopolis, IL and Cleveland, OH. He was ordained on June 24, 1959, by Bishop Ambrose Pinger, OFM, at St. Francis of Assisi Church in Teutopolis.

The son of a shoe factory worker, Father Ted grew up in Washington, MO, the y of five children. "My and sisters all passed their 70's and I'm 77," resolutely.

As hospital chaplain Ted makes rounds daily to patients and their providing religious m upon request, and assist when needed.

He celebrates Mass at 4 p.m. (except on Fri Saturday) providing tive, prayerful respite f members, staff, and vi all faiths.

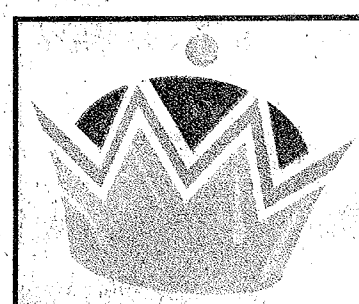
His Sunday afterno is unique in that he tently prays before a room only crowd of wo Complete with songs, readings and an insigh lifting homily, the 4 p.m a convenient, accessible tive for members of sur Catholic communities.

"We are so fortunat Father Ted as the chapl Francis," said Dan P President and CEO of cis Hospital. "He has

Weather Report

	Hi	Lo	Prec.
June 18	93	72	-----
June 19	95	74	-----
June 20	88	70	.95
June 21	93	71	.93

See the current weather and forecast on *www.thejournal-news.net*



Queen Pageant

Meet this year's County Fair queen candidates on page 5A.

Golden Gr

There's a master in t for thi Golden Gr

County Plans Ahead For Natural Disaster Damage

Representatives from Montgomery County and local municipalities will meet Thursday, Sept. 17, at the Montgomery County Public Health Department at 10 a.m. to continue working on a plan to reduce damage from natural disasters.

This group, the Montgomery County Natural Hazard Mitigation Committee, is holding its third meeting to prepare this plan. Committee meetings are open to the public.

"We have gathered storm event information to help identify our vulnerabilities across the county. During the summer, the participating municipalities and various county departments began discussing the kinds of projects that might be most beneficial. Now we will identify specific projects to reduce damages caused by these storms." said Ruben Boehler, County Engineer.

Retrofitting roads, bridges, water supplies and other services to better withstand natural disasters, improving communications throughout the county, building storm shelters, and developing public information about how to protect against these disasters are some examples of the kind of projects and activities that might be included in the Natural Hazard Mitigation Plan.

The public will have multiple opportunities to provide input. In addition to attending minutes of the committee, citizen surveys are being administered at community events, through the county website and through the municipal offices of participating communities.

Interested persons may submit questions and comments to the committee members or directly to the Montgomery County Emergency Management Agency. A draft plan will be prepared for public review and comment before it is submitted to the Illinois Emergency Management Agency and the Federal Emergency Management Agency.

Once the state and federal emergency management agencies approve it, Montgomery County and the participating municipalities can adopt the plan, making them eligible for hazard mitigation funds.

Give Blood. . .
Wednesday, Sept. 16
Noon - 6:30 p.m.

PUBLIC NOTICE

NOTICE OF PUBLIC HEARING

Notice is hereby given that the Zoning Board of Appeals of the City of Hillsboro, Illinois, will hold a public hearing on Wednesday the 7th day of October A.D. 2009, at 6:30 p.m., at City Hall, located at 447 South Main Street, in the City of Hillsboro, Illinois, for the purpose of hearing arguments for and against the following proposed text amendment to Section 40-4-4 of the Municipal Code of Hillsboro, Illinois, as follows, to-wit:

Section 40-4-4 of the Municipal Code of the City of Hillsboro, Illinois shall be amended to allow the following as a permitted use in the "A" – Agricultural District:

"An underground coal mine facility, together with (a) related above ground mining facilities, equipment, shafts, and portals, (b) related coal transportation, handling, and storage facilities and systems; and (c) coal washing, crushing, disposal, and screening facilities and systems; provided, however, that prior to the operation of such facilities the Illinois Department of Natural Resources, Offices of Mines and Minerals shall have duly issued to the permittee all necessary permits required by it for the operation of a coal mine."

All persons interested shall be heard.

Dated this 9th day of September, A.D. 2009.

PUBL

City of Hillsboro

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FINANCIAL STATEMENT FOR THI

I, David Booher, City Clerk of the City of Hillsboro, prepared for publication and is correct to the best of m

REVENUE SUMMARY: Corporate Taxes $838,030.84 $9,294.17; Utility Tax Collected $308,460.98; Pull Tabs Licenses Fees (Liquor) $11,100.00; Cable Franchise Fee $ Building Permits $3,466.36; State Income Tax $383,877.6 Property Replacement Tax $20,628.93; Sales Tax $586,9 Tax $61,209.19; Warrants/Foreign Sheriff $1,536.00; Adr $120,000.00; Concession Receipts $5,962.00; Swim Po $17,795.92; Cabin Fees $1,260.00; Home Lot Leases $ Camping Fees $125,527.16; Boat Permits $47,626.25; Fees $32,881.00; Duck Blinds $2,212.50; Marina Slip Fee Lake Restoration (Savings) $84,962.00; Interest Earned $ Interest from Challacombe $2,560.97; Interest from IPTI Interest from Pool Savings $1.87; Interest from Skateboar $12.61; Interest Playground Equip. (Savings) $12.43; Intere Forest (Savings) $14.96; Interest Lake Restoration (Saving Challacombe Rentals $875.00; Firemans Club House Rent Donations for Electric $4,554.00; Donations Parks/Playgro $2,000.00; Road & Property Bond $250.00; Miscellaneous $ Reimb. & Refunds $130,323.62; Sale of Equip.-Labo $195,000.00; Transfer from Land Acq. $307.09CR; Transfer O&M $502,871.45; Transfer from Water to repay Chall $ Transfer from Sewer $120,000.00; Royalties $46,941.92; Loc $4,230.00; Parking Fines $10.00; Dog Fines $675.00; Poli (Test Fees) $250.00; 2% Fire Tax $3,930.11; Fire Runs Sub. Fees Collected $34,260.00; Allotments, State $1 Lake Lots Deposits $775.00; Deposits Received $440.00 City Payment $12,000.00; Taylor Springs Payment $600. WTP Depreciation (New) $260.13; Interest WTP Bond & $439.77; Transfer from WTP Depreciation $21,144.00; Tr WTP Bond & Int $250,400.00; Penalties Collected $24,708 Water $1,651,348.83; Sale of Bulk Water $454.25; Water T $950.00; Sewer Receipts $634,651.34; BOD Surcharges $ Dumping Fees/Misc. Services $4,532.62; Sale of Airpo $173,872.00.

TOTAL REVENUES: $6,

COMPENSATION SUMMARY: Under $25,000: Whit Danielle; Fleming, Erica Breann; Milanos, Angelo Nicholas Denee; Whitlow, Brooke Michele; Seamon, Ada Lucille; Garry R.; McCammack, Kasey Bethann; Wetzel, Emily Nic John; Evans, Cory H.; Braun, Bailey Paige; White, Alexa Sweet, Hannah Jean; Pretnar, Maria E.; Jarman, Katy E. Kelsie D.; Wetzel, Joshua T.; Grantham, Caleb James; Mich Stacie Renae; Homa, Kaitlin E.; Schulte, Hope D.; Niehau Scott; Blankenship, Annette C.; Jurgena, Christopher W.; Pu Michelle; Huber, Brett Adam; Hill, Constance Marie; Mc Dennis Lee; Sherer, Christopher E.; Trost, Geoff A.; Baran, Lyerla, Joe L.; Sanders, Sharon M.; Carter, Louise M.; Ro L.; Robinson, Shawn E.; Hicks, Larry W.

Litchfield News-Herald Monday, January 11, 2010

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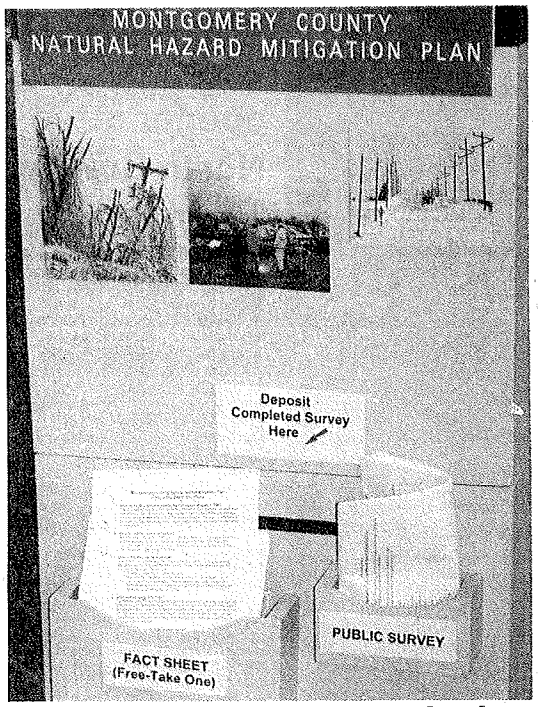

Public's help is needed to reduce storm damage

How can vital services be provided to Montgomery county residents when electrical power lines are down? What steps can be taken to prevent injuries and deaths from major storms?

These and other questions will be discussed when the Montgomery County Natural Hazard Mitigation Planning Committee meets at 10 a.m. Thursday, Jan. 14, at the Montgomery County Public Health Department.

This committee has been conducting working meetings, open to the public, since May 2009 to prepare a plan that will identify projects and activities which could 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.

"Other emergency plans are directed at responding after a storm or natural disaster hits. This is the first time in Montgomery county that we are looking at actions that can reduce or eliminate damages caused by specific types of storms and other natural disasters," according to Ruben Boehler, county engineer.

Participating municipalities and various county departments have been identifying the kinds of projects that should be included in the plan.

Interested persons can submit questions and comments to committee members or directly to the Montgomery County Emergency Management Agency by contacting Diana Holmes, 532-9560.

Information about the planning process is available via the Montgomery county website and at the kiosk (see accompanying photo) located on the first floor of the historic courthouse.

Adopted girl's fantasy becomes CW series

PASADENA, Calif. (AP) - An adopted girl who fantasized that her real mother was Nancy Reagan turned those youthful dreams into a television series.

The new CW network series "Life Unexpected," about a 16-year-old girl in foster care discovering her birth parents, came directly from the life of creator Liz Tigelaar. The series debuts on Jan. 18.

As a girl growing up in Texas, Tigelaar dreamed about who her birth parents were. Since she heard her birth mother lived in Washington, D.C., she believed it was Nancy Reagan - until her mother told her it was biologically unlikely. Tigelaar is 34; the former first lady is 88.

While Reagan didn't make it into the CW series, Tigelaar wrote a story informed by real-life experience.

"When you have no idea and have nothing to go on, you really create that story in your head," said Tigelaar, a former assistant on "Dawson's Creek" and writer of books for young adults who is now in charge of her first TV series. The actress who plays the girl in the series, Britt Robertson, looks like she could be Tigelaar's younger sister.

Even if they didn't live in the White House, Tigelaar said she always hoped her birth parents had cool jobs. The people in the series who connect with a daughter the father never knew he had are a radio DJ and bar owner.

Tigelaar met her birth mother for the first time in November.

"The first thing she said was, 'I'm not a radio DJ,'" Tigelaar said.

McCain aide: Palin thought her candidacy 'God's plan'

WASHINGTON (AP) - Sarah Palin believed that Sen. John McCain chose her to be his running mate in 2008 because of "God's plan," according to a top political strategist in the Arizona Republican's campaign.

In an interview with the CBS news magazine "60 Minutes," Steve Schmidt described Palin as "very calm - nonplussed" after McCain met with her at his Arizona ranch just before putting her on the Republican ticket. McCain had planned to name Sen. Joe Lieberman, I-Conn., as his vice presidential choice until word leaked, sparking what Schmidt called political blowback over picking the 2000 Democratic vice presidential nominee.

Schmidt said he asked Palin about her serenity in the face of becoming "one of the most famous people in the world." He quoted her as saying, "It's God's plan."

Palin has not ruled out a run for the presidency.

Schmidt was interviewed by "60 Minutes" for a segment about a new book about the 2008 presidential race, "Game Change," by John Heilemann of New York magazine and Mark Halperin of Time magazine.

Schmidt credited Palin with being a quick study and for giving a great speech at the Republican convention in St. Paul, Minn., but he said it soon became clear that she often was not accurate in her remarks.

"There were numerous instances that she said things that were - that were not accurate that, ultimately, the campaign had to deal with. And that opened the door to criticism that she was being untruthful and inaccurate. And I think that that is something that continues to this day," he said.

Palin's spokeswoman, Meg Stapleton, has disputed the version of events presented in the reporters' book.

"The governor's descriptions of these events are found in her book, 'Going Rogue.' Her descriptions are accurate," Stapleton said in a statement to "60 Minutes." Stapleton added: "She was there. These reporters were not."

Schmidt conceded that had Palin not been on the ticket, "our margin of defeat would've been greater than it would've been otherwise."

TODAY'S BIRTHDAYS: Alexander Hamilton (1755?-1804), U.S. statesman; William James (1842-1910), philosopher/psychologist; Jean Chretien (1934-), Canadian politician, is 76; Naomi Judd (1946-), singer, is 64; Jasper Fforde (1961-), author, is 49; Mary J. Blige (1971-), singer, is 39.

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18 - Free Offers
20 - Services

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Printer Friendly

Print Page

TUESDAY MAY 25, 2010 Last modified: Sunday, May 23, 2010 10:53 PM CDT

Time For Public Input On County Natural Hazard Plan

The committee planning the Montgomery County Natural Hazard Mitigation Plan will be available for public comment on Thursday, June 17, from 5-7 p.m. at the Health Department on Route 185.

The committee has been working since May 2009 to identify projects and activities that can be accomplished before a natural disaster occurs to protect county residents and property from their effects.

"We have received public input to develop this plan since we began meeting last year," committee chairman Ruben Boehler of Farmersville said. "This input has included information about storm events, property damages, and potential projects that could reduce harm to people and property."

Municipalities of Coffeen, Farmersville, Hillsboro, Litchfield, Nokomis, Raymond, and Witt along with county departments have worked on the plan.

Questions or comments may be sent to the Montgomery County Emergency Management Agency (EMA) director Diana Holmes at 532-9560.

Following the June 17 public forum, any revisions will be sent to the Illinois Emergency Management Agency and the Federal Emergency Management Agency for approval.

"After state and federal approval is obtained, the plan must be adopted by each participating municipality and the county to become eligible for federal funds," Holmes said.

MONTGOMERY COUTNY NEWSPAPERS

Free Press-Progress (once weekly)
112 W. State
Nokomis, IL 62075
(217) 563-2115

Litchfield News-Herald (five days weekly)
112 E. Ryder
Litchfield, IL 62056
(217) 324-2121

Panhandle Press (once weekly)
Pentagon Plaza, N. Rt. 48
Raymond, IL 62560
(217) 229-4412

Raymond News (once weekly)
327 E. Broad
Raymond, IL 62560
(217) 229-3421

The Journal-News (twice weekly)
431 South Main Street
P.O. Box 100
Hillsoboro, IL 62049
(217) 532-3933

APPENDIX G

MONTGOMERY COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

PUBLIC FORUM – OPEN HOUSE

JUNE 17, 2010
MONTGOMERY COUNTY PUBLIC HEALTH DEPARTMENT
5:00 P.M. – 7:00 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 the residents of Montgomery County. Since 2002, Montgomery County has had three presidentially-declared disasters. In addition, in the past decade alone, there have been over 25 severe storms (thunderstorms, high winds, hail, heavy rain etc.), 18 severe winter storms, 15 extreme heat events, six tornadoes and one 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 the loss of life and property damage resulting from natural hazards. This process helps the county and participating municipalities 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 hazard mitigation plan?

By preparing and adopting a natural hazard 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 Montgomery County Multi-Jurisdiction Natural Hazards Mitigation Plan?

Recognizing the benefits that could be gained from preparing a natural hazard mitigation plan, the Montgomery County Board passed a resolution on April 8, 2008 authorizing the development of the Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan. The County then invited all the municipalities within Montgomery County to participate. The following municipalities chose to participate in the Plan's development:

- Coffeen
- Farmersville
- Hillsboro
- Litchfield
- Nokomis
- Raymond
- Witt

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 jurisdictions, the general public as well as agriculture, business, education, emergency services (ambulance, fire and law enforcement), healthcare, GIS, and insurance. The Planning Committee met five times between May, 2009 and June, 2010.

Which natural hazards are included in the Plan?

After much discussion, the Planning Committee chose to include the following natural hazards in this Plan:

- severe storms (thunderstorms, hail, lighting & heavy rain)
- tornadoes
- severe winter storms (snow & ice)
- extreme heat
- flood
- drought
- earthquakes
- dam failures

What is included in the Plan?

The Plan is divided into sections that cover the planning process; the risk assessment conducted on each of the previously identified natural hazards; the mitigation strategy, including list of mitigation actions identified for each participating jurisdiction; recommendations; and plan maintenance and adoption. The majority of the 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 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 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 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 Plan before it is submitted to the Illinois Emergency Management Agency (IEMA) and the Federal Emergency Management Agency (FEMA) for review. Once IEMA and FEMA have reviewed and approved the Plan, it will be presented to the County and each participating jurisdiction for formal adoption. After adopting the Plan, each participating jurisdiction can apply for federal mitigation funds and begin implementation of the mitigation actions identified in the Plan.

APPENDIX H

MONTGOMERY COUNTY
MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

PUBLIC FORUM – JUNE 17, 2010
COMMENT SHEET

The Montgomery County Multi-Jurisdictional Natural Hazards Mitigation Plan evaluates damage to life and property from storms and other natural hazards that occur in the County. This Plan also identifies projects and activities submitted by the County and each participating municipality that will help reduce these damages. This comment sheet should be used to provide feedback on the draft Plan.

What comments, concerns or questions do you have regarding the draft Plan? (Use additional sheets if necessary.)

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Please Print Your Name, Address, and Phone Number Below

Name: _____ Phone: _____

Address: _____

_____ Zip Code: _____

Comments will be accepted until July 2, 2010.

Place
Stamp
Here

Diana Holmes
Montgomery County Emergency Management Agency
102 N. Main Street
Hillsboro, IL 62049

APPENDIX I

Montgomery County Emergency Management Agency
120 W. Main St.
Hillsboro, IL 62049

Diana Holmes
Coordinator
Office 217/532-9560
Pager 217/956-8035
Fax 217/532-9608
Email mcesda99@yahoo.com
Administrative Assistant
Cathy 217/532-9562

TO: Macoupin Co. EMA – Jim Pitchford, Fayette Co. EMA- Steve Kohler, Madison Co. EMA- Larry Ringling, Christian Co. EMA – Mike Crews, Bond Co. EMA – Allan Davis, Sangamon Co. EMA - Dave Butt, Shelby Co. EMA- Gary Bryant.

FROM: Diana Holmes, Montgomery Co. EMA Director

SUBJECT: Hazard Mitigation Planning

DATE: May 27, 2009

The purpose of this memorandum is to let you know that Montgomery County is preparing a countywide Natural Hazards Mitigation Plan. We are preparing this Plan to meet the Federal Emergency Management Agency's (FEMA) prerequisite for hazard mitigation funds under several programs.

Johnson, Depp & Quisenberry, an environmental and engineering consulting firm, is preparing the Plan and leading the planning process.

The Montgomery County Natural Hazards Mitigation Planning Committee has been formed to work on the Plan. The next meeting of the Committee will be:

Thursday, June 25
10 a.m.
Montgomery County Public Health Department
11191 IL Route 185
Hillsboro, IL

The Committee meetings are open to the public and you are welcome to attend.

If you have questions or comments on our mitigation planning effort, or if you would like to participate, please feel free to contact me at 217/532-9560. You may also contact Greg Michaud, our mitigation planning consultant, at 217/529-4534.

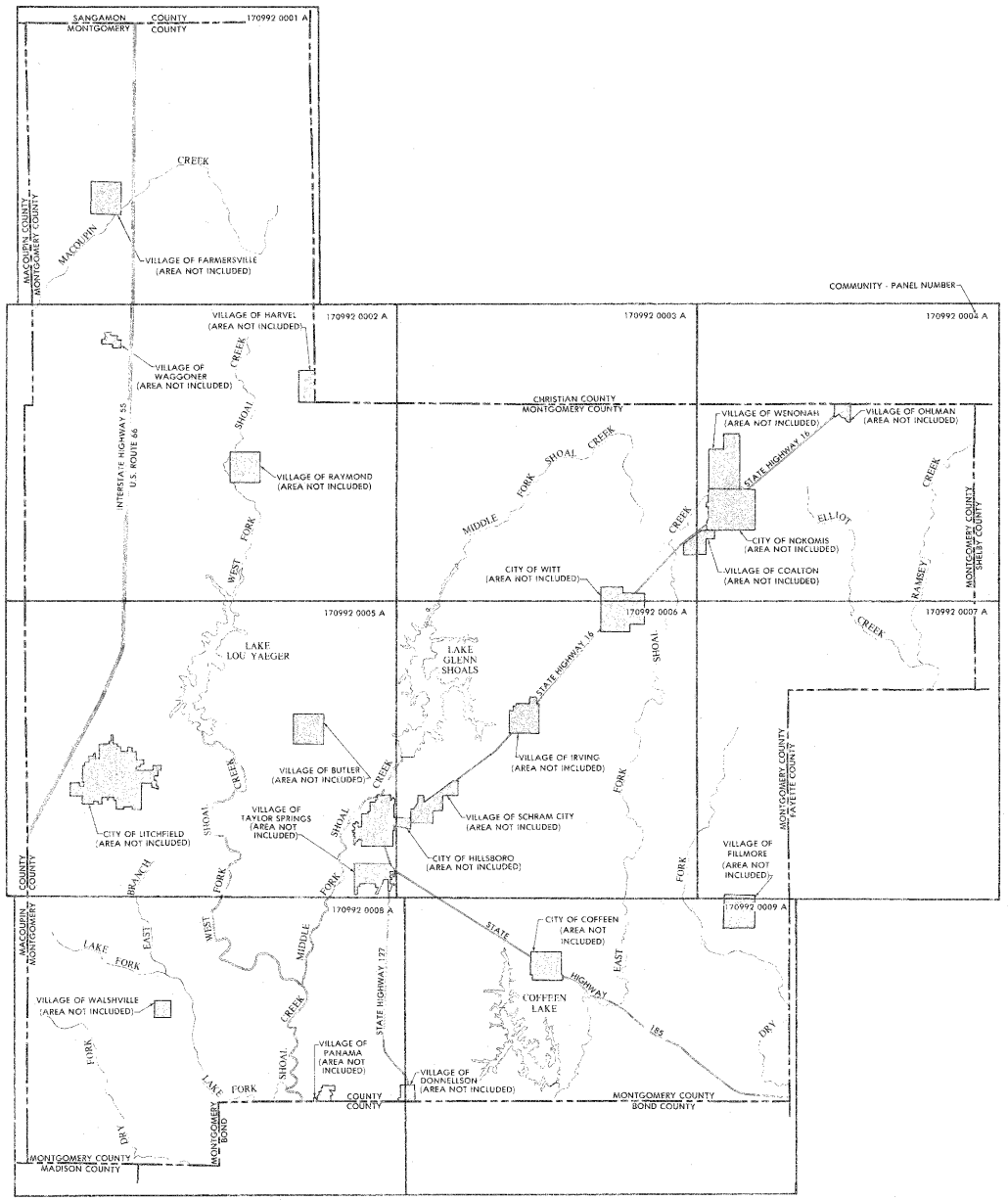
Thank You

Diana Holmes

Diana Holmes
Montgomery County EMA

Appendix I

APPENDIX J



KEY TO SYMBOLS

SPECIAL FLOOD HAZARD AREA — ZONE A

Note: These maps may not include all Special Flood Hazard Areas in the community. After a more detailed study, the Special Flood Hazard Areas shown on these maps may be modified, and other areas added.

TO DETERMINE IF FLOOD INSURANCE IS AVAILABLE IN THIS COMMUNITY, CONTACT YOUR INSURANCE AGENT, OR CALL THE NATIONAL FLOOD INSURANCE PROGRAM, at (800) 638-6620, OR (800) 424-8872.

INITIAL IDENTIFICATION DATE:
JANUARY 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

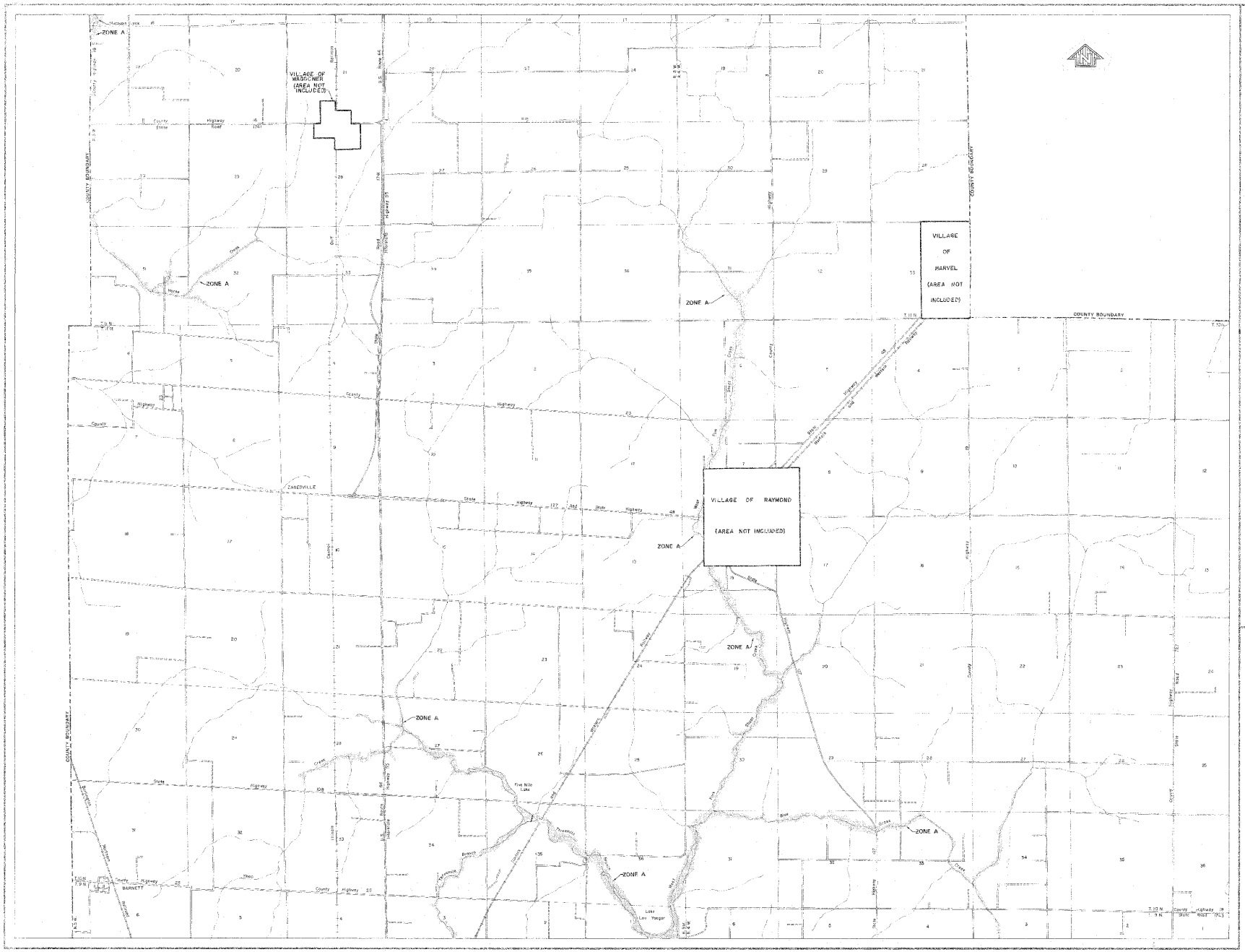
EFFECTIVE DATE:
JANUARY 9, 1981

federal emergency management agency
federal insurance administration

Appendix J

KEY TO SYMBOLS
SPECIAL FLOOD HAZARD AREA
ZONE A
COUNTY BOUNDARY
ZONE A
WHITE OAK
THOMASVILLE
VILLAGE OF
FARMERSVILLE
(AREA NOT INCLUDED)
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

Appendix J



KEY TO SYMBOLS

SPECIAL FLOOD HAZARD AREA — ZONE A

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 170982 0002 A

EFFECTIVE DATE: JANUARY 5, 1981

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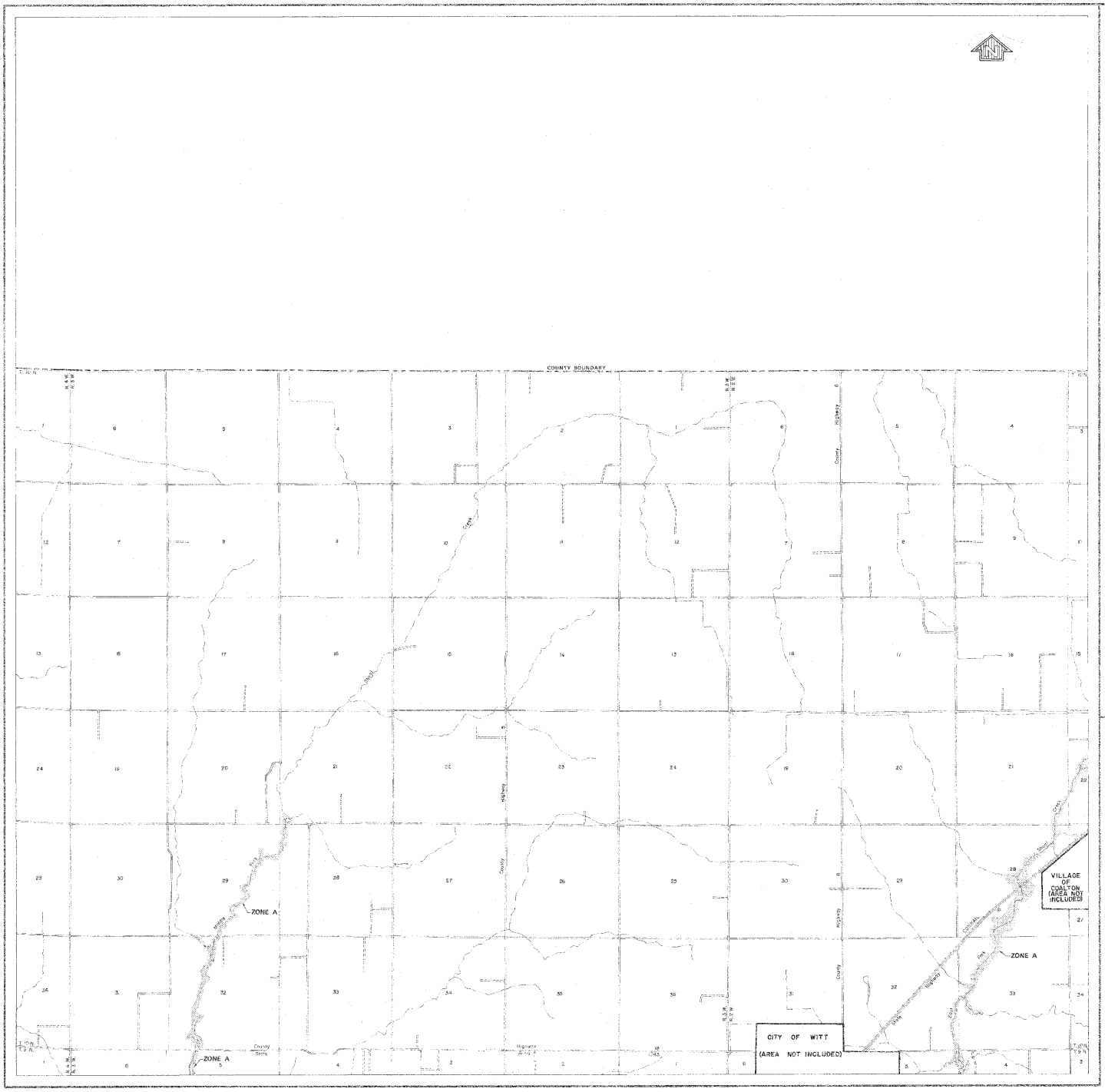
federal insurance administration



KEY TO SYMBOLS

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APPROXIMATE SCALE IN FEET: 2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

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FLOOD HAZARD BOUNDARY MAP

MONTGOMERY COUNTY, ILLINOIS

UNINCORPORATED AREA

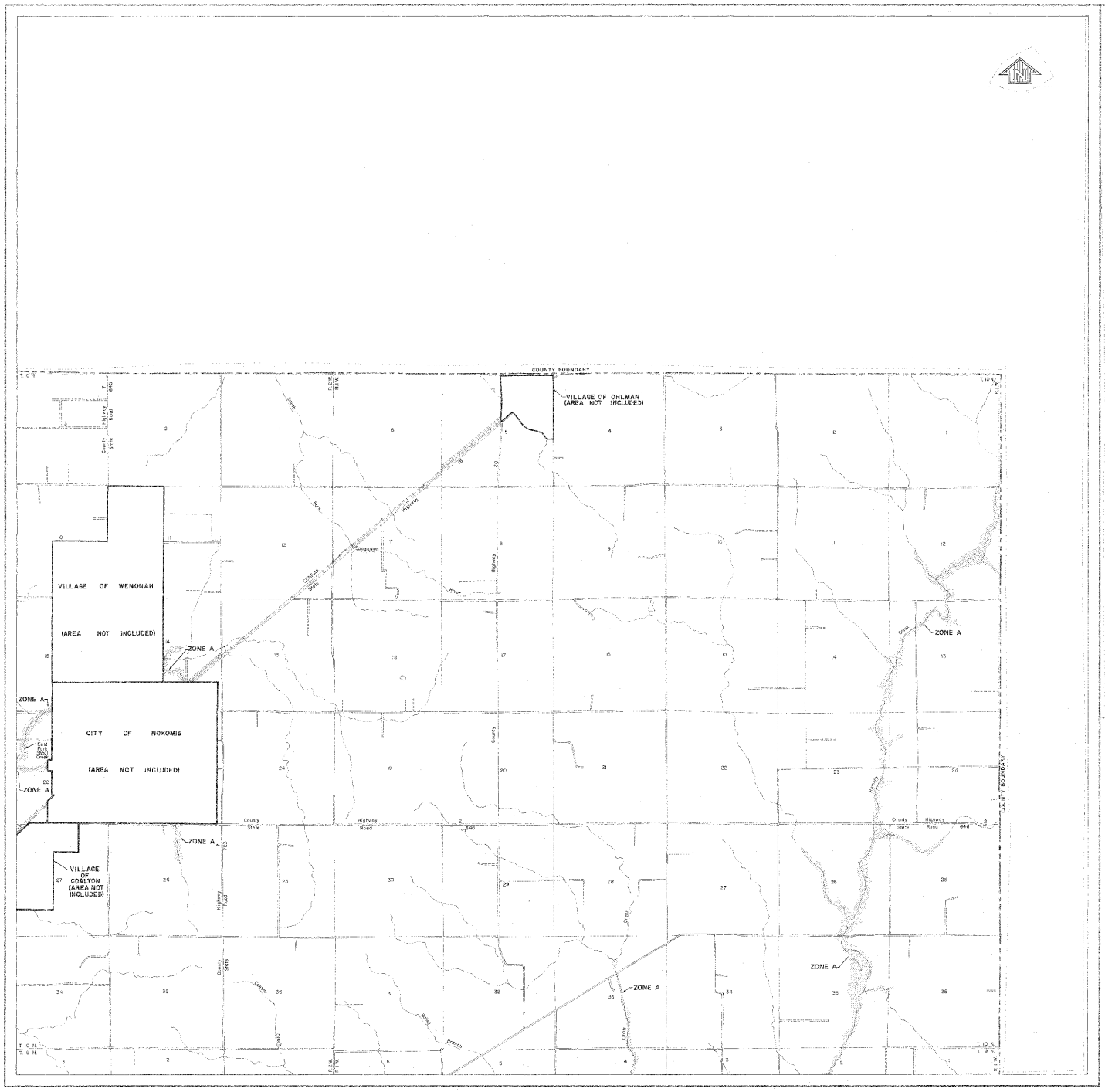
PANEL 3 OF 9

(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

SPECIAL FLOOD HAZARD AREA

ZONE A

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2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FHBM

FLOOD HAZARD BOUNDARY MAP

MONTGOMERY COUNTY, ILLINOIS

UNINCORPORATED AREA

PANEL 4 OF 9

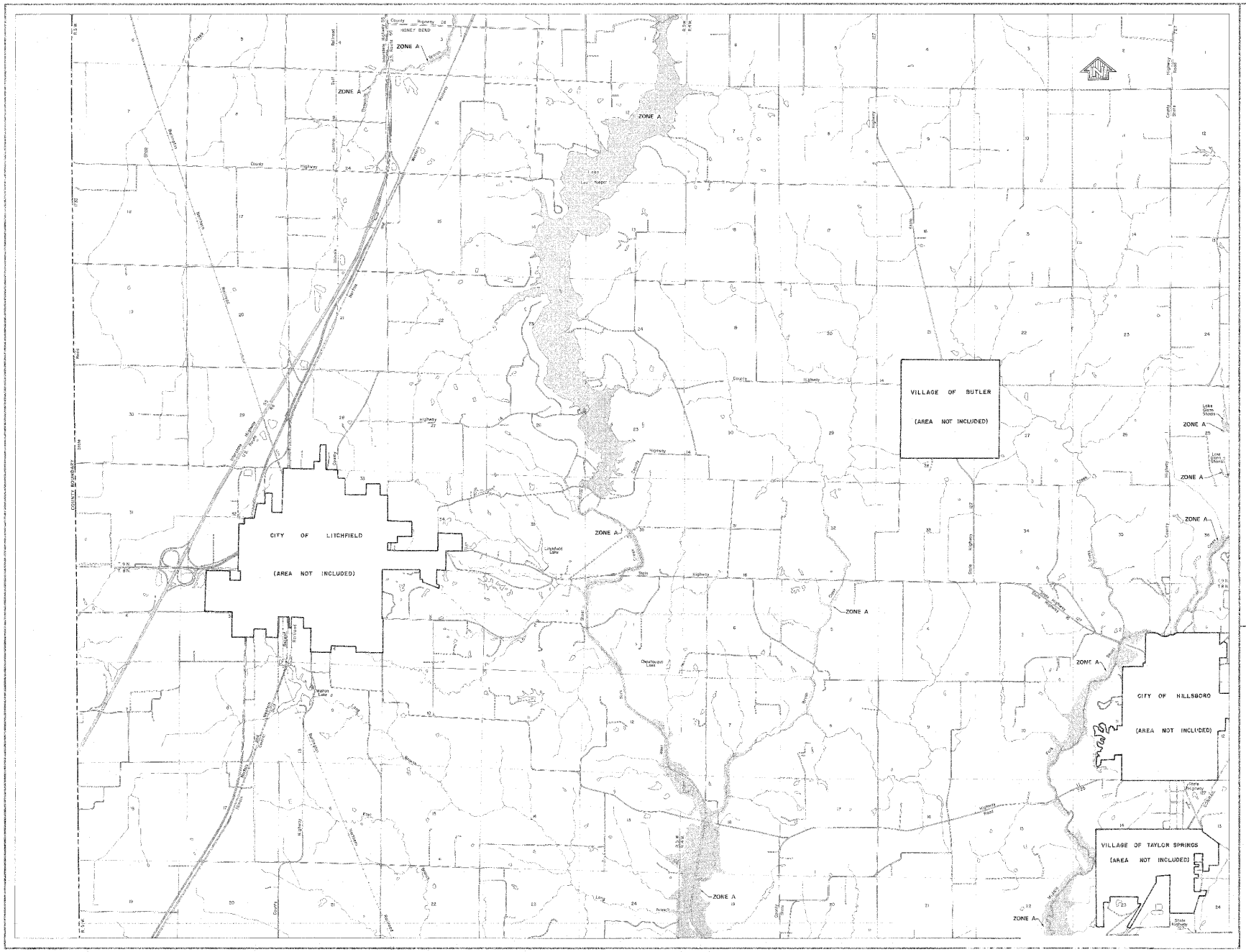
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
170992 0004 A

EFFECTIVE DATE:
JANUARY 9, 1981

federal emergency management agency
federal insurance administration

Appendix J



KEY TO SYMBOLS

SPECIAL FLOOD HAZARD AREA — ZONE A

NATIONAL FLOOD INSURANCE PROGRAM

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FLOOD HAZARD BOUNDARY MAP

MONTGOMERY COUNTY, ILLINOIS

UNINCORPORATED AREA

PANEL 5 OF 9

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
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EFFECTIVE DATE:
JANUARY 8, 1981

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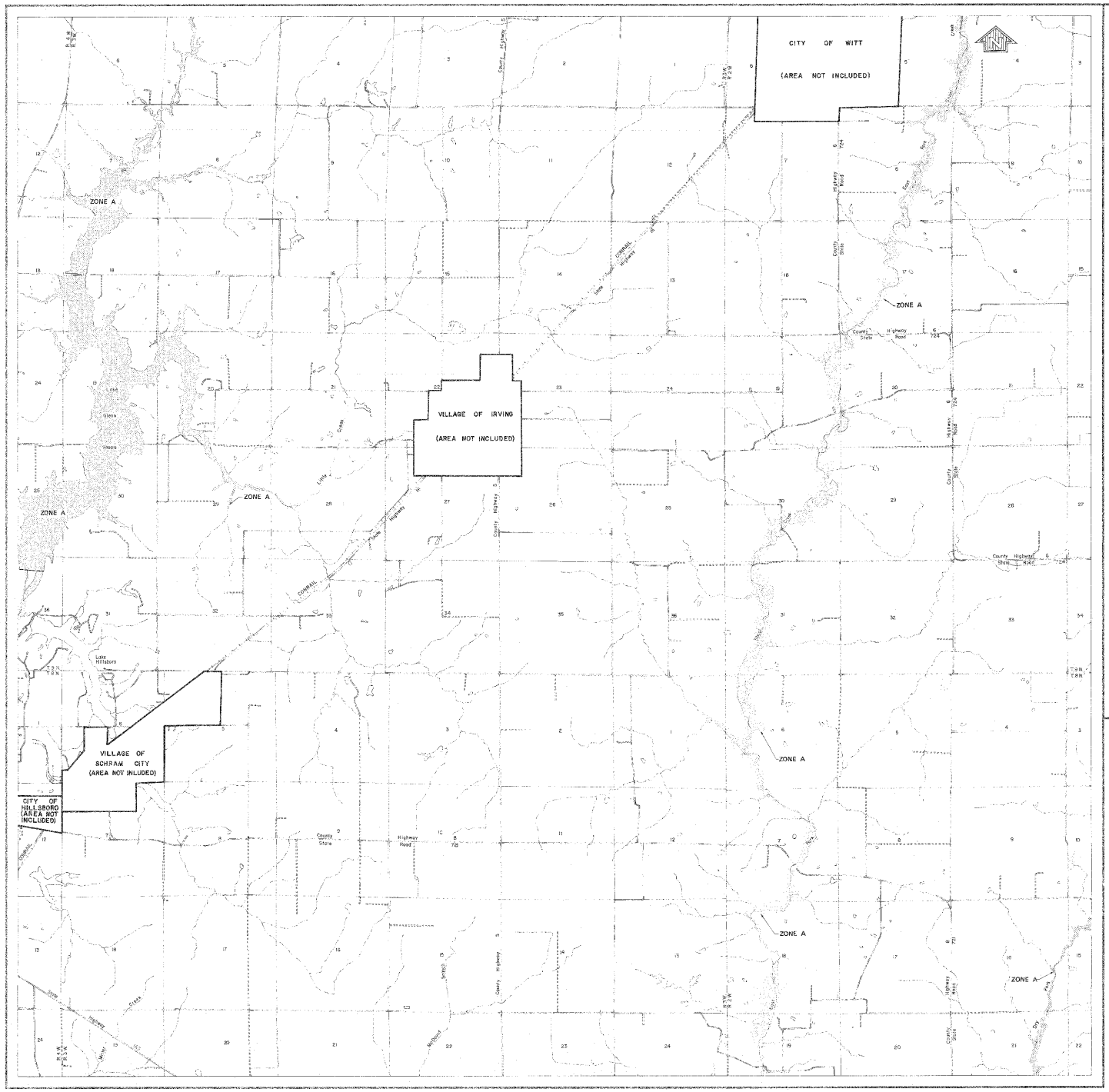
federal insurance administration



KEY TO SYMBOLS

SPECIAL FLOOD HAZARD AREA — ZONE A

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APPROXIMATE SCALE IN FEET:
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NATIONAL FLOOD INSURANCE PROGRAM

FHBM

FLOOD HAZARD BOUNDARY MAP

MONTGOMERY COUNTY, ILLINOIS

UNINCORPORATED AREA

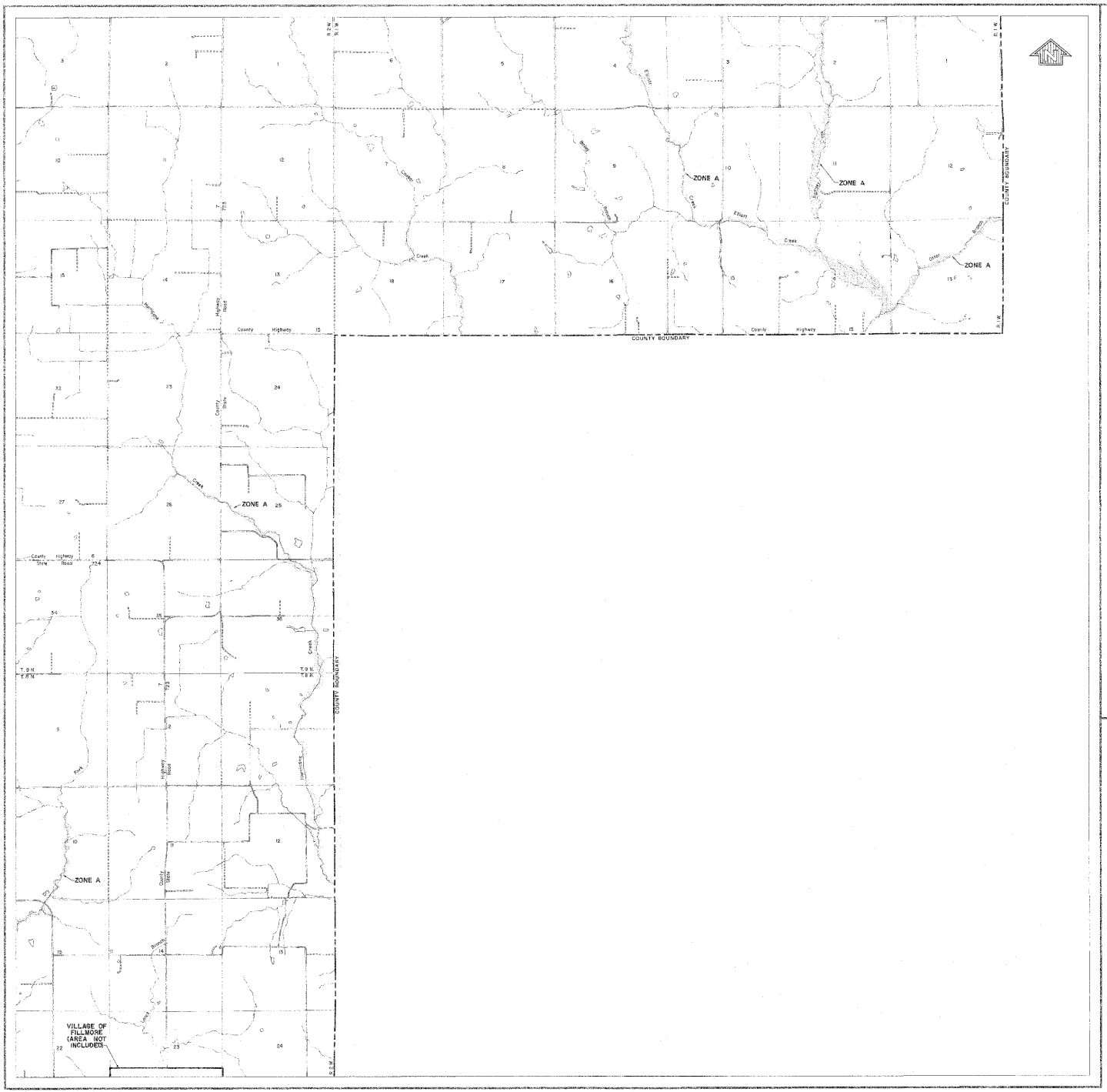
PANEL 6 OF 9

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
170992 0006 A

EFFECTIVE DATE:
JANUARY 9, 1981

federal emergency management agency
federal insurance administration



KEY TO SYMBOLS

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APPROXIMATE SCALE IN FEET

2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FHBM

FLOOD HAZARD BOUNDARY MAP

MONTGOMERY COUNTY, ILLINOIS

UNINCORPORATED AREA

PANEL 7 OF 9

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
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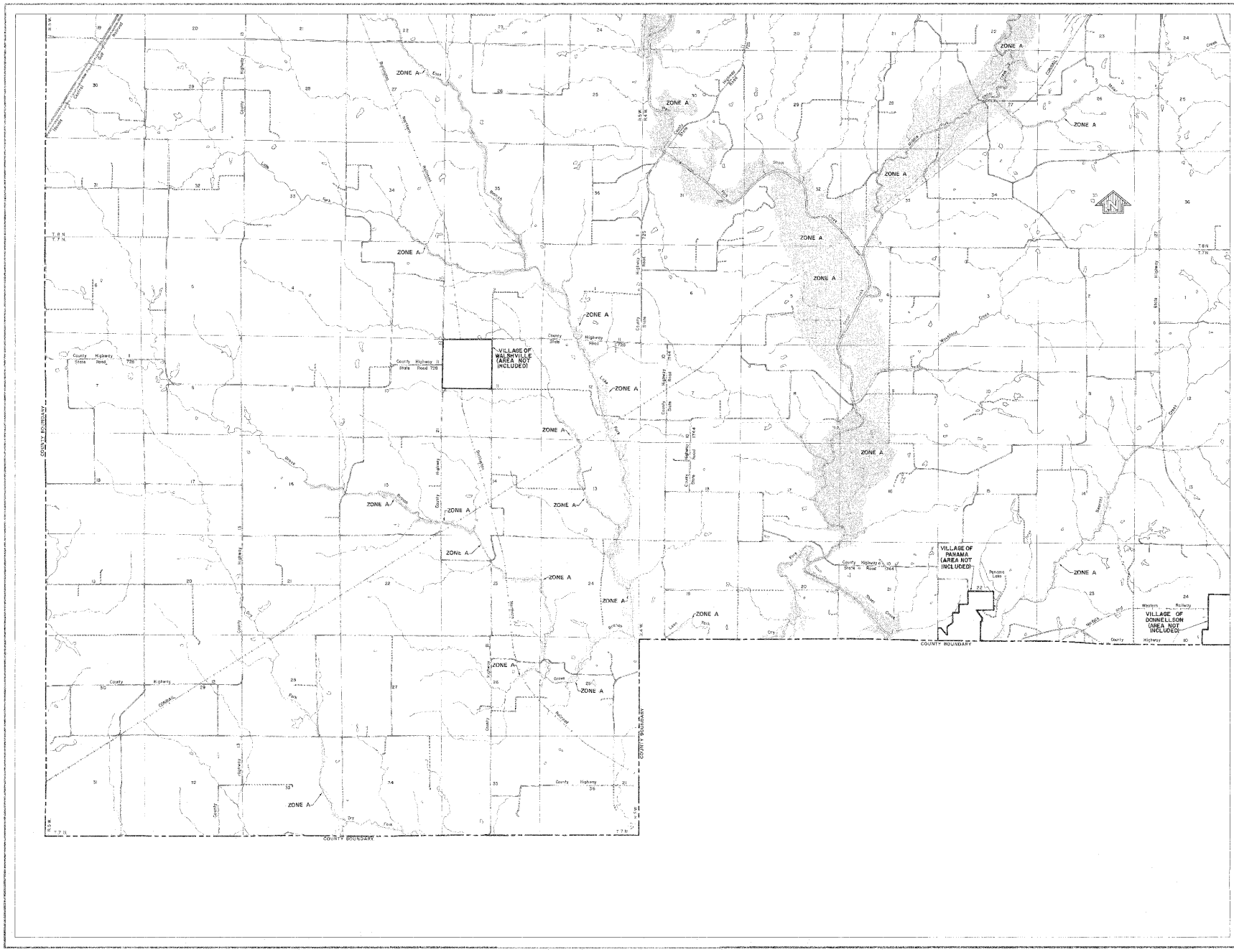
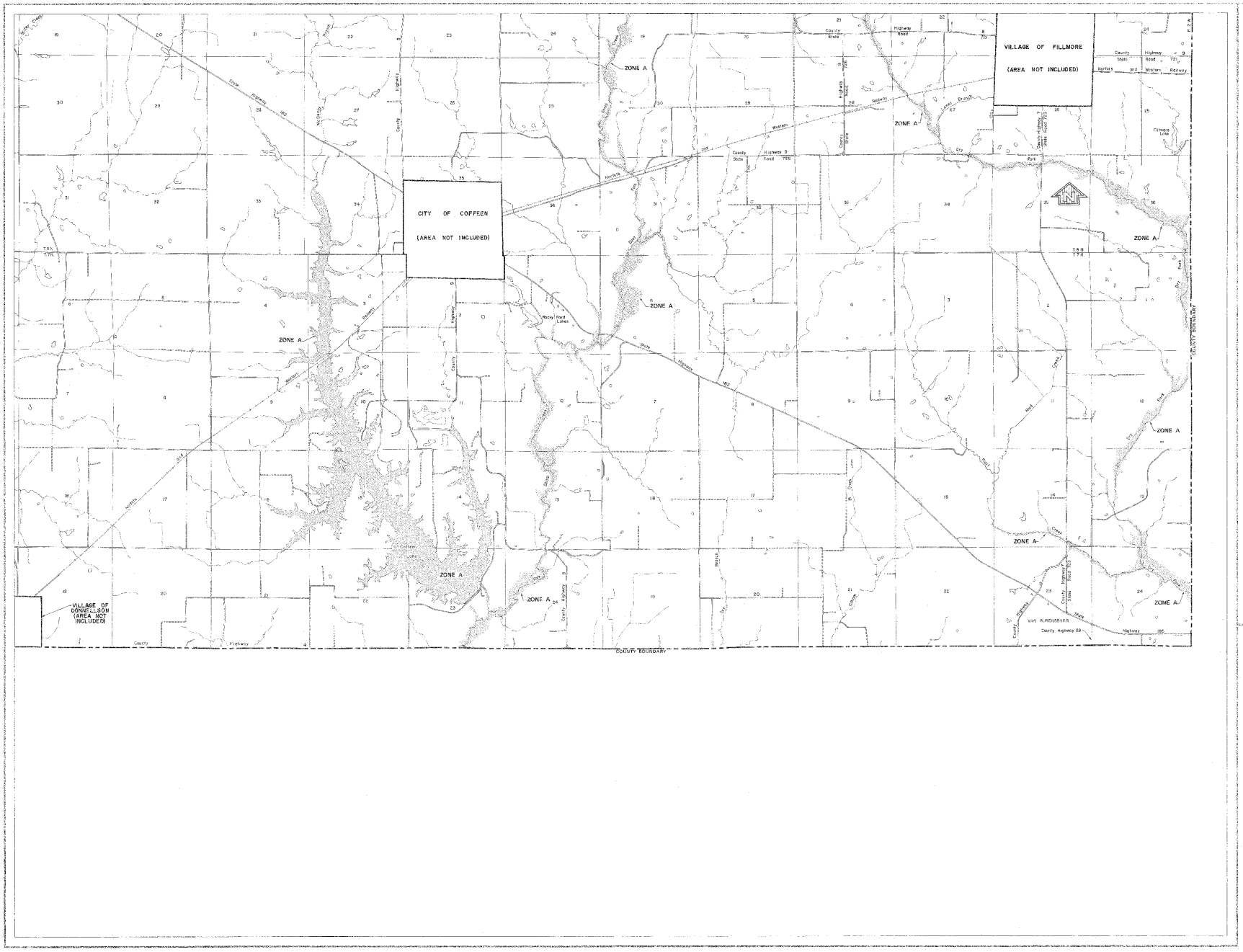
EFFECTIVE DATE:
JANUARY 9, 1981

federal emergency management agency
federal insurance administration


ZONE A
VILLAGE OF WALSHVILLE (AREA NOT INCLUDED)
VILLAGE OF PANAMA (AREA NOT INCLUDED)
VILLAGE OF DONNELLSON (AREA NOT INCLUDED)
COUNTY BOUNDARY
KEY TO SYMBOLS
SPECIAL FLOOD HAZARD AREA
ZONE A
NATIONAL FLOOD INSURANCE PROGRAM
FHBM
FLOOD HAZARD BOUNDARY MAP
MONTGOMERY COUNTY, ILLINOIS
UNINCORPORATED AREA
PANEL 6 OF 9
COMMUNITY-PANEL NUMBER
170952 0008 A
EFFECTIVE DATE:
JANUARY 9, 1981
federal emergency management agency
federal insurance administration

Appendix J



KEY TO SYMBOLS

ZONE A

THE AVAILABILITY OF FLOOD INSURANCE IS AVAILABLE IN THIS COMMUNITY. CONTACT YOUR INSURANCE AGENT OR CALL THE NATIONAL FLOOD INSURANCE PROGRAM AT (800) 638-6620, OR (800) 424-8872

NATIONAL FLOOD INSURANCE PROGRAM

FHBM

FLOOD HAZARD BOUNDARY MAP

MONTGOMERY COUNTY, ILLINOIS

UNINCORPORATED AREA

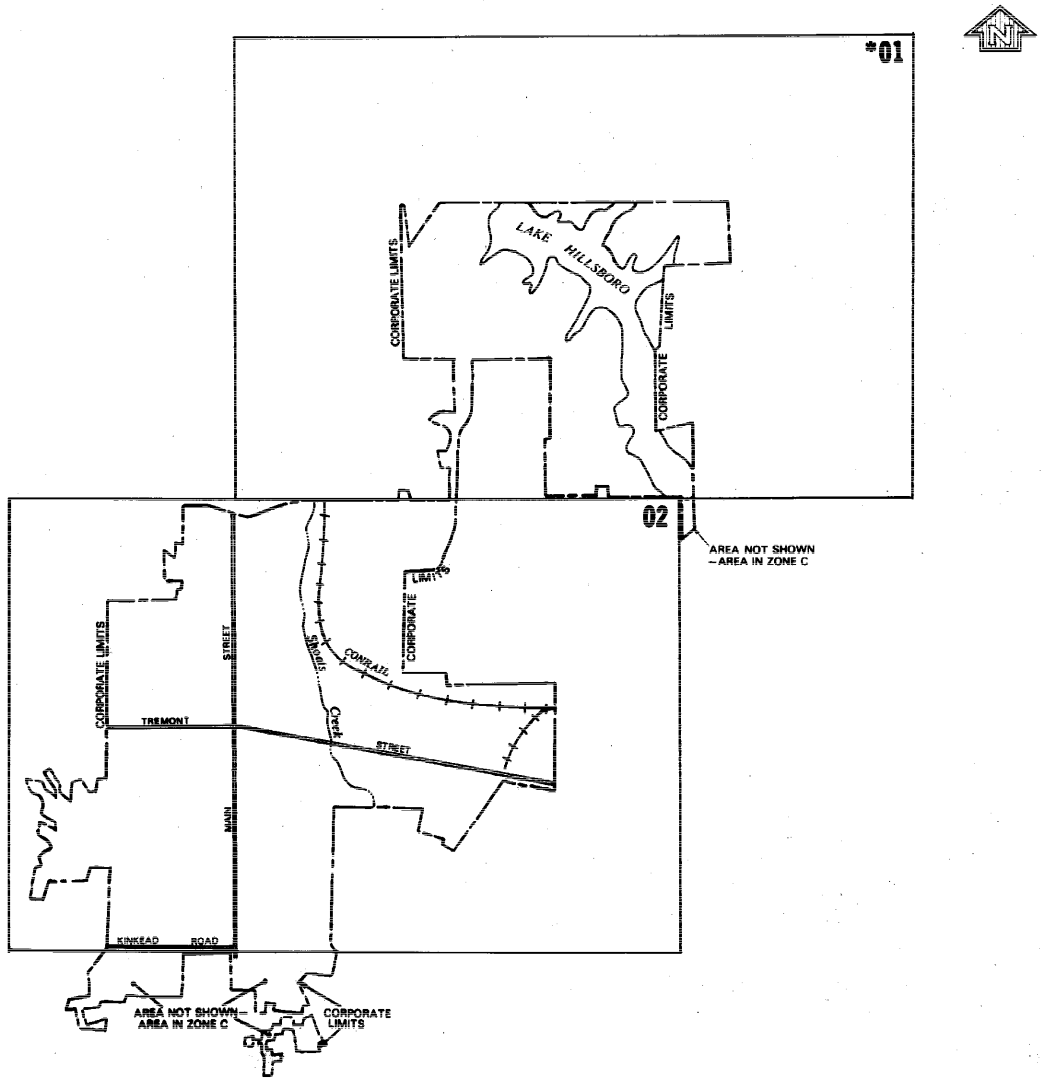
PANEL 9 OF 9

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
170992 0009 A

EFFECTIVE DATE:
JANUARY 3, 1981

federal emergency management agency
federal insurance administration



*PANEL NOT PRINTED–AREA IN ZONE C

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	RM7x
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:

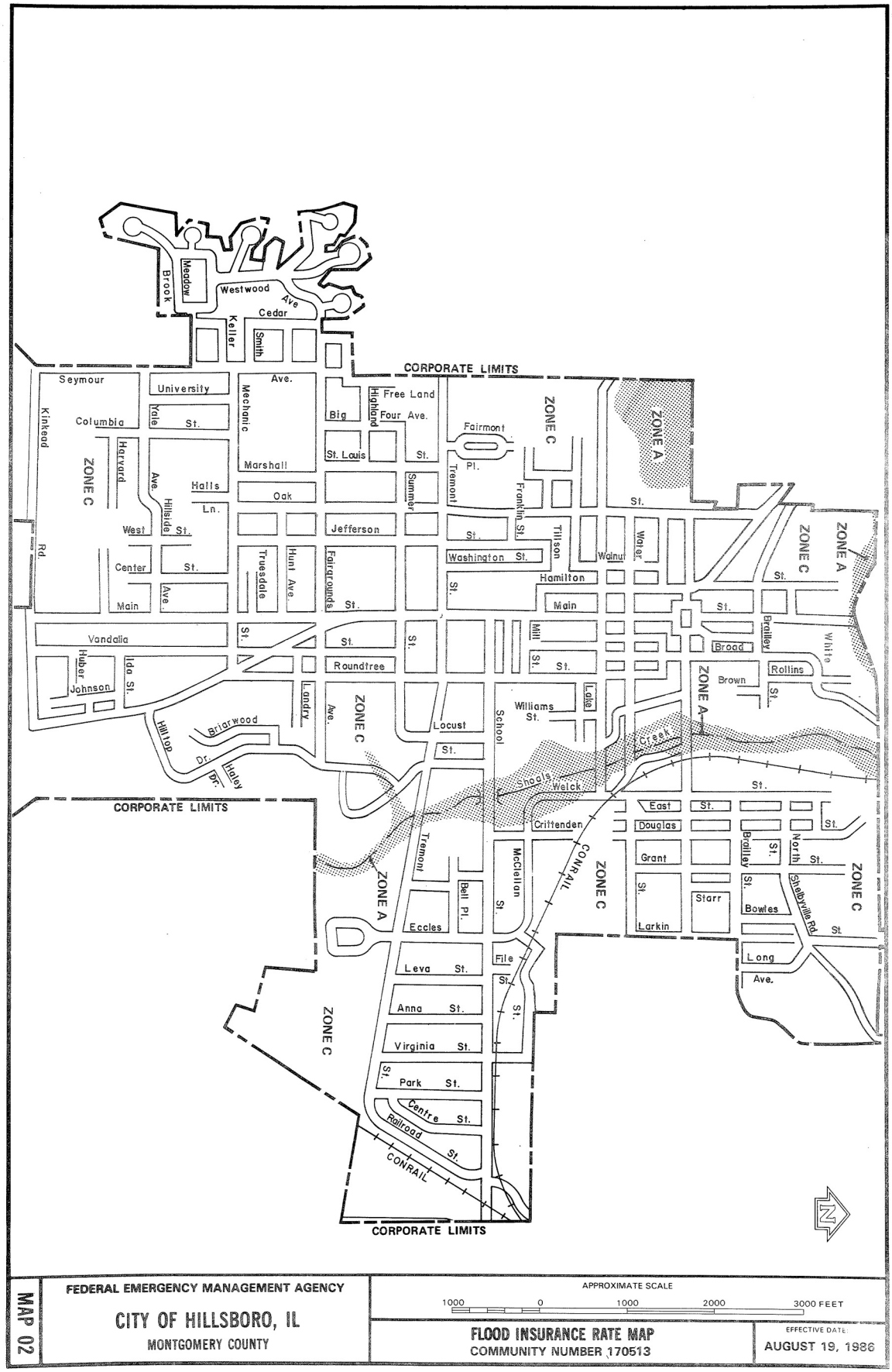
FEDERAL EMERGENCY MANAGEMENT AGENCY

FIRM

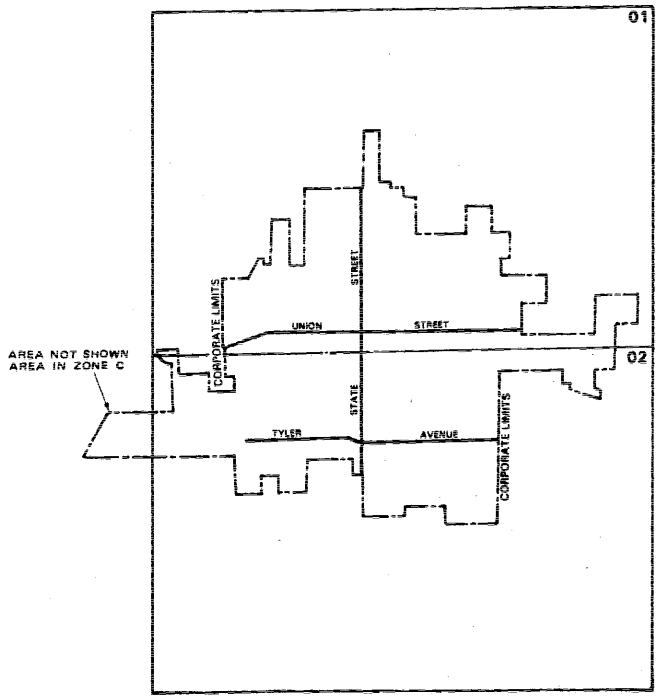
FLOOD INSURANCE RATE MAP 01-02
MAP INDEX
CITY OF HILLSBORO, IL

MONTGOMERY COUNTY

COMMUNITY NUMBER 170513 C


CORPORATE LIMITS
Meadow
Brook
Westwood
Ave
Cedar
Keller
Smith
Seymour
University
Ave.
Mechanic
Free Land
Highland
Big
Four Ave.
Kinkead
Columbia
Yale
St.
Harvard
ZONE C
Marshall
St. Louis
St.
Fairmont
Pl.
ZONE C
ZONE A
Halls
Ln.
Oak
Summer
Tremont
Franklin St.
Hillside
Ave.
West
St.
Jefferson
St.
Tillson
Walnut
Water
Rd.
Center
St.
Truesdale
Hunt Ave.
Fairgrounds
Washington St.
Hamilton
Main
Ave.
St.
Main
St.
Vandalia
St.
St.
St.
Mill
Brailley
White
Huber
Ida St.
Johnson
Roundtree
St.
Broad
Rollins
Brown
Landry
Ave.
ZONE C
Locust
St.
School
Williams St.
Lalas
ZONE A
Briarwood
Hilltop
Dr.
Haley
Dr.
Creek
Shoals
Welck
St.
CORPORATE LIMITS
East
St.
Douglas
Crittenden
Tremont
McClellan
St.
CONRAIL
ZONE C
Grant
Brailley
St.
North
St.
ZONE A
Bell Pl.
St.
Starr
Bowles
Shelbyville Rd.
ZONE C
Eccles
St.
Larkin
St.
Leva St.
File
St.
Long
Ave.
Anna St.
St.
ZONE C
Virginia St.
St.
Park St.
Centre St.
Railroad St.
CONRAIL
CORPORATE LIMITS
N
MAP 02
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

Appendix J



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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NOTES TO USER

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INITIAL IDENTIFICATION: MAY 17, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS: JULY 18, 1975

FLOOD INSURANCE RATE MAP EFFECTIVE: AUGUST 19, 1985

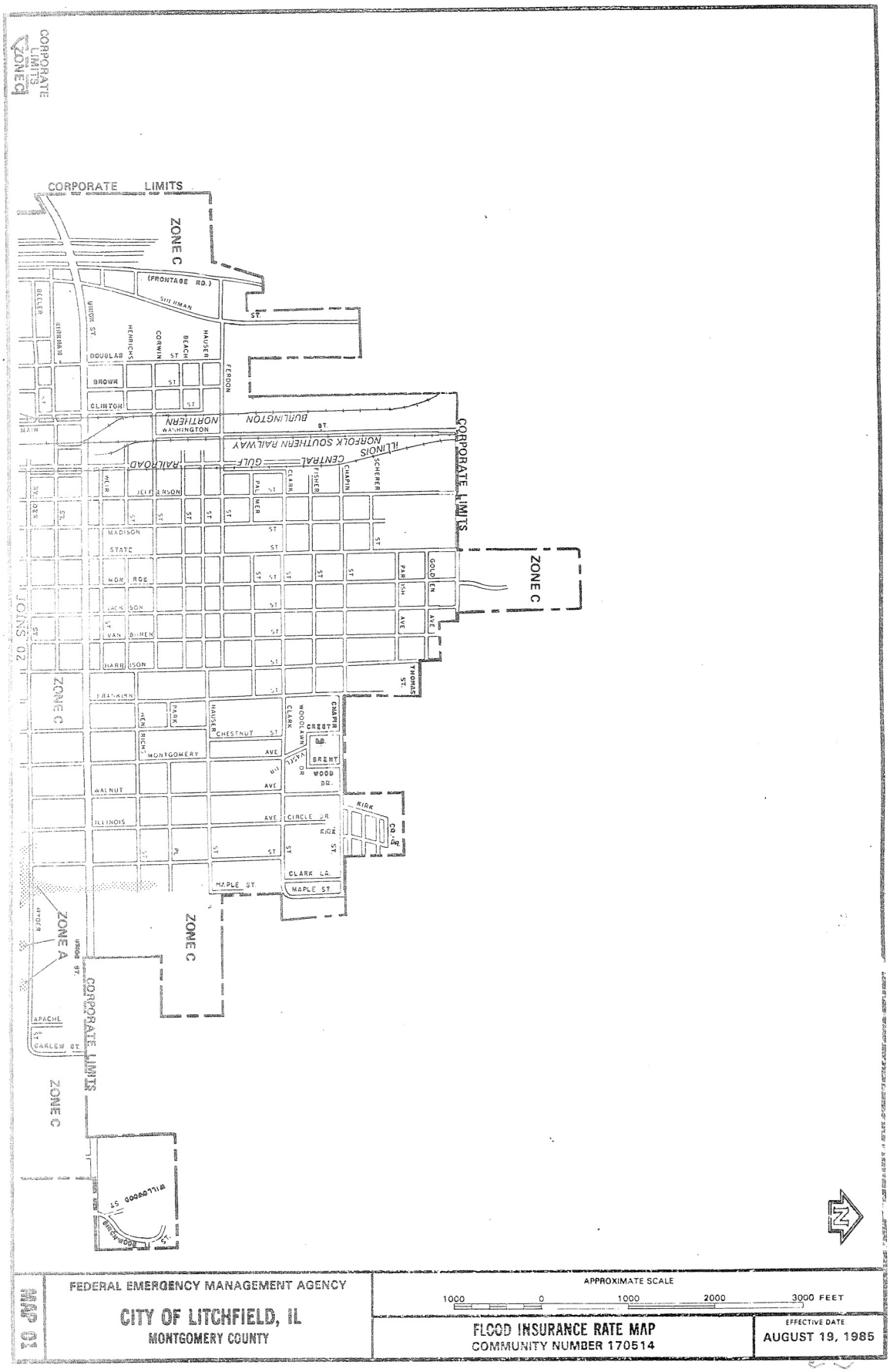
FLOOD INSURANCE RATE MAP REVISIONS:

FEDERAL EMERGENCY MANAGEMENT AGENCY

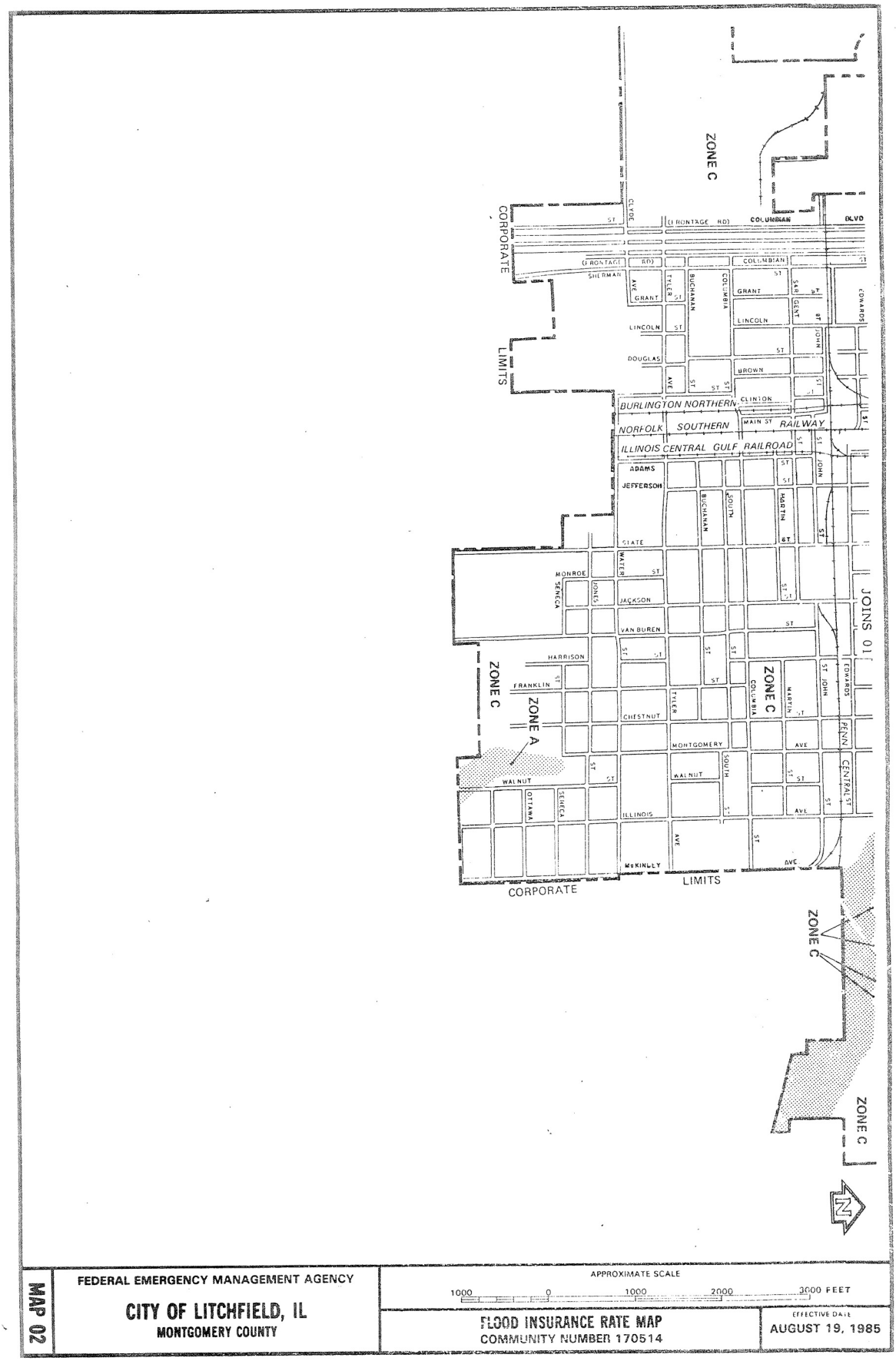
FIRM

FLOOD INSURANCE RATE MAP 01-02
MAP INDEX
CITY OF LITCHFIELD, IL
MONTGOMERY COUNTY

COMMUNITY NUMBER 170514 B


CORPORATE LIMITS
ZONE C
(FRONTAGE RD.)
SHILLMAN
ST.
BECKER
UNION ST.
HENRICHS
CORWIN ST
BEACH
HAUSER
FERDON
DOUGLAS
BROWN
CLINTON
NORTHERN
WASHINGTON
BURLINGTON
ST
ILLINOIS NORFOLK SOUTHERN RAILWAY
CENTRAL GULF RAILROAD
MEIR
JEFFERSON
PALMER
CLARK
FISHER
CHAPIN
SCHERER
MADISON
STATE
MONROE
JACKSON
VAN BUREN
HARRISON
GOLDEN AVE.
PARKISH AVE.
THOMAS ST.
FRANKLIN
HENRICH
PARK
CHESTNUT
MONTGOMERY
AVE
WOODLAWN
CREST
BREMT
WOOD DR.
WALNUT
ILLINOIS
CIRCLE DR
KIRK
CO. DR.
MAPLE ST
CLARK LA.
ZONE A
APACHE
GARLEW ST
WILLOWOOD ST
BRICKWOOD ST.
FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF LITCHFIELD, IL
MONTGOMERY COUNTY
MAP 01
APPROXIMATE SCALE
1000 0 1000 2000 3000 FEET
FLOOD INSURANCE RATE MAP
COMMUNITY NUMBER 170514
EFFECTIVE DATE
AUGUST 19, 1985

Appendix J



MAP 02

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LITCHFIELD, IL

MONTGOMERY COUNTY

APPROXIMATE SCALE

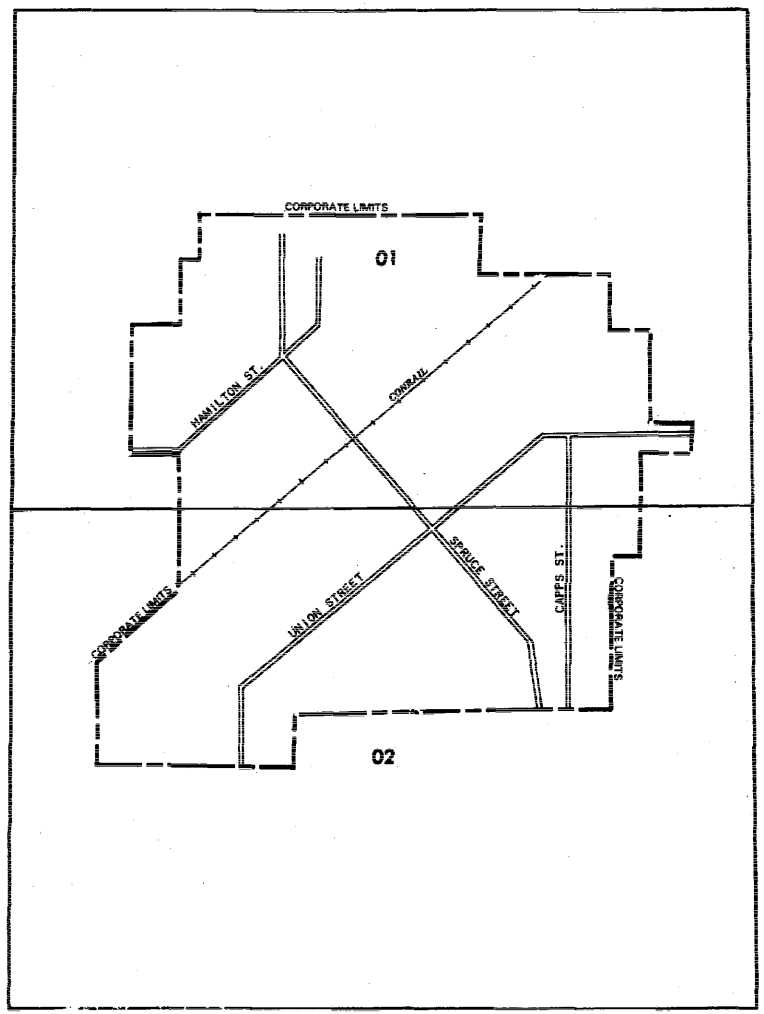
1000 0 1000 2000 3000 FEET

FLOOD INSURANCE RATE MAP

COMMUNITY NUMBER 170514

EFFECTIVE DATE

AUGUST 19, 1985



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

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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:

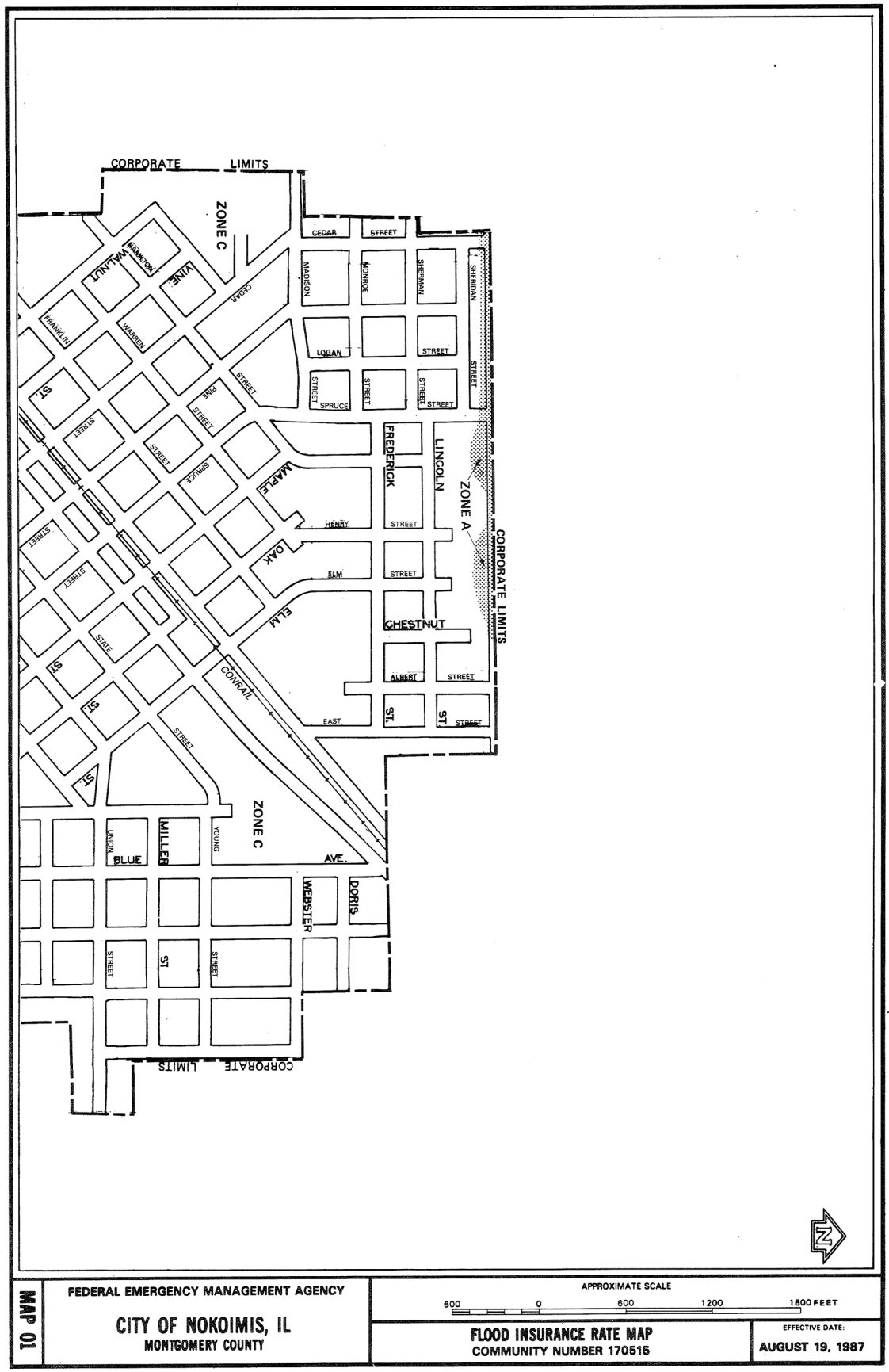
FEDERAL EMERGENCY MANAGEMENT AGENCY

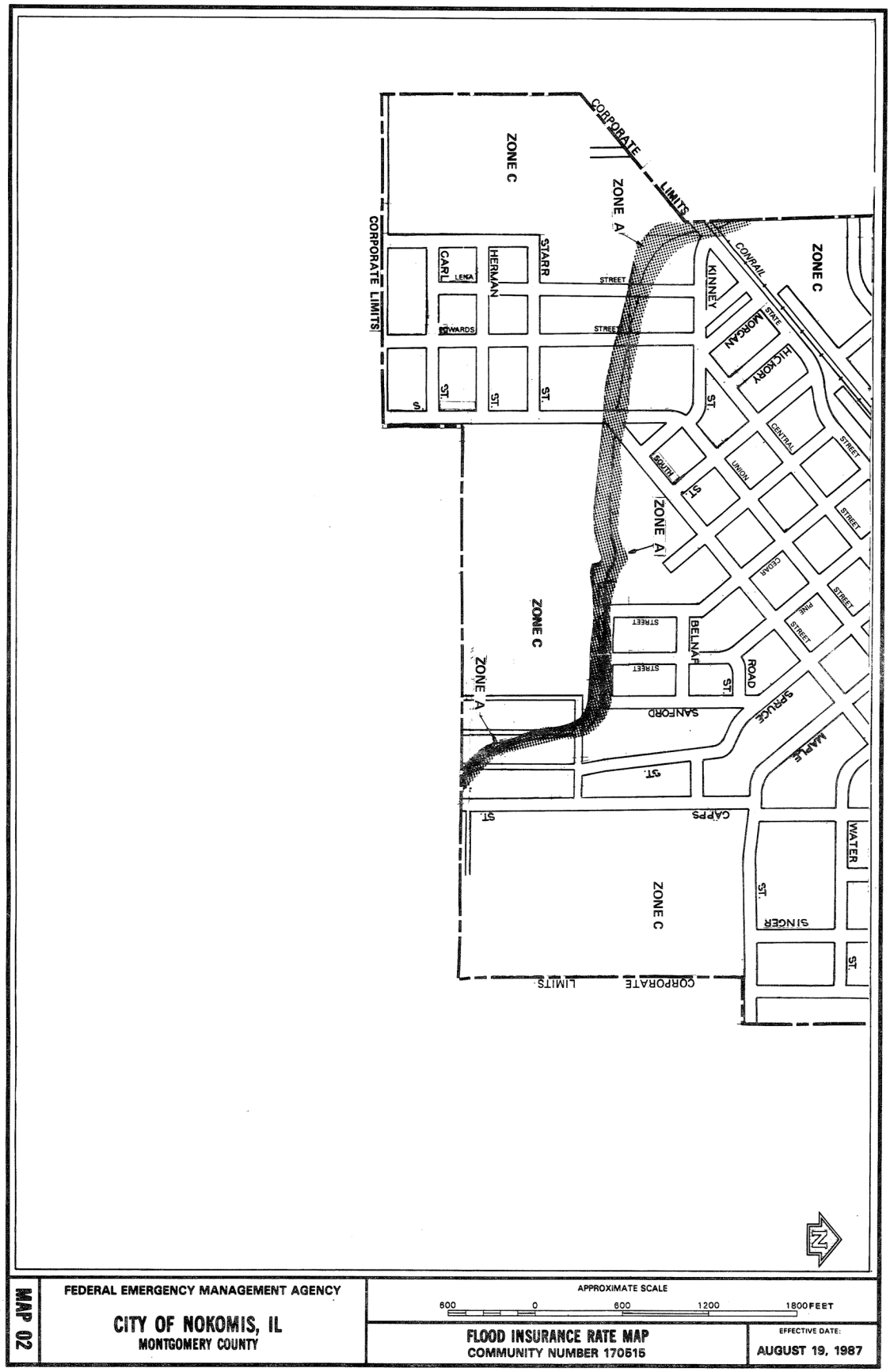
FIRM

FLOOD INSURANCE RATE MAP 01-02
MAP INDEX

CITY OF NOKOMIS, IL
MONTGOMERY COUNTY

COMMUNITY NUMBER 170515 B


CORPORATE LIMITS
ZONE C
CEDAR
STREET
MADISON
MONROE
SHERMAN
SHERIDAN
LOGAN
SPRUCE
PINE
WALNUT
VINE
FRANKLIN
WARREN
MAPLE
OAK
ELM
FREDERICK
LINCOLN
ZONE A
HENRY
CHESTNUT
ALBERT
EAST
ST.
CONRAIL
STATE
YOUNG
UNION
BLUE
MILLER
AVE.
WEBSTER
DORIS
ZONE C
CORPORATE LIMITS
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



MAP 02

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF NOKOMIS, IL
MONTGOMERY COUNTY

APPROXIMATE SCALE
600 0 600 1200 1800 FEET

FLOOD INSURANCE RATE MAP
COMMUNITY NUMBER 170515

EFFECTIVE DATE:
AUGUST 19, 1987

APPENDIX K