

# Natural Hazards Mitigation Plan

## Kane County, Illinois



**Natural Hazards Mitigation Planning Committee**

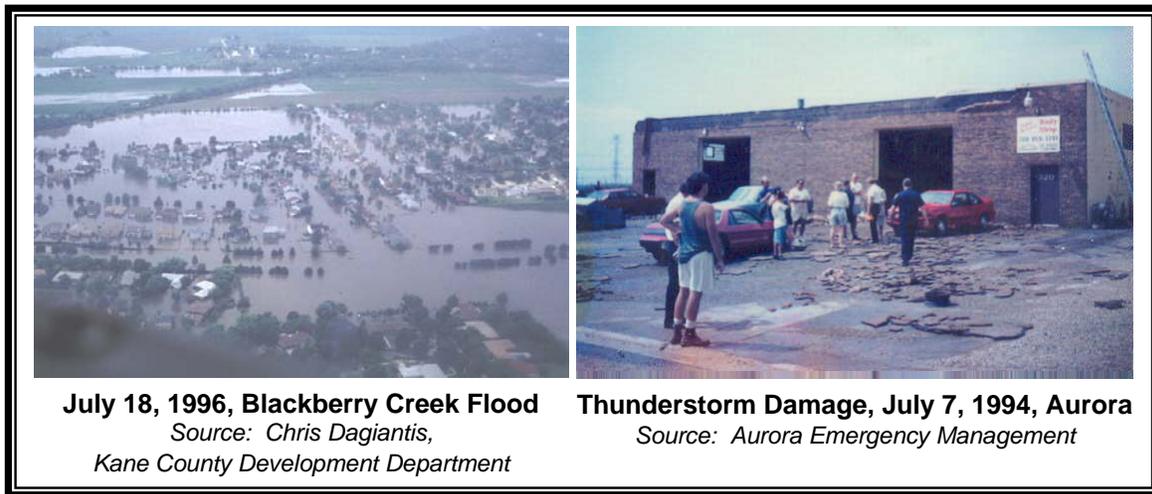
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# Natural Hazards Mitigation Plan

## Executive Summary

### 1. Introduction

Kane County Illinois is subject to natural hazards that threaten life and health and have caused extensive property damage. Floods struck the County in 1996, 2007, and 2008 blizzards in 1999, 2000, 2006, and 2008, and tornadoes in 1990, 1991, 1993, 2003 and 2004. To better understand these hazards and their impacts on people and property, and to identify ways to reduce those impacts, the County's Department of Environmental Management and Office of Emergency Management jointly undertook this *Natural Hazards Mitigation Plan*.



Mitigation activities need funding. A mitigation plan is now a requirement for Federal mitigation funds. Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165) states that after November 1, 2003, local governments applying for *pre*-disaster mitigation funds must have an approved local mitigation plan. After November 1, 2004, a plan will also be needed for *post*-disaster mitigation funds under the Hazard Mitigation Grant Program. These requirements are spelled out in 44 CFR (Code of Federal Regulations) Part 201.

This *Plan* was prepared by the Natural Hazards Mitigation Planning Committee, created by a resolution of the Kane County Board. The Committee's members include representatives of County offices, interested municipalities, and public and private stakeholder organizations.

The *Plan* identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by natural hazards. It focuses on the five major natural hazards facing Kane County: floods, tornadoes, earthquakes, thunderstorms and winter/ice storms. **The full *Natural Hazards Mitigation Plan* can be reviewed or downloaded at [www.co.kane.il.us/hazards/](http://www.co.kane.il.us/hazards/).**

## 2. Hazard Analysis

The Committee reviewed the five hazards: what causes them, their likelihood of occurring, and their impact on people, property, critical facilities, and the local economy. The information is based on available technical studies and reports by the participating agencies and communities on their past experiences. The following table was prepared.

Impact of the Hazards							
Hazard	Annual Chance	Impact Location	Sq. miles Affected	Safety Hazard	Property Damage	Vulnerable Critical Facilities	Economic Disruption
Base Flood	1%	Floodplains	57	Med	Major	18 facilities	Businesses, roads damaged/closed
10-year Flood	10%	Floodways	13	Med	Moderate	3 Emergency response facilities, 2 casinos	Roads closed
Dam Failure	< 1%	Floodplains	N/A	Med	Major	N/A	Businesses, roads damaged/closes
Tornadoes	30%	Anywhere	1	Med	Major	Schools, buildings with large spaces	Utility lines down
Earthquakes	1%	Urban areas	100	Low	Minor	Masonry structures, items on shelves, etc.	Minor impact
Thunderstorms	100%	Anywhere	100	High	Minor	Radio communications disrupted	Hail damage to crops, transportation disrupted, power surges
Winter Storms	100%	Anywhere	500	High	Minor	Power losses	Utility lines down, livestock threatened

## 3. Goals

Based on the hazard analysis, the Committee selected tornadoes, floods, thunderstorms and winter storms as the primary concerns. After a review of other plans and goals, the following goals and guidelines were set for the planning process:

- Goal 1. Protect the lives and health of the citizens of Kane County from the effects of natural hazards.
  - Goal 2. Encourage self-help and self-protection measures to mitigate the effects of natural hazards on private property.
  - Goal 3. Protect critical facilities and public infrastructure with public funds.
  - Goal 4. Identify specific projects to mitigate damage where cost-effective and affordable.
  - Goal 5. Reduce the number of repetitively damaged existing structures
- Guideline 1. Focus natural hazards mitigation efforts on tornadoes, floods, thunderstorms and winter storms.

- Guideline 2. Encourage people to assume some responsibility for their own protection.
- Guideline 3. New developments should not create new exposures to damage from natural hazards.
- Guideline 4. Local initiatives should focus on protecting citizens and public property.
- Guideline 5. Seek county, state, and federal support for special projects.
- Guideline 6. Preserve open space in hazardous areas, especially where they are sensitive natural areas and agricultural land.
- Guideline 7. Be consistent with existing plans.

#### **4. Preventive Measures**

The Committee reviewed a variety of mitigation measures to protect new construction from hazards and see that future development does not increase potential losses. It was found that building code standards and their enforcement were generally good, but could be improved. Land use plans, zoning ordinances and subdivision standards could better address natural hazards. Training would improve enforcement of mobile home installation and the County's stormwater management ordinance.

#### **5. Property Protection**

Property protection measures are used to modify buildings or property subject to damage. They include acquisition, barriers, retrofitting, and insurance. These measures are implemented by the property owners, so appropriate government activities include public information, technical assistance and financial support. Special attention is given to designated repetitively flooded areas. Government offices need to protect their own properties, including making sure they are adequately insured for all hazards.

#### **6. Resource Protection**

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. They include preserving wetlands and farmland, erosion and sedimentation control, preventing dumping in streams and urban forestry. Except for dumping, the County and the municipalities have very effective regulatory programs. Urban forestry programs are encouraged to protect utility lines during wind and ice storms.

#### **7. Emergency Services**

It was concluded that warning programs are good, although more could be done for rural areas and for flood warning on smaller streams. Most emergency response plans do not have hazard-specific procedures. As with the other measures, public education can help greatly. Informed people can find out what the threats are on their own and can take appropriate actions to protect themselves and their property.

## 8. Structural Projects

Most past projects, such as levees and reservoirs have been successful in controlling flooding, but at a cost. They are expensive and, without property precautions, they can be environmentally destructive. They only protect to a specified design level (a levee in Montgomery was overtopped by the July 1996 flood). The Committee identified the greatest need was to set criteria to ensure structural projects do not adversely affect other properties or natural functions. It also recommended a formal and regular program of drainage system maintenance.

## 9. Public Information

Almost every measure reviewed would benefit from a public information program. The Committee reviewed outreach projects, real estate disclosure, providing background information to libraries and on websites, and providing technical assistance. Top messages to convey were identified and the most effective media to convey those messages are listed.

## 10. Action Plan

Chapter 10 is the culmination of the Committee's work. It includes 11 programmatic action items, 3 public information action items, and 3 actions to administer and support a County-wide mitigation program to reach the four goals. These are listed on the next two pages. On page ES-6 is a table that lists the responsible agencies for each action item.

Most of these action items can be implemented by County and municipal staff. Only action items 4 and 6 require outside funding support. The original planning committee was replaced by a standing Mitigation Coordinating Committee to monitor execution of the *Plan* and act as a forum for hazard mitigation ideas and issues.

### 10.1. Program Action Items

- 1. Building Code Improvements:** Adopt the latest International series of codes, the new national standard that is being adopted throughout the country. Additional code revisions should be pursued to strengthen new buildings against damage by high winds, tornadoes and hail.
- 2. Improved Code Enforcement:** Develop and conduct training for building department staff on the natural hazards aspects of the International Codes, regulation of mobile home installation, and the new County stormwater ordinance and its flood and natural resource protection provisions.
- 3. Review of Plans and Development Regulations:** When they are up for revision, comprehensive plans, land use plans, and zoning and subdivision ordinances should incorporate mitigation provisions.

4. **Facility Audits:** Evaluate all critical facilities' exposure to damage from the hazards of flooding, high winds, lightning, hail and power losses from downed lines. Include a review of insurance coverage and identify where more information can be found on the property protection measure(s) recommended by the audit.
5. **Retrofitting Incentives:** Establish a program of technical assistance and financial incentives to encourage property protection measures on private property.
6. **Repetitive Loss Projects:** Protect buildings in the five priority repetitive loss areas through acquisition or elevation. Seek funding support.
7. **Drainage Maintenance:** Implement a formal and regular drainage system maintenance program.
8. **Urban Forestry:** Implement an urban forestry program that qualifies the municipality to become a Tree City, USA.
9. **Flood Threat Recognition:** Determine whether it would be worthwhile to add rain and stream gages and develop a central gage monitoring capability for flood and flash flood predictions.
10. **Improved Emergency Response:** Conduct a review of emergency response plans and programs to identify where additional activities are needed to respond to natural hazards.
11. **Flood Control Projects:** Implement flood control projects, including farm drainage and bridges and culverts improvements, where they prove to be the most appropriate approach to reduce flood damage, but make sure they meet certain criteria.

## 10.2. Public Information Strategy

12. **Hazard Mitigation Materials:** Prepare background information, articles, and other explanations of hazard mitigation topics and provide them to County, municipal, and private offices for use in presentations, newsletter articles, webpages, brochures and other outreach projects.
13. **Outreach Projects:** Prepare and disseminate outreach projects based on the materials provided under action item 12. Such projects should include articles in newsletters, news releases, directed mailings, handouts, websites, and displays.
14. **Property Protection References:** Provide building departments, libraries, webmasters, and other interested offices with a list of websites on property protection and references that can be ordered for free from state and federal offices.

## 10.3. Administrative Action Items

**15. Plan Adoption:** Adopt this *Natural Hazards Mitigation Plan* by passing a resolution. The County’s resolution creates the Mitigation Coordinating Committee. The municipal resolutions adopt each action item that is pertinent to the community and assign a person responsible for it.

**16. Mitigation Coordinating Committee:** Convert the Natural Hazards Mitigation Planning Committee to a permanent advisory body. It would act as a forum for hazard mitigation issues, monitor implementation of this *Plan*, and report on progress and recommended changes to the County Board and each municipality.

**17. Community Rating System:** Following a workshop, each municipality and the County would review floodplain management activities currently undertaken and those recommended by this *Plan* and decide whether to apply for a Community Rating System flood insurance premium rate discount for its residents.

Action Items and Responsible Agencies																	
	1. Building Code Improvements	2. Improved Code Enforcement	3. Plans & Development Regs	4. Facility Audits	5. Retrofitting Incentives	6. Repetitive Loss Projects	7. Drainage Maintenance	8. Urban Forestry	9. Flood Threat Recognition	10. Improved Emergency Response	11. Flood Control Projects	12. Hazard Mitigation Materials	13. Outreach Projects	14. Property Protection References	15. Plan Adoption	16. Mitigation Coordinating Comm.	17. Community Rating System
Kane County																	
County Board															X		
Office of Emergency Mgmt.				X						X		X	X	X		X	
Environmental and Building Mgmt.		X	X		X	X	X		X		X					X	X
Water Resources					X	X					X					X	
Development	X	X	X	X												X	
Transportation							X				X					X	
Municipalities																	
City Council/Village Board															X		
Designated department(s)	X	X	X	X	X	X	X	X		X	X		X			X	X
Townships							X				X					X	
Drainage Districts							X										
IDOT											X						
Red Cross												X	X	X		X	

# Natural Hazards Mitigation Plan

## Contents

Executive Summary .....	ES-1
1. Introduction	
1.1. Planning Approach.....	1-2
1.2. Plan Update.....	1-5
1.3. The Setting .....	1-6
1.4. Land Use and Development.....	1-9
1.5. Critical Facilities .....	1-11
1.6. References.....	1-12
2. Hazard Analysis	
2.1. The Flood Hazard .....	2-1
2.2. Impact of Flooding.....	2-12
2.3. Tornadoes.....	2-26
2.4. Earthquakes.....	2-33
2.5. Thunderstorms .....	2-38
2.6. Winter/Ice Storms .....	2-43
2.7. Conclusions.....	2-47
2.8. References.....	2-50
3. Goals	
3.1. Setting the stage .....	3-1
3.2. Setting directions .....	3-5
3.3. Goals and Guidelines .....	3-6
4. Preventive Measures	
4.1. Building Codes .....	4-1
4.2. Manufactured Homes.....	4-6
4.3. Planning and Zoning.....	4-7
4.4. Subdivision Regulations .....	4-12
4.5. Open Space Preservation .....	4-13
4.6. Stormwater Management.....	4-14
4.7. Conclusions.....	4-18
4.8. Recommendations.....	4-19
4.9. References.....	4-20

## 5. Property Protection

5.1. Keeping the Hazard Away .....	5-1
5.2. Retrofitting.....	5-4
5.3. Insurance.....	5-7
5.4. The Government’s Role.....	5-9
5.5. Repetitive Loss Properties .....	5-12
5.6. Conclusions.....	5-14
5.7. Recommendations.....	5-14
5.8. References.....	5-15

## 6. Resource Protection

6.1. Wetland Protection .....	6-1
6.2. Erosion and Sedimentation Control.....	6-4
6.3. River Restoration .....	6-5
6.4. Best Management Practices.....	6-7
6.5. Dumping Regulations .....	6-9
6.6. Urban Forestry .....	6-10
6.7. Farmland Protection.....	6-11
6.8. Conclusions.....	6-13
6.9. Recommendations.....	6-14
6.10. References.....	6-14

## 7. Emergency Services

7.1. Threat Recognition .....	7-1
7.2. Warning .....	7-4
7.3. Response .....	7-7
7.4. Critical Facilities Protection .....	7-11
7.5. Post-Disaster Recovery and Mitigation .....	7-11
7.6. Conclusions.....	7-13
7.7. Recommendations.....	7-14
7.8. References.....	7-15

## 8. Structural Projects

8.1. Reservoirs and Detention.....	8-3
8.2. Levees and Floodwalls.....	8-6
8.3. Channel Improvements .....	8-7
8.4. Crossings and Roadways .....	8-9
8.5. Drainage and Storm Sewer Improvements .....	8-10
8.6. Drainage System Maintenance .....	8-12
8.7. Conclusions.....	8-13
8.8. Recommendations.....	8-13
8.9. References.....	8-14

9. Public Information

9.1. Outreach Projects ..... 9-1  
9.2. Real Estate Disclosure ..... 9-3  
9.3. Library and Web Sites ..... 9-5  
9.4. Technical Assistance..... 9-6  
9.5. Public Information Program Strategy ..... 9-7  
9.6. Conclusions..... 9-11  
9.7. Recommendations..... 9-11  
9.8. References..... 9-12

10. Action Plan

10.1. Program Action Items..... 10-2  
10.2. Public Information Strategy..... 10-9  
10.3. Administrative Action Items..... 10-11

Appendices

- Appendix A. Original 2003 Committee Participants
- Appendix B. Public Involvement Activities
- Appendix C. Kane County Hazard Analysis
- Appendix D. Critical Facilities
- Appendix E. Public Information Strategy Exercise
- Appendix F. The Community Rating System
- Appendix G. County and Municipal Resolutions



The Original 2003 *Natural Hazards Mitigation Plan* was prepared with the technical support of French & Associates, Ltd., 153 Nanti Street, Park Forest, Illinois 60466. FrenchAsoc@aol.com

# Chapter 1. Introduction

**The problem:** Kane County Illinois, is subject to natural hazards that threaten life and health and have caused extensive property damage. Floods struck the County in 1993, 1996, and 2007, blizzards in 1999 and 2000, and tornadoes in 1990, 1991 and 1993. To better understand these hazards and their impacts on people and property, and to identify ways to reduce those impacts, the County’s Department of Environmental Management and Office of Emergency Management jointly undertook this *Natural Hazards Mitigation Plan*.

“Hazard mitigation” does not mean that all hazards are stopped or prevented. It does not suggest complete elimination of the damage or disruption caused by such incidents. Natural forces are powerful and most natural hazards are well beyond our ability to control. Mitigation does not mean quick fixes. It is a long-term approach to reduce hazard vulnerability.

*“Hazard mitigation” is defined as any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. – FEMA*

**Why this plan?** Every community faces different hazards and every community has different resources and interests to bring to bear on its problems. Because there are many ways to deal with natural hazards and many agencies that can help, there is no one solution or cookbook for managing or mitigating their effects.

Planning is one of the best ways to correct these shortcomings and produce a program of activities that will best mitigate the impact of hazards and meet other needs. A well-prepared plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and with other goals and activities, preventing conflicts and reducing the costs of implementing each individual activity.

Mitigation activities need funding. A mitigation plan is now a requirement for Federal mitigation funds. Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165) states that as of November 1, 2003, local governments applying for *pre*-disaster mitigation funds must have an approved local mitigation plan. Similarly, as of November 1, 2004, a plan is also needed for *post*-disaster mitigation funds under the Hazard Mitigation Grant Program. These requirements are spelled out in 44 CFR (Code of Federal Regulations) Part 201.

Therefore, a mitigation plan will both guide the best use of mitigation funding and meet the prerequisite for obtaining such funds from the Federal Emergency Management Agency. FEMA also recognizes plans through its Community Rating System, a program that reduces flood insurance premiums in participating communities.

**This Plan:** This *Plan* identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by natural hazards. The *Plan* focuses on the five major natural hazards facing Kane

County: floods, tornadoes, earthquakes, thunderstorms and winter/ice storms. It fulfills the Federal mitigation planning requirements, qualifies for Community Rating System credit and provides the County and its municipalities with a blueprint for reducing the impacts of these natural hazards on people and property.

The information contained within this plan could support other county and municipal planning initiatives. These plans could include the counties Emergency Response Plan, Land Resource Management Plan, and municipal emergency response or operating plans. The goals, guidelines, Hazard Analysis, action items and information on natural disasters discussed in this plan could be incorporated into these county or municipal plans, when appropriate.

## 1.1. Planning Approach

This *Plan* is the product of a rational thought process that reviews alternatives and selects and designs those that will work best for the situation. This process is an attempt to avoid the need to make quick decisions based on inadequate information. It provides carefully considered directions to the County government and to the participating municipalities by studying the overall damage potential and ensuring that public funds are well spent.

**Planning Committee:** This *Natural Hazards Mitigation Plan* was developed under the guidance of a Natural Hazards Mitigation Planning Committee, created by a resolution of the Kane County Board on November 12, 2002. Municipalities within Kane County were originally invited to participate in the committee and interested municipalities passed a resolution stating their commitment to the plan development. The Committee's members included representatives of County offices, interested municipalities, and public and private stakeholder organizations.



The member organizations and each participant who originally attended at least 3 meetings are shown in the table at the end of this chapter. All of the original participants are listed in Appendix A. The member organizations and participants as of 2008 are listed in a table after the original committee member table.

The Committee developed the plan from December 2002 through September 2003. The plan development included the hazards and their effects on people and property, consideration of a variety of ways to reduce and prevent damage, and recommendations for the most appropriate and feasible measures for implementation.

Technical support for the development and implementation of the Natural Hazards Mitigation plan is provided by the Kane County Office of Emergency Management, the Department of Environmental and Building Management and the Department of GIS

Technologies. French & Associates, Ltd., a hazard mitigation consulting firm, provided technical support for the development of the original plan.

**Planning process:** The Natural Hazards Mitigation Planning Committee followed a standard 10-step process, based on guidance and requirements of the Federal Emergency Management Agency (FEMA). This process is summarized in the flow chart on page 1-4.

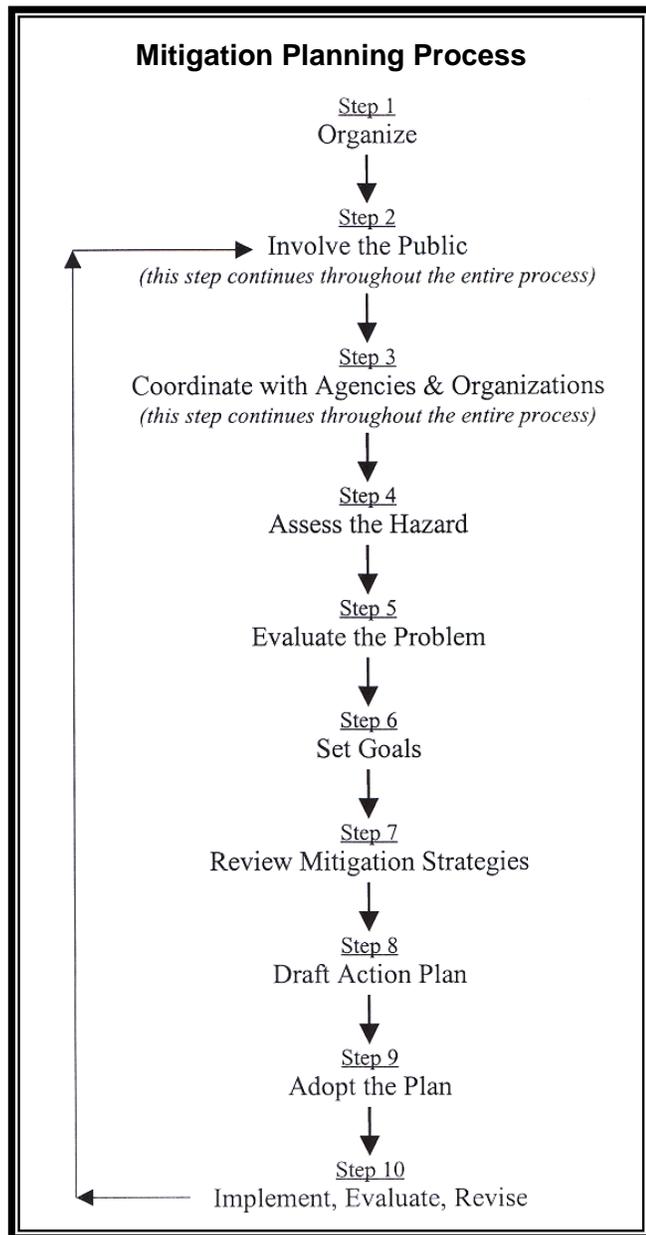
**Public Involvement:** Step 2 of the planning process was to obtain input from the public, particularly residents and businesses that have been affected by natural hazards. The public was invited to participate through several concurrent means, including:

- Contact with Committee members and their organizations
- A standing invitation to attend Committee meetings
- Press releases.
- A special website, [www.co.kane.il.us/hazards/](http://www.co.kane.il.us/hazards/)
- A public meeting was held on September 4, 2003, to receive comments on the draft plan

Examples of these efforts can be seen in Appendix B.

**Coordination:** Existing plans and programs were reviewed during the planning process. It should be underscored that this plan does not replace other planning efforts, such as the County's comprehensive plan, stormwater management planning and the Local Emergency Planning Committee (which focuses on hazardous materials). This plan complements those efforts and, as noted in later chapters, builds on their recommendations.

During the planning process, contacts were made with regional, state, and federal agencies and organizations. On November 26, 2002, a letter was sent to a variety of stakeholder organizations as well as the following agencies to determine how their programs affect or could support the County's mitigation efforts.



- US State Geological Survey
- U.S. Fish & Wildlife Service
- U.S. Army Corps of Engineers
- National Weather Service
- Federal Emergency Management Agency
- Illinois Emergency Management Agency
- Northeastern Illinois Planning Commission
- Illinois Department of Natural Resources
- Illinois State Water Survey

In most cases, these agencies did not provide any information or comments in response to this effort. Direct discussions with several of them did prove quite helpful.

At the end of the planning process, each of these agencies was sent a notice requesting their review of the draft *Plan*. They were advised that the draft could be reviewed on the County’s website and they were asked to provide any comments in time for the September 4, 2003, public meeting. This notice also went to all municipalities in the County (including the four that did not sign up to participate), all 16 townships, and the adjoining counties of McHenry, Lake, Cook, DuPage, Will, Kendall, and DeKalb.

**Hazard assessment and problem evaluation:** The Committee tackled steps 4 and 5 of the planning process concurrently during the months of January and February, 2003. The hazards reviewed were based on the Office of Emergency Management’s 2001 *Kane County Hazard Analysis*, which is included as Appendix C. It scored natural and man-made hazards for their likelihood of occurring, their potential impact, and the vulnerability of the County to them. It found five natural hazards had an overall score of “high” or “medium.”

Major Natural Hazards						
Natural Hazard	Time of Occurrence				Last Major Event	
	Fall	Winter	Spring	Summer	Year	Location
Flood	X	X	X	X	2008	Center County
Tornado	X		X	X	1993	North County
Earthquake	X	X	X	X	1912	County-wide
Thunderstorm & Hail	X		X	X	2007	Center/North County
Winter & Ice Storm		X			2000	County-wide

The hazard data and the Committee’s findings and conclusions are covered in Chapter 2 of this *Plan*. Chapter 2 assesses each hazard – what causes it and the likelihood of occurrence – and the impact of the hazard on human development, i.e., how vulnerable Kane County is to damage.

**Goals:** The Committee conducted a goal setting exercise at its March meeting. The goals were then drafted and revised at subsequent meetings. The results are discussed in Chapter 3 of this *Plan*.

**Mitigation Strategies:** The Mitigation Planning Committee considered everything that could affect the impact of the hazards and reviewed a wide range of alternatives. The Committee’s work and the subsequent plan document explored six general strategies for reaching the goals. These strategies are the subject of Chapters 4 – 9 in this *Plan*.

- Preventive – e.g., zoning, building codes, and other development regulations
- Property protection – e.g., relocation out of harm’s way, retrofitting buildings, insurance
- Resource protection – e.g., wetlands protection, urban forestry programs
- Emergency services – e.g., warning, sandbagging, evacuation
- Structural projects – e.g., levees, reservoirs, channel improvements
- Public information – e.g., outreach projects, technical assistance to property owners

**Action plan:** After the many alternatives were reviewed, the Committee drafted an “action plan” that specifies recommended projects, who is responsible for implementing them, and when they are to be done. The action plan is included in Chapter 10 of this *Natural Hazards Mitigation Plan*.

## 1.2 Plan Update

Since the Plan’s adoption by Kane County and local communities in 2003, the Natural Hazards Mitigation Planning Committee has met twice a year to track implementation of the action items contained in the Plan. County resolution 03-308 officially adopted this plan and specifically stated that all meetings of the mitigation coordinating committee will be open to the public. With this in mind the public has been encouraged to attend and participate in these bi-annual meetings. An open invitation is listed on the county website along with the meeting schedule as well as a copy of the plan and the yearly reports.

The Committee reviewed the plan in 2008 and updated the plan to reflect progress made and changes to items based on new progress or policy changes. The committee did not feel an outside contractor was needed for the update. The process used by the committee to update the plan was by committee member survey. Each committee member was provided a copy of the plan and required to update the information specific to their jurisdiction or items of the plan that would impact their organization. Updated information was then sent to the Office of emergency Management to be compiled and included in the plan. This method was used to update the entire plan. Committee members felt that major changes would not be needed; just a general update would be required for this review and update cycle. In addition the committee reviewed the goals and guidelines discussed in chapter 3 and found them to still be valid and will not need to be changed. The Office of emergency management also updated all statistical weather

and geological data within the plan. A draft copy of the updated plan was then provided to all committee members and they had the opportunity to provide any final changes.

During the review process the committee felt it was important to involve surrounding counties. They were provided with a copy of the plan so they could coordinate and/or incorporate it into other plans from surrounding jurisdictions. A draft copy of the updated plan was provided to the seven counties (McHenry, Lake, Cook, DuPage, Will, Kendall, and DeKalb) that surround Kane County. Each of the counties had the opportunity to provide input on the updates to the committee.

Since the planning committees formation all of the original participating municipalities have continued to participate by providing a representative to serve on the committee. The Villages of Barrington Hills, Bartlett and Hoffman Estates have only small portions of their corporate limits in Kane County and opted to not participate. Pingree Grove did not originally adopt the plan; however they have been participating on the committee and have stated they will adopt the updated plan. The village of Campton Hills incorporated on April 17, 2007 and shortly thereafter started to participate with the committee; the village adopted the original plan on January 20, 2009.

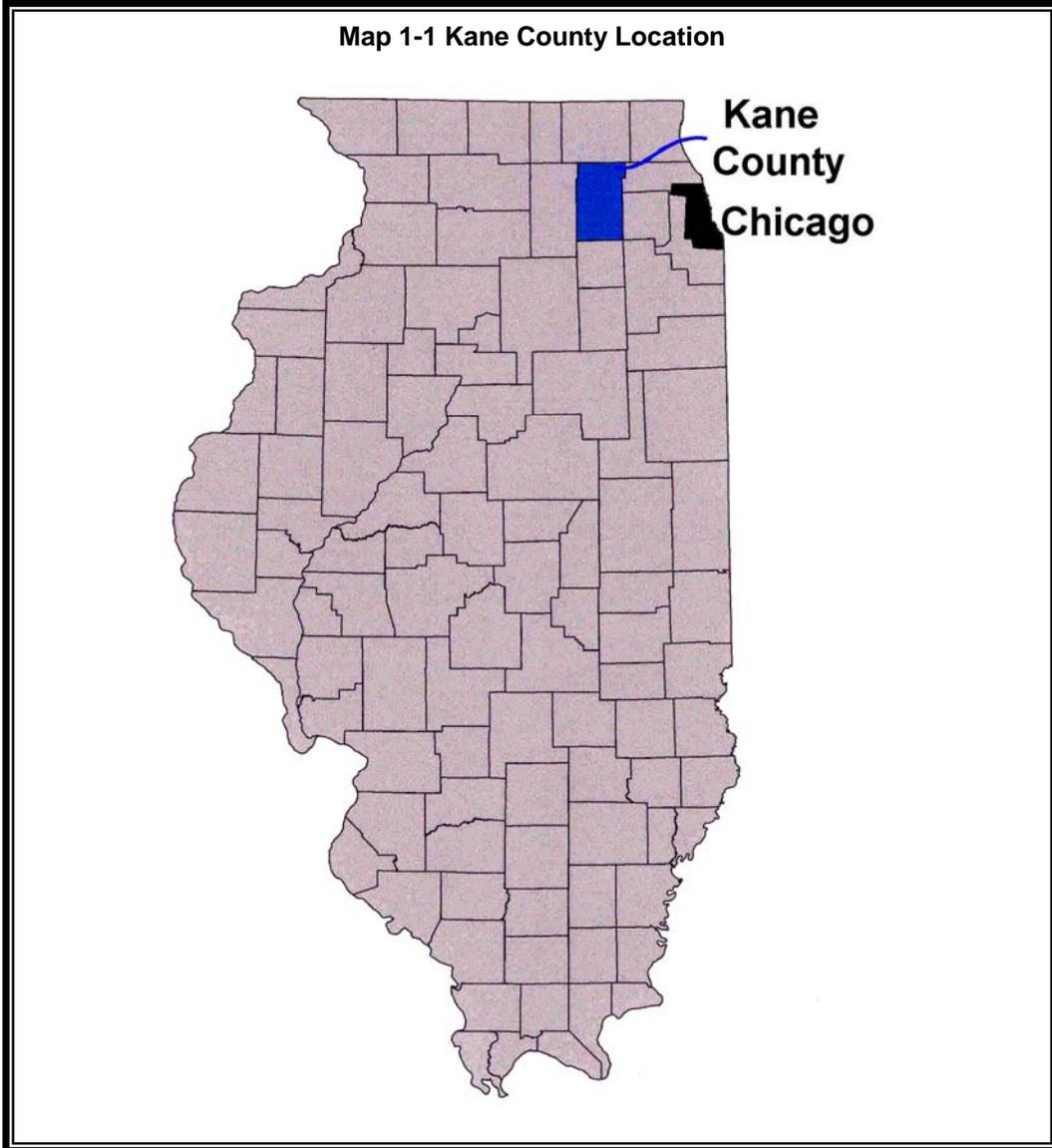
### **1.3 Setting**

Kane County is located in northeastern Illinois; 20 miles west of the City of Chicago (see Map 1-1). The County measures 30 miles north to south and 18 miles east to west. It covers 522 square miles. Kane County's topography slopes from rolling hills in the northwestern part of the County to the Fox River Valley which runs north to south through the eastern quarter of the County.

Kane County's topography was formed 10,000 - 12,000 years ago by the last glacial movement in the region. When the ice sheet receded it left behind rolling morainal hills, level outwash plains, the drainage basins of the Kishwaukee and Fox Rivers, and other features associated with glacial recession. The drainage basin of the Fox River influences the varied landscape in the eastern portion of the county. The county's central portion has a gentle rolling terrain with hilly ridges. The topography of the western and southern portion of the county is generally flat.

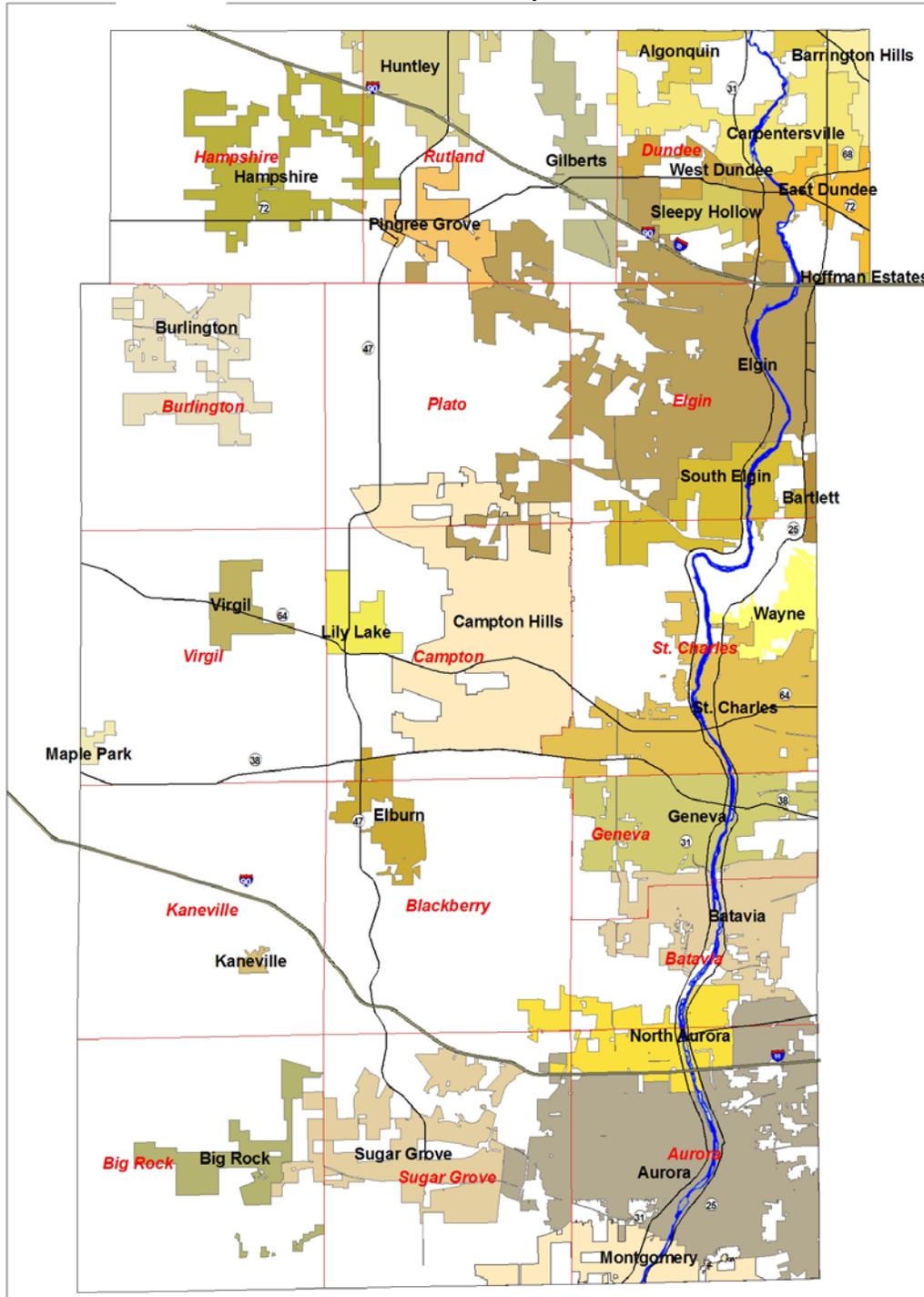
In the eastern portion of the county, the Fox River flows southerly through the entire length of the county. The land bordering the Fox River is steepest in the north where high bluffs overhang its banks.... As the river continues south the land gradually descends to an elevation of 610 feet in the Village of Montgomery, the lowest elevation in the county. – *2020 Land Resource Management Plan*, page 97

In 2000, Kane County had a population of 404,119, an increase of 27% from the 1990 census. Political jurisdictions include 16 townships and 29 municipalities. In 2007 Campton Hills incorporated bringing the total municipalities to 30. Most of the incorporated municipalities are located where development is concentrated: along the Fox River in the eastern third of the County. Approximately 25% of the County's land area and 81% of the population is contained within the 30 municipalities.



# Map 1-2. Kane County Setting

Source: Kane County GIS



## 1.4 Land Use and Development

Hazard mitigation is primarily concerned with development: where are the people, the buildings that they live and work in, and the infrastructure that serves them? The table to the right shows the breakdown of developed and undeveloped/agricultural areas for the whole county.

Kane County Land Uses	
Land Use	Percent
Agricultural	83%
Mining/quarrying	> 1%
Open space	3%
Vacant	2%
Total Undeveloped	88%
Residential	8%
Commercial/industrial	> 1%
Institutional/government	1%
Transportation/utilities	2%
Total Developed	12%
<i>Source: 2020 Land Resource Management Plan, page 118</i>	

The “Undeveloped” land use category includes agricultural land, which is not really “undeveloped.” Agricultural land includes things such as farmhouses, nurseries, agricultural businesses, and improved farmland. However, there is not a concentration of buildings and infrastructure exposed to damage by natural hazards, so it is treated as undeveloped for this *Plan’s* purposes. Ten

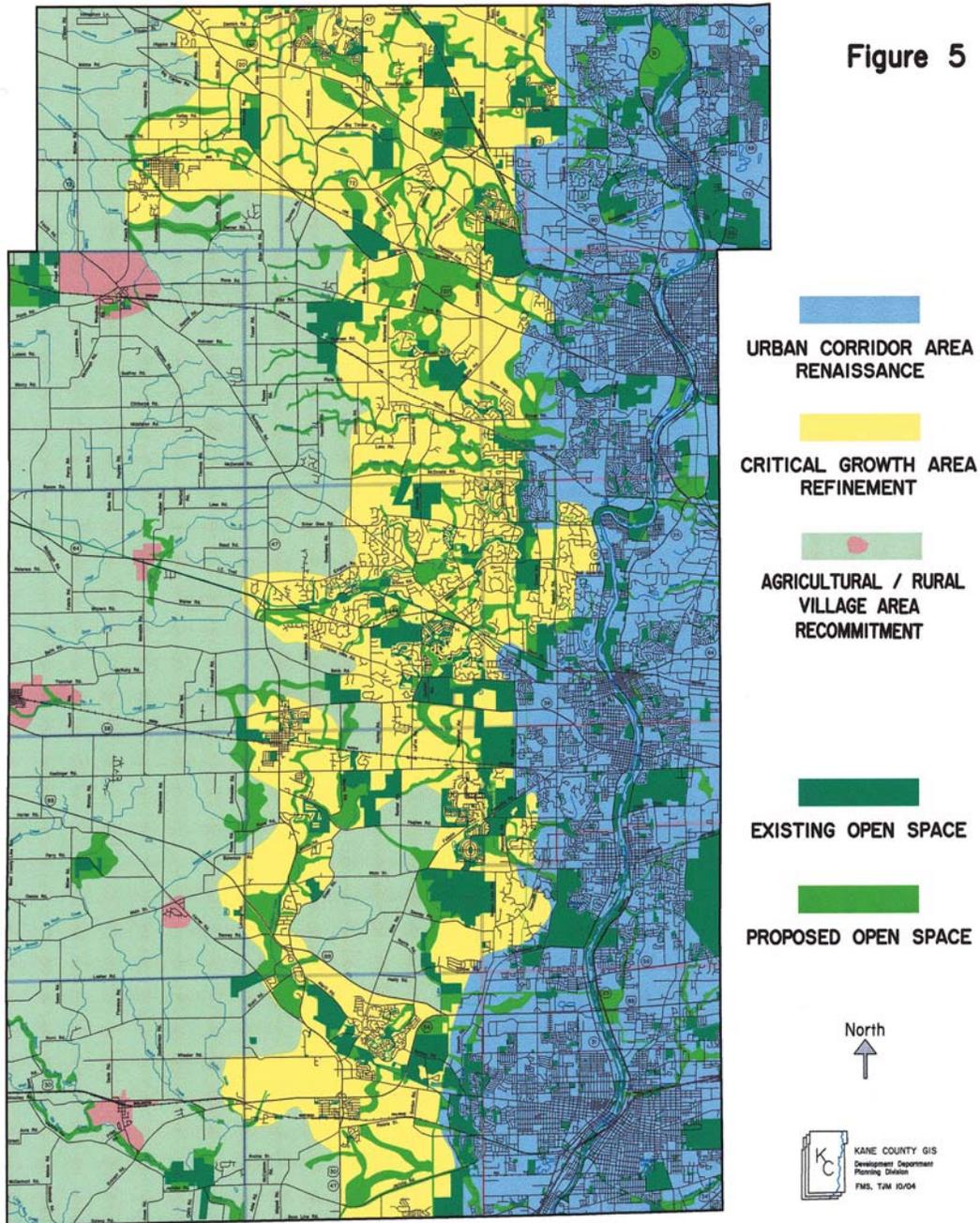
western and central townships account for 87% of the County’s agricultural land. The undeveloped land use category also includes mining, quarrying, open space and vacant land, all of which suffer little during a flood, tornado or other disaster.

The “Developed” land use category includes residential and commercial development, such as homes, businesses, and factories. Almost all (99%) of the residential development in Kane County is single-family homes. The institutional/government category includes public facilities, schools, churches, hospitals, etc. More than 2/3 of the institutional/government area is located in Geneva and Batavia Townships and includes Fermilab, Mooseheart and Marmion Academy. Transportation and utilities are the major components of the County’s infrastructure. This includes roads and highways, power sources and distribution, and water and sewage treatment and distribution.

Eighty-eight percent (88%) of the County’s land area is considered undeveloped. However, since the last decade saw a 27% increase in population and since the County population continues to grow, it is certain that development will continue to extend westward. Accordingly, this hazard mitigation plan addresses activities that can protect future development from natural hazards. This is discussed in Chapter 6.

The *2030 Land Resource Management Plan* addresses managing this growth and preventing suburban sprawl by designating four land use strategy areas. These are shown on the next page.

# 2030 CONCEPTUAL LAND USE STRATEGY MAP



The Urban Corridor, the municipalities along the Fox River from Algonquin on the north to Montgomery on the south, is experiencing what can best be described as a “renaissance”, a new urban focus for a new century. The historic development patterns along the Fox River continue expanding along with the growing population of the cities and villages. Today these municipalities are home for about 80% of the county’s population. (*2030 Land Resource Management Plan*, page 22)

West of the Urban Corridor is the Critical Growth Area, where most of the major new developments are occurring.

The theme of “refinement” is applied to the Critical Growth Area both in terms of refining the geographic area and the diversity and extent of development activities. The geography of the Critical Growth Area has been enlarged because of several factors: westward expansion of the Urban Corridor; approval of Facility Planning Area boundaries by IEPA; recognition of the growth of Hampshire, Sugar Grove and Elburn; unincorporated land use changes approved by the county; major open space acquisitions and enhancement of the greenway system; and the 2030 population, household and employment projections. The Critical Growth Area faces the greatest challenges to sensible, managed growth. It is where we have the greatest opportunity to incorporate Smart Growth principles and “Priority Places” into community development decisions. *(2030 Land Resource Management Plan, page 22)*

The western half of Kane County is considered the Agricultural/Village Area. The County’s objective in that area is to preserve the farmland and small town atmosphere. Development will be directed to the other two strategy areas, through zoning, farmland preservation, and control of expansion of public facilities, such as sewers and wastewater treatment.

When the Planning Commission reviewed the Conceptual Land Use Strategy, they concluded that no theme was more appropriate for the Agricultural/Rural Village Area than “recommitment”. As our population grows and the Urban Corridor and Critical Growth Areas expand, we need to re-new efforts to prevent premature conversion of farmland to other uses and recommit to preserving agricultural areas and open space. *(2030 Land Resource Management Plan, page 24)*

## **1.5 Critical Facilities**

When dealing with natural disasters, some development is more important than others, and these are considered to be “critical facilities.” Critical facilities are buildings and infrastructure whose exposure or damage can affect the well being of a large group. For example, the impact of a flood or tornado on a hospital is greater than on a home or most businesses.

Generally, critical facilities fall into two categories:

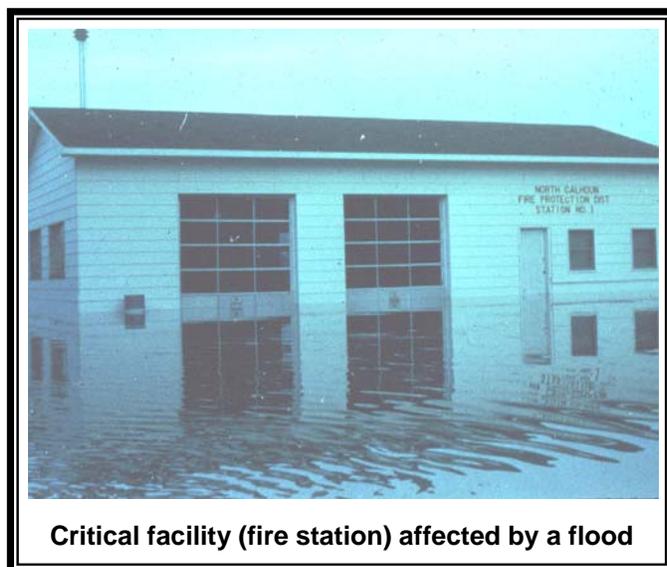
- Buildings or locations vital to public safety and the disaster response and recovery effort, such as police and fire stations and telephone exchanges, and
- Buildings or locations that, if damaged, would create secondary disasters. Examples of such buildings or locations are hazardous materials facilities and nursing homes.

Critical facilities are not strictly defined by any agency. For this mitigation planning effort, seven categories of critical facilities were used:

1. Hazardous materials sites. These have been broken into two categories based on USEPA classifications: those with “extremely hazardous substances” (EHS) and those without. These definitions are in 40 CFR Part 355, Appendices A and B, which also defines their “threshold planning quantities,” i.e., how much of the substance qualifies to being a concern. EHS includes well over 100 substances, from acetone to zinc phosphide
2. Health facilities: hospitals and nursing homes.
3. Emergency response facilities: police and fire stations, public works sites, etc.
4. Utilities: water and wastewater treatment plants, electrical substations, etc.
5. Schools.
6. Places of assembly, such as theaters and casinos.
7. Bridges that would be inundated during the base or 100-year flood. These are discussed more in Chapter 2, section 2.2.

The distribution of these facilities by municipality is shown on the table on the next page. Most of these are plotted on Maps 1-4 through 1-10 on the following pages. The full list of each category is included as Appendix D.

Chapter 2 discusses critical facilities that are impacted by each natural hazard. For some hazards, such as floods, affected critical facilities can be readily identified since we can predict where a flood is likely to be. For other hazards, such as tornados, the impact on critical facilities can only be broadly identified. But for all hazards and for all critical facilities, hazard mitigation measures can be identified and this is done throughout Chapters 4 through 9.



**Critical facility (fire station) affected by a flood**

## 1.6 References

1. *2020 Land Resource Management Plan*, Kane County, Illinois, Kane County Development Department, 1996.
2. *2030 Land Resource Management Plan, Kane County Illinois, Kane County Development Department*,
3. Critical facilities data supplied by municipalities and County offices.
4. *Kane County Hazard Analysis*, Kane County Office of Emergency Management, 2001.
5. *Example Plans*, FEMA/Community Rating System, 2002

6. *Getting Started – Building Support for Mitigation Planning*, FEMA, FEMA-386-1, 2002
7. *State and Local Plan Interim Criteria Under the Disaster Mitigation Act of 2000*, FEMA, 2002
8. Survey of County offices and municipalities, Spring 2003.

Critical Facilities									
	HazMat – EHS	HazMat – non EHS	Health	Emergency	Utilities	Schools	Assembly	Bridges	Total
Algonquin *				2	13	3			18
Aurora **	17	18	18	13	32	72	4	10	184
Barrington Hills *									0
Bartlett *									0
Batavia **	12	7		10	18	12		10	69
Big Rock				4					4
Burlington					1	1			2
Carpentersville	2	3		5	9	13		2	34
East Dundee **	1	1		4	7				13
Elburn	5	1		3	6	1			16
Elgin **	15	21	15	17	19	45	2	4	138
Geneva	8	2	2	10	19	13	1		55
Gilberts	1	1		5	4				11
Hampshire	1	9		4	2	3		4	23
Hoffman Estates *									0
Huntley *	1	1		3	7			1	13
Lily Lake									0
Maple Park **				7	5	3			15
Montgomery **	5	4		5	5	2			21
North Aurora	4	1	1	4	4	6			20
Pingree Grove					1				1
St. Charles **	12	11	1	10	17	23	1	3	78
Sleepy Hollow				3		1		1	5
South Elgin	1	4	2	5	9	3		2	26
Sugar Grove	1			5		1			7
Virgil				1					1
Wayne **				3	6	1	1		11
West Dundee				4	5	4		1	14
Unincorporated areas	12	4		12	1	14			66
County total	98	88	39	139	190	221	9	61	845

\* Numbers do not include sites outside the Kane County portion of the municipality

\*\* Numbers includes sites outside the Kane County portion of the municipality (which is not plotted on the following maps)

Source: Municipal surveys, Office of Emergency Management, Kane County GIS Technologies

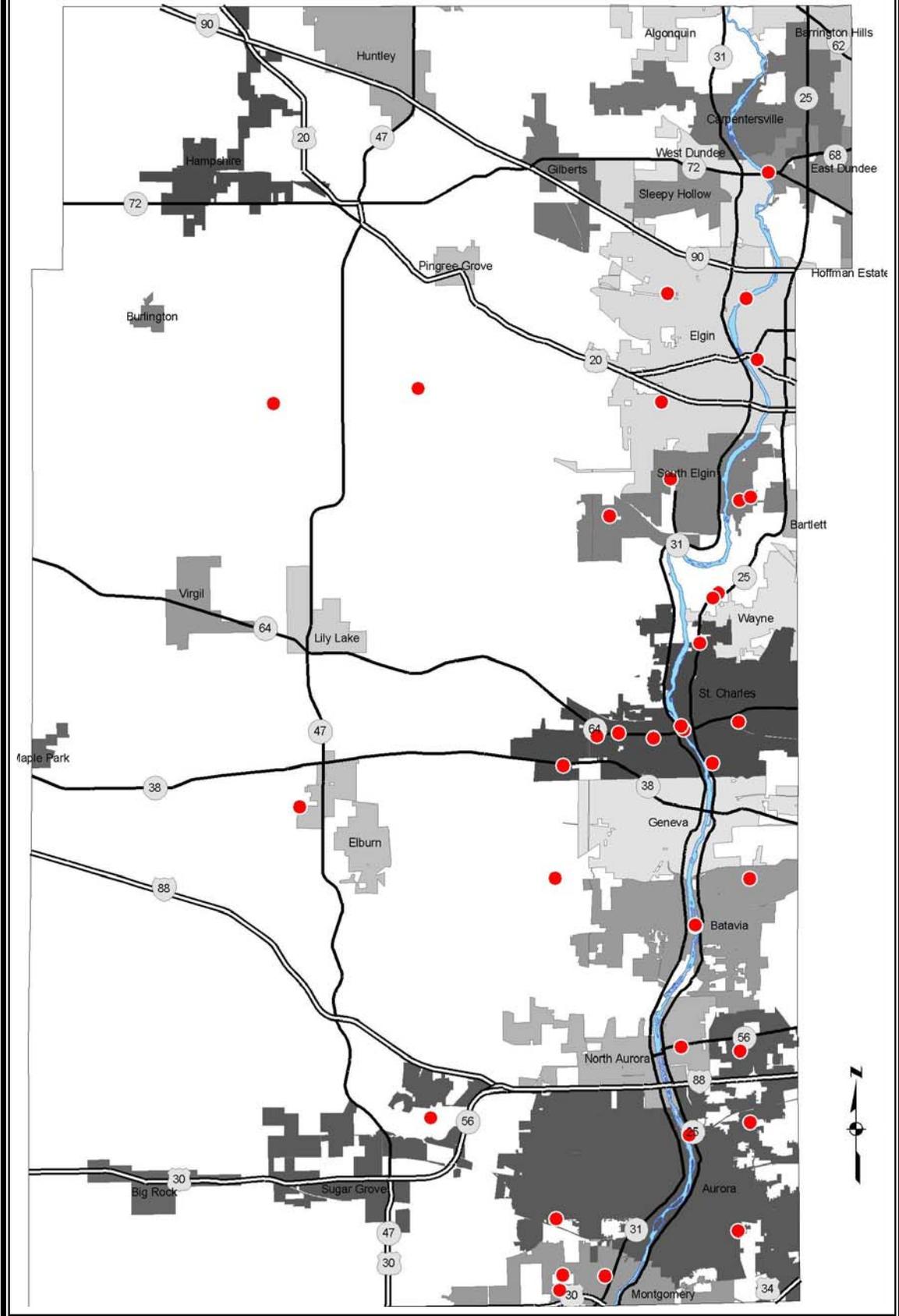
Note: Not all of these sites could be plotted on the following maps



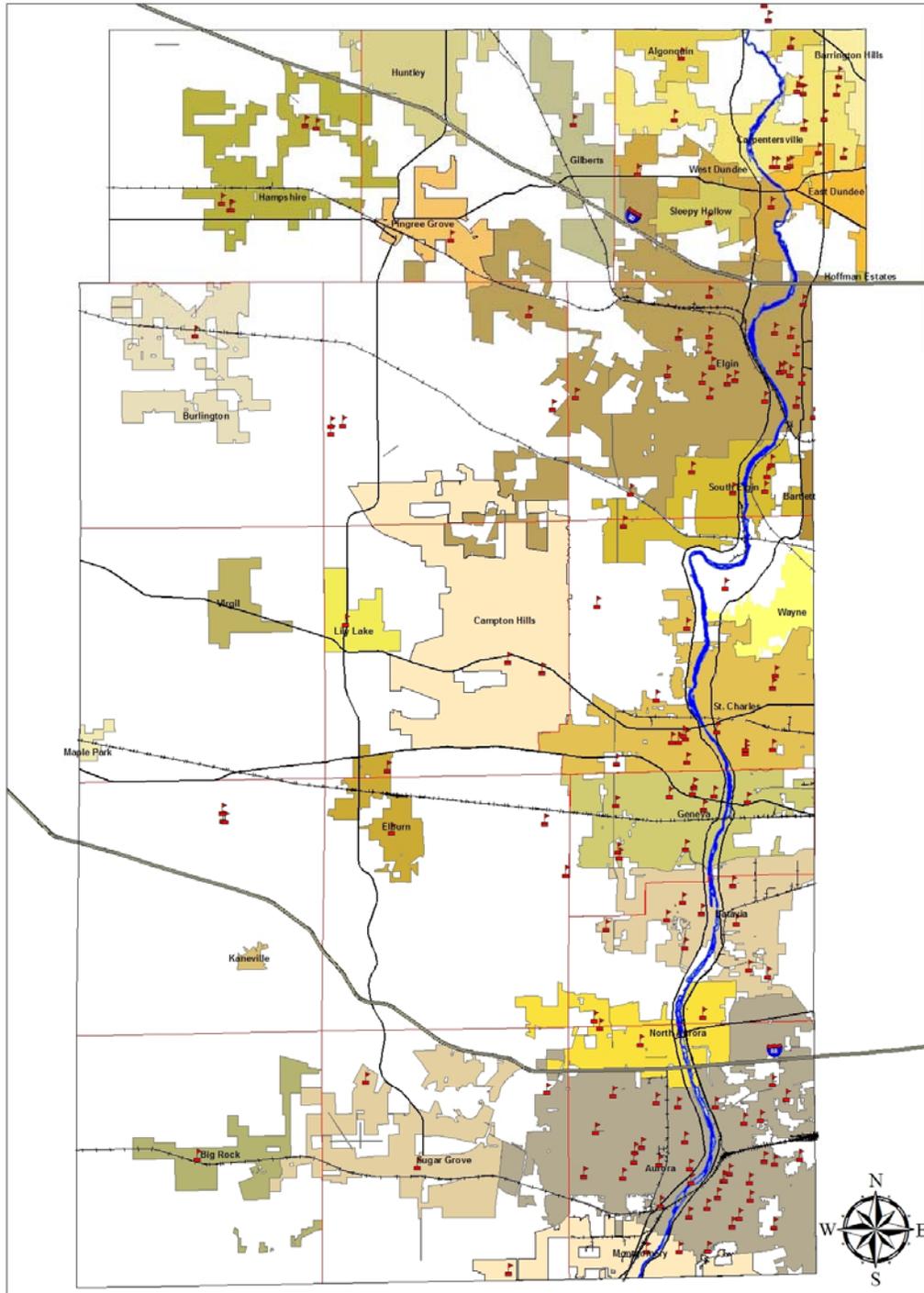




Map 1-7. Critical Facilities: Utilities



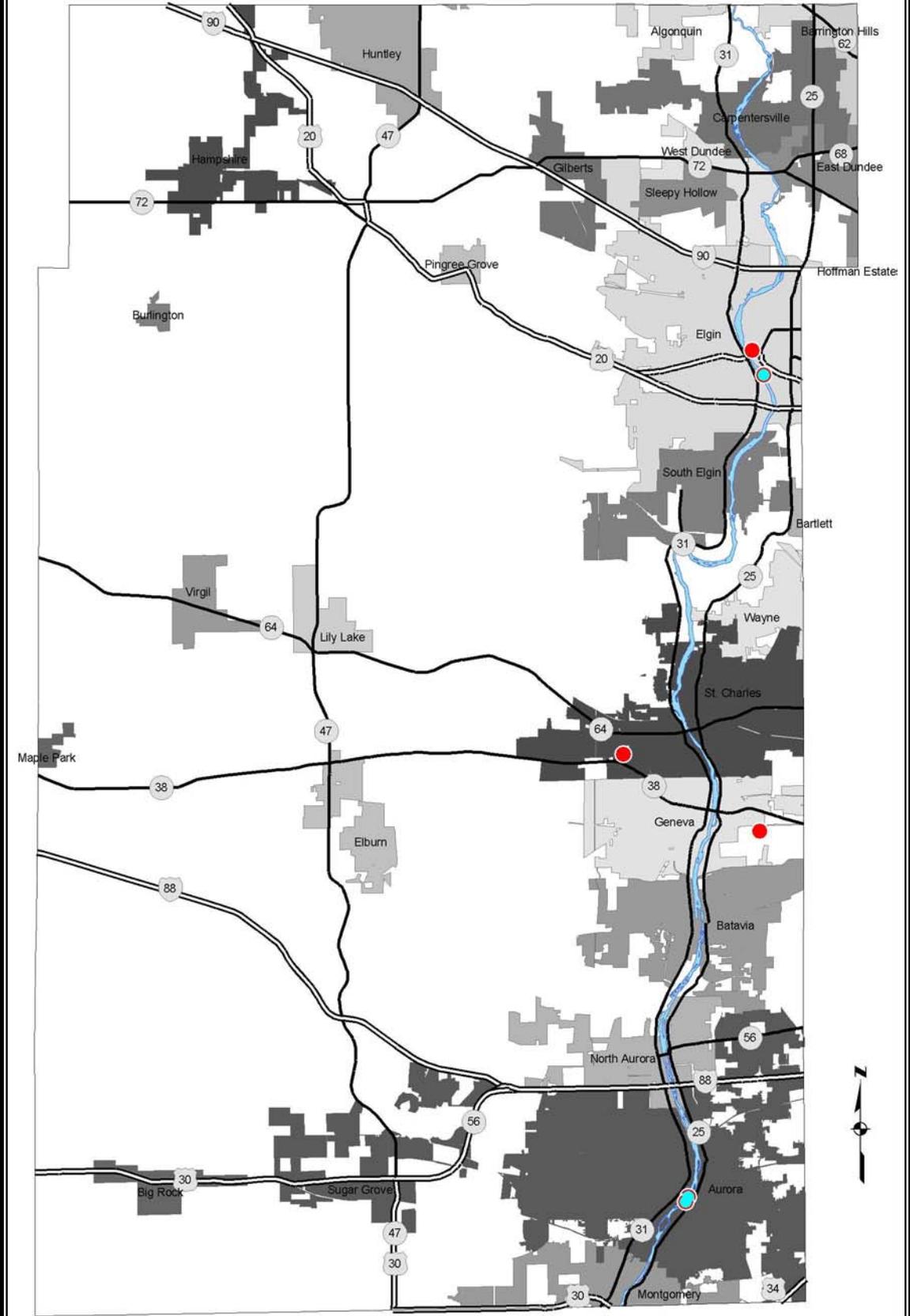
Map 1-8. Critical Facilities: Schools



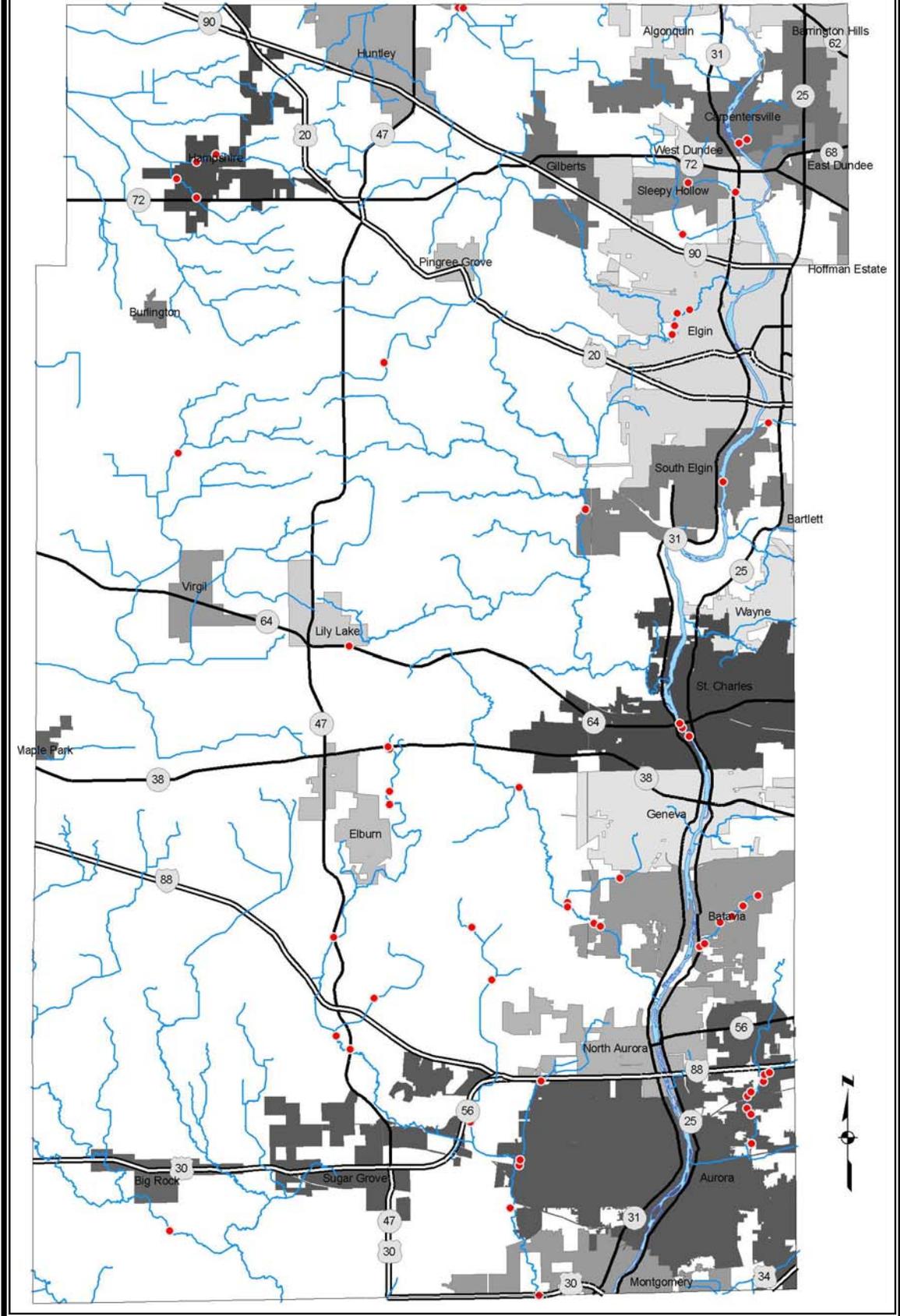
**KANE COUNTY**  
**School Locations**

**Legend**  
▲ schools

Map 1-9. Critical Facilities: Places of Assembly



**Map 1-10. Critical Facilities: Bridges Affected by the Base Flood**



<b>Original Natural Hazards Mitigation Planning Committee</b>	
<b>Agency/Organization</b>	<b>Participant</b>
Committee Chair	Laura Ross
<b>County Departments</b>	
Environmental Management	Karen Kosky, Steve Garrison
Emergency Management	Alan Choutka
Development	
Water Resources	Paul Schuch, Souts Thavong
Transportation	Bob Skidmore
Health	Fred Carlson
GIS Technologies	Jason Verachtert
<b>Municipalities *</b>	
Algonquin	Craig Arps
Aurora	Mark Flaherty
Batavia	Don Gatske
Big Rock	Doug Porch, Sandy Bell
Burlington	Debra Walsh, Mary Ann Wilkison
Carpentersville	Jon Mensching
East Dundee	David Kitzmiller
Elburn	David Morrison
Elgin	Chad Butzow, John Loete
Geneva	Betty Collins
Gilberts	Michael Joswick
Hampshire	Ed Szydlowski
Huntley	John Ciombor, Keith Schaedel, Keith Mallegni
Lily Lake	Heather Gravlin
Maple Park	Claudia Tremaine
Montgomery	Mike Pubentz
North Aurora	Dan Nelson, Mike Glock
Sleepy Hollow	Stephen Pickett
South Elgin	Richard Babica
St. Charles	Greg Chismark, Craig Hanson
Sugar Grove	Brad Sauer
Virgil	Jean Hardt
Wayne	Carol Schoengart
West Dundee	Frank Buhmann
<b>Stakeholders</b>	
Kane County Townships	Ron Johnson
American Red Cross of Greater Chicago	Mary Anne Hoeller
American Red Cross, Fox River Chapter	Ken Robertson
The Conservation Foundation	Ksenia Rudensiuk
<p>* The Villages of Barrington Hills, Bartlett and Hoffman Estates have only small portions of their corporate limits in Kane County and opted to not participate. Other than Pingree Grove, all other Kane County municipalities passed the participation resolution.</p>	

<b>Natural Hazards Mitigation Planning Committee as of January 2009</b>	
<b>Agency / Organization</b>	<b>Participant</b>
<b>County Departments</b>	
Emergency Management	Sean Madison
Environmental Management	Karen Kosky, Steve Garrison
GIS Technologies	Jason Verachtert
Health	Fred Carlson
Transportation	Bill Edwards
Water Resources	Scott Hajek
<b>Municipalities</b>	
Algonquin	Craig Arps
Aurora	Mark Flaherty, Daryl Devick
Batavia	Don Gatske, Jeff Glaser
Big Rock	Doug Porch, Sandy Bell
Burlington	Mary Ann Wilkison
Campton Hills	Laura Andersen
Carpentersville	Jon Mensching
East Dundee	TJ Moore
Elburn	David Morrison, Steve Smith, James Linane
Elgin	Brad Entler, John Loete
Geneva	Chuck Lencioni
Gilberts	Michael Joswick
Hampshire	George Brust, Jan Kraus
Huntley	Mike Klunk, G. Schmitt
Lily Lake	Heather Gravlin
Maple Park	Claudia Tremaine
Montgomery	Mike Pubentz
North Aurora	Dan Nelson, Mike Glock
Pingree Grove	Carol Lussky
Sleepy Hollow	Stephen Pickett
South Elgin	Chuck Behm
St. Charles	Derek Piec
Sugar Grove	Brad Sauer
Virgil	Jean Hardt
Wayne	Daniel Callahan
West Dundee	Tom Lutzow
<b>Stakeholders</b>	
American Red Cross, Fox River Chapter	Doug Weigand

## Chapter 2. Hazard Analysis

### 2.1. Overbank Flooding

The most common and most damaging floods occur along rivers and streams and this is called overbank flooding. Overbank flooding of rivers and streams can be caused by one or more of three factors:

- Too much precipitation in the watershed for the channels to convey
- Obstructions in a channel, such as an ice jam or beaver dam, and
- Large release of water when a dam or other obstruction fails.

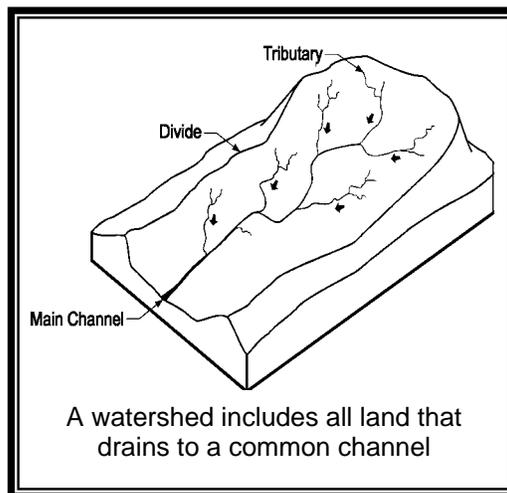
All three of these factors are reviewed in this section, but most floods are caused by the first, too much precipitation in the watershed.

Flooding can also occur in streets when rainwater can't flow into a storm sewer. Basements can flood when rainwater can't flow away from the house or when the sewers back up. These problems are usually caused by heavy local rains and are often not related to overbank flooding or floodplain locations. Data on these sewer backup and local drainage problems are included in the later section on thunderstorms.

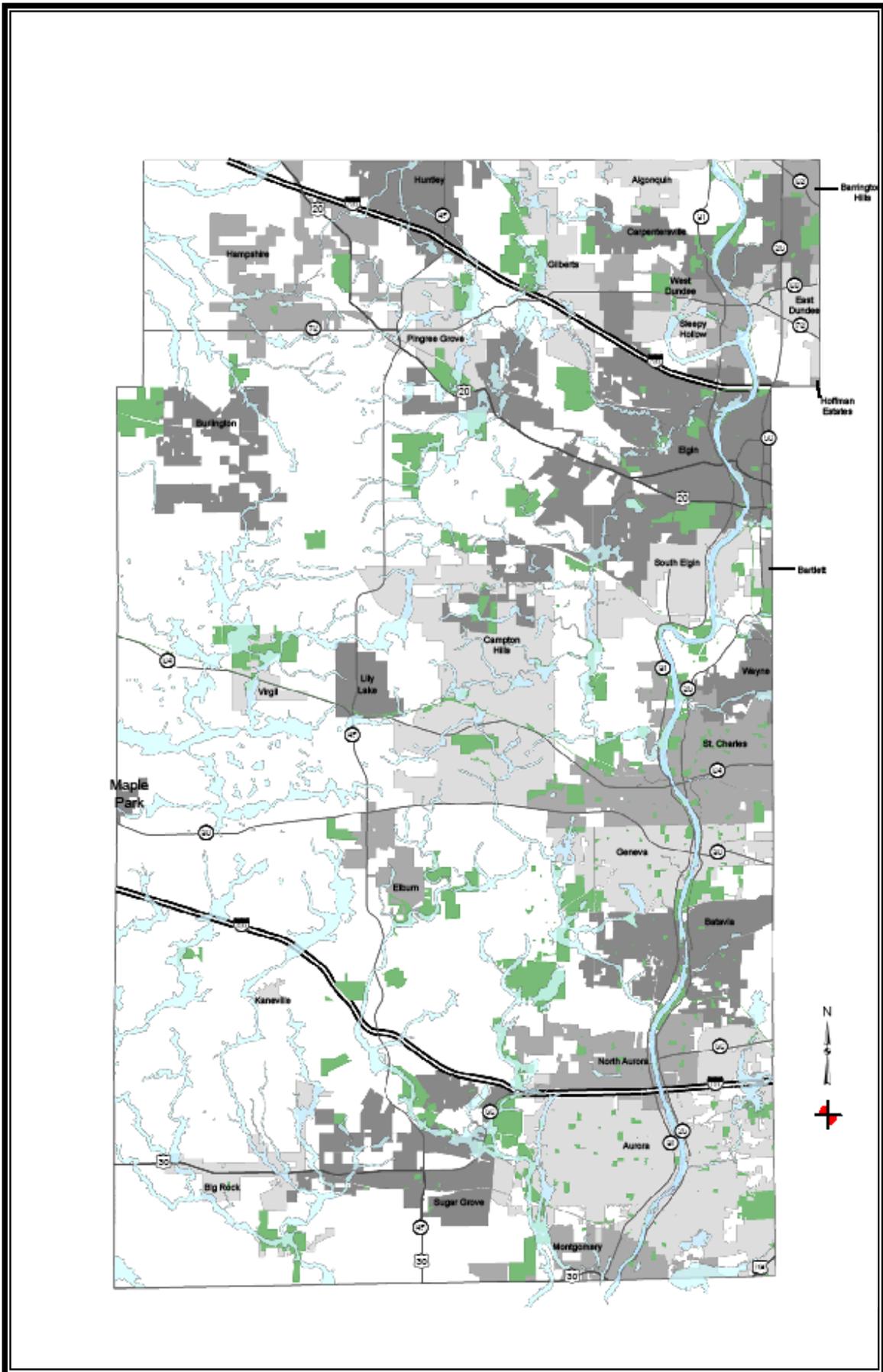
**Precipitation:** Kane County receives an average of 32 – 36 inches of rain each year, including an annual average of 39 inches of snow (generally, 7 inches of snow has the equivalent water content of one inch of rain). However, it is not spread out evenly over the year. The amount of rain that falls varies from storm to storm and varies over an area.

**Watersheds:** A “watershed” is an area of land that drains into a lake, stream or other body of water. The runoff from rain or snowmelt is collected by smaller channels (tributaries), which send the water to larger channels and eventually to the lowest body of water in the watershed (main channel). When a channel receives too much water, the excess flows over its banks and into the adjacent area – causing a flood.

Kane County has 12 major watersheds, which are shown in Map 2-1 on the next page. Data on these watersheds are displayed in the table on page 2-3.



Many of the major watersheds in Kane County extend into neighboring counties. In the case of the Fox River, the watershed begins in Wisconsin. A number of the watersheds, such as Tyler Creek and Mill Creek, flow into the Fox River. Other watersheds, such as Coon Creek or Union Ditch, flow to the west and eventually make their way to the Kishwaukee River.



<b>Watershed and Floodplain Data</b>				
<b>Watershed Name</b>	<b>Area (square miles)</b>	<b>Percent Developed</b>	<b>Area of Floodplain (sq. mi.)</b>	<b>Percent Of Watershed in Floodplain</b>
Big Rock-Welch Creek	86.2	6.3 %	9.9	11.5
Blackberry Creek	61.6	17.1	5.5	8.9
Coon Creek	47.6	7.9	3.8	8.0
Eakin Creek	25.6	8.0	1.9	7.5
Ferson-Otter Creek	53.9	28.9	4.8	8.9
North Fox River	61.5	53.3	4.3	6.9
South Fox River	38.5	69.1	2.2	5.8
Mill Creek	30.9	27.7	3.2	10.3
Tyler Creek	40.0	10.3	4.1	10.2
Union Ditch	62.5	5.4	9.8	16.6
Indian/Waubonsie Creek	13.2	41.2	1.7	13.0
DuPage River	2.5	18.5	N/A	N/A
<b>Total:</b>	<b>524.0</b>	<b>23.4 %</b>	<b>51.2</b>	<b>10.2</b>
<i>Source: Kane County Comprehensive Stormwater Management Plan</i>				

Within these 12 major watersheds are smaller subwatersheds that drain into the tributaries. All of these streams have adjacent floodplains that are inundated during a flood.

All but three of the watersheds listed above eventually flow into the Fox River. Coon and Eakin Creeks and Union Ditch flow generally west out of the County to the Kishwaukee River. All other watersheds are “subwatersheds” of the Fox River watershed. This means that almost 75 percent (388 square miles) of the county is part of the Fox River watershed. The North Fox River and South Fox River watersheds listed above include the land that run off directly into the main stem of the Fox River or into its immediate tributary streams.

The Fox River itself has a much larger watershed upstream of Kane County. The river originates in Wisconsin and travels through McHenry and Lake County before it reaches Kane County. The Fox River watershed, where it enters Kane County, is about 1,410 square miles.

As with most major rivers and watersheds in Illinois, the Fox River responds more slowly to rain and runoff than do the other, smaller, streams in the County. But when floods do occur on the Fox River, the duration of the flooding can extend from days into weeks. Other flooding throughout the County may only last for hours.

**Watershed development:** The condition of the land in the watershed affects what happens to the precipitation. For example, more rain will run off the land and into the streams if the terrain is steep, if the ground is already saturated from previous rains, if the

watershed is significantly covered with impervious pavement and parking lots, or if depressional storage areas have been filled in.

The table on the previous page shows which watersheds are more developed. Because of the urban development, these watersheds (e.g., Indian/Waubonsie Creek) will usually flood more quickly than the rural watersheds (e.g., Union Ditch). In rural watersheds, more rain and snow can soak into the ground rather than run off quickly into the creeks and rivers.

The North and South Fox River watersheds have the highest percentage and the most concentration of development in the County. The majority of the Fox River watershed above Kane County, however, consists of open space and agricultural land.

**Flash floods:** Flash floods are generated by severe storms that drop much rainfall in a short time. All flash floods strike quickly and end swiftly. Areas with steep slopes and narrow stream valleys are particularly vulnerable to flash flooding, as are the banks of small tributary streams. In hilly areas, the high-velocity flows and short warning time make flash floods hazardous and very destructive.

In urban areas, flash flooding can occur where impervious surfaces, gutters and storm sewers speed runoff. Flash floods also can be caused by dam failure, the release of ice-jam flooding, or the collapse of a debris dam.

The floodplains mapped by the National Flood Insurance Program and shown on Map 2-1 are for watersheds greater than one square mile. Flash floods often occur in smaller watersheds and are therefore not shown on most floodplain maps.



**Obstructions:** Obstructions can be channel obstructions, such as small bridge openings or log jams, or floodplain obstructions, such as road embankments, fill and buildings. Channel obstructions will cause smaller, more frequent floods, while floodplain obstructions impact the larger, less frequent floods where most of the flow is overbank, outside the channel.

Obstructions can be natural or man made. Natural obstructions, like log jams, can be cleared out or are washed away during larger floods. The greater problem is man made obstructions, which tend to be more permanent. They are discussed in Chapter 4's section on floodways.

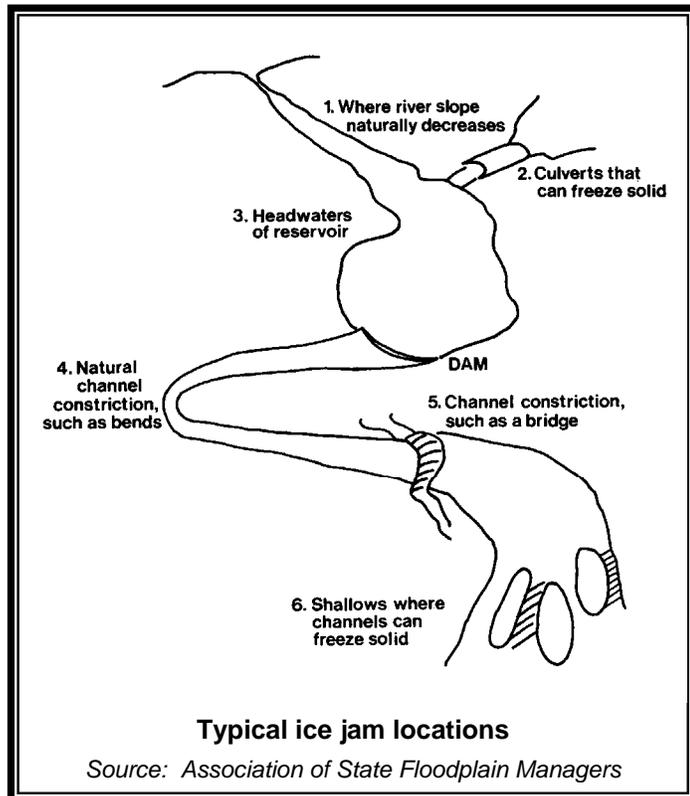
**Ice jams:** Ice jams occur when warm weather and rain break up frozen rivers or any time there is a rapid cycle of freezing and thawing. The broken ice floats downriver until it is blocked by an obstruction such as a bridge or shallow area. An ice dam forms, blocking the channel and causing flooding upstream. Ice jams present three hazards:

- Sudden flooding of areas upstream from the jam, often on clear days with little or no warning,
- Sudden flooding of areas downstream when an ice jam breaks. The impact is similar to a dam break, damaging or destroying buildings and structures.
- Movement of ice chunks that can push over trees and crush buildings.

Ice jam flooding in Kane County occurs on the Fox River. Studies have determined that ice jams will begin to form on the Fox when there have been 60 or more “degree freezing days” and over 1,000 cubic feet per second of flow in the Fox River. With these conditions, frazil ice begins to form.

“Frazil ice” consists of small particles of ice formed in highly turbulent, supercooled water, such as river rapids or riffles, during cold, clear winter nights when the heat loss from the water to the atmosphere is very high. As the frazil particles are transported downstream, they join together to form flocs that eventually rise to the surface where they form frazil pans or floes. Frazil is often described as slush ice because of its appearance. The ice flows downstream and accumulates, and can eventually form a dam. Flow and more ice can build up behind the ice dam.

The East and West Dundee areas have been most susceptible to ice jams. The worst recent ice jam flooding occurred in February 1988. Winter freezing and flow conditions through January and February allowed frazil ice to form in the Fox and travel



East Dundee, 1988 –

Edward Vucsko, 33, a salesman of industrial sewing machines, had looked out on his backyard to watch the ice-coated river begin to swell slightly over its banks.

"So I went out to put down some sandbags, thinking I'd just put a few down and go back inside," Vucsko said. "In one hour, it was like somebody jammed a rag in the drain and everything backed up. Water in the house, everything."

*Source: Chicago Tribune, February 8, 1988*

downstream towards the Interstate 90 bridge. An ice dam formed, causing the river to back up and flow out of its banks. Homes were flooded and residents were evacuated from the Richardson Subdivision in unincorporated East Dundee.

From 1988 to 2007 two ice booms were installed in the Fox River: one in the Carpentersville pool and the other in East Dundee. The ice booms operated to skim any frazil ice off of the river to allow a smooth sheet of ice to form. The use of ice booms was discontinued in 2007. The flows in the Fox River in northern Kane County are partially influenced by the operation of the McHenry Dam with a goal to keep the flow below 1,000 cubic feet per second when conditions are favorable for ice jams to develop. These measures were taken to reduce the ice jam threat in the Dundee area.

**Dam failure:** Dams are made to hold back large amounts of water. If they fail or are overtopped, they can produce a dangerous flood situation because of the high velocities and large volumes of water released. A break in a dam can occur with little or no warning on clear days when people are not expecting rain, much less a flood. Breaching often occurs within hours after the first visible signs of dam failure, leaving little time for evacuation.

Dam failures are usually caused by either structural problems with the dam or by hydrologic problems. Structural problems include seepage, erosion, cracking, sliding and overturning that are a result of the age of the dam or lack of maintenance. Hydrologic problems typically occur when there is excessive runoff due to heavy precipitation. A dam failure can occur if the dam has to impound (hold back) more water than it was designed to, or if the spillway capacity is inadequate for the amount of water needing to pass downstream.

A dam can suffer a partial failure or a complete failure, but the potential energy of the water stored behind even a small dam can cause loss of life and great property damage downstream. The following factors influence the impact of a dam failure:

- Level of failure (partial or complete)
- Rapidity of failure (sudden or gradual)
- Amount of water released
- Nature of the development or infrastructure located downstream.

In Illinois, dams are categorized in one of three classes, according to the degree of threat to life and property in the event of dam failure:

**Class I** – Dams located where failure has high probability for causing loss of life or substantial economic loss in excess of that which would naturally occur downstream of the dam if the dam had not failed.

**Class II** – Dams located where failure has moderate probability for causing loss of life or may cause substantial economic loss in excess of that which would naturally occur downstream of the dam if the dam had not failed.

**Class III** – Dams located where failure has low probability for causing loss of life or minimal economic loss in excess of that which would naturally occur downstream of the dam if the dam had not failed or where there are no permanent structures for human habitation.

<b>Kane County Dams</b>				
<b>Stream</b>	<b>Name</b>	<b>IDNR Class</b>	<b>IDNR ID</b>	<b>Approx. Height*</b>
Blackberry Creek Trib. E	Lake Prestbury Dam	III	IL 00924	4.5 ft.
Ferson Creek	Spillway			6.5 ft.
Ferson Creek	Spillway			7 ft.
Ferson Creek	Dam (near Private Drive)			8 ft.
Ferson Creek	Concrete Dam			4.5 ft.
Ferson Creek	Campton Lake Dam	III	IL 00908	---
Fox North Tributary	Woodland Creek Dam	III	IL 50123	---
Fox North Trib. (East)	North Lake Dam	III	IL 00923	--
Fox River	Montgomery Dam	II	IL 00920	7 ft.
Fox River	Aurora (near North Avenue)			4 ft.
Fox River	Aurora – West Dam	III	IL 00918	8.5 ft.
Fox River	North Aurora Dam	II	IL 00917	8 ft.
Fox River	Batavia Dam	II	IL 00915	6.5 ft.
Fox River	Batavia, North Dam			--
Fox River	Geneva Dam	III	IL 50087	7.5 ft.
Fox River	St. Charles Lake South Dam	II	IL 00913	8 ft.
Fox River	South Elgin Dam			9 ft.
Fox River	Elgin/Kimball Dam			16 ft.
Fox River	Carpentersville Dam	III	IL 00909	10 ft.
Indian Creek	Fermilab Main Injector Dam	III	IL 50350	--
Jelkes Creek	Jelkes Creek Dam			2.5 ft.
Jelkes Creek	Jelkes Creek Dam			2.5 ft.
Jelkes Creek	Tara Lake Dam	I	IL 00906	--
Mill Creek	Mooseheart Lake Dam	II	IL 00907	13.5 ft.
Mill Creek or Mill Cr. Trib	Fox Mill Lagoon Dam	III	IL 50337	--
Mill Creek Tributary	Eaglebrook Country Club #1	III	IL 50269	--
Mill Creek Tributary	Eaglebrook Country Club # 2	III	IL 50270	--
Otter Creek Tributary	Spring Valley Lake Dam	III	IL 00910	--
Sleepy Creek	Pine Lake Dam	II	IL 50046	-
Tyler Creek	Lyle Avenue Dam	III	IL 50275	--

\*Approximate height is taken from the FEMA Flood Insurance Study, 2002

Source: Kane County Office of Emergency Management, Illinois Department of Natural Resources, Illinois Department of Natural Resources, FEMA Flood Insurance Study, 2002

The Illinois Department of Natural Resources (IDNR) Dam Safety Section has 20 of Kane County's dams in its inventory. IDNR has identified the Tara Lake dam on Jelkes Creek as a Class I Dam due to the high probability of life or property loss should a failure occur. Six dams are rated as Class II dams and 13 dams are Class III.

All of the dams in the Office of Emergency Management inventory are listed in the table below. Other Kane County dams that are not included in the IDNR inventory are considered low hazard dams. These dams were not included in the inventory primarily because their height was less than 25 feet and they had less than a 50 acre-foot impounding area. If these dams were added to the inventory, they would be Class III dams.

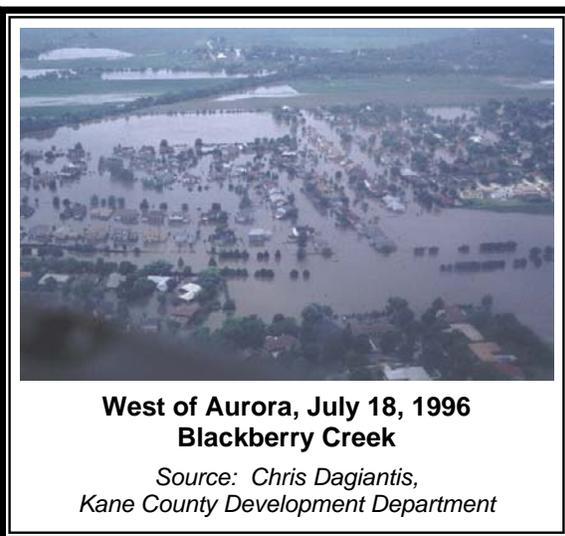
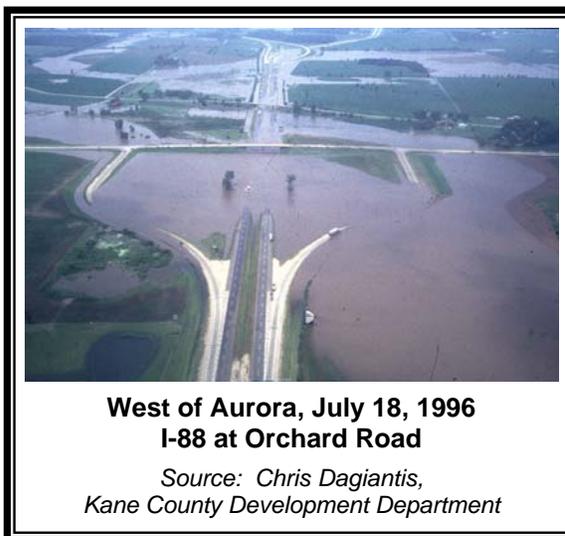
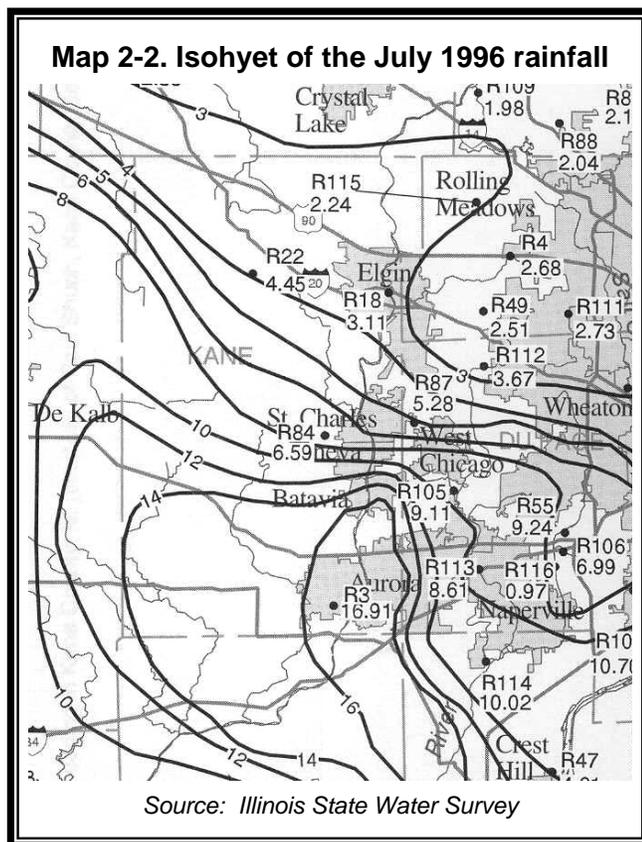
Recent Floods				
Month	Year	Location	Watershed	Declaration
June	1981	Aurora, Montgomery	Blackberry, Fox Tribs.	State
December	1982	Fox River	Fox River	State
July	1983	Aurora, Montgomery, Elgin, Sugar Grove	Blackberry, Indian, Welch, Fox Tribs.	State
Sep - Oct	1986	North end of County	Fox Tribs.	Federal
Jan - Feb	1988	East & West Dundee	Fox River – (Ice Jam)	State
March	1993	Fox River	Fox River	State
May	1996	Fox River	Fox North, South	State
July	1996	South end of County	Blackberry, Indian, Tribs	Federal
February	1997	Elgin, St. Charles	Fox North Tribs.	---
June	1999	Hampshire Township	Coon Creek	---
August	2007	Center/North county	Fox River, Ferson-Otter, Tyler	Federal
September	2008	Center County	Fox River, Ferson-Otter, Blackberry	Federal
<i>Source: Kane County Office of Emergency Management and Illinois Emergency Management Agency</i>				

**Historical flooding:** Kane County can flood in any season. Floods have been caused by localized storms, rain over several days on saturated ground, and ice jams. Winter flooding can also occur when rain hits frozen ground and cannot be absorbed. There have been no records of recent floods caused by dam failure.

Over the last two decades, a significant flood has occurred in Kane County on the average of every other year. Many of them received a state or federal disaster declaration.

**1996 flood:** The July 1996 flood was due to a combination of wet conditions (July was the wettest month on record for Aurora) and heavy local rain. Record rainfall came from several subsequent thunder-storms tracking along the same west to east stalled low-pressure front.

The pattern of the rain is shown on Map 2-2. It can be seen that the heaviest rainfall concentrated over southeastern Kane County and northeastern Kendall County. An Aurora rain gage recorded 16.91 inches in 24 hours, a record for the state. Record peak flows were recorded at 19 stream flow gages in the area. The US Geological Survey estimated that the flooding was greater than a 100-year flood on Blackberry Creek near Yorkville and the Fox River at Dayton.



**Future flood risk:** Past floods are indications of what can happen in the future, but flood studies and mitigation plans are based on the *statistical risk* of future flooding. Flood studies extrapolate from historical records to determine the statistical potential that storms and floods of certain magnitude will recur. Such events are measured by their “recurrence interval,” i.e., a 10-year storm or a 50-year flood.

These terms are often misconstrued. Commonly, people interpret the 50-year flood definition to mean “once every 50 years.” This is incorrect. Statistically speaking, a 50-year flood has a 1/50 (2%) chance of occurring in any given year. In reality, a 50-year flood could occur two times in the same year, two years in a row, or four times over the course of 50 years. It is possible to not have a 50-year flood over the course of 100 years.

Kane County has had several different flood studies. The official floodplain study for insurance and regulatory purposes is the *Flood Insurance Study* by the Federal Emergency Management Agency (FEMA).

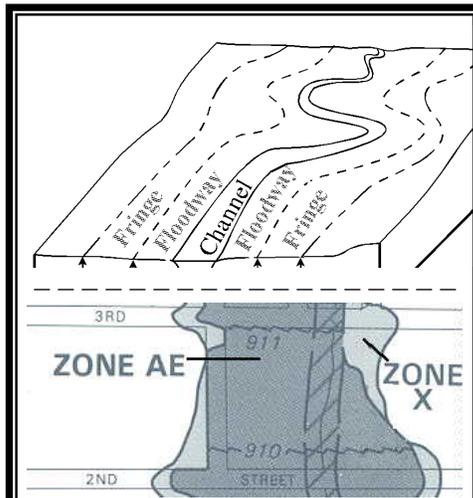
### What are the odds of a flood?

The term “100-year flood” has caused much confusion for people not familiar with statistics. Another way of looking at it is to think of the odds that a base flood will happen sometime during the life of a 30-year mortgage (26% chance).

#### Chance of Flooding over a Period of Years

Time Period	Flood Size			
	10-year	25-year	50-year	100-year
1 year	10%	4%	2%	1%
10 years	65%	34%	18%	10%
20 years	88%	56%	33%	18%
30 years	96%	71%	45%	26%
50 years	99%	87%	64%	39%

Even these numbers do not convey the true flood risk because they focus on the larger, less frequent, floods. If a house is low enough, it may be subject to the 10- or 25-year flood. During the proverbial 30-year mortgage, it may have a 26% chance of being hit by the 100-year flood, but the odds are 96% (nearly guaranteed) that a 10-year flood will occur during the 30 year period. Compare those odds to the only 5% chance that the house will catch fire during the same 30-year mortgage.



#### Floodplain/Floodway Delineation

The upper schematic identifies the channel, floodway and fringe portions of the base floodplain, which is shown in the lower map as a Zone AE on the Flood Insurance Rate Map (FIRM). The floodway is shown on the FIRM with diagonal lines. The Zone X is the area mapped as higher than the base floodplain, but it may still have local drainage and flooding problems.

FEMA uses the “base” flood as the basis for its regulatory requirements and flood insurance rate setting. This *Plan* uses the base flood, too. The base flood is the one percent (1%) chance flood, i.e., the flood that has a one percent (one out of 100) chance of occurring in any given year. The one percent chance flood has also been called the 100-year flood.

Another term used is the “500-year flood.” This has a 0.2% chance of occurring in any given year. While the odds are more remote, it is the national standard used for protecting critical facilities, such as hospitals and power plants.

**The base floodplain:** The area inundated by the base flood is the “base floodplain.” FEMA maps (called Flood Insurance Rate Maps or FIRMs) also call this the Special Flood Hazard Area or the A Zone. The base floodplains for Kane County are the ones shown on Map 2-1. An example of a FIRM is shown to the left.

The central part of the floodplain is called the “floodway.” The floodway is the channel and that

portion of the adjacent floodplain which must remain open to permit passage of the base flood. Floodwaters generally are deepest and swiftest in the floodway, and anything in this area is in the greatest danger during a flood. The remainder of the floodplain is called the “fringe,” where water may be shallower and slower.

Floodways are also subject to special development regulations, as explained in Chapter 6. Because of the extra hazard and the special regulations, this *Plan* looks at floodway data separately from data for the fringe areas and those floodplains where the floodway has not been mapped.

**Depth:** The table to the right shows depths above channel bottoms. Actual overbank flood depths are several feet lower. There is only 1 – 2 feet in difference between the 10-year and 100-year flood levels. There is a 1.5 foot difference between the 100- and 500-year flood levels on the Fox and, in most places, only a ½ foot difference on the other streams. These figures show that flood depths in Kane County are relatively shallow, as would be expected in flat northern Illinois.

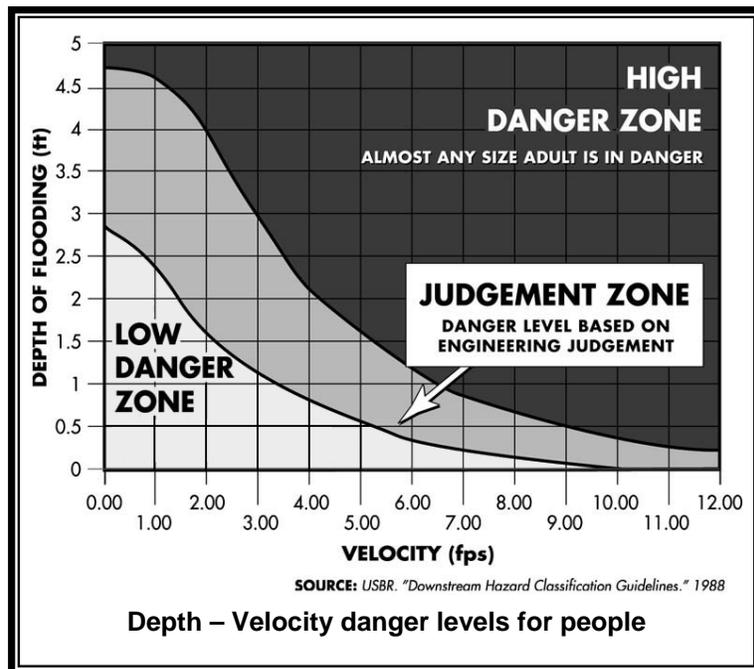
Flood Depths Above Channel Bottom		
Stream	10-Year	100-Year
Fox at Montgomery	10	12
Fox at St. Charles	9	11.5
Fox at Carpentersville	9	12
Blackberry Creek	7-9	8-9
Ferson Creek	5	6
Otter Creek	5	6
Tyler Creek	6	8
Jelkes Creek	3.5	4.5
Welch Creek	6	9
Hampshire Creek	4	5

**Velocity:** The speed of moving water, or velocity, is measured in feet per second. Flood velocity is important to mitigation because the faster water moves, the more pressure it puts on a structure and the more it will erode stream banks and scour the earth around a building’s foundation.

The FEMA Flood Insurance Study includes the “average floodway velocity” for those streams that were studied in detail. This figure is helpful in determining the relative hazard of an area, but is not an accurate indication of the velocity of a flood at any individual site. Sites close to the channel will probably have higher velocities than this figure and sites at the fringe of the floodplain will be subject to lower velocities.

In Kane County, the average floodway velocities are less than five feet per second, except in two areas. They are higher on the smaller streams at bridge and culvert crossings and they are slightly higher on the Fox below the confluence of Indian Creek. Otherwise, most of the county’s streams are subject to flooding at less than five feet per second, where velocity is not considered a problem for construction of buildings and facilities.

While buildings may be easy to protect in areas of low velocities, people are not always safe. The total impact of moving water is related to the depth of the flooding. Studies have shown that deep water and low velocities can cause as much damage as shallow water and high velocities (see graph). Again, the summary data presented in this *Plan* should be augmented by site-specific data, such as depths and velocities, when looking at mitigation alternatives at any single location.



## 2.2. Impact of Flooding

Past and future flood impacts are discussed in this section. Impacts are reviewed under four categories: impact on people (e.g., safety and health), damage to buildings, damage to critical facilities, and economic disruption (damage to businesses and infrastructure).

**Safety:** A car will float in less than 2 feet of moving water and can be swept downstream into deeper waters. This is one reason floods kill more people trapped in vehicles than anywhere else (see table). Victims of floods have often put themselves in perilous situations by ignoring warnings about travel or mistakenly thinking that a washed-out bridge is still there.

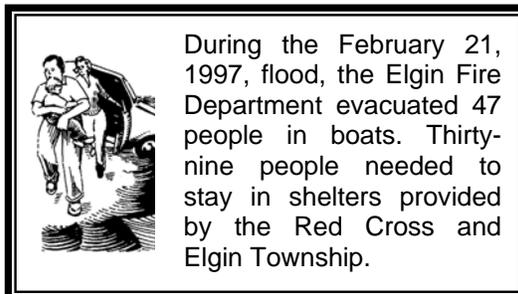
People die of heart attacks, especially from exertion during a flood fight. Electrocutation is a cause of flood deaths, claiming lives in flooded areas that carry a live

Flood Related Deaths, Illinois and United States								
	Vehicle		Outdoors		Indoors		Total	
	IL	US	IL	US	IL	US	IL	US
1995	0	39	1	35	0	6	1	80
1996	0	79	2	39	0	13	2	131
1997	1	46	0	60	0	12	1	118
1998	0	75	1	40	0	21	1	136
1999	0	26	1	34	0	8	1	68
2000	3	24	1	13	0	0	4	37
2001	1	24	0	20	0	4	1	48
2002	0	28	2	20	0	1	2	49
2003	1	39	0	40	0	7	1	86
2004	0	45	0	35	0	2	0	82
2005	0	18	0	24	0	1	0	43
2006	0	32	0	41	0	3	0	76
Total	6	475	8	401	0	78	14	954

Deaths are from river and flash floods. Most of the deaths are from flash floods. *Source: National Weather Service*

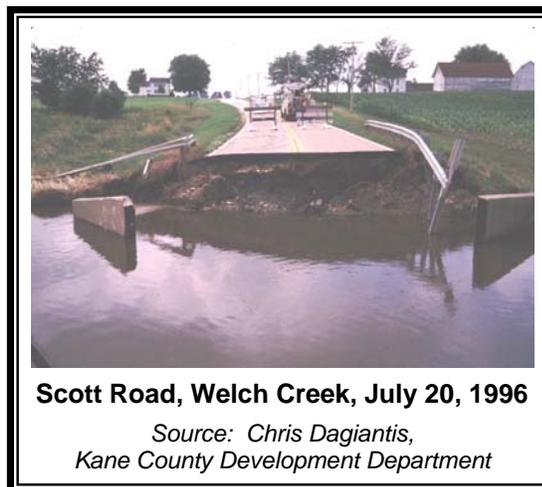
current created when electrical components short out. Floods also can damage gas lines, floors, and stairs, creating secondary hazards such as gas leaks, unsafe structures, and fires. Fires are particularly damaging in areas made inaccessible to fire-fighting equipment by high water or flood-related road or bridge damage.

**Warning and evacuation:** The threat to life posed by a flood can be avoided if people can evacuate before the waters reach their buildings or close their evacuation routes. This requires advance notice that a flood is coming and a system to disseminate flood warnings. Flood warning programs are discussed in Chapter 7. Only on the Fox River is there enough lead time to allow protective steps, such as sandbagging, to be taken.



Other, smaller, streams rise so fast during a heavy local rain, that expensive systems of remote rain and stream gages would be needed to provide adequate notice to emergency managers. Even then, there would be little time for people to do much more than escape to high ground.

**Bridges:** A key evacuation and safety concern is when roads and bridges go under water. Generally, the larger the road, the more likely it will not flood, but this is not always the case (witness the interstate highway under water in the photo on page 2-9).



A review of the Flood Insurance Rate Map and accompanying flood profiles identified 58 bridges and culverts that will be underwater during a base flood. These are shown in Map 1-10 in Chapter 1. They are listed in Appendix D.

A bridge does not have to be under water to be damaged or to cut off an evacuation route. In some cases the bridge is high, but the access road may be flooded. In other cases, the bridge or culvert can be washed out. This is especially dangerous if a person drives on a flooded road and assumes that the bridge is still there.

In addition to the locations listed in Appendix D, there are bridges and culverts in areas that are not included in the Flood Insurance Rate Map study areas, such as those located along small tributary streams.

The following have been identified by the municipalities and township road commissions as obstructing or impeding the flow water during flood events:

- Batavia: culverts along the Mill Creek Tributary
- Batavia: bridges and culverts along Mahoney Creek and its tributaries

- Big Rock Township: Granart Road at Big Rock Creek
- Burlington Township: Middleton Road
- Elgin: State Street bridge piers at the Fox River
- Geneva Township: Wenmoth Road along Mill Creek
- Lily Lake: State Route 64, east of State Route 47 along Ferson Creek
- Montgomery: US 30 at Blackberry Creek (several structures)
- Montgomery: Railroad structure downstream of U.S. Route 30 at Blackberry Creek
- Plato Township: Rohrsen Road
- Rutland Township: Kruetzer Road bridge
- South Elgin: McDonald Road at Otter Creek
- South Elgin: State Street at the Fox River
- St. Charles: Prairie Street at the Fox River
- St. Charles: State Route 64 at the Fox River
- West Dundee: State Route 31 on Sleepy Creek

**Health:** While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry whatever was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where cattle and hogs are kept can contribute polluted waters to the receiving streams.

Flood waters saturate the ground which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment lead to overloaded sewer lines which back up into low lying areas and some homes. Even though diluted by flood waters, raw sewage can be a breeding ground for bacteria, such as e coli, and other disease causing agents. Because of this threat, the Kane County Health Department gave tetanus shots to people affected by the July 1996, August 2007, and September 2008 floods.

The second type of health problem comes after the water is gone. Stagnant pools become breeding grounds for mosquitoes, and wet areas of a building that have not been cleaned breed mold and mildew. A building that is not thoroughly and properly cleaned becomes a health hazard, especially for small children and the elderly. The Kane County Health Department states that some people have reported upper respiratory problems that they believe are caused by molds that grew after the July 1996 flood.

Another health hazard occurs when heating ducts in a forced-air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants.

If the water system loses pressure, a boil order may be issued to protect people and



animals from contaminated water. Following the July 1996 flood, the Kane County Health Department tested private wells in rural areas and distributed bottled water to their owners.

The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

“These follow-up studies show a consistent pattern of increased psychological problems among flood victims for up to 5 years after the flood. The findings regarding non-psychiatric morbidity are less consistent, but many of the reported morbidity problems such as hypertension and cardiovascular disease-and even leukemia and lymphoma-may be stress related.” – *The Public Health Consequences of Disasters*, page 74.

Following the July 1996 flood, 16 shelters were opened to house displaced families. Another measure of the impact on people and the disruption flooding causes is applications for Federal disaster assistance. After the July 1996 flood, 6,568 Kane County families applied for various types of individual assistance, such as temporary housing and “unmet needs,” i.e., funds needed for things that insurance and other sources of assistance do not provide.

In Kane, DuPage and Kendall Counties, the American Red Cross opened eleven service centers to assist families following the July 1996 flood. Over the course of the flood and the recovery, the Red Cross served over 43,000 meals to families, workers and volunteers. The total cost to the Red Cross temporary housing, meals, and other assistance was in excess of \$1.2 million. Three deaths were associated with the July 1996 disaster. Three people were hospitalized and 65 people were injured as a result of the flood.

**Building damage:** In a few situations, deep or fast moving waters will push a building off its foundation, but this is rare and Kane County has few areas where the depths and velocities are that high. More often, structural damage is caused by the weight of standing water, known as “hydrostatic pressure.”

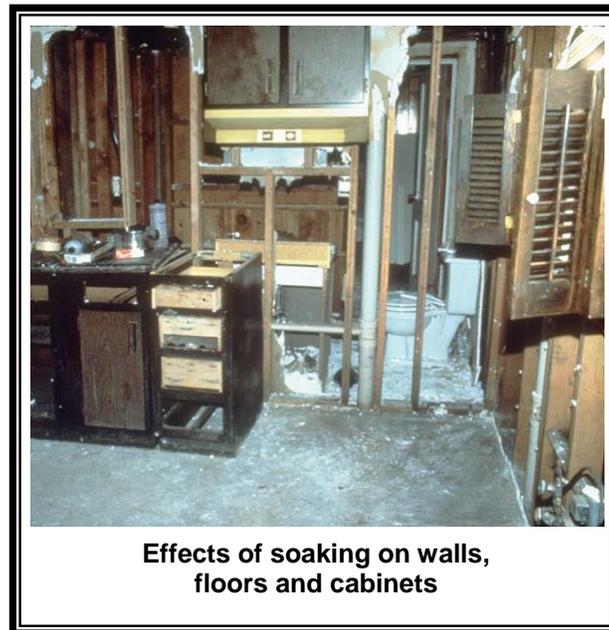
Basement walls and floors are particularly susceptible to damage by hydrostatic pressure. Not only is the water acting on basement walls deeper, but a basement is also subject to the combined weight of water and saturated earth. In addition, water in the ground underneath a flooded building will seek its own level, resulting in uplift forces that can break a concrete basement floor.



Due to the relatively low velocities and shallow flood depths in the County, the most common type of damage inflicted by a flood is caused by soaking. When soaked, many materials change their composition or shape. Wet wood will swell and, if dried too quickly, will crack, split or warp. Plywood can come apart. Gypsum wallboard will fall apart if it is bumped before it dries out. The longer these materials are wet, the more moisture, sediment and pollutants they will absorb.

Soaking can cause extensive damage to household goods. Wooden furniture may become so badly warped that it cannot be used. Other furnishings such as upholstery, carpeting, mattresses, and books usually are not worth drying out and restoring. Electrical appliances and gasoline engines will not work safely until they are professionally dried and cleaned.

In short, while a building may look sound and unharmed after a flood, the waters can cause a lot of damage. As shown in the above photo, to properly clean a flooded building, the walls and floors should be stripped, cleaned, and allowed to dry before being recovered. This can take weeks and is expensive.



After the September 2008 flood, houses in Elgin’s Poplar Creek subdivision sustained three to four feet of flood water on the main floor of the structures. As a result of the water damage the Elgin Code Department red tagged 39 homes in the area displacing approximately 140 people.

**Damage data:** The number of buildings exposed to overbank flooding is shown in the table on page 2-18. One source of building damage data is the flood studies conducted for several watersheds. In addition to providing estimates of historical damage, these studies produced predicted damage estimates.

The 1986 “Floodplain Management Study – Indian Creek and Tributaries” produced the data in the table below for the 1983 flood on Indian Creek and its tributaries. The study estimated that the watershed had average annual damage of \$595,800 with 156 buildings at risk for the 100-year event. While, this includes portions of DuPage County, all property damage was located in the Kane County portion of the watershed.

<b>Building Damage Data, 1983 Flood, Indian Creek and Tributaries</b>		
<b>Subbasin</b>	<b>Buildings</b>	<b>Estimated Damage</b>
Eastview Estates	50 to 80 homes	\$400,000
Upper Indian Creek	30+ homes	\$100,000
	1 nursing home	\$125,000
Middle Indian Creek	8 homes	\$15,000
Lower Indian Creek	Garbe Steel Co. 5	\$205,000
South Tributary	J&B Industries	Under development in 1983. Damage would have been around \$1,000,000
<i>Source: Floodplain Management Study – Indian Creek and Tributaries</i>		

A 1989 study for the Blackberry Creek watershed reported that the 1983 flood was estimated to be a 35-year event with \$300,000 in property damage. A 1999 plan for the Blackberry Creek watershed estimated that the 1996 flood caused \$18,000,000 in property damage to basements and \$13,800,000 from first floor damage.

The Blackberry Creek study found 90 buildings at risk for the 100-year or base flood event and estimated damage of \$1,608,400. This produces an average damage per building of \$17,871 in 1989 dollars. The Comprehensive Stormwater Management Plan states that damage from the 1996 flood “were nearly \$14 million in the Blackberry Creek watershed.”

Another source of damage data is past claims paid by the National Flood Insurance Program. These are shown in the table on the next page.

Flood insurance claims figures do not include items not covered by a flood insurance policy, such as landscaping and automobiles, and the value of lost family heirlooms. They also do not include damage to uninsured or underinsured properties. With these caveats in mind, the two tables show:

- The hardest hit communities have been Aurora and Montgomery.
- The most expensive floods were July 1983, September 1986, and July 1996.
- The July 1996 flood not only affected the most properties, it caused the most damage per property.
- Claims over the last 24 years have averaged approximately \$12,000 for the structures and \$5,000 for contents.

If one adjusts for inflation and accounts for the deductibles and uninsured items, we could conclude that floods in Kane County can be expected to cause \$15,000 - \$20,000 damage to structures and \$6,000 - \$10,000 for contents.

Based on these numbers, \$25,500 is assumed to be the average cost per flooded building. This number is multiplied times the number of buildings in the floodplain in the last column in the table on page 2-18. The result is the expected dollar cost of a 100-year or base flood in terms of property damage to buildings and their contents.

Flood Insurance Claims Data By Flood					
Month	Year	Location	Total Claims	Average Structural Claim <sup>+</sup>	Average Contents Claim <sup>+</sup>
July	1978	Algonquin	6	\$1,215	\$1,264
September	1978	North Aurora	8	\$4,101	\$2,305
March	1979	Fox River	37	\$2,659	\$1,524
June	1981	Aurora, Montgomery	12	\$5,556	\$1,505
July	1982	Northern County	10	\$4,047	\$2,137
December	1982	Fox River	7	\$3,168	\$746
April	1983	Fox River	3	\$442	\$1,039
July	1983	Aurora, Montgomery	54	\$13,083	\$4,549
March	1985	Aurora area	7	\$1,139	\$698
September	1986	Northern County	5	\$14,016	\$5,290
August	1987	Aurora	7	\$3,358	\$4,845
February	1988	Upper Fox River	13	\$4,893	\$2,869
May	1990	Aurora	4	\$7,569	\$3,714
July	1993	Algonquin, Elgin	8	\$8,798	\$1,680
February	1994	Elgin	8	\$3,415	\$1,815
July	1996	Aurora, Montgomery	164	\$20,293	\$7,355
February	1997	Elgin, St. Charles	21	\$8,757	\$3,339
Other floods	1978 – 2001		59	\$4,637	\$4,375
<b>County Total</b>	1978 – 2001		433	\$11,928	\$5,061
<p><i>Data may include claims for areas of the municipality outside of Kane County. A few "outlier" claims were not included in the averages.</i></p> <p>+ Structural coverage includes the furnace, built-in cabinets, wall-to-wall carpeting, etc.</p> <p>Source: FEMA claims data as of November 2002</p>					

**Building age:** The *Comprehensive Stormwater Management Plan* noted an interesting fact:

The oldest areas of most of the towns (built prior to the early part of this century) are generally not subject to flooding. The areas of newest development (eighties and nineties) also do not appear to be subject to significant flooding. Those areas developed during the fifties and sixties appear to be the most subject to flooding. (page 37)

It appears that early developments avoided problem areas and newer development is being managed more wisely (and is subject to floodplain and stormwater management regulations).

Floodplain Building Data						
	Total Number of Buildings		Flood Insurance Claims			Estimated Dollar Loss ++
	Floodplain **	Floodway	Total Claims	Average Structural + Claim	Average Contents + Claim	
Algonquin *	132	1	29	\$5,527	\$1,156	\$102,000
Aurora *	707	190	156	\$13,665	\$5,064	\$18,028,500
Barrington Hills *	0	0	2	\$18,331	0	\$0
Bartlett *	0	0	0	0	0	\$0
Batavia	59	18	1	\$2,473	0	\$1,504,500
Big Rock	15	0	0	0	0	\$382,500
Burlington	0	0	0	0	0	\$0
Carpentersville	100	11	2	\$3,422	0	\$2,550,000
East Dundee *	123	6	6	\$3,585	\$2,698	\$3,136,500
Elburn	2	0	0	0	0	\$51,000
Elgin *	219	54	28	\$4,221	\$2,797	\$5,584,500
Geneva	56	7	0	0	0	\$1,428,000
Gilberts	8	1	0	0	0	\$204,000
Hampshire	43	8	2	\$2,505	0	\$1,096,500
Hoffman Estates *	0	0	0	0	0	\$0
Huntley *	3	0	2	\$274	\$439	\$76,500
Lily Lake	8	0	0	0	0	\$204,000
Maple Park *	1	0	0	0	0	\$25,500
Montgomery *	131	16	99	\$20,314	\$6,457	\$3,340,500
North Aurora	11	8	12	\$3,570	\$50	\$280,500
Pingree Grove	0	0	0	0	0	\$0
St. Charles *	186	20	18	\$5,288	\$2,233	\$4,743,000
Sleepy Hollow	56	6	1	0	\$2,725	\$1,428,000
South Elgin	172	79	6	\$2,022	\$913	\$4,386,000
Sugar Grove	8	1	2	\$2,487	\$113	\$204,000
Virgil	3	0	0	0	0	\$76,500
Wayne *	7	2	0	0	0	\$178,500
West Dundee	59	19	1	\$9,644	\$3,509	\$1,504,500
Unincorporated areas	644	184	66	\$6,715	\$3,903	\$16,422,000
<b>County total</b>	<b>2,625</b>	<b>631</b>	<b>433</b>	<b>\$11,928</b>	<b>\$5,061</b>	<b>\$66,937,500</b>

\* Data may include figures for areas of the municipality outside of Kane County and claims outside the mapped base floodplain.

\*\* The number of buildings in the floodplain (2nd column) includes buildings in the floodway.

+ Structural coverage includes the furnace, built-in cabinets, wall-to-wall carpeting, etc.

++ Estimated dollar loss is the estimate of total building damage from a 100-year or base flood. It is the number of buildings in the base floodplain times \$25,500, the average cost per flooded building.

Source: GIS, FEMA claims data as of November 2002

**Repetitive Losses:** There are several different definitions of a “repetitive loss property.” This *Plan* uses the Community Rating System’s definition, in part because data are readily available: a repetitive loss property is one which has received two flood insurance claim payments for at least \$1,000 each since 1978. These properties are important to the National Flood Insurance Program and the Community Rating System because even though they comprise 2% of the policy base, they account for 33% of the country’s flood insurance claim payments.

There are several FEMA programs that encourage communities to identify the causes of their repetitive losses and develop a plan to mitigate the losses (this *Plan* meets FEMA’s repetitive loss planning criteria).

There are 28 repetitive loss properties in Kane County in 7 municipalities and the unincorporated areas. The Privacy Act prohibits publishing the exact locations or addresses of insured properties in a public document. These addresses were visited and it was found that three buildings have been purchased and cleared or otherwise removed from the site. One building has been rebuilt, elevated above the flood level, so it is no longer counted as a repetitive loss site. One property was a duplicate listing and two could not be found.

As a result of this review, the remaining 21 properties were used to identify 18 repetitive loss *areas*. A repetitive loss *area* contains one or more properties on the FEMA list plus adjacent properties with the same or similar flooding conditions. These areas are listed in the table on page 2-21. They range in size from one building that appears to be the only one subject to repetitive flooding to 112 similarly situated properties.

Sixteen of the 18 areas are located on Map 2-3 (the last two are in Algonquin, but outside Kane County). Areas 4, 5, 13, 17 and 18 consist of single non-residential buildings. The other 13 areas are all single family homes. These buildings have a variety of foundation types, flood depths, and planned improvements. Four areas (1, 8, 9, 16) are in the mapped regulatory floodway.

Most of the properties have only received two claims. One property in area 2 and one in area 5 have received claim payments 7 and 9 times, respectively, but the total paid on these two only equal 36% and 10% of their total property values, so they are a long way from any building code requirements that would mandate flood protection.

It is noted that three properties on FEMA’s list have been cleared. The field survey identified other properties in repetitive loss areas 7 and 12 that have been acquired or retrofitted. Forty homes were purchased in area 12 following the 1996 flood.



Kane County Repetitive Loss Areas					
	City	Name/Street	Bldgs	Flood source	Flood years
1	Uninc. Aurora	Connie Court	7	Indian Creek	81, 82, 83
2	Aurora	Austin Ave	1	Indian Creek	78, 81, 82, 83, 85, 87, 96
3	Aurora	East View Estates.	2	Indian Creek	85, 86, 90, 93, 96
4	Aurora	Farnsworth	1	Indian Creek	82, 83, 93, 96
5	Aurora	New York	1	Local drainage	79, 83, 84, 85, 87, 89, 90, 97, 00
6	Aurora	Sherwood	1	Local drainage	83, 87
7	Elgin	Illinois Ave	14	Poplar Creek	90, 97
8	Uninc. East Dundee	Fox River Drive	40	Fox River	88, 94
9	Uninc. St. Charles	Grove, Willow	17	Fox River	79, 83, 86, 93, 94, 97
10	Uninc. Sugar Grove	Kadaka	1	Blackberry Creek	85, 87, 91, 93, 94
11	Uninc. Aurora	Lindenwood	7	Local drainage	87, 96
12	Montgomery	Park View Marveray	45	Waubonsie Creek	79, 81, 83, 96
13	Montgomery	Mill Street	1	Fox River	96, 97
14	Montgomery	North River	19	Fox River	96, 97
15	North Aurora	Butterfield	2	Local drainage	5/78, 9/78
16	South Elgin	S. Riverside	31	Fox River	79, 88
17	Algonquin	Harrison	1	Local drainage	90, 95
18	Algonquin	La Fox	1	Fox River	79, 82
<i>Source: FEMA claims data as of November 2002, field surveys by French &amp; Associates</i>					

**Critical facilities:** Critical facilities that could be impacted by flooding are relatively easily identifiable – they are located in the floodplain. Critical facilities are discussed on pages 1-10 – 1-19. The maps of the seven types of facilities were overlain on the GIS floodplain layer to determine how many and what types of critical facilities are subject to overbank flooding. The results are shown in the table on the next page.

The table shows that while there are hundreds of critical facilities in Kane County, a relatively small number are in either the mapped floodplain or the 500-year floodplain (the 500-year flood is considered the most appropriate protection level for critical facilities). The GIS review also found only five critical facilities in mapped floodways: three emergency response facilities and two places of assembly (the riverboat casinos).

**Economic Impact:** Floods cause other problems that are not as easy to identify as damage to buildings and critical facilities. Businesses that are disrupted by floods often have to be closed. They lose their inventories, customers cannot reach them, and employees are often busy protecting or cleaning up their flooded homes.

Several municipalities reported that they had businesses that were flooded, but no dollar impact was estimated.

Floodprone Critical Facilities														
	HazMat		Health		Emergency		Utilities		Schools		Assembly		Total	
	100-year	500-year	100-year	500-year	100-year	500-year	100-year	500-year	100-year	500-year	100-year	500-year	100-year	500-year
Algonquin *	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aurora *	1	1	0	1	1	1	1	1	0	0	1	1	4	5
Barrington Hills *	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bartlett *	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batavia	0	0	0	0	1	1	1	1	1	1	0	0	3	3
Big Rock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burlington	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carpentersville	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Dundee *	0	0	0	0	3	3	0	0	0	0	0	0	3	3
Elburn	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elgin *	1	1	0	0	0	0	0	0	1	1	1	1	3	3
Geneva	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gilberts	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hampshire	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hoffman Estates *	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Huntley *	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lily Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maple Park *	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montgomery *	0	0	0	0	0	2	1	1	0	0	0	0	1	3
North Aurora	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pingree Grove	0	0	0	0	0	0	0	0	0	0	0	0	0	0
St. Charles *	1	1	0	0	0	0	0	0	0	0	0	0	1	1
Sleepy Hollow	0	0	0	0	2	2	0	0	0	0	0	0	2	2
South Elgin	1	1	0	0	0	0	0	0	0	0	0	0	1	1
Sugar Grove	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Virgil	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wayne *	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Dundee	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unincorporated areas	2	2	0	0	0	0	0	0	1	1	0	0	3	3
<b>County total</b>	<b>6</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>7</b>	<b>9</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>24</b>

\* Data includes only the Kane County portion of the municipality  
Source: Municipal surveys, Office of Emergency Management, Kane County GIS Technologies

**Impact on taxes:** As with flooded roads, public expenditures on flood fighting, sandbags, fire department calls, clean up and repairs to damaged public property affect all residents of the County, not just those in the floodplain. Here are some examples of public expenditures from the July 1996 flood:

- Lily Lake spent over \$5,000 repairing roads and ditches
- Batavia spent over \$131,000, including \$37,000 in landfill fees for depositing debris and \$41,000 in damage to critical facilities
- The Blackberry Township Road District spent \$30,000± repairing roads and bridges
- Geneva spent over \$20,000 on repairs to storm sewers and other public property.
- Geneva city crews responded to 125 “flood calls” on July 17 – 19.
- FEMA and the State paid \$1,674,000 in disaster assistance grants to 1,504 families (Individual and Family Grant Program) and \$20,742,320 for temporary housing.

The following bridges were repaired or replaced after the 1996 flood at the noted costs

- Scott Road bridge at Welch Creek (see page 2-12, replacement cost: \$268,000)
- Swan Road bridge at Big Rock Creek (repair cost: \$61,545)
- Jericho Road bridge at Big Rock Creek (repair cost: \$77,000)

Presidential disaster declarations in 1986 and 1996 that provided disaster assistance to local governments and non-profit organizations, in addition to the payments to families listed above. The types of damage and costs suffered by public agencies from the 1996 flood are displayed on the table on the next page.

While the costs itemized on the next page represent the 75% FEMA share, Federal assistance is not available for smaller, more localized floods and it cannot be counted on in the future. Further, a recent law now requires that public agencies purchase insurance on floodprone buildings. The amount of insurance that should be carried is deducted from disaster assistance payments.

**Transportation:** Loss of road access is a major flood impact that affects all residents and businesses, not just those who own property in the floodplain. Sometimes the loss is temporary, such as during the flood. Bridges that can be expected to go under water are shown in Map 1-10 and are discussed on pages 2-12 – 2-13.

Sometimes the loss of transportation lasts well after the disaster. When roads, bridges or railroads are washed out by a flood, it can be weeks or months before they are repaired and reusable.

**FEMA Disaster Assistance Payments to Public Agencies, July 1996 Flood**

<b>Applicant</b>	<b>FEMA \$ Assistance Received</b>	<b>A. Debris Removal</b>	<b>B. Emergency Measures</b>	<b>C. Roads and Bridges</b>	<b>D. Water Control Facilities</b>	<b>E. Buildings and Equipment</b>	<b>F. Utilities</b>	<b>G. Parks, Rec, and Other</b>
Aurora (City)	2,562,979	X	X	X	X			
Aurora (Township)	61,616							
Aurora East School Dist. 131	432,296		X			X		
Aurora Met. Exp. Aud. Authority	69,286		X			X		
Aurora Twp. Highway Dept.	196,344	X	X	X				
Batavia (City)	129,715	X	X	X	X	X	X	
Big Rock Twp. Highway Dept.	23,274			X				
Blackberry (Township)	27,675			X				
Campton (Township)	15,639			X				X
Elburn (Village)	48,035	X	X	X	X	X	X	X
Fox Valley Park Dist.	73,525	X			X			X
Geneva (City)	72,836	X	X	X	X		X	
Geneva Park Dist.	10,218							X
Geneva Twp. Road District	25,924	X	X	X	X			
Ill. Math & Science Academy	150,197					X		
Kane Co. Div. of Transportation	427,987		X	X	X			
Kane Co. Forest Preserve Dist.	37,863	X	X	X	X	X		X
Kane Co. Health Dept.	14,445		X					
Kane Co. Sheriff Office	2,139		X			X		
Kane County	54,132					X		
Kaneland Comm. Sch. Dist. 302	11,514					X		
Lily Lake (Village)	5,779			X			X	
Maple Park (Village)	7,724					X	X	
Montgomery (Village)	452,577	X	X	X				
Montgomery/Countryside Fire Dist.	21,978		X			X		
North Aurora (Village)	29,924	X	X	X				
Quad County Urban League	8,254					X		
Science and Technology Center	1,182					X		
Sugar Grove (Township)	17,467	X						
Sugar Grove (Village)	47,044	X	X	X				
Waubensee Community College	33,901					X		
West Aurora School Dist. 129	1,000	X	X			X		
<b>Kane County Total</b>	<b>\$5,074,469</b>							

Source: FEMA

**Trends:** Flood problems can increase if floodprone areas are developed without accounting for the hazard. “Approximately 65% of the existing mapped floodplain occurs in land uses that are available for development (agriculture and vacant)” (*Comprehensive Stormwater Management Plan*, page 37). Flooding can also increase if the increase in stormwater runoff that accompanies urban development is not managed.

The trend in Kane County is for more development, especially in the Critical Growth Area in the central portion of the County (see page 1-9). Chapter 4 discusses activities that can help ensure that new development does not aggravate existing flooding and create flood problems.

**National Flood Insurance Plan:** The NFIP is a Federal program enabling property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. Participation in the NFIP is based on an agreement between local communities and the Federal Government that states if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas, the Federal Government will make flood insurance available within the community as a financial protection against flood losses. (As indicated on the FEMA website: <http://www.fema.gov/business/nfip/intnfip.shtm>).

Each of the municipalities participating in this plan also participate in the NFIP. As of May 1, 2008 there are three CRS communities; Carpentersville (Class 8), St. Charles (Class 8), and Sugar Grove (Class 7).

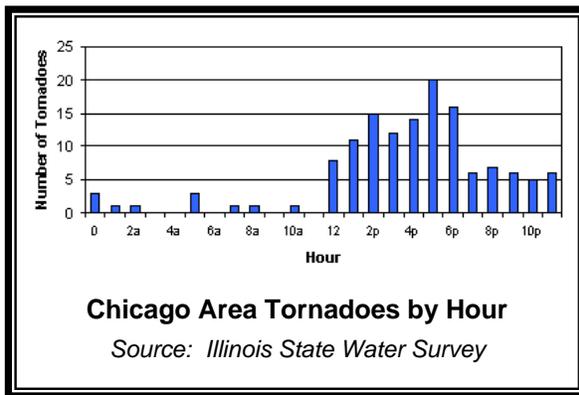
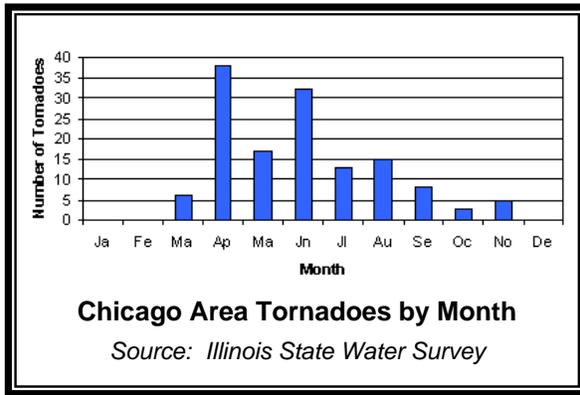
## 2.3. Tornadoes

A tornado is a swirling column of air extending from a thunderstorm to the ground. Tornadoes can have wind speeds from 40 mph to over 300 mph. A majority of tornadoes have wind speeds of 112 mph or less.

**The hazard:** Debris hurled by the wind can hit with enough force to penetrate walls. Tornadoes create localized low-pressure areas that can make a building explode. Windows, chimneys and roofs are the most vulnerable parts of buildings to tornado damage.

Tornadoes can move forward at up to 70 miles per hour, pause, slow down and change directions. Most have a narrow path, less than a 100 yards wide and couple of miles long. However, damage paths can be more than 1 mile wide and 50 miles long.

Late spring-early summer is the peak of tornado activity in the year. As seen in the chart below left, April, May, and June have the most frequent occurrences of tornadoes in the Chicago area. Tornadoes peak in the afternoon, when convectional heating is at a maximum. As shown in the chart below right, the peak time for tornadoes is at 5:00 p.m.



ENHANCED FUJITA SCALE		
Category	Wind Speed	Affect
F 0	65-85 mph	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; Shallow-rooted trees pushed over.
EF 1	86-110 mph	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF 2	111-135 mph	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF 3	136-165 mph	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF 4	166-200 mph	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF 5	>200 mph	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd); high-rise buildings have significant structural deformation; incredible phenomena will occur.

**Historical Events:** In the past fifty years, Kane County has had 15 tornadoes. These are listed in the table to the right.

A detailed study of Chicago area tornadoes was conducted by the University of Chicago. The historical events are shown in Map 2-4. While this does not include all of Kane County, it does show that no area is safe from a twister.

The best known recent tornado in the area was the one that hit northwestern Will County on August 28, 1990. It was part of a storm that developed in Wisconsin at 12:00 p.m. At 1:42 a tornado was spotted northwest of Rockford. It was followed by a golf-ball size hail

in Rockford and DeKalb County. At 3:30 the twister hit Plainfield and the Joliet area. The storm and high winds moved on into Indiana.

The tornado had winds up to 300 miles per hour, giving it a Fujita rating of F-5 (see box, previous page). It cut a path of destruction 20 miles long and from 200 yards to half a mile wide. Its impacts are highlighted on page 2-28.

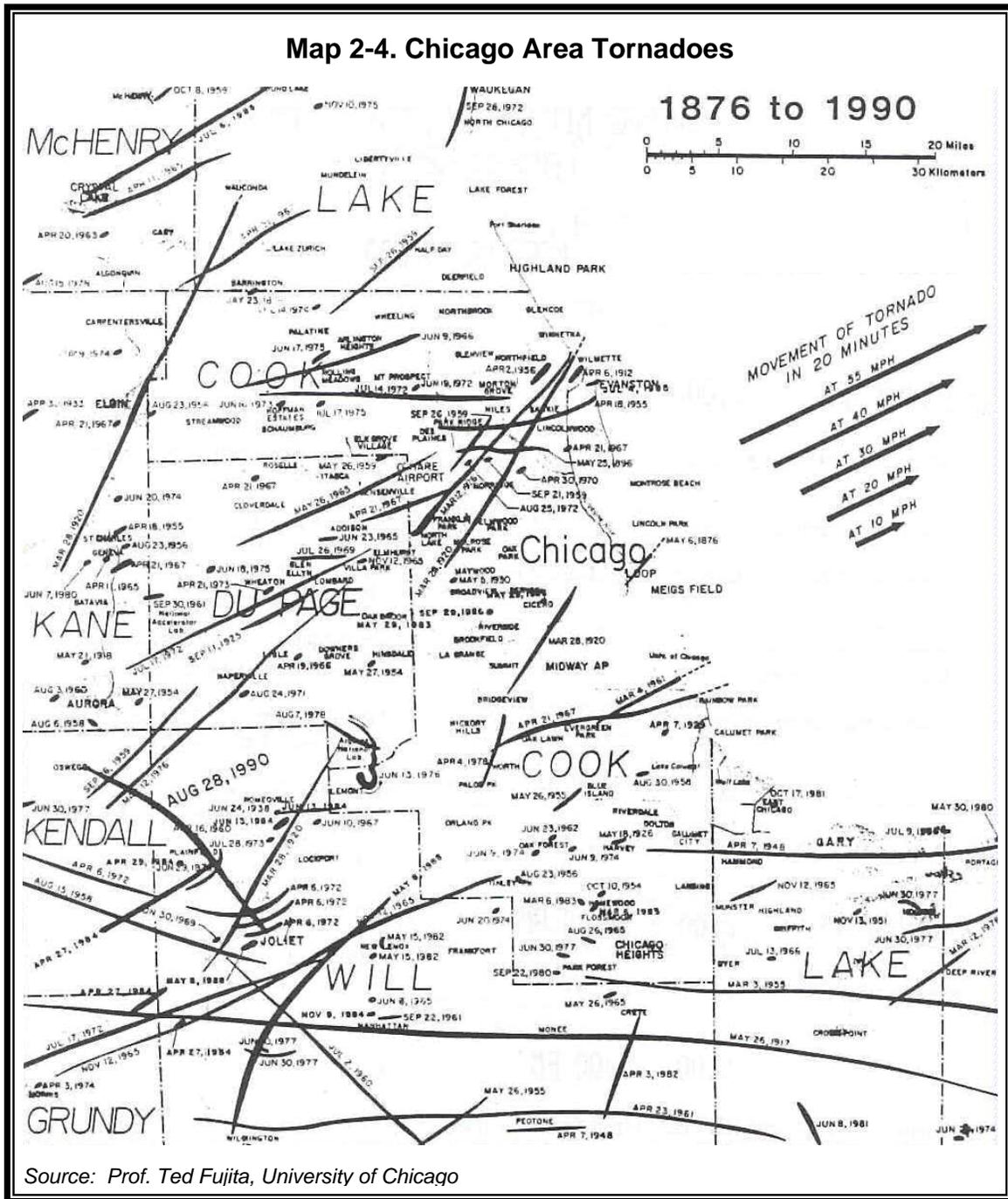
In Kane County, storm damage was most severe at the Aurora airport, where winds of 94 mph were recorded. Planes were flipped over and hangers were damaged. The high winds toppled mature trees in Aurora.

Most of the damage, however, was to Will County and three schools in Plainfield. More than 1,200 homes and buildings and at least 50 businesses were damaged or destroyed. Damage to three schools in Plainfield left 1,600 students without classrooms. Luckily, the tornado hit after school had been let out, although there were some deaths among participants in after-school activities.

<b>Kane County Tornadoes Since 1950</b>			
<b>Date</b>	<b>Time</b>	<b>Injuries</b>	<b>Fujita</b>
April 28, 1955	2100	0	F1
August 23, 1956	1400	3	F1
August 23, 1956	1400	0	F2
August 06, 1958	1710	0	F2
August 03, 1960	1630	0	F1
April 11, 1965	1600	0	F1
April 19, 1966	2240	0	F1
April 21, 1967	1710	0	F2
June 09, 1974	1840	0	F0
June 20, 1974	1810	0	F0
June 07, 1980	1338	0	F0
July 16, 1980	0255	0	F2
May 15, 1982	1400	0	F0
May 05, 1991	1618	0	F1
July 02, 1993	1800	0	F0
May 28, 2003	1419	0	F0
May 10, 2004	1655	0	F0
<i>Source: National Weather Service</i>			

Map 2-4 and recent history make it appear that Kane County has no major threat from tornadoes. However, the County has been lucky. If the August 1990 tornado had struck 12 – 15 miles to the north and west, it would have hit the Aurora area where the higher concentration of development would probably have meant more deaths and destruction than what occurred in Will County.

### Map 2-4. Chicago Area Tornadoes



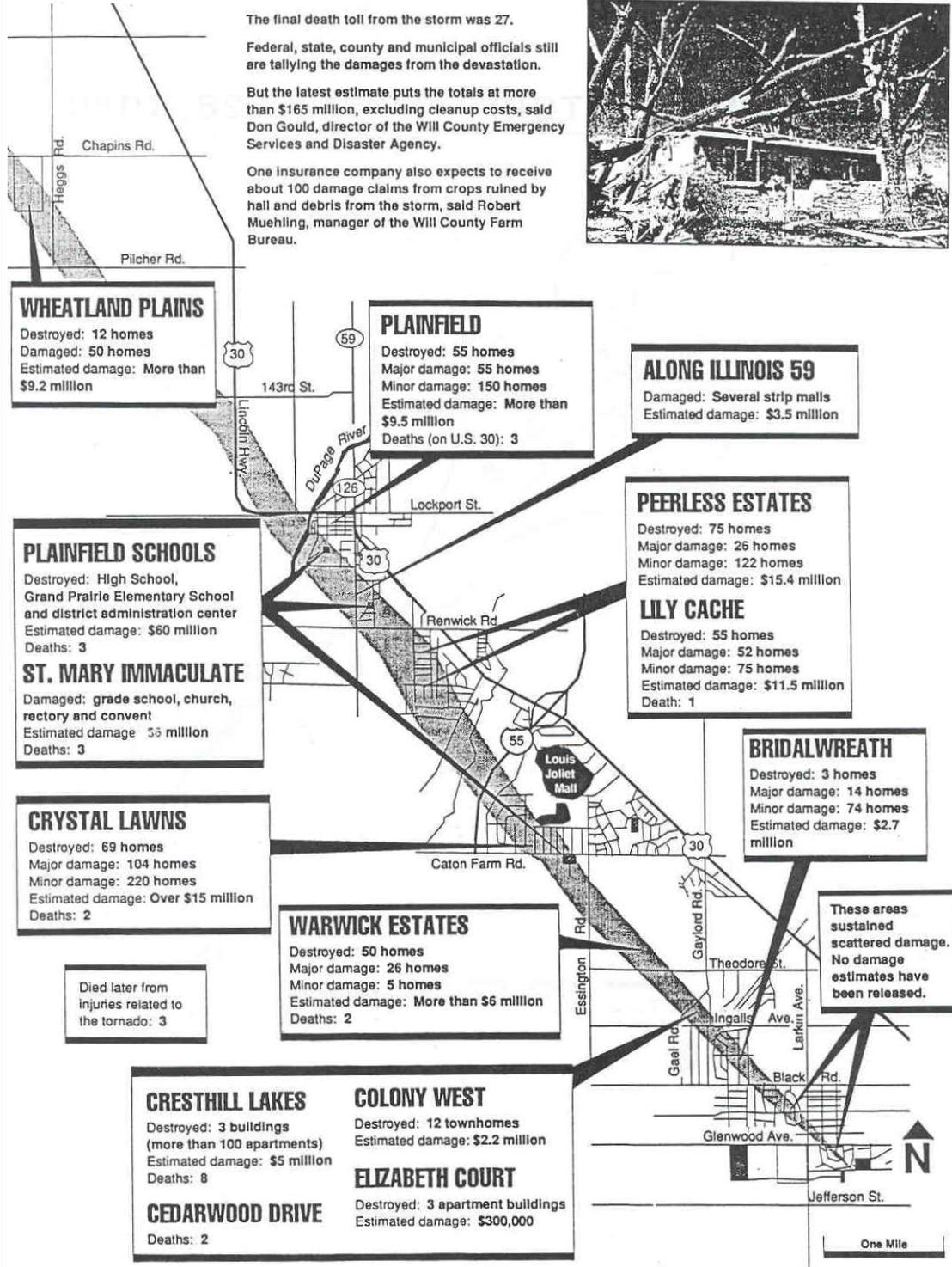
# A trail of death and destruction

The final death toll from the storm was 27.

Federal, state, county and municipal officials still are tallying the damages from the devastation.

But the latest estimate puts the totals at more than \$165 million, excluding cleanup costs, said Don Gould, director of the Will County Emergency Services and Disaster Agency.

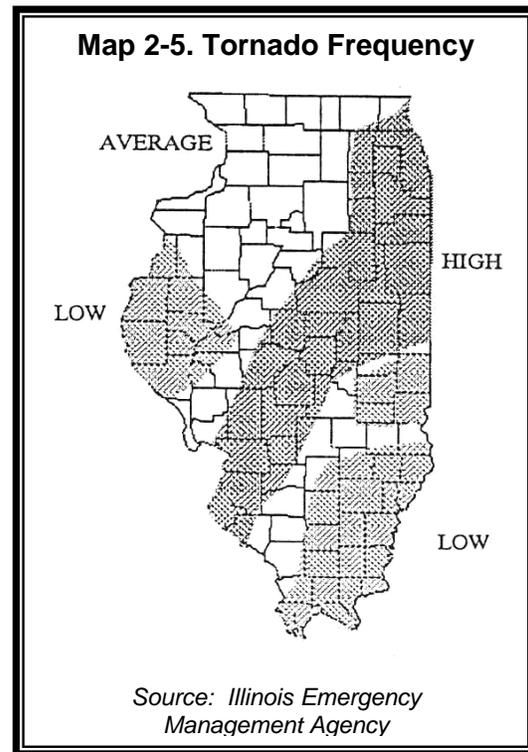
One insurance company also expects to receive about 100 damage claims from crops ruined by hail and debris from the storm, said Robert Muehling, manager of the Will County Farm Bureau.



**Frequency:** Approximately 1,000 tornadoes occur each year in the United States. Illinois is tied for 7<sup>th</sup> in the United States with an average of 26 tornadoes per year. Tornadoes are most likely to occur in April through June, but a tornado can occur at any time. Over half hit between 3:00 and 7:00 p.m. There are no official recurrence intervals calculated for tornadoes.

Kane County has had 15 of the 1,472 tornadoes recorded in Illinois between 1950 and 1999. Kane County is classified as having a high tornado risk based on historic tornado wind speeds and the number of recorded tornadoes per 1,000 square miles.

With 15 occurrences over 50 years, the likelihood of a tornado hitting somewhere in the county is 0.3 (30%) in any given year. Assuming a tornado affects one square mile and there are 524 square miles in Kane County, the odds of a tornado hitting any particular square mile in the County is 1 in 1,750 each year or a 0.0006% chance.



**Safety:** Although recent tornadoes in Kane County did not kill anyone, tornadoes are still killers. The August 1990 twister caused 28 deaths. The table below shows the tornado related fatalities in the United States for the last five years and where they occurred. The number of people who live in mobile homes is far smaller than the number who live in permanent homes, however they have practically the same number of deaths.

Year	Vehicle	Permanent Home	Mobile Home	Other	Total
1995	4	15	8	3	30
1996	2	8	14	1	25
1997	3	38	15	11	67
1998	16	46	64	4	130
1999	6	39	36	13	94
2000	3	6	18	2	29
2002	3	15	17	5	40
2003	0	24	25	5	54
2004	2	15	8	10	35
2005	2	3	32	1	38
2006	7	29	28	2	66
Totals	48	238	265	57	608

During this period, four people were killed in Illinois, two in mobile homes and two in vehicles.

Source: National Weather Service

The table shows that the residents in mobile homes are at the greatest risk. There are seven mobile home parks within Kane County.

**Health:** The major health hazard from tornadoes is physical injury from flying debris or being in a collapsed building or mobile home. Based on national statistics for 1970 – 1980, for every person killed by a tornado, 25 people were injured and 1,000 people received some sort of emergency care. The August 1990 twister injured 350 people.

Within a building, flying debris or missiles are generally stopped by interior walls. However, if a building has no partitions any glass, brick or other debris blown into the interior is life threatening. Following a tornado, damaged buildings are a potential health hazard due to instability, electrical system damage, and gas leaks. Sewage and water lines may also be damaged.

**Building damage:** Although tornadoes strike at random, making all buildings vulnerable, three types of structures are more likely to suffer damage:

- Mobile homes,
- Homes on crawlspaces (more susceptible to lift), and
- Buildings with large spans, such as airplane hangers, gymnasiums and factories.

Structures within the direct path of a tornado vortex are often reduced to rubble. However structures adjacent to the tornadoes path are often severely damaged by high winds flowing into the tornado vortex, known as inflow winds. It is here, adjacent to the tornado's path where the building type and construction techniques are critical to the structures survival.

In 1999, FEMA conducted an extensive damage survey of residential and non-residential buildings in Oklahoma and Kansas following an outbreak of tornadoes on May 3, 1999, which killed 49 people. The assessment found

- The failure for many residential structures occurred where the framing was attached to the foundation or when nails were the primary connectors between the roofing and the walls. A home in Kansas was lifted from its foundation where the addition of nuts to the bolts anchoring the wood framing to the foundation may have been all that was needed to have kept this from happening.
- Roof geometry also played a significant role in a building's performance.
- Failure of garage doors, commercial overhead doors, residential entry doors or large windows caused a significant number of catastrophic building failures.
- Manufactured homes on permanent foundations were found to perform better than those that were not on solid walls.

**Critical facilities:** Critical facilities are discussed on pages 1-10 – 1-19. Because a tornado can hit anywhere in the County, all of them are susceptible to being hit. Schools are a particular concern, though for two reasons:

- They have large numbers of people present, either during school or as a storm shelter, and
- They have large span areas, such as gyms and theaters.

The 1990 Plainfield tornado was an unfortunate example of this. It struck the Plainfield High School, Grand Prairie Elementary School, St. Mary Immaculate Church and the gymnasium to the Church's elementary school. Cost to repair the two public schools was estimated at up to \$35 million. The cost for the church and its school was \$5 million.

Large span buildings were also affected in 1990. In addition to the schools and their gyms, hangers at the Aurora airport and Joliet's Essington Road Fire Station were damaged. At this time, we do not know which critical facilities in Kane County may have large span structures.

**Economic Impact:** The major impact of a tornado on the local economy is damage to businesses and infrastructure. A heavily damaged business, especially one that was barely making a profit, often has to be closed. The post-disaster damage report stated that at least 50 businesses were destroyed by the 1990 tornado.

Infrastructure damage is usually limited to above ground utilities, such as power lines. The 1990 tornado knocked out two 345,000 volt transmission towers, leaving 65,000 Com Ed costumers without power. Damage to phone lines left 14,000 customers without service. Damage to utility lines can usually be repaired or replaced relatively quickly.

Damage to roads and railroads is also localized. If it can't be repaired promptly, alternate transportation routes are usually available. Transportation was disrupted when highways were closed during the August 1990 storm due to high winds and debris.

Public expenditures include search and rescue, shelters, and emergency protection measures. The large expenses are for repairs to public facilities and the clean up and disposal of debris. Most public facilities are insured, so the economic impact on the local treasury may well be small.

Clean up and disposal can be a larger problem, especially with limited landfill capacity near the damage site. Preliminary damage assessments for public expenditures after the 1990 tornado totaled \$4 million, 2/3 of that for debris clearance.

## 2.4. Earthquakes

Earthquakes are one of nature's most damaging hazards. Earthquakes, and the potential damage from earthquakes, are more widespread than people realize. Earthquakes are caused by the release of strain between or within the Earth's tectonic plates. The severity of an earthquake depends on the amount of strain, or energy that is released along a fault or at the epicenter of an earthquake. The energy released by an earthquake is sent to the earth's surface and released.

There are several common measures of earthquakes, including the Richter Scale and the Modified Mercalli Intensity (MMI) scale. The Richter Scale is a measurement of the magnitude, or the amount of energy released by an earthquake. Magnitude is measured by seismographs. The Modified Mercalli Intensity is an observed measurement of the

earthquake's intensity felt at the earth's surface. The MMI varies, depending on the observer's location to the earthquake's epicenter.

<b>Earthquake Measurement Scales</b>		
<b>Mercalli</b>	<b>Richter</b>	<b>Felt Intensity</b>
I	0-4.3	Not felt except by a very few people under special conditions. Detected mostly by instruments
II		Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
III		Felt noticeably indoors. Standing automobiles may rock slightly.
IV	4.3-4.8	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V		Felt by nearly everyone. Many People are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	4.8-6.2	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII		Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction,
VIII	6.0-7.3	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.
IX		Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X		Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Landslides occur on steep slopes.
XI	7.3-8.9	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII		Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.
<i>Source: Multi-Hazard Identification and Risk Assessment</i>		

An earthquake's intensity depends on the geologic makeup of the area and the stability of underlying soils. The effects of earthquakes can be localized near its epicenter or felt significant distances away. For example, a 6.8-magnitude earthquake in the New Madrid Fault in Missouri would have a much wider impact than a comparable event on the California Coast. The thick sandstone and limestone strata of the central United States behave as "conductors" of the earthquake's energy, and tremors can be felt hundreds of miles away. By contrast, the geology of the West Coast allows the energy to be dissipated relatively quickly which keeps the effects of an earthquake more localized.

Earthquakes can trigger other types of ground failures which could contribute to the damage. These include landslides, dam failures, and liquefaction. In the last situation, shaking can mix groundwater and soil, liquefying and weakening the ground that supports buildings and severing utility lines. This is a special problem in floodplains where the water table is relatively high and the soils are more susceptible to liquefaction.

The Modified Mercalli and Richter Scales are compared in the table on the previous page, but it is important to note that the Mercalli Intensity varies based on the observer's proximity to the epicenter. Using the example of a 6.8-magnitude earthquake event at the New Madrid Fault, the intensity in St. Louis may be "IX", but in Kane County the intensity may be observed as a "VI."

**Historical events:** In the United States, the most frequent reports of earthquakes come from the West coast, but the largest earthquakes felt in the US occurred in Missouri in 1811 and 1812 along the New Madrid Fault. The Great New Madrid Earthquakes are the benchmarks from which all earthquakes in the Midwest are measured. An important fact is that the earthquakes of 1811 and 1812 were not single events. Rather the earthquakes were a series of over 2,000 shocks in five months.

Five of these quakes were larger than a magnitude of 8 on the Richter Scale, which totally destroyed the town of New Madrid. The earthquakes caused the land to roll in visible waves that raised and sank land as much as 20 feet. The tremors of these earthquakes were no doubt felt throughout all of Illinois, since the quakes are said to have rung church bells in New England.

There was a report of a quake at Fort Dearborn (Chicago) in August 1804. On October 31, 1895 an earthquake near Charlestown, Missouri measured 6.2 on the Richter Scale and caused damage up to level IX on the MMI Scale. The US Geological Survey website, "Earthquake History of Illinois" provides the following reports:

Among the largest earthquakes occurring in Illinois was the May 26, 1909, shock which knocked over many chimneys at Aurora. It was felt over 500,000 square miles and strongly felt in Iowa and Wisconsin. Buildings swayed in Chicago where there was fear that the walls would collapse. Beds moved on their casters.... [G]as line connections broke at Aurora. [This was listed as an MMI VII.]

In January, 1912 an MMI VI occurred "Near Aurora, Freeport, Morris, and Yorkville, Illinois...The highest intensity was reported at those towns in Kane, Stephenson, Grundy, and Kendall Counties, respectively. Slight damage to chimneys was reported at Batavia and Geneva, Ill., north of Aurora, in Kane County. Two distinct shocks were observed at some places.

**Frequency:** About 200 earthquakes happen each year in the New Madrid seismic zone, but most are too small to be felt by people. The larger ones are listed in the table to the right. None of these caused much damage in the affected areas of the state.

Recent Earthquakes Felt in Illinois		
Richter	Date	Epicenter
5.0	May 10, 1987	Near Lawrenceville IL
4.5	Sep. 28, 1989	15 miles south of Cairo, IL
4.7	Apr. 27, 1989	15 miles SW of Caruthersville, MO
4.6	Sep. 26, 1990	10 miles south of Cape Girardeau, MO
4.6	May 3, 1991	10 miles west of New Madrid, MO
4.2	Feb. 5, 1994	Lick Creek-Goreville Area
4.2	June 28, 2004	8 miles E of Troy Grove, IL
3.6	Jan. 2, 2006	2 miles NNW of Equality, IL
5.2	April 18, 2008	5 miles NNE of Belmont, IL

Source: *Illinois Hazard Mitigation Plan 2000, US Geological Survey*

Small earthquakes ranging in magnitude from 3.0 to 5.0 on the Richter scale occur about once every 20 years in Kane County. The most significant of these was the May 26, 1909 quake described on the previous page.

Although it is estimated that the earthquakes of 1811 and 1812 are likely to occur once every 500 to 600 years, it is still likely that a damaging earthquake (6.0 to 7.6 on the Richter Scale) is likely to occur in this lifetime. The table to the right shows the estimated probability of damaging earthquakes in Illinois.

According to the Central U.S. Earthquake Consortium, Kane County is in an earthquake intensity zone of VI (MMI Scale) for a 7.6-magnitude earthquake along the New Madrid Seismic Zone. There is a 19% – 29% chance that the County will be hit with an earthquake with a MMI intensity of VI over the next 35 years. This would be slightly less than a 1% chance in any given year. As noted in the table on page 2-32, this level of quake would be felt by everyone, but would cause minor structural damage.

Probability of Earthquake Event in The New Madrid Seismic Zone		
Richter	Year 2000	Year 2035
6.3	40% - 63%	86% - 97%
7.6	5.4% - 8.7%	19% - 29%
8.3	0.3% - 1.0%	2.7% - 4.0%

Source: Illinois State Geological Survey

It is important to note that the level of damage is dependent on the location of the earthquake. There are faults and other potential sources of a quake closer to Kane County than New Madrid, Missouri.

**Safety:** Approximately 1,600 people have been killed by earthquakes in the US since colonial times, 1,000 of them were in California and 700 of those were in the 1906 San Francisco quake. “Trauma caused by partial or complete collapse of human-made structures is the overwhelming cause of death and injury in most earthquakes.” (*The Public Health Consequences of Disasters, pages 18 – 19.*)

Vulnerable buildings, roads, bridges and utility lines and the unpredictability and instantaneous nature of earthquakes can result in enormous losses of life. The table to the right shows the number of deaths in the larger quakes in the United States over the last 30 years. Note that some earthquakes with high Richter ratings, such as the one at Big Bear Lake, have low death counts because they occurred in unpopulated areas.

US Earthquakes Deaths since 1970			
Year	Location	Richter	Deaths
1971	Los Angeles, CA	6.4	65
1975	Hawaii	7.2	2
1983	Coalinga, CA	6.5	1
1987	Whittier, CA	5.9	8
1989	Loma Prieta, CA	7.1	62
1991	Arcadia, CA	6.0	2
1992	Big Bear Lake, CA	7.4	2
1994	Northridge, CA	6.9	57
1995	Wyoming	5.3	1
2003	San Simeon, CA	6.6	2

Source: US Geological Survey

Because the greatest potential for loss of life is to people within a collapsing building, the threat to Kane County residents is directly related to the condition of the buildings. This

is discussed below under building damage. Other life safety threats include collapsing roads and bridges, flooding from dam breaches, fires from ruptured gas lines, and release of hazardous chemicals from broken storage tanks or trucks.

**Health:** The main health concerns from earthquakes arise from sheltering people and caring for injuries. These would be the same as for other quick and destructive hazards, such as tornadoes.

**Building damage:** Generally, wood frame buildings and structures on solid ground fare best during an earthquake. Wood frame buildings are flexible enough to withstand ground shaking and swaying. Evaluations of recent earthquakes found that damage was primarily caused to:

- Unreinforced masonry structures,
- Older buildings with some degree of deterioration,
- Buildings without foundation ties.
- Multi-story structures with open or “soft” first floors, and

Most building codes have standards related to the first three concerns. This means that the most threatened buildings are older ones (built before current codes), masonry ones, and taller ones with open first floors.

In addition to the building type, damage is related to the underlying soils. Buildings on solid ground fare better, while those on loose or sandy soils will suffer more from shaking. These can be found in floodplains. If there is enough water present, the shaking can liquefy the underlying soils, which removes the support under the foundation.

Given the relatively low threat of a quake at a MMI scale of VII or greater, the threat to buildings in Kane County would be limited to large, older, unreinforced masonry structures. There is no readily available data on the number and location of these types.

**Critical Facilities:** Damage to critical facilities would be similar to damage to other types of buildings. However, sometimes, just a little damage can render the facility useless. Example: a minor shift in a fire station can effectively clamp the doors shut. If the fire trucks cannot get out, the fire department’s critical duties cannot be performed.

**Economic Impact:** As with tornadoes, the major impact of an earthquake on the local economy is damage to businesses and infrastructure. Public expenditures for repairs to public facilities and clean up and disposal of debris can be high, especially if the structures are not insured for earthquakes.

Damage to infrastructure and utilities can be very high. Roads and bridges can suffer substantial damage. Subsurface pipes, such as water and gas lines, can break. Water supply dams can be breached. Power poles can fall. While these can all be repaired, it may take a long time depending on how widespread the damage is. The longer it takes, the greater the economic impact and likelihood that some businesses will not recover.

## 2.5. Thunderstorms

Thunderstorms are most likely to happen in the spring and summer months and during the afternoon and evening hours but can occur year-round and at all hours. The biggest threats from thunderstorms are flash flooding and lightning. In most cases, flash flooding occurs in small drainage areas where water quickly accumulates before it drains to the mapped floodplains discussed in sections 2.1 and 2.2. When taken together, these local drainage problems can be as great a problem as overbank flooding.

Most municipalities have areas of flooding related to local drainage, some more than others. It appears that local drainage flooding is more problematic than overbank flooding in many municipalities....

Local drainage problems are often the result of structures located in isolated depressions and former wetlands with no surface outlet. Other local drainage problems are associated with older developments (post World War II and pre-detention) that were constructed without effective stormwater drainage systems. (*Comprehensive Stormwater Management Plan*, page 37)

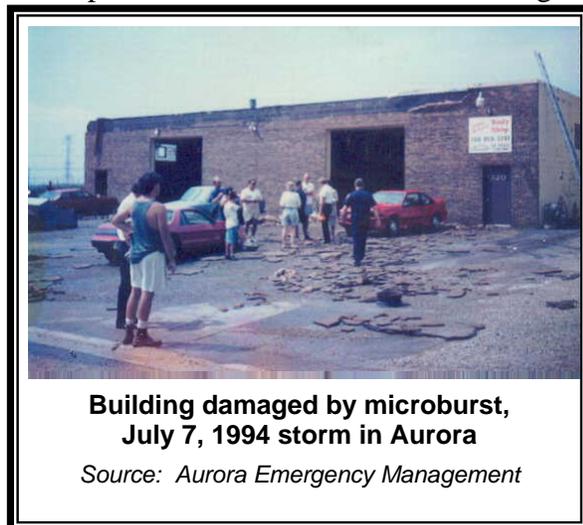


Lightning, which occurs during all thunderstorms, can strike anywhere. Generated by the buildup of charged ions in a thundercloud, the discharge of a lightning bolt interacts with the best conducting object or surface on the ground. The air in the channel of a lightning strike reaches temperatures higher than 50,000°F. The rapid heating and cooling of the air near the channel causes a shock wave which produces thunder.

Other threats from thunderstorms include downburst winds, high winds, hail and tornadoes. Downburst winds are strong, concentrated, straight-line winds created by falling rain and sinking air that can reach speeds of 125 mph (200 km/h).

Hailstones are ice crystals that form within a low-pressure front due to warm air rising rapidly into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation. The size of hailstones is a direct function of the severity and size of the storm. Significant damage does not result until the stones reach 1.5 inches in diameter, which occurs in less than half of all hailstorms.

The National Weather Service classifies a thunderstorm as severe if its winds reach or exceed 58 mph, produces a tornado, or



drops surface hail at least 0.75 inch in diameter. Compared with other atmospheric hazards such as tropical cyclones and winter low pressure systems, individual thunderstorms affect relatively small geographic areas. The average thunderstorm system is approximately 15 miles in diameter (75 square miles) and typically lasts less than 30 minutes at a single location. However, weather monitoring reports indicate that coherent thunder-storm systems can travel intact for distances in excess of 600 miles.

**Historical events:** Generally, thunderstorms and their accompanying hazards do not warrant a disaster declaration or a lot of documentation. Based on the reports submitted by the municipalities, there have been many storms and they have had a variety of impacts. These are listed in the table on page 2-39.

Storms in July 1993 caused numerous flash flood events. Three to six inches fell over portions of McHenry, DeKalb, Kane, DuPage, and Cook counties on July 18-19. Some 500 residents below an earthen dam were evacuated in McHenry County after officials expressed concerns the dam might break. Fortunately the dam held. In DeKalb County, 300-400 residents of a trailer park were evacuated in Sycamore due to flash flooding of the Kishwaukee River.

**Frequency:** The Kane County area averages 60 – 70 thunderstorm events each year (*Multi Hazard Identification and Risk Assessment*, page 31). They average an hour in duration. It is estimated that only five storms each year have the hailstorms and high winds to be considered a severe thunderstorm. Assuming the average severe storm affects 100 square miles, the odds of a severe thunderstorm hitting any particular square mile in Kane County are 1 to 1 or 100%.

**Safety:** The threat to life varies by the cause of death. Between 1995 and 2000, the National Weather Service reported 20 people in Illinois were killed by flash floods, wind and lightning brought by thunderstorms (see table). Hail rarely causes loss of life.

Most of these deaths can be prevented through safe practices. Much information has come out over the last 20 years about lightning safety, for example. Before 1990, an average of 89 people were killed by lightning each year. By 2000, this number had dropped to 52.

**Health:** No special health problems are attributable to

	Lightning		Wind		Flash Flood		Total	
	IL	US	IL	US	IL	US	IL	US
1995	1	85	2	38	0	60	3	183
1996	2	52	0	23	2	94	4	169
1997	1	42	0	37	0	86	1	165
1998	0	44	0	41	0	118	0	203
1999	2	46	0	29	0	60	2	135
2000	0	51	1	25	3	29	4	105
2001	5	44	1	17		35	6	96
2002	1	51	5	45	1	38	7	134
2003	0	43	0	43	1	67	1	153
2004	0	32	1	42	0	58	1	132
2005	1	38	0	22	0	28	1	88
2006	1	47	0	39	0	59	1	145
<b>Total</b>	<b>14</b>	<b>575</b>	<b>10</b>	<b>401</b>	<b>7</b>	<b>732</b>	<b>31</b>	<b>1,708</b>

Deaths from flash floods are also counted in the table on page 2-12.

Source: National Weather Service.

thunderstorms, other than the potential for tetanus and other diseases that arise from injuries and damaged property. When lightning strikes a human being, serious burns or death are the common outcomes. For every person killed by lightning, three people are injured. For those who survive, their injuries can lead to permanent disabilities. 70% of the survivors suffer serious, long-term effects, such as memory loss, sleep disorders, depression, and fatigue.

**Buildings:** As with tornadoes, mobile homes are at a high risk to damage from thunderstorms. Wind and water damage can result when windows are broken by flying debris or hail. Lightning can cause direct damage to structures (especially those without lightning protection systems) and can cause fires that damage forests and structures. In 1993, damage from thunderstorm winds was \$348.7 million and lightning caused an additional \$32.5 million in damage.



Hail can inflict severe damage to roofs, windows and siding, depending on hailstone size and winds. One study of insured losses in St. Louis found that 75% of the dollar damage was to roofing, 12% to awnings, 6% to exterior paint, 4% to glass and 3% to siding (*Hail Loss Potential in the US*, page 2). The Village of Virgil reports that the May 12, 1998 hailstorm caused an average damage of \$15,000 – \$20,000 per home, with some as high as \$100,000.

TORRO Hailstorm Intensity Scale			
Intensity Category	Typical Hail Diameter (mm)	Probable Kinetic Energy	Typical Damage impacts
H0 Hard Hail	5	0-20	No damage
H1 Potentially Damaging	5-15	>20	Slight general damage to plants, crops
H2 Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3 Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4 Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5 Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6 Destructive	40-60		Bodywork of grounded aircraft dented, brick walls pitted
H7 Destructive	50-75		Severe roof damage, risk of serious injuries
H8 Destructive	60-90		Severe damage to aircraft bodywork
H9 Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10 Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

# Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-20 ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (13-20 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against wind
9	41-47	Strong Gale	High waves (20 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (20-30 ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	Exceptionally high (30-45 ft) waves, foam patches cover sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	

### Recent Thunderstorms and Their Impacts

Date	Location	Hazard	Reported Impact
7/29/93	Algonquin	Flash flood	11 Village vehicles flooded, \$130,000 to replace them, repair the Historic Village Hall parking lot
6/14/94	Aurora	Wind	Power outages, downed trees
6/94	St. Charles	Flash flood	50-100 properties damaged (\$100,000 damage)
7/7/94	Aurora	Microburst	Property damage (see photo page 2-37)
5/9/95	Aurora	¾" Hail	
6/2/95	Elgin	Flash flood	Businesses closed due to flooded streets
5/96	Geneva	Rain	5,000 children's books in the public library were damaged (\$13,000)
7/97	Burlington Twp	Flash flood	\$1,000 to repair bridge
7/97	St. Charles	Flash flood	50 properties damaged (\$50,000 in damage)
5/5/98	Sleepy Hollow	Hail	Roof damage
5/12/98	Virgil	Hail	Roof, siding and vehicle damage
6/15/00	Elgin	Flash flood	4 families evacuated
6/1/01	Carpentersville	Lightning	Damaged communications system within police and village departments (\$5,300), and Opticom system for emergency response vehicles
7/7/01	Huntley	Lightning	House damaged (\$8,000 in damage)
7/22/01	Huntley	Lightning	House damaged (\$5,000 in damage)
8/22/01	Sleepy Hollow	Lightning	Phone system damaged
Spring/02	Plato Township	Flash flood	Loss of crops
6/10/02	Huntley	Lightning	House damaged (\$32,000 in damage)
6/10/02	South Elgin	Lightning	Aerial siren destroyed (also damaged in 2000)
7/02	South Elgin	Flash flood	Thornwood Way closed, 2 cars totaled
8/02	Lily Lake	Lightning	\$2,500 - \$3,000 damage to a residence
7/03	County-wide	Lightning	Widespread strikes and house fires
7/03	South Elgin	Lightning	One fire fighter injured by lightning
5/04	Hampshire	Wind	Trees and power lines were down. Two semi tractor-trailers were blown off the road in northern Kane County
12/05	Sugar Grove	Wind	A farm house was damaged and 400 feet of cedar fence was torn down (\$10,000 in damage)
4/06	Aurora	Hail	Hail as big as golf balls were reported around the city
7/06	Elgin	Wind	Trees, tree limbs and power lines were blown down across many areas
8/06	St. Charles	Lightning	Lightning struck a house \$25,000 in damage
3/07	Aurora	Wind	A maintenance building and two condo buildings were damaged by high winds (\$200,000 in damage)
8/07	Geneva	Wind	Extensive tree and power line damage across Geneva

*Source: Municipal reports, National Weather Service*

During the period 1994 – 2000, the insurance industry paid out \$17.5 billion in claims, or an average of \$2.5 billion per year. Sixty-six percent of the losses were to personal buildings, 15% to commercial buildings, and 19% to vehicles (IBHS website). A four day series of hailstorms and tornadoes in the Midwest in April 1994 produced 300,000 insurance claims – more than Hurricane Andrew or the Northridge earthquake (*Multi-Hazard Identification and Risk Assessment*, page 60).

Of the nation’s “Top Ten” hailstorms between 1994 and 2000, number 4 was the May 18, 2000, storm in the Chicago suburbs. A total of \$572 million was paid in property claims.

**Critical Facilities:** Critical facilities are susceptible to the same damage and disruption from thunderstorms as other buildings. Emergency operations can be disrupted as thunderstorms and lightning affect radio communications and antennas are a prime target for lightning.

**Economic Impact:** Thunderstorms, flash flooding, wind and hail can all (or separately) destroy crops in the field. Long stemmed vegetation, such as corn and wheat, is particularly vulnerable to hail. Winds greater than 39 miles per hour can damage crops during the growing season. Lightning is one of the major causes of forest fires. Fortunately, these impacts are relatively localized.

Thunderstorms can impact transportation and utilities. Airplanes have crashed when hit by downbursts or lightning. Automobiles and their windshields are subject to damage by hail. The May 12, 1998 hailstorm in Virgil damaged 75 vehicles.

Power lines can be knocked out by lightning or knocked down by wind and debris. Lightning can also cause power surges that damage appliances, electronic equipment and computers.

## 2.6. Winter/Ice Storms

The Illinois Emergency Management Agency defines a severe winter storm as a storm that meets one or more of the following criteria:

- A snowstorm that produces six inches or more of snow within 48 hours or less,
- An ice storm in which 10% of the cooperative National Weather Service stations in Illinois report glaze, and/or
- A snowstorm or ice storm in which deaths, injuries, or property damage occurs.

There are many ways for winter storms to form, but certain key ingredients are needed. First temperatures must be below freezing in the clouds and near the ground. There must be a source of moisture in the form of evaporating water. Then lift in the atmosphere causes the moisture to rise and form clouds of precipitation.

Winter storms in the Midwest are caused by Canadian and Arctic cold fronts that push snow and ice deep into the interior region of the United States. Our area is also subject to

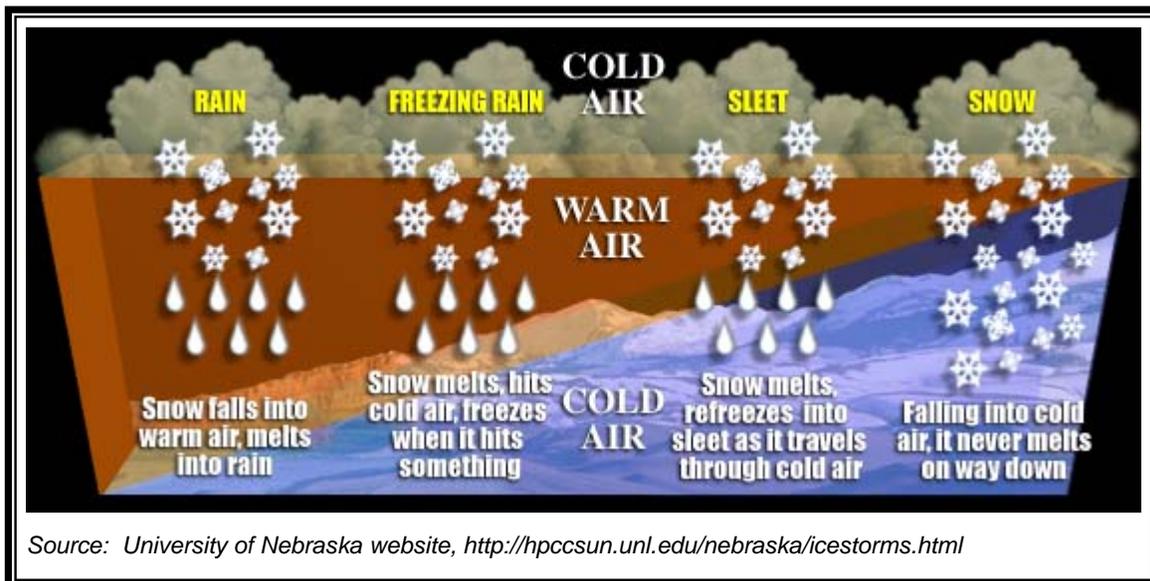
lake effect snowstorms that develop from the passage of cold air over the relatively warm surface of Lake Michigan which can cause heavy snowfall and blizzard conditions.

Winter storms can occur as heavy snowfalls, ice storms or extreme cold temperatures. Winter storms can occur as a single event or they can occur in combination which can make an event more severe. For example, a moderate snowfall could create severe conditions if it were followed by freezing rain and subsequent extremely cold temperatures. The aftermath of a winter storm can impact a community or region for weeks, and even months.

**Snow:** Heavy snowfalls can range from large accumulations of snow over many hours to blizzard conditions with blowing snow that could last several days. The National Weather Service’s snow classification is in the table on the next page.

Snow Classifications	
Blizzard	Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less than ¼ mile for at least 3 hours.
Blowing Snow	Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
Snow Squalls	Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
Snow Showers	Snow falling at varying intensities for brief periods of time. Some accumulation possible.
Snow Flurries	Light snow falling for short duration with little or no accumulation.

*Source: National Weather Service*



**Ice Storms:** An ice storm occurs when freezing rain falls from clouds and freezes immediately upon impact. Freezing rain is found in between sleet and rain. It occurs when the precipitation falls into a large layer of warm air and then does not have time to

refreeze in a cold layer (near or below 32°F) before it comes in contact with the surface which is also near or below 32°F, as illustrated below.

Note that ice jam flooding is covered under the flood hazard. It is not related to ice storms, but the break up of frozen rivers in later winter.

**Historical Events:** One of the worst winter storms to impact the State was on January 26-27, 1967, when as much as 23 inches of snow fell on the Chicago area. Travel throughout northern Illinois was curtailed and areas to the south experienced a glaze of ice which made travel virtually impossible until January 29. Fifty deaths were directly attributed to this storm.

In 1979, a Federal snow emergency was declared when the northern third of the State received 6 inches or more of snowfall between January 12 and 14. The heaviest snowfall, between 12 and 20 inches, was recorded in the northeast quarter of the State, where traffic was paralyzed and transportation corridors closed.

Reports on smaller recent winter storms are summarized in the table below.

<b>Recent Winter/Ice Storms and Their Impacts</b>			
<b>Date</b>	<b>Location</b>	<b>Hazard</b>	<b>Reported Impact</b>
Winter 90	Geneva	Snow	Roof leak resulted in water damage
Winter 94	Geneva	Snow	Roof leak resulted in water damage
Feb 96	Geneva	Cold	Frozen sprinkler burst, causing water damage
Feb 97	Montgomery	Snow	Some businesses closed
Jan 99	County-wide	Snow	Federal disaster declaration
	Batavia	Snow	\$70,000 snow removal bill
	Blackberry Twp.	Snow	\$4,000 overtime for snow removal
	Geneva	Snow	\$68,000 for snow removal and salting
	North Aurora	Snow	\$18,700 for snow removal
	St. Charles Twp.	Snow	\$24,000 for snow removal
Dec 00	County-wide	Snow	Federal disaster declaration
	Blackberry Twp.	Snow	\$7,800 snow removal bill
	Batavia	Snow	\$54,000 snow removal bill
	Geneva	Snow, ice	\$31,000 damage to the public library
	Montgomery	Snow	\$50,000 for Public Works and Police staff
	North Aurora	Snow	\$5,300 snow removal bill
	St. Charles Twp.	Snow	\$7,800 for snow removal
	South Elgin	Snow	\$60,000 snow removal, downtown closed 3 days
Dec 01	Huntley	Snow	Businesses shut down
	Geneva	Snow	\$44,000 for snow removal and salting
1/06	County-wide	Snow	10 to 12 inches of snow fell over the county
1/08	Southern County	Snow	12.0 inches in Aurora, 11.5 inches in Batavia, 11.0 inches in Elburn
<i>Source: Municipal reports</i>			

**Frequency:** During the 20th century, there were at least two severe winter storms in Illinois each year. In an average year, five severe winter storms strike somewhere in the state. Due to the geographic latitude, and its proximity to the Great Lakes, most of these would hit Kane County, although ice storms are more common in the central part of the state, where temperatures are warmer. Therefore, the odds of a winter storm hitting Kane County in any given year are 1:1 or a 100% chance.

**Safety:** Winter storms bring the following two types of safety hazards:

- Weather related hazards, including hazardous driving and walking conditions and heart attacks from shoveling snow.
- Extreme cold, from the low temperatures, wind chill, and loss of heat due to power outages.

In the United States, the number of deaths peaks in midwinter and reaches a low point in late summer, but most deaths are not directly related to the weather. The table to the right shows that winter storms have lead to more deaths in Illinois than any other natural hazard. Certain populations are especially vulnerable to the cold, including the elderly, the homeless, and lower income families with heating problems.

**Health:** About 70% of the injuries caused by snow and ice storms result from vehicle accidents and 25% occur to people caught out in the storm.

<b>Winter Storm Deaths Illinois and United States</b>						
	Winter Weather		Cold Related		Total	
	IL	US	IL	US	IL	US
1995	0	11	0	22	0	33
1996	1	86	5	62	6	148
1997	10	90	8	51	18	141
1998	2	68	0	11	2	79
1999	2	41	1	7	3	48
2000	1	33	0	15	1	48
2001	0	18	0	4	0	22
2002	0	17	0	11	0	28
2003	0	28	4	20	4	48
2004	1	28	17	27	18	55
2005	0	34	8	24	8	58
2006	0	17	1	2	1	19
<b>Total</b>	<b>17</b>	<b>471</b>	<b>44</b>	<b>256</b>	<b>61</b>	<b>727</b>

*Source: National Weather Service.*

The effect of cold on people is usually made more severe by the impact of wind chill factors. Wind chill is reported as a temperature, but is not the actual temperature. Rather it is how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature.

Extreme cold can result in people and animals suffering from frostbite and hypothermia. Frostbite is damage to tissue caused by the effects of ice crystals in frozen tissue.

Extremities (hands, feet, ears, nose) with more circulation difficulties are most frequently affected.

Hypothermia is the lowering of the core body temperature. It is “clinically significant” when the body temperature is below 95°F. Severe hypothermia occurs when the body’s temperature drops below

<b>Injuries Related to Cold</b>
– 50% happen to people over 60 years old
– More than 75% happen to males
– About 20% happen at home

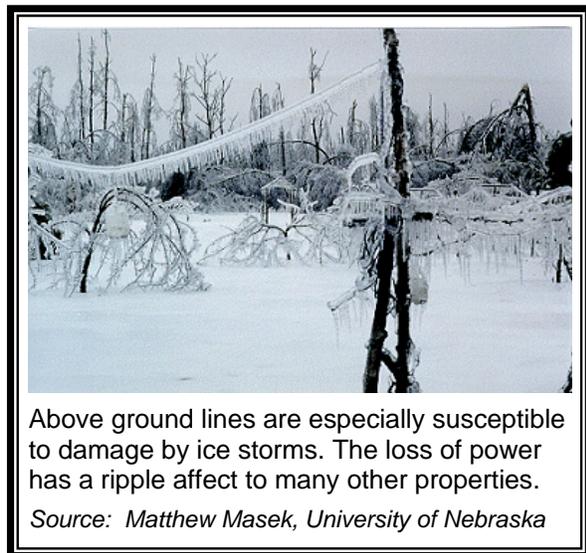
85°F, resulting in unconsciousness. If help does not come, death follows. Great care is needed to properly rewarm even mild cases.

**Buildings:** Historically, roofs would collapse due to heavy snow loads, but most buildings in Kane County are now constructed with low temperatures, snow loads and ice storms in mind. With today’s energy consciousness, buildings are much better insulated than they were 50 years ago. Winter storms do not have a major impact on buildings.

**Critical Facilities:** The major impacts of snow and ice storms on property are to utilities and roads. Power lines and tree limbs are coated with heavy ice resulting in disrupted power and telephone service, often for days. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and over passes are particularly dangerous because they freeze before other surfaces.

**Economic impact:** Loss of power means businesses and manufacturing concerns must close down. Loss of access due to snow or ice covered roads has a similar effect. The effects are particularly difficult when the storm is widespread, like the ones in 1967 and 1979 were.

Prolonged periods of snow and cold temperatures can be damaging to agriculture. Fruit trees can be damaged by severe cold or ice accumulation, and livestock may freeze or be more susceptible to disease. Rapid melting of heavy snow cover in the spring can flood farmland and delay spring planting.



## 2.7. Conclusions

This chapter provides information on the five natural hazards that have the greatest impact on Kane County: floods, tornadoes, earthquakes, thunderstorms and winter/ice storms. Data on the hazards are provided in terms of severity, frequency and historical occurrences.

The impacts of these hazards are reviewed under four categories: impact on people (e.g., safety and health), damage to buildings, damage to critical facilities, and economic disruption (damage to businesses and infrastructure).

While it is hard to compare different natural phenomena, a general summary can show how they impact the County. This is done in the table on the next page, “Impact of the Hazards.”

**Frequency:** The annual chance column in the table shows the likelihood of occurrence in any given year. These numbers are discussed in the “Frequency” section of each hazard.

**Location:** The location and area affected by a single occurrence is shown.

**Safety:** The safety hazard rating for thunderstorms and winter/ice storms is relatively high because each has killed 20 people in Illinois since 1995. Floods have resulted in 11 deaths and tornadoes 4 during the same time period. There have been no killer earthquakes in Illinois since 1995 and the 1% chance quake is only expected to cause minor damage to buildings.

**Property damage:** The property damage column is a factor of the estimated damager per structure times the number of structures likely to be damaged by the hazard. A tornado that will destroy 50 \$100,000 homes produces \$5 million in property damage, the same as a flood that causes \$25,000 in damage to 200 homes.

**Critical facilities:** The types of critical facilities and infrastructure that are affected are listed.

**Economic disruption:** Typical impacts on businesses and utilities are listed in this column.

Overall, we have adequate data on the hazards affecting the County as a whole. However, to measure the impact on individual communities and locations, such as critical facilities, requires additional effort beyond the scope of this county-wide plan. It is recommended that each critical facility be investigated further to determine its vulnerability to damage by the hazards reviewed in this chapter.

Impact of the Hazards							
Hazard	Annual Chance	Impact Location	Sq. miles Affected	Safety Hazard	Property Damage	Vulnerable Critical Facilities	Economic Disruption
Base Flood	1%	Floodplains	57	Med	Major	18 facilities	Businesses, roads damaged/closed
10-year Flood	10%	Floodways	13	Med	Moderate	3 Emergency response facilities, 2 casinos	Roads closed
Dam Failure	< 1%	Floodplains	N/A	Med	Major	N/A	Businesses, roads damaged/closes
Tornadoes	30%	Anywhere	1	Med	Major	Schools, buildings with large spaces	Utility lines down
Earthquakes	1%	Urban areas	100	Low	Minor	Masonry structures, items on shelves, etc.	Minor impact
Thunderstorms	100%	Anywhere	100	High	Minor	Radio communications disrupted	Hail damage to crops, transportation disrupted, power surges
Winter Storms	100%	Anywhere	500	High	Minor	Power losses	Utility lines down, livestock threatened

## 2.8. References

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## Chapter 3. Goals

The goals for this planning effort were established by the Natural Hazards Mitigation Planning Committee. The goals were developed to reflect on current community priorities, to be consistent with current countywide planning efforts, and in consideration of the impact of each natural hazard that affects Kane County. On March 6, 2003, the Committee conducted several exercises to outline the goals for this mitigation plan and to develop guidelines for funding and implementation. During the update process in 2008, the committee reviewed these goals and determined that each one was still relevant and did not need to be changed.

### 3.1. Setting the stage

The Committee recognized that the goals of this plan need to be consistent and complement the goals of other Kane County planning efforts. In 1996, the 2020 Land Resource Management Plan was adopted and it set “Countywide Planning Goals.” These Goals were updated in the 2030 Land Resource Management Plan, adopted in 2004. In 1998, the Comprehensive Stormwater Management Plan was adopted. This countywide plan established goals to minimize stormwater damage and for watershed protection. The goals for these plans are listed on the next page.

After a review of the goals set by the two previous County planning efforts, the Committee reviewed current community priorities in order to set the stage for determining the direction of the natural hazard mitigation strategies. The Committee was broken into five small groups of roughly equal size. Everyone was asked:

What are the top five priorities for your community and Kane County? What do your community leaders hold as most important? Do not answer this from your personal views, but reflect the position of your city council, village board, County Board or organization’s constituency.

Each person submitted his or her five suggestions to the group. Groups then consolidated their list into their five top community priorities. Each group then reported to the whole committee. The results were posted as reminders of what is important to Kane County. There was no attempt to develop a master list of community priorities. The exercise was to put people in a frame of mind, thinking about the future of the County, in preparation for the rest of the goal setting exercises.



**Groups during the stage-setting exercise**

### **2020 Land Resource Management Plan Countywide Planning Goals**

Employment: Kane County's present position as an economically balanced community (employment equal to labor force) should be maintained.

People: All types of people should be able to live in Kane County so that a labor force with diversified skills and training is available.

Housing: Housing of all sizes, types, and prices should be available.

Environmental Considerations: Every person has the right to live and work in an attractive and healthful environment.

Natural Resources: All development decisions should consider the conservation and wise use of the soil, air, water resources, and the natural environment of Kane County.

Agricultural Preservation: Support the conservation, protection, development, and improvement of agricultural land for the production of food and other agricultural products.

Historic Preservation: Protect and maintain local historic and cultural resources that contribute to the character of Kane County.

Transportation: Provide safe, efficient transportation systems compatible with land use.

Cooperative Planning: Work with the various jurisdictions located within Kane County to achieve a shared community vision.

Source: *2020 Land Resource Management Plan*, 1996, page 10

### **2030 Land Resource Management Plan Countywide Smart Growth Planning Goals**

1. Mix Land Uses
2. Take advantage of compact-building design
3. Create a range of housing opportunities and choices
4. Create walkable neighborhoods
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, farmland, natural beauty, and critical environmental areas
7. Strengthen and direct development towards existing communities
8. Provide a variety of transportation choices
9. Make development decisions predictable, fair and cost effective
10. Encourage community and stakeholder collaboration in development decisions

Source: *2030 Land Resource Management Plan*, 2004, page 179

## Comprehensive Stormwater Management Plan Goals

1. Establish a unified stormwater management framework with uniform, countywide stormwater management standards.
2. Minimize and reduce stormwater damages to existing structures and land use, including agriculture to maximize the protection of public health, safety, and welfare.
3. Require adequate stormwater management measures for all new development to minimize increases in stormwater damages.
4. Encourage the development of an area-wide, unified emergency program with an emphasis on improved preparation and effective communication capabilities.
5. Identify, protect, and improve floodplains, waterways, lakes, ponds, wetlands, and groundwater recharge areas.
6. Protect and improve water quality.
7. Create, enhance, and promote public awareness and understanding of stormwater management issues to meet the Goals and Objectives of the Stormwater Management Program.
8. Identify and develop revenue sources to complete the goals and objectives, and to implement the adopted stormwater management program.
9. Develop and maintain a comprehensive data base for each watershed within the County.
10. Evaluate and encourage the continuation, where appropriate, of existing drainage districts. Promote and encourage reorganization of watershed based drainage districts which can provide for the implementation of the Countywide Stormwater Management Plan.

Source: *Stormwater Management Plan*, 1998, pages 4 – 6

The current community priorities reported by the five groups were:

### Priorities selected by 3 groups

Control/hold up the rate of growth  
Improve roads and highways  
Provide a safe place to live and work

### Priorities selected by 2 groups

Improve schools and educational programs  
Improve/get more businesses  
Preserve historic and cultural resources  
Protect natural resources, open space, parks  
Improve municipal services  
Develop commercial/industrial businesses  
Improve quality of life

### Priorities selected by 1 group

Improve/get more open space



**One of the small groups during the 2003 goal setting exercises**

- Improve/get more recreation facilities
- Preserve farmlands
- Promote economic growth through development of new business
- Enhance public infrastructure and cultural resources

The next step in setting the stage of current planning and mitigation efforts in Kane County was to complete the conclusions to the hazard analysis in Chapter 2 – that is, identify the impact of the natural hazards that the County is subject to. Everyone was given a handout with the table that appears on page 2-45. All parts were completed except the last column.

Each person scored each hazard for its overall impact on his/her community. A score of 5 means it has a major impact and 1 means the hazard has little or no impact on the community. The groups tallied their scores and discussed the scores and why they ranked some hazards higher or lower than others.

Each group then reported to the whole committee. The results were tallied and are presented here:

Hazard	Total
Tornadoes	131
Base Flood	112
Winter Storms	100
Thunderstorms	98
10-year Flood	89
Dam failure	45
Earthquakes	28



In the discussion that followed, it was noted that people feel that even though tornadoes have a low probability of occurrence and affect relatively small areas, they have a dramatic impact on those affected. Floods, on the other hand, are more common and widespread, but have less of an overall impact, especially on safety and health, and the damage is more predictable. Thunderstorms and winter storms were felt to be chronic problems that affect everyone.

Scoring was also reflective of the impacts that natural hazards can have on rural areas verses urban areas of the County. For example, rural areas may be unaffected by a 10-year flood while urban area may incur flood damage.

It was concluded in 2003 that four of the listed hazards deserved particular attention: tornadoes, floods, thunderstorms and winter storms. The other two have relatively minor impacts on the County and its residents. Dam failures threaten small areas of the County and earthquakes have a low risk of occurrence and little impact on people and property. These conclusions allowed completion of Chapter 2's hazard analysis.

## 3.2. Setting directions

After the stage was set, the Committee conducted three exercises to ask what the plan should focus on, how mitigation projects should be funded and implemented, and how those efforts should be prioritized.

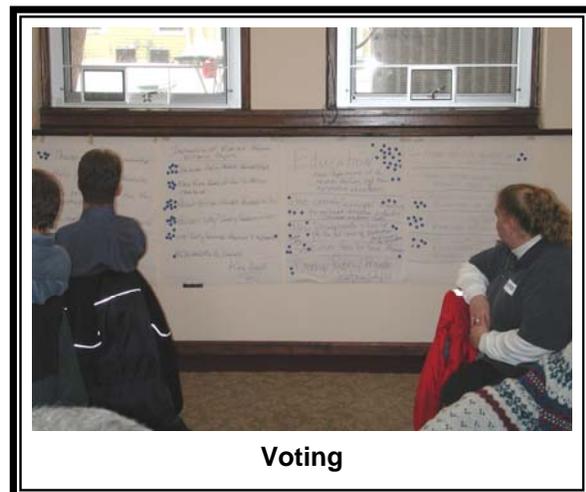
The results of these exercises in 2003 set the direction of the mitigation planning effort.

For the first question, the group leaders asked each person for things that mitigation activities should focus on and why they are important. These were recorded and discussed until each group settled on the five most important. These were reported out to the whole committee and posted. They are listed on the next page

Next, each group tackled the question “How should mitigation projects be funded and implemented?” Again, each person submitted his or her views to the groups and the group leaders obtained group consensus on the top five. These were also reported out to the committee and posted. They are listed on the next page.

The last exercise was a prioritization of the results of each group’s recommendations. To do this, each person was given five blue and five red dots that they could use to vote on one or more of the things to focus on (red dots) and the ways to fund and implement mitigation measures (blue dots). They could put all five dots on one item or split them in any way.

The results of this last exercise are shown here, in order of preference. The number in front of each item is the number of votes that item received.



### “What should the plan focus on?”

- 31 Protect people’s lives
- 27 Protect public health
- 25 Protect public services (fire, police, etc.)
- 24 Protect critical facilities
  
- 20 Protect streets and utilities
- 13 Protect farmlands
- 7 Give special attention to elderly/disabled
- 7 Protect wetlands/natural areas

### “How should mitigation projects be funded and implemented?”

- 20 Develop public/private partnerships

- 20 Make people aware of the hazards they face AND how they can protect themselves
- 18 Make people aware of how they can protect themselves
- 17 New developments should pay the full cost of protection measures
- 16 Protect critical facilities regardless of the cost
  
- 14 Seek user fees to fund measures
- 12 Protect life/safety regardless of the cost
- 12 Use county/municipal agencies to implement mitigation activities
- 8 Help people protect themselves
- 5 Use county/municipal funds to pay for mitigation activities
- 1 Benefit/Cost Review

For each of these exercises, the Committee members were given lists of possible responses. The exercises revealed important information to guide the planning effort, both in what was selected from the list and what was not selected from the list. For example, the plan should focus on life/safety issues and protecting farmlands and natural areas over buildings and property.

Also, the cost of mitigation projects should be borne by those affected, where possible, rather than the public at large. The exception to this are projects that protect critical facilities and life/safety. It is also significant that options dependent on outside state and federal funding were not selected.

### **3.3. Goals and Guidelines**

The exercises from the March 6, 2003 meeting on setting the stage and setting directions provided the guidance for establishing goals and guidelines for the planning effort. The goals and guidelines for development of the Kane County Natural Hazards Mitigation Plan are:

- Goal 1. *Protect the lives and health of the citizens of Kane County from the effects of natural hazards.***
- Goal 2. *Encourage self-help and self-protection measures to mitigate the effects of natural hazards on private property.***
- Goal 3. *Protect critical facilities and public infrastructure with public funds.***
- Goal 4. *Identify specific projects to mitigate damage where cost-effective and affordable.***
- Goal 5. *Reduce the number of repetitively damaged existing structures***
- Guideline 1. *Focus natural hazards mitigation efforts on tornadoes, floods, thunderstorms and winter storms.***
- Guideline 2. *Encourage people to assume some responsibility for their own protection.***
- Guideline 3. *New developments should not create new exposures to damage from natural hazards.***
- Guideline 4. *Local initiatives should focus on protecting citizens and public property.***
- Guideline 5. *Seek county, state, and federal support for special projects.***

***Guideline 6. Preserve open space in hazardous areas, especially where they are sensitive natural areas and agricultural land.***

***Guideline 7. Be consistent with existing plans.***

These goals and guidelines are consistent with the goals of the County's 2030 Land Resource Management Plan and the County's Stormwater Management Plan. The goals of this plan, however, appropriately focus on the health and safety associated with natural hazards and on the importance of people being able to protect themselves and their property from damage.

## Chapter 4. Preventive Measures

The objective of preventive measures is to protect new construction from hazards and see that future development does not increase potential losses. Building, zoning, planning, and/or code enforcement offices usually administer preventive measures. They include the following:

- Building Codes
- Standards for Manufactured Homes
- Planning and Zoning
- Subdivision Regulations
- Open Space Preservation
- Stormwater Management

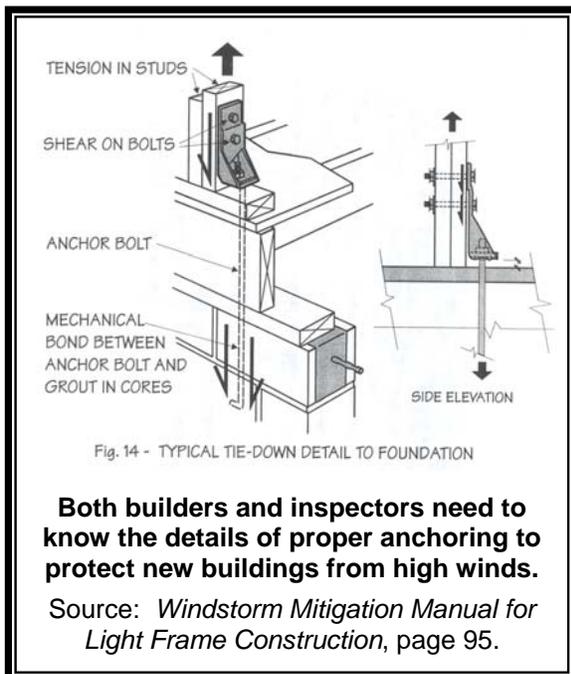
### 4.1. Building Codes

Building codes provide one of the best methods of addressing all the hazards in this plan. They are the prime measure to protect new property from damage by earthquakes, tornadoes, high winds, and snow storms. When properly designed and constructed according to code, the average building can withstand the impacts of most of these forces.

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

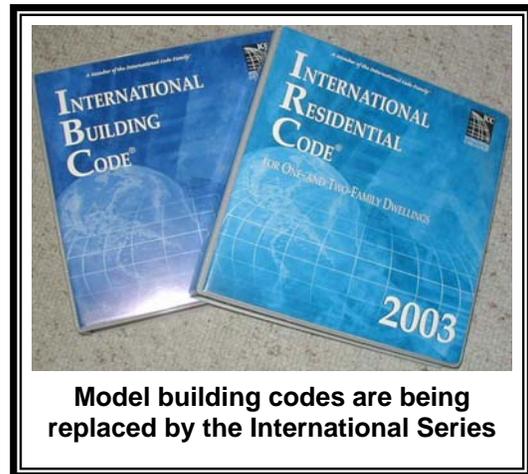
Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Provisions that should be included are:

- Making sure roofing systems will handle high winds and expected snow loads,
- Providing special standards for tying the roof, walls and foundation together to resist the effects of wind (see illustration),
- Requiring new buildings to have tornado “safe rooms,”
- Including insulation standards that ensure protection from extreme heat and cold as well as energy efficiency,
- Regulating overhanging masonry elements that can fall during a quake,



- Ensuring that foundations are strong enough for earth movement and that all structural elements are properly connected to the foundation, and
- Mandating overhead sewers for all new basements to prevent sewer backup.

**Model Building Codes:** Most communities in Illinois are working with various versions of the National Building Code of the Building Officials and Code Administrators (BOCA) and/or the One and Two Family Dwelling Unit Code published by the Council of American Building Officials (CABO). These standard building codes provide the basis for good building safety programs, especially protection from fire and electrical hazards. However, the BOCA and CABO codes are not “state of the art” when it comes to addressing natural hazards. They are being replaced by the new International Code series.



**Model building codes are being replaced by the International Series**

**Tornado standards:** After a disaster, FEMA often sends a Building Performance Assistance Team to evaluate how well buildings built to code held up. A recent evaluation of wind and tornado damage concluded that the BOCA and CABO codes should be amended to incorporate wind load standards ASCE 7-95 and 7-98. The new I-codes have already incorporated these standards into their codes.

The Institute for Business and Home Safety (IBHS) has also reviewed the I-codes with respect to hazards such as hurricanes, floods, hail, and tornadoes. The IBHS recommends that the International Residential Code should be amended to increase design for wind loads to meet hurricane resistant standards, SSTD-10-99.

Tornado safe rooms are discussed in Section 5.2. A building code could require them in new construction.

**Flood standards:** The I-Codes have a section on flood protection that communities must adopt separately. However, these building code standards are superseded by the Kane County Stormwater Ordinance, which is discussed in a later section of this chapter.

**Fortified Homes:** IBHS has a set of recommendations to strengthen a building to better resist the impacts of natural hazards. The specific requirements for a “Fortified” home are available through the IBHS website at [www.ibhs.com](http://www.ibhs.com). A Fortified Tornado Windstorm Protection



Checklist, provided on the website, defines nearly 20 standards, such as the size and depth of anchor bolts and materials of windows and skylights.

IBHS has researched the cost for implementing the Fortified program. The following table shows the increased cost of constructing a “Fortified” home. For less than 10% above the cost of the average home, a builder can incorporate all of the recommended criteria for a safer building.

	Standard Home	"Fortified" Home	Incremental Cost
Impact resistant windows and doors	\$5,450	\$15,500	\$10,050
Garage doors	\$650	\$1,250	\$600
Roof decking	\$650	\$1,750	\$1,100
Sealing roof joints	\$0	\$650	\$650
Roof covering	\$2,350	\$3,350	\$1,000
Concrete/steel down pours	\$0	\$500	\$500
Fortified inspection costs	\$0	\$1,000	\$1,000
Total incremental cost			\$14,900
Percentage of base cost			9.8%

**Cost of a home meeting the “Fortified” code recommendations**

**Thunderstorm standards:** The IBHS also supports stronger codes for roofing standards so they can better resist damage from hail. It recommends that communities adopt the Underwriters Laboratory Standard 2218, to increase the impact resistance of roofing

**Code Administration:** Just as important as the code standards is the enforcement of the code. There were many reports of buildings that lost their roofs during Hurricane Andrew because sloppy construction practices did not put enough nails in them. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly anchored requires site inspections at each step.

There is a national program that measures local building code natural hazard protection standards and code administration. The Building Code Effectiveness Grading Schedule (BCEGS) is used by the insurance industry to determine how well new construction is protected from wind, earthquake and other non-flood hazards. It is similar to the 10-year

old Community Rating System and the century-old fire insurance rating scheme: building permit programs are reviewed and scored, a class 1 community is the best, and a class 10 community has little or no program.



**Local implementation:** The table on the next page lists the building codes in use in Kane County and the BCEGS rating for each community. This provides summary data on the status of adoption and administration of building codes in Kane County. *It must be noted that a community with 15.00 points under “Adopted Code” will lose that score at the next 5 year cycle visit if it does not adopt the current International series of codes.*

Kane County Building Code Data				
Community	Building Code	BCEGS Scores		BCEGS Class
		* Adopted Code	** Code Administration	
Algonquin	Res'l: 1998 IRC Com'l: BOCA	15.00	62.53	3
Aurora	2000 IBC	15.00	48.75	5
Batavia	Res'l: 1995 CABO Com'l: 1996 BOCA	15.00	38.09	6
Big Rock	Same as Kane County			
Burlington	Same as Kane County			
Carpentersville	Res'l: 1995 CABO Com'l: 1996 BOCA	7.13	51.77	8
East Dundee	Res'l: 2000 IRC Com'l: 1999 BOCA	15.00	61.67	4
Elburn	Res'l: 1989 CABO Com'l: 1990 BOCA *	3.00	47.96	9
Elgin	2000 IBC	15.00	66.29	3
Geneva	Res'l: 1995 CABO Com'l: 1996 BOCA *	6.68	48.00	8
Gilberts	BOCA 1999	15.00	64.58	3
Hampshire	2000 IBC	15.00	60.26	4
Huntley	Res'l: 1998 IRC Com'l: 1999 BOCA	15.00	63.2	3
Kane County	Res'l: 1989 CABO Com'l: 1990 BOCA	7.13	50.55	8
Lily Lake	Same as Kane County			
Maple Park	2000 IBC	15.00	60.26	4
Montgomery	2000 IBC	15.00	40.76	6
North Aurora	2000 IBC	15.00	58.86	4
Sleepy Hollow	2000 IBC	15.00	46.80	5
South Elgin	1996 BOCA	15.00	37.59	6
St. Charles	Res'l: 1998 IRC Com'l: 1993 BOCA	***	***	***
Sugar Grove	Res'l: 1995 CABO Com'l: 1996 BOCA	15.00	37.44	6

Virgil	Same as Kane County			
Wayne	Res'l: 1998 IRC Com'l: 1996 BOCA	15.00	63.20	3
West Dundee	2000 IBC	15.00	62.81	3
<p>* Score is out of a maximum of 15 points for adopting the latest building code. A community with 15.00 points will lose that score at the next cycle visit if it does not adopt the current International series of codes.</p> <p>** Score for administration, inspections, staff training, etc., is out of a max of 85 points</p> <p>*** Has submitted materials to ISO to improve its BCEGS classification</p> <p>IRC: International Residential Code (for 1 and 2 family dwellings)</p> <p>IBC: International Building Code (for all other buildings)</p> <p>Big Rock, Lily Lake and Virgil contract with Kane County for building code services</p> <p style="text-align: center;"><i>Source: Survey of municipalities, Insurance Services Office, Inc.</i></p>				

**State property:** Construction of state buildings and some other government buildings is exempt from municipal or County regulations. The Illinois Capital Development Board (CDB) is the construction management agency for state projects, such as prisons, college and university classroom buildings, mental health hospitals and state parks.

In the 2003 state budget, the CDB is overseeing several projects on Kane County critical facilities, including the Illinois Math and Science Academy, Elgin Mental Health Center, St. Charles Youth Center, and the Elgin Armory. The agency also works with the Illinois State Board of Education and the Kane County Regional Office of Education to administer grants for construction and renovation of elementary and secondary schools.

The CDB recognizes local building codes, but does not require a permit or inspection from the local building department. The agency will soon be adopting the International Codes for its use.



**CRS credit:** The Community Rating System provides flood insurance discounts to those communities that implement various floodplain management activities that meet certain criteria. Comparing local activities to those national criteria helps determine if local activities should be improved.

The Community Rating System encourages strong building codes. It provides credit in two ways: points are awarded based on the community's BCEGS classification and points are awarded for adopting the International Code series. Up to 120 points are possible. Based on the data in the table on the previous page, Sleepy Hollow, for example, would receive 70 points.

The CRS also has a prerequisite for a community to attain a CRS Class 8 or better: the community must have a BCEGS class of 6 or better. To attain a CRS Class 4 or better, the community must have a BCEGS class of 5 or better. In other words, a strong building code program is a must to do well in the Community Rating System.

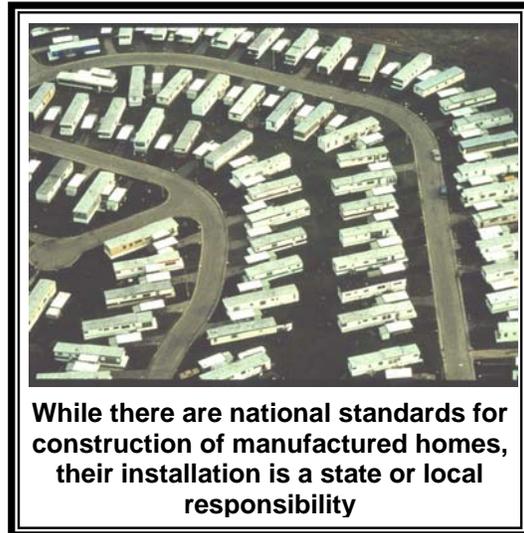
## 4.2. Manufactured Homes

Manufactured or “mobile” homes are usually not regulated by local building codes. They are built in a factory in another state and are shipped to a site. They do have to meet construction standards set by the US Department of Housing and Urban Development. All mobile type homes constructed after June 15, 1976 must comply with HUD’s National Manufactured Home Construction and Safety Standards. These standards apply uniformly across the country and it is illegal for a local unit of government to require additional construction requirements. Local jurisdictions may regulate the location to these structures and their on-site installation.

Hazards Addressed	
Y	Flood
Y	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

As is well known, the greatest mitigation concern with manufactured housing is protection from damage by wind. The key to local mitigation of wind damage to mobile homes is their installation.

Following tornadoes in Oklahoma and Kansas, FEMA’s Building Performance Assistance Team found that newer manufactured housing that had been anchored to permanent foundations performed better. They also found that newer homes are designed to better transmit wind up-lift and overturning forces to the foundation. Unfortunately, they also found that building officials were often unaware of manufacturer’s installation guidelines with respect to permanent foundations.



**Local implementation:** The Illinois Mobile Home Act and Manufactured Home Tiedown Code are enforced by the Illinois Department of Public Health. The State code includes equipment and installation standards. Installation must be done in accordance with manufacturers’ specifications. There is a voluntary program for installers to be trained and certified.

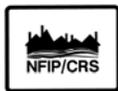
Following the installation of a manufactured home, installers must send the state a certification that they have complied with the State’s tiedown code. Inspections are only done if complaints are made regarding an installation.

Because the state regulates installation of mobile homes and mobile home parks, many local officials believe that they cannot enforce other ordinances. Kane County mobile

home park owners report that manufactured homes are installed with little or no contact with local permit officials. However, the Kane County Stormwater Ordinance applies to all structures, including manufactured homes.

In addition to code standards to protect the mobile home from high winds is the need to protect the occupants. There are no state or federal requirements for shelters in mobile home parks.

Mobile school classrooms are structures similar to manufactured homes. They, too, are regulated by the Illinois Department of Public Health, but the school must provide the Kane County Regional Office of Education with an architect’s seal of compliance. Each year, there must be an inspection of the anchoring and a renewed evacuation plan signed by the superintendent of the school district. These provisions provide a higher level of protection than current procedures do for residential mobile homes.



**CRS credit:** Up to 50 points are provided for enforcing the floodplain management requirements in mobile home parks. Because the Kane County Stormwater Ordinance has these provisions, communities with mobile home parks could receive this credit. Additional points are possible for other special regulations, such as prohibiting manufactured housing in the floodway. There are no CRS credits for manufactured housing standards for hazards other than flooding.

### 4.3. Planning and Zoning

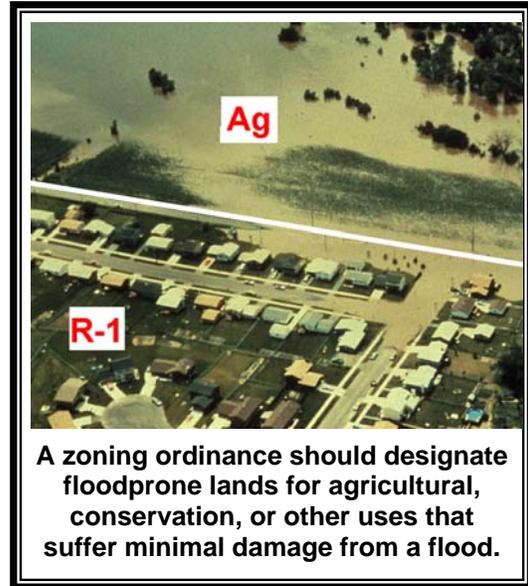
Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, especially floodplains and wetlands. They do this by designating land uses that are more compatible to the natural conditions of the land, such as open space or recreation. They can also benefit by simply allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach.

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

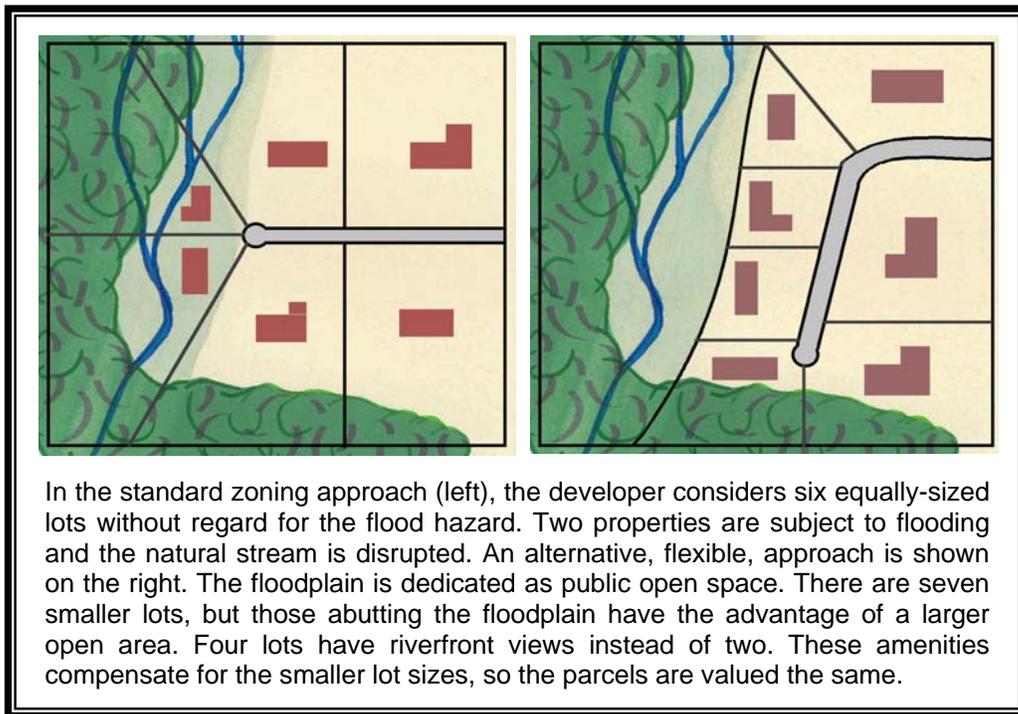
**Comprehensive Plans:** These plans are the primary tools used by communities to address future development. They can reduce future flood related damages by indicating open space or low density development within floodplains and other hazardous areas. Unfortunately, natural hazards are not always emphasized or considered in the specific land use recommendations.

**Zoning Regulations:** A zoning ordinance regulates development by dividing a community into zones or districts and setting development criteria for each zone or district. Zoning codes are considered the primary tool to implement a comprehensive plan's guidelines for how land should be developed.

Zoning ordinances usually set minimum lot sizes for each zoning district. Often, developers will produce a standard grid layout, such as that shown in the R-1 district to the right. The ordinance and the community can allow flexibility in lot sizes and location so developers can avoid hazardous areas.



One way to encourage such flexibility is to use the planned unit development (PUD) approach. The PUD approach allows the developer to easily incorporate flood hazard mitigation measures into the project. Open space and/or floodplain preservation can be facilitated as site designs standards and land use densities can be adjusted, as in the example below.



**Capital Improvement Plans:** A capital improvement plan will guide a community's major public expenditures for the next 5 to 20 years. Capital expenditures may include acquisition of open space within the hazardous areas, extension of public services into hazardous areas, or retrofitting existing public structures to withstand a hazard.



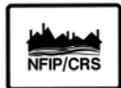
**Local implementation:** The table on the next page summarizes the findings of a review of comprehensive and land use plans adopted by the County and the municipalities. Almost all of the newer plans designate floodplains, wetlands or stream corridors for preservation for open space, recreational uses or habitat. An example of this is the St. Charles *Comprehensive Plan* adopted in 1996. It's features are discussed in the box on page 4-10.

While, most of the zoning ordinances in the County allow planned unit developments, most have no corresponding district for the floodplain areas shown on the land use maps. Some make no mention of floodplains, generally because local floodplain ordinances (and now the County's stormwater management regulations) take precedence.

An exception to this is Algonquin's zoning ordinance which has a special overlay district for the western third of the Village. Floodplains, wetlands and similar features are designated "eco-corridors and protected areas." All development proposals must be planned developments and they "must preserve lands that are designated as eco-corridor areas" (Section 21.13.D.1.a).

Another zoning approach is Wayne's, which requires a minimum lot size of four acres in the western half of the Village. The streams run along the lot lines in many spots, allowing developers to build on the high ground and leave the floodplains for backyards.

**CRS credit:** Up to 100 points are provided for regulations that encourage developers to preserve floodplains or other hazardous areas from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan.



<b>Land Use Plans and Zoning Districts</b>		
<b>Municipality</b>	<b>Plan</b>	<b>Zoning</b>
Algonquin	Large park proposed along the Fox River	Woods Creek Watershed Overlay District protects stream corridors
Aurora	Nothing special on floodplains	Park/open space district along the Fox River and Blackberry Creek
Batavia	Floodplains recommended for open space, corridors and PUDs	No special provisions
Big Rock	Newly incorporated, no plan	Being prepared
Burlington	Being revised	Being revised
Carpentersville	Open space along the Fox River	Manufacturing along the Fox
East Dundee	Undeveloped floodplains recommended for conservation	No special district. Separate floodplain ordinance is referenced
Elburn	Floodplains recommended for open space	Stream corridors shown as detention or "PUD golf course"
Elgin	Nothing special on floodplains	Many floodplains zoned as "community facility" district
Geneva	Most floodplains designated as open space or parks/recreation	Most floodplains zoned as low density residential
Gilberts	Draft plan: development in floodprone areas is "precluded"	Most floodprone areas are zoned agriculture or conservancy
Hampshire	1980 plan: open space corridors on stream channels, but no floodplains	Floodplains shown on zoning map, but no special use provisions
Huntley	Buffers along streams	No special provisions
Kane County	Floodplains and wetlands recommended for open space	Open space on streams and in wetlands as part of PUD process
Lily Lake	Floodplains encouraged for open space, recreation and habitat	No special provisions
Maple Park	Floodplains encouraged for open space, recreation and habitat	No special provisions
Montgomery	Stream corridors as "conservation"	No special provisions
North Aurora	Floodplain (Fox River) designated for public open space	No special provisions
Sleepy Hollow	Wetlands recommended for greenways, no mention of floodplains	No special provisions
South Elgin	Nothing special on floodplains	No special provisions
St. Charles	See box on page 4-10	No special provisions
Sugar Grove	Floodplains designated for open space/environmental corridor	No special provisions
Virgil	Nothing special on floodplains	Floodplains zoned for agriculture
Wayne	Being revised	Large lot districts allow avoidance of floodplain in many cases
West Dundee	Preserving drainage system is important to "maintain local character"	Some of the Sleepy Creek floodplain is zoned park & public
<i>Source: Survey of municipalities</i>		

## St. Charles' Comprehensive Plan

The City of St. Charles' *Comprehensive Plan* was adopted in 1996. Three chapters are devoted to "natural development factors:" geological conditions, hydrological conditions, and open space. The introduction to this section states:

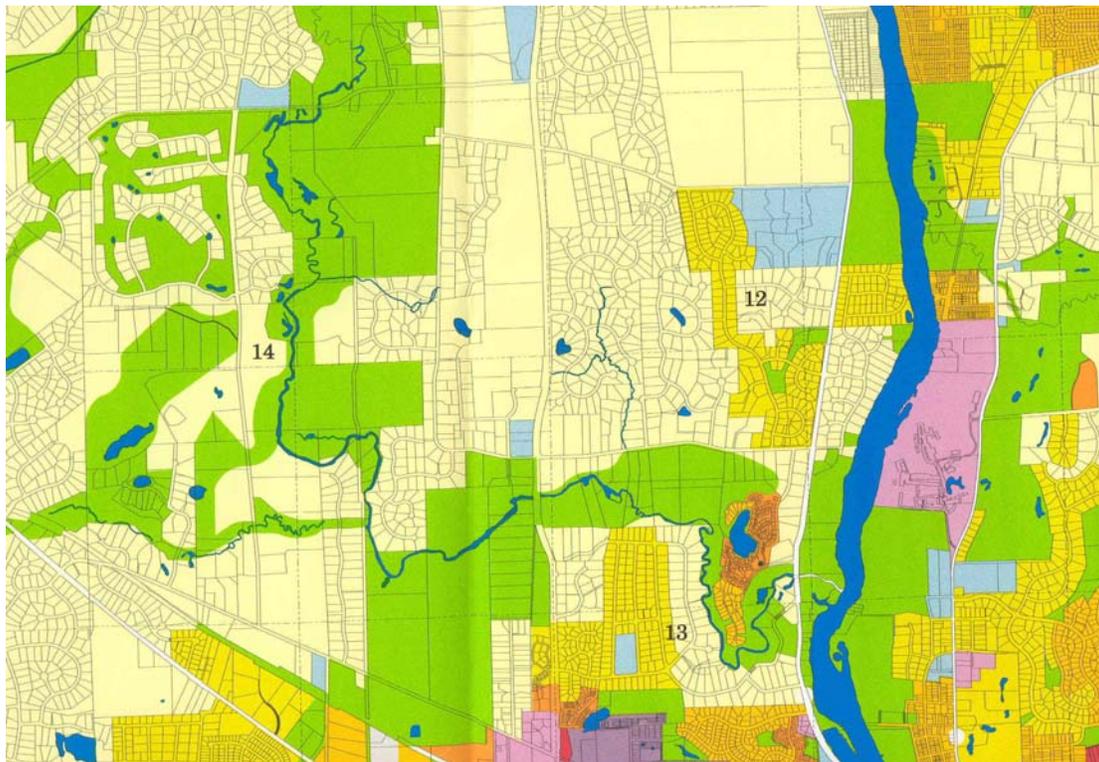
Many of today's environmental problems result either from past ignorance of the impact of man's actions or insufficient attention to the importance of natural systems.... An understanding of this information will enable the community to build and maintain a harmony between development and nature. *Comprehensive Plan*, page 5-2.

The plan recommends requiring permit applications to include a soil survey and development proposals to be reviewed by the Kane-DuPage Soil and Water Conservation District for their impact on natural features.

The chapter on hydrological conditions notes that "One of the best ways to prevent losses from flood damage is to protect floodplains from development." (page 6-6). It then describes the beneficial uses of floodplains, such as outdoor recreation, wildlife habitat, and enhancing scenic beauty. This chapter includes a map showing all the lots and floodplains in the City.

The chapter on open space and recreation builds on this attention to preserving floodplains. It identifies the benefits of preserving and restoring natural areas and the special attention that should be paid to the Fox River waterfront. There is also a section on "continuity of open space" which recommends corridors to protect linear features (like streams) and link parks and other sites. Pursuing these concerns not only makes for a more pleasant and safe environment to live in, it enhances the City's "image and character."

All of these concerns come together in one of the most important parts of the *Plan*, the Future Land Use Map. As seen in the excerpt below, the City intends to overlap the green open space areas with the blue watercourses and their floodplains.



## 4.4. Subdivision Regulations

Subdivision regulations govern how land will be subdivided and sets construction standards. These standards generally address roads, sidewalks, utilities, storm sewers and drainageways. They can include the following hazard protection standards:

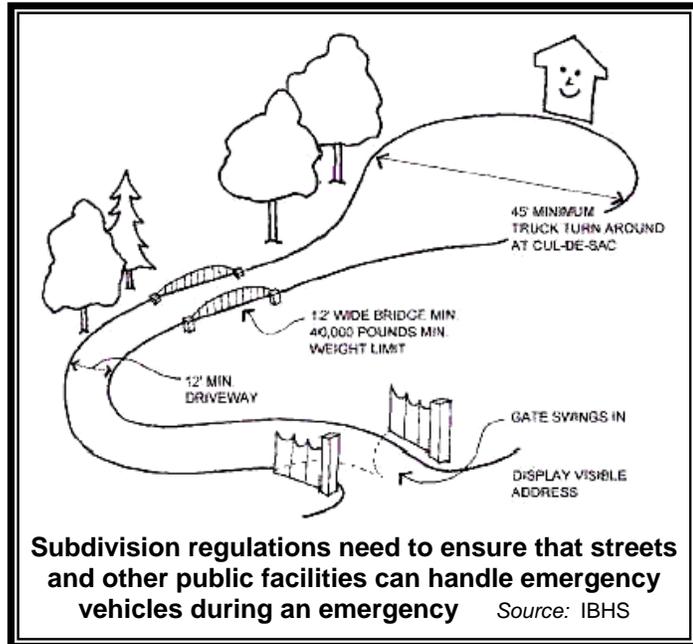
Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

- Requiring that the final plat show all hazardous areas (as in the example on page 9-4).
- Road standards that allow passage of fire fighting equipment and snow plows
- Requiring power or phone lines to be buried
- Minimum water pressures adequate for fire fighting
- Requiring that each lot be provided with a building site above the flood level
- Requiring that all roadways be no more than one foot below the flood elevation.



### Local implementation:

The Kane County Stormwater Ordinance states that “New and replacement water supply systems, wells and sanitary sewer lines may be permitted if all manholes or other above-ground openings located below the [flood protection elevation] are watertight.” (§406(a)). Roads, bridges and culverts are not allowed to increase flood heights. Geneva’s subdivision ordinance reserves the right to prohibit subdivisions in floodplains.



Maple Park’s ordinance is typical.

It states “Electrical and telephone service shall be located underground wherever possible” (Section 16-206.A). The County’s ordinance requires underground wires and cables in all new subdivisions (Section 19-114).



**CRS credit:** Up to 25 points are provided for requiring that new streets in a floodplain be elevated to no more than one foot below the flood elevation. There are no CRS credits for requirements for hazards other than flooding.

## 4.5. Open Space Preservation

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

Capital improvement plans and comprehensive land use plans can identify areas to be preserved through any or all of the following means:

- Acquisition,
- Dedication by developers,
- Dedicating or purchasing an easement to keep the land open, and
- Specifying setbacks or buffer zones where development is not allowed.



**Local implementation:** There are two kinds of open space: lands that are currently open, such as vacant and farm land, and lands that are preserved as open space, such as parks and forest preserves. As noted in Chapter 1, 88% of Kane County is open or undeveloped, but only 3% is preserved as open space.

Of the 36,786 acres of floodplain, 29,000 acres (79%) are open, but only 4,432 acres (12%) are preserved as open space. The map on the next page shows areas currently in forest preserve, park and other land uses designated as open space. Additional areas are kept open through ownership and regulation. For example, all mapped floodways should stay open because of the state law that prohibits new construction in them.

The Kane County *2030 Land Resource Management Plan* has a section on open space and a 2030 Open Space Map. The text notes the benefits of open space and, in particular, preserving it along waterways. Two of the Plan’s policies, for example, are “3. obtaining additional shoreline areas along the Fox River and its major tributaries to provide public trails, stream access, and resource protection” and “9. Coordinate open space planning and preservation with protection and maintenance of county water resources.”



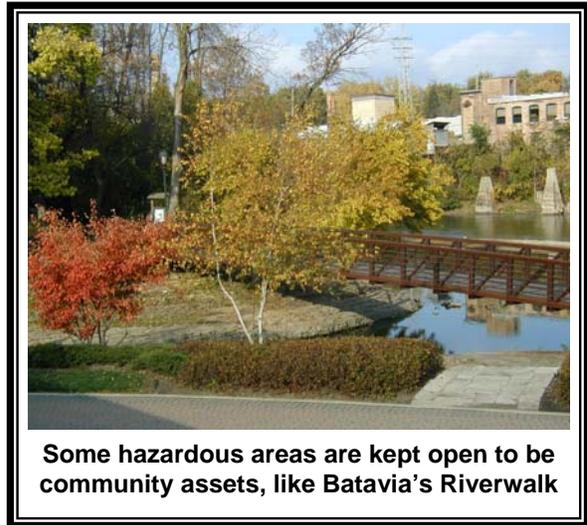
**The Fox River Trail connects several riverfront parks and forest preserves**

The *2030 Plan* proposes a significant increase in preserved open space, especially along the Fox River tributaries. Extensive tracts are proposed in the “critical growth area” just west of the Fox River communities (see Map 1-3). This is the one area that will benefit the most by keeping new development out of harm’s way. As noted on page 4-9, some municipal comprehensive plans have a similar

orientation to keeping floodplains free from development of damageable buildings by setting them aside for open space uses.

Preserving agricultural land is discussed in Chapter 6.

The Kane County Stormwater Management Ordinance requires buffers along creeks, streams, lakes, wetlands and rivers. These buffers, roughly 50 feet in width, must be dedicated as easements on all newly platted lots. The maintenance responsibility for these easements must be recorded on the deeds.



**Some hazardous areas are kept open to be community assets, like Batavia’s Riverwalk**



**CRS credit:** Preserving floodprone areas as open space is one of the highest priorities of the Community Rating System. Up to 700 points can be given, based on how much of the floodplain is in parks, forest preserves, golf courses, undeveloped floodway or other uses that can be depended on to stay open.

Additional credit is provided if there are deed restrictions on the parcels.

#### 4.6. Stormwater Management

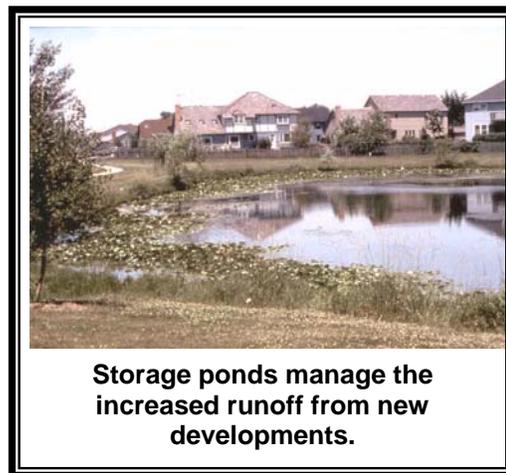
Development in floodplains is development in harm’s way. New construction in the floodplain increases the amount of development exposed to damage and can aggravate flooding on neighboring properties.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

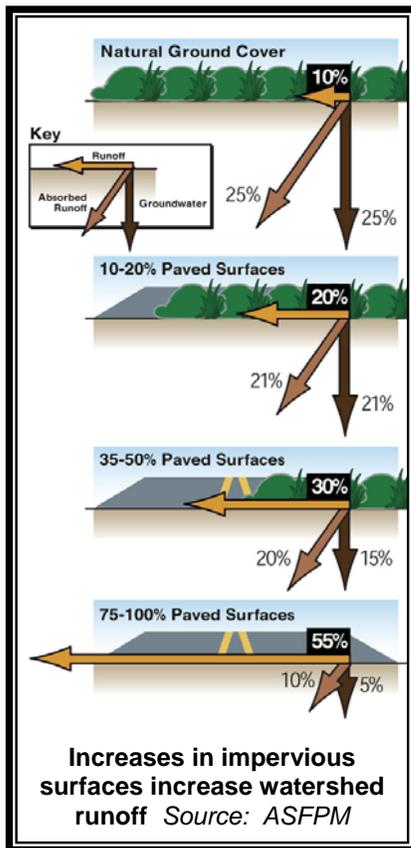
Development outside a floodplain can also contribute to flooding problems. Stormwater runoff is increased when natural ground cover is replaced by urban development (see graphic). Development in the watershed that drains to a river can aggravate downstream flooding, overload the community’s drainage system, cause erosion, and impair water quality.

Stormwater management encompasses two approaches to protecting new construction from damage by surface water:

- Regulating development in the floodplain to ensure that it will be protected from flooding and that it won’t divert



**Storage ponds manage the increased runoff from new developments.**



floodwaters onto other properties, and

- Regulating all development to ensure that the post-development peak runoff will not be greater than under pre-development conditions.

Most communities participate in the National Flood Insurance Program (NFIP). The NFIP and the Illinois Department of Natural Resources set minimum requirements for regulating development in the floodplain. All new buildings must be protected from the base or 100-year flood and no development can cause an increase in flood heights or velocities.

Stormwater runoff regulations require developers to build retention or detention basins to minimize the increases in the runoff rate caused by impervious surfaces and new drainage systems. Generally, each development must not let stormwater leave at a rate higher than that under pre-development conditions.



**Local implementation:** State law authorizes counties in Northeastern Illinois to set minimum stormwater management standards for all municipalities in the county. This is

done by the Kane County Stormwater Management Division of the Environmental Management Department.

**Floodplains:** The October 2001 Kane County Stormwater Ordinance meets or exceeds all of the state and NFIP floodplain regulatory requirements. Each municipality is required to adopt the county’s ordinance provisions. Most have adopted the ordinance and become “certified communities.”

Having good regulations on the books is one thing, but it is even more important that local officials are properly administering them. Failure to fully enforce the floodplain development regulations is cause for probation or suspension from the NFIP. FEMA and the Department of Natural Resources periodically visit or contact communities to verify that staff understand and are enforcing the floodplain regulations.

The table on the next page shows the status of the most recent Community Assistance Contacts or Visits. It can be seen that most communities were found to be generally OK, that is, only a few minor problems were found in their administration or enforcement. In most cases, no problems were found.

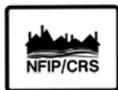
**Runoff:** The County’s stormwater ordinance sets requirements for managing runoff from new developments. Stormwater storage facilities are required for single family residential developments over 3 acres and all other developments over 1 acre in size. Storage facilities must be designed to retain the first 0.75 inches of runoff from the connected impervious areas and infiltrate this water into the soil. The remaining runoff must be detained with a peak release rate of 0.1 cubic feet per second per acre of development.

The ordinance and supporting Technical Guidance Manual encourage site planning that reduces runoff and the impact of the development on the surrounding area. Examples include:

- Promoting the use of native vegetation within the runoff storage basins,
- Requiring buffers along streams, lakes, wetlands, etc.,
- Requiring retention or infiltration of the initial runoff, and
- Requiring existing depressional storage (areas not designated as floodplains) to be compensated for at a 1:1 ratio.

The County ordinance also allows for the development of watershed plans. Watershed plans look at the unique characteristics of each

watershed and may adopt more or less stringent requirements than those in the County’s ordinance. The ordinance provides for a fee-in-lieu of site runoff storage in the event a watershed plan recommends the use of a larger central basin. To date no watershed-specific requirements have been established.



**CRS credit:** CRS credit is provided for both higher regulatory standards in the floodplain and runoff management standards for new developments. Credit is based on how those standards exceed the minimum NFIP requirements.

Community Assistance Contacts and Visits		
Municipality	Date	Findings
Algonquin	6/26/02	OK
Aurora	12/19/01	OK
Batavia	1/9/03	OK
Big Rock	5/18/06	OK
Burlington	3/29/07	OK
Carpentersville	4/20/05	OK
East Dundee	12/5/02	OK
Elburn	12/8/02	OK
Elgin	9/26/06	Minor Problems
Geneva	8/7/01	OK
Gilberts	12/17/03	OK
Hampshire	4/24/08	OK
Huntley	2/26/03	Generally OK
Kane County	10/27/04	OK
Lily Lake	Just joined NFIP, 12/20/02	
Maple Park	10/30/06	OK
Montgomery	5/13/02	OK
North Aurora	10/17/05	OK
Sleepy Hollow	11/1/05	OK
South Elgin	3/3/06	Minor Problems
St. Charles	11/30/07	OK
Sugar Grove	3/24/05	OK
Virgil	12/9/03	OK
Wayne	10/26/06	OK
West Dundee	7/25/01	OK
<i>Source: FEMA's Community Information System Illinois Department of Natural Resources</i>		

The County's Stormwater Ordinance has the following provisions that would be recognized by the CRS (in addition to the provisions discussed in other sections):

- Buildings must be elevated to a level two feet above the base (100-year) flood elevation (although attached garages can be lower, reducing the CRS score),
- Fill must meet certain standards to protect it from erosion and scour,
- Flood storage lost due to filling and construction must be compensated for by removal of an equal volume of storage,
- Only appropriate uses are allowed in the floodway. Buildings are not appropriate uses,
- Standards for retention and detention basins,
- Requirements for erosion and sedimentation control, and
- The requirement to incorporate best management practices into all plans.

The County and all municipalities should receive at least 300 points for these provisions of the Kane County Stormwater Ordinance. The provisions in the Kane County Ordinance certainly exceed minimum State and Federal requirements.

## **4.7. Conclusions**

1. Building codes are the prime preventive measure for earthquakes, tornadoes, high winds, and snow storms. The majority of the communities within the County have building codes that will provide some protection of future buildings from these hazards.
2. The County and many communities have older building codes and have not adopted the International Code series, which provides better protection from natural hazards.
3. According to the Institute for Building and Home Safety, the International Residential and Building Codes do not adequately protect new construction from damage by tornadoes and hail.
4. Based on the national Building Code Effectiveness Grading Schedule (BCEGS), administration of building codes by the County and several municipalities could be improved.
5. State administration of installation of mobile or manufactured homes does not guarantee that they will be adequately tied down or protected from flooding and other hazards.
6. The majority of the comprehensive and land use plans address floodplains and the need to preserve these hazardous areas from intensive development. However, most zoning ordinances do not designate floodprone areas for any special type of land use.

7. Standards in subdivision regulations for public facilities should account for the hazards present at the site. New building sites, streets, and water systems should facilitate access and use by fire and emergency equipment.
8. At least 12% of the county's floodplain is open space in public ownership. However, 79% of the floodplain is still undeveloped and not preserved as open space. Therefore, preventive measures can have a great impact on the future flood damages.
9. The County's floodplain development and stormwater management regulations exceed minimum national and State standards and will be helpful in preventing flood problems from increasing.
10. Local permit officials need to be aware of their authorities and current regulatory standards for installation of mobile homes and the new County stormwater rules.

#### **4.8. Recommendations**

1. All communities should adopt the latest International series of codes, the new national standard that is being adopted throughout the country. Current efforts by multi-community organizations of building departments to develop local amendments for regional consistency should be pursued, provided they produce equivalent natural hazard protection features.
2. All communities should work to improve their BCEGS rating, with a target of reaching at least a Class of 5 or better in time for their next cycle visit by the Insurance Services Office. This is the level recognized by FEMA's Community Rating System as a minimum requirement for better CRS classes.
3. On a regional basis, municipal and County code enforcement staffs should work together to:
  - a. Develop building code language to strengthen new buildings against damage by high winds, tornadoes and hail,
  - b. Adequately regulate mobile home installation (so that newly installed mobile homes get the same level of attention as other types of new single-family homes), and
  - c. Understand and enforce the new County stormwater management and flood protection provisions.
4. On a regional basis, municipal and County planning and engineering staff should develop example subdivision ordinance language that requires new infrastructure to have hazard mitigation provisions, such as

- 1) Streets and water systems that facilitate access and use by fire and emergency equipment,
  - 2) Buried utility lines, and
  - 3) Storm shelters in new mobile home parks.
5. Municipal comprehensive plans, land use plans and zoning ordinances should incorporate open space provisions that will protect properties from flooding and preserve wetlands and farmland. The County's *2020 Land Resource Management Plan* provides a guide for this. Subsequent County-wide plans should, too.
  6. Offices responsible for design, construction or permitting critical facilities should ensure that the design accounts for natural hazards and adjacent land uses.
  7. The public, developers, builders, and decision makers should be informed about the hazard mitigation benefits of these preventive measures and the procedures that should be followed to ensure that new developments do not create new problems.

#### **4.9. References**

1. *2020 Land Resource Management Plan*, Kane County Development Department, 1996.
2. *City of St. Charles Comprehensive Plan*, St. Charles Plan Commission, 1996
3. *CRS Coordinator's Manual*, FEMA, 1999.
4. *Design and Construction Guidance for Community Shelters*, FEMA, 2000.
5. *Guidelines for Installing Manufactured Homes in Illinois*, Illinois Department of Public Health, 2000.
6. *Kane County Stormwater Ordinance*, Kane County Stormwater Management Committee, December 2001.
7. *Kane County Stormwater Technical Guidance Manual*, Kane County Stormwater Management Committee, January 2002.
8. *Midwest Tornadoes of 1999, Observations, Recommendations and Technical Guidance*, FEMA, Building Performance Assessment Report, Preliminary Report, July 13, 1999
9. *Multi-Hazard Identification and Risk Assessment*, Federal Emergency Management Agency, 1997.
10. Survey of municipalities, comprehensive plans, zoning ordinances, and BCEGS reports, Spring, 2003.

11. *Regulation of Factory Built Structures in Illinois*, Illinois Department of Public Health, 2000.
12. *Subdivision Design in Flood Hazard Areas*, American Planning Association and FEMA, PAS Report 473, 1997.
13. Websites of the Institute for Business and Home Safety ([www.ibhs.org](http://www.ibhs.org)) and the Illinois Department of Public Health ([www.idph.state.il.us](http://www.idph.state.il.us)).
14. *Windstorm Mitigation Manual for Light Frame Construction*, Illinois Emergency Management Agency, 1997

## Chapter 5. Property Protection

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building,
- Modify the building so it can withstand the impacts of the hazard, and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency. These are discussed later in this chapter.

### 5.1. Keeping the Hazard Away

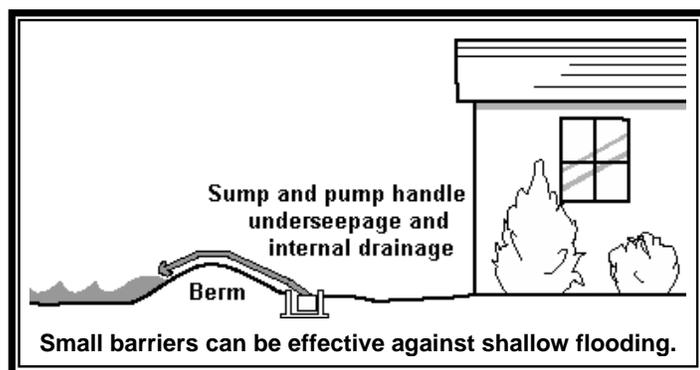
Generally, natural hazards do not damage vacant areas. As noted in Chapter 2, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. A fire break is an example of this approach – brush and other fuel are cleared away from the building so a fire may not reach it.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

For the five hazards considered in this plan, flooding is the one hazard that can be kept away from a building. There are four common methods to do this:

- Erect a barrier between the building and the source of flooding,
- Move the building out of the floodprone area
- Elevate the building above the flood level
- Demolish the building.

**Barriers:** A flood protection barrier can be built of dirt or soil (“berm”) or concrete or steel (“floodwall”). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for



leaks, seepage of water underneath, and rainwater that falls inside the perimeter. This is usually done with a sump and/or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier.

Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and maintained. A berm can settle over time, lowering its protection level. A floodwall can crack, weaken, and lose its watertight seal. Therefore, barriers need careful design and maintenance (and insurance on the building, in case of failure).

**Relocation:** Moving a building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost goes up for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. However, experienced building movers can handle any job.

In areas subject to flash flooding, deep waters, or other high hazard, relocation is often the only safe approach. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.

**Building elevation:** Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents.

Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

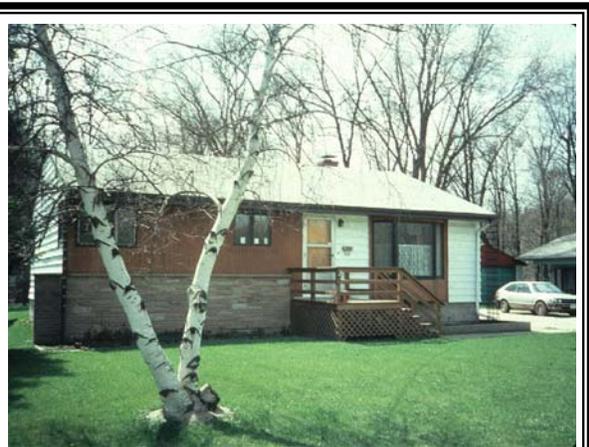
Elevating a building will change its appearance. If the required amount of elevation is low, the result is similar to putting a building on a 2- or 3-foot-high crawlspace (see example to the right). If the building is raised 4, 6, or more feet, owners are concerned that it will stick out like a sore thumb and may decline to implement an elevation project.



This low floodwall on the Des Plaines River has landscaping to minimize the adverse impact on the property's appearance.



Small, wood frame buildings are the easiest to relocate



This house was elevated one foot above the base flood elevation of the Des Plaines River.

Another problem with this approach is with basements. Only the first floor and higher are elevated. The basement remains as the foundation. All utilities are elevated and the basement is filled in to protect the walls from water pressure. The owner loses the use of the basement, which may deter him or her from trying this approach.

A third problem with elevation is that it may expose the structure to greater impacts from other hazards. If not braced and anchored properly, an elevated building may have less resistance to the shaking of an earthquake and the pressures of high winds. Given the low threat of earthquakes and low flood depths in Kane County, careful design and construction should prevent these secondary problems.

**Demolition:** Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damage. It is cheaper to demolish them and either replace them with new, flood protected structures, or relocate the occupants to a safer site. Generally, demolition projects are undertaken by a government agency, so the cost is not borne by the property owner, and the land is converted to public use, such as a park.



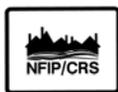
This home was acquired and demolished by the Lake County Stormwater Management Commission. The site was cleared for open space.

Acquisition, followed by demolition, is most appropriate for buildings that are difficult to move—such as larger, slab foundation, or masonry structures—and for dilapidated structures that are not worth protecting.

One problem that sometimes results from an acquisition and demolition project is a “checkerboard” pattern in which nonadjacent properties are acquired. This can occur when some owners, especially those who have and prefer a waterfront location, prove reluctant to leave. Creating such an acquisition pattern in a community simply adds to the maintenance costs that taxpayers must support.



**Local implementation:** Following the 1996 flood, some 68 homes were purchased in Montgomery and Aurora with FEMA mitigation funds. The sites were cleared to provide recreation space and flood storage. Some homes on the Fox have been elevated.



**CRS credit:** The Community Rating System provides the most credit points for acquisition and relocation because this measure permanently removes insurable buildings from the floodplain. The score is based on the number of buildings removed compared to the number remaining in the floodplain (Activity 520 – Acquisition and Relocation).

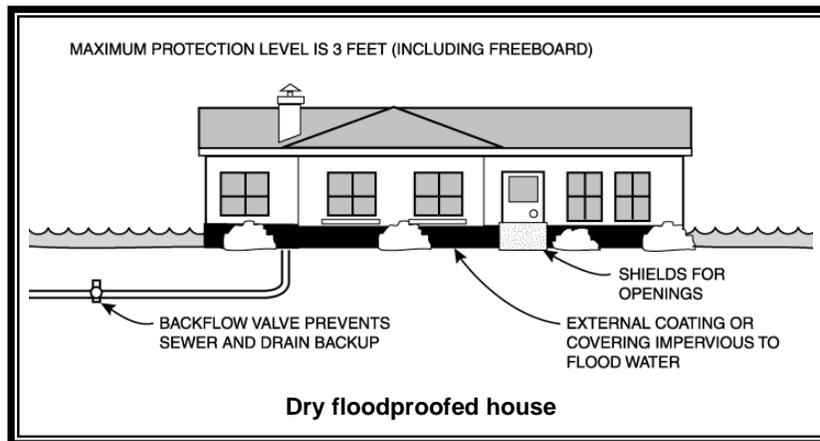
The CRS also credits barriers and elevating existing buildings (Activity 530 – Flood Protection). Elevating a building above the flood level will also reduce the flood insurance premiums on that individual building. Because barriers are less secure than elevation, not as many points are provided.

## 5.2. Retrofitting

Section 5.1 focused on keeping the hazard from reaching a building or damage-prone part of a property. An alternative is to modify or “retrofit” the site or building to minimize or even prevent damage. There are a variety of techniques to do this. This section looks at the measures that can be implemented to protect existing buildings from damage by floods, sewer backup, earthquakes, tornadoes and high winds, and winter storms.

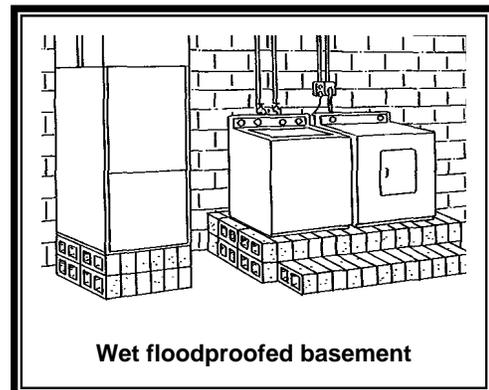
Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
v	Winter storm

**Flood retrofitting measures** include **dry floodproofing** where all areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings (doors, windows, and vents) are closed, either permanently, with removable shields, or with sandbags.



Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under State, FEMA and County regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

The alternative to dry floodproofing is **wet floodproofing**: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage.



For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater, and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Wet floodproofing has one advantage over the other approaches: no matter how little is done, flood damage is reduced. Thousands of dollars in damage can be prevented by simply moving furniture and electrical appliances out of a basement.

A third flood protection modification addresses flooding caused by overloaded sanitary or combined sewers. Four approaches may be used to protect a structure against **sewer backup**: floor drain plugs, floor drain stand-pipes, overhead sewers, and backflow protection valves.

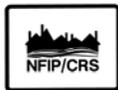
The first two devices keep water from flowing out of the lowest opening in the building, the floor drain. They cost less than \$25. However, if water becomes deep enough in the sewer system, it can flow out of the next lowest opening, such as a toilet or tub, or it can overwhelm a drain plug by hydrostatic pressure and flow into the building through the floor drain. The other two measures, overhead sewers and backflow protection valves keep water in the sewer line during a backup. These are more secure, but more expensive (\$3,000-\$4,000).



Floor drain plug



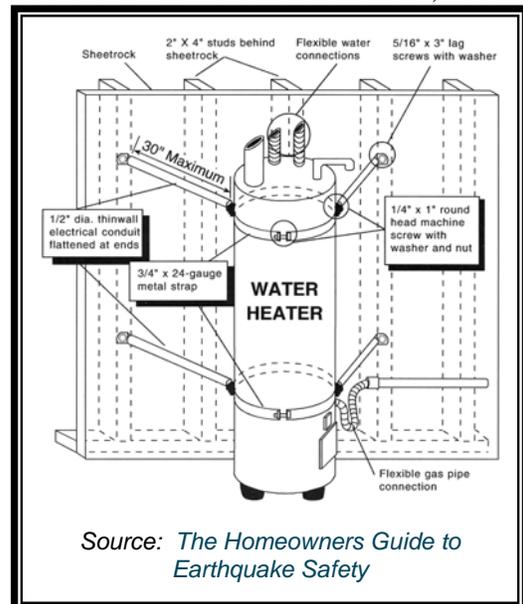
**Local implementation:** Committee members from Aurora, Elgin, South Elgin and St. Charles reported on retrofitting projects in their communities. Most of these related to sewer backup protection, but they also included regrading yards and floodproofing some homes.



**CRS credit:** Credit for dry and wet floodproofing and sewer backup protection is provided under Activity 530 (Retrofitting). Because these property protection measures are less secure than barriers and elevation, not as many points are provided.

**Earthquake** retrofitting measures include removing masonry overhangs that will fall onto the street during shaking. Bracing the building provides structural stability, but can be very expensive.

Less expensive approaches may be more cost-effective for an area like Kane County that faces a relatively low earthquake threat. These include tying down appliances, water heaters, bookcases and fragile furniture so they won't fall over during a quake and installing flexible utility connections.



Source: *The Homeowners Guide to Earthquake Safety*

While these simple and inexpensive measures may be cost effective for a home or business, they may not be sufficient for protection of critical facilities. Fire stations need to be sure that they can open their doors and hospitals must be strong enough to continue operating during the shocks and aftershocks.

**Tornado retrofitting** measures include constructing an underground shelter or “safe room” to protect the lives of the occupants. Their worth has been proven by recent tornadoes in Oklahoma, as shown in the photo to the right. They can be installed for approximately \$3,000.



Another retrofitting approach for tornadoes and **high winds** is to secure the roof, walls and foundation with adequate fasteners or tie downs. These help hold the building together when the combination of high wind and pressure differences work to pull the building apart.

A third tornado and high wind protection modification is to strengthening garage doors, windows and other large openings. If winds break the building’s “envelope,” the pressures on the structure are greatly increased.

Retrofitting approaches to protect buildings from the effects of **thunderstorms** include storm shutters, lightning rods (illustrated to the right), and strengthening connections and tie-downs (similar to tornado retrofitting). Roofs could be replaced with materials less susceptible to damage by hail, such as modified asphalt or formed steel shingles.



**Burying utility lines** is a retrofitting measure that addresses the winds from tornadoes and thunderstorms and the ice that accompanies winter storms. Installing or incorporating backup power supplies minimizes the effects of power losses caused by downed lines. “Retrofitting” the trees that hang over power lines is discussed in Section 6.6. Urban Forestry. Surge suppressors protect delicate appliances during thunderstorms.

**Winter storm** retrofitting measures include improving insulation on older buildings and relocating water lines from outside walls to interior spaces. Windows can be sealed or covered with an extra layer of glass (storm windows) or plastic sheeting. Roofs can be retrofitted to shed heavy loads of snow and prevent ice dams that form when snow melts.



**Local implementation:** No retrofitting projects for non-flood hazards were reported to the Planning Committee.



**CRS credit:** Retrofitting to protect a building for hazards other than flooding is not credited under the CRS.

### 5.3. Insurance

Technically speaking, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild and (hopefully) afford to incorporate some of the other mitigation measures in the process.

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

Insurance has the advantage that, as long as the policy is in force, the property is protected and no human intervention is needed for the measure to work. A standard **homeowner’s insurance** policy will cover a property for the hazards of tornado, wind, hail, and winter storms. Separate endorsements are usually needed for earth movement (e.g., earthquake) coverage.

Although most homeowner’s insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the National Flood Insurance Program. **Flood insurance** coverage is provided for buildings and their contents damaged by a “general condition of surface flooding” in the area.

Some people have purchased flood insurance because it was required by the bank when they got a mortgage or home improvement loan. Usually these policies just cover the building’s structure and not the contents. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. There is limited coverage for basements and the below grade floors of bilevels and trilevels.

Several insurance companies have **sump pump failure** or **sewer backup coverage** that can be added to a homeowner’s insurance policy. Each company has different amounts of coverage, exclusions, deductibles, and arrangements. Most are riders that cost extra. Most exclude damage from surface flooding that would be covered by a National Flood Insurance policy.

Larger local governments can self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can be a major drain on the treasury. Communities cannot expect Federal disaster assistance to make up the difference. Under Section 406(d) of the Stafford Act.

If an eligible insurable facility damaged by flooding is located in a [mapped floodplain] ... and the facility is not covered (or is underinsured) by flood insurance on the date of such flooding, FEMA is required to reduce Federal disaster assistance by the *maximum* amount of insurance proceeds that would have been received had the buildings and contents been fully covered under a National Flood Insurance Program (NFIP) standard flood insurance policy. [Generally, the maximum amount of proceeds for a non-residential property is \$500,000.]

[Communities] Need to:

- Identify all insurable facilities, and the type and amount of coverage (including deductibles and policy limits) for each. The anticipated insurance proceeds will be deducted from the total eligible damages to the facilities.
- Identify all facilities that have previously received Federal disaster assistance for which insurance was required. Determine if insurance has been maintained. *A failure to maintain the required insurance for the hazard that caused the disaster will render the facility ineligible for Public Assistance funding....*
- [Communities] *must* obtain and maintain insurance to cover [their] facility - buildings, equipment, contents, and vehicles - for the hazard that caused the damage in order to receive Public Assistance funding. Such coverage must, at a minimum, be in the amount of the eligible project costs. FEMA will not provide assistance for that facility in future disasters if the requirement to purchase insurance is not met. – FEMA Response and Recovery Directorate Policy No. 9580.3, August 23, 2000

In other words, the law expects public agencies to be fully insured as a condition of receiving Federal disaster assistance.

**Local implementation:** Data on private insurance policies are not available. Flood insurance has been available in Kane County communities since the 1970's. Current flood insurance coverage is shown in the table to the right. The right column shows the percentage of floodplain coverage. This is the number of floodplain policies divided by the number of buildings in the floodplain, as shown in the table on page 2-18. For some communities on the County line, the figures may inflate the actual coverage, but the pattern is clear: on the average, only one in three floodplain properties in Kane County are covered by flood insurance.

Kane County has a commercial policy on its own properties with a \$25,000 deductible. The flood and earthquake limit is \$5,000,000; however both have a separate \$50,000 deductible.

Of the 28 municipalities in the County, 16 are enrolled in either the Illinois Municipal League Risk Management



Flood Insurance Policies			
	Total Policies	Floodplain	
		Policies	% coverage
Algonquin	130	91	69%
Aurora	821	452	64%
Batavia	10	0	0%
Big Rock	0	0	0%
Burlington	0	0	N/A *
Carpentersville	16	12	12%
East Dundee	44	40	33%
Elburn	0	0	0%
Elgin	110	69	32%
Geneva	16	5	9%
Gilberts	1	0	0%
Hampshire	10	4	9%
Huntley	4	1	33%
Lily Lake	0	0	0%
Maple Park	0	0	0%
Montgomery	60	21	16%
North Aurora	9	3	27%
St. Charles	35	17	9%
Sleepy Hollow	21	17	30%
South Elgin	80	64	37%
Sugar Grove	10	3	38%
Virgil	0	0	0%
Wayne	8	5	71%
West Dundee	10	6	10%
Uninc. areas	267	167	26%
<b>County total</b>	<b>1,661</b>	<b>981</b>	<b>37%</b>

\* Burlington has no buildings in its floodplain  
Source: FEMA. Data as of January 2003

Association or the Intergovernmental Risk Management Agency. Both organizations provide risk management advice and coverage for all of the hazards covered in this plan, including flood and earthquake. The other 12 municipalities have either no insurance or commercial policies.



**CRS Credit:** There is no credit for purchasing flood or basement insurance, but the Community Rating System does provide credit for local public information programs that explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage.

## 5.4. The Government’s Role

Property protection measures are usually considered the responsibility of the property owner. However, local governments should be involved in all strategies that can reduce flood losses, especially acquisition and conversion of a site to public open space. There are various roles the County or a municipality can play in encouraging and supporting implementation of these measures.

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

**Government facilities:** One of the first duties of a local government is to protect its own facilities. Fire stations, water treatment plants and other critical facilities should be a high priority for retrofitting projects and insurance coverage.

Often public agencies discover after the disaster that their “all-hazard” insurance policies do not cover the property for the type of damage incurred. Flood insurance is even more important as a mitigation measure because of the Stafford Act provisions discussed above.

**Public Information:** Providing basic information to property owners is the first step in supporting property protection measures. Owners need general information on what can be done. They need to see examples, preferably from nearby. Public information activities that can promote and support property protection are covered in Chapter 9.

**Financial Assistance:** Communities can help owners by helping to pay for a retrofitting project. Financial assistance can range from full funding of a project to helping residents find money from other programs. Some communities assume responsibility for sewer backups, street flooding, and other problems that arise from an inadequate public sewer or public drainage system. Less expensive community programs include low interest loans, forgivable low interest loans and rebates. A forgivable loan is one that does not need to be repaid if the owner does not sell the house for a specified period, such as five years. These approaches don’t fully fund the project but they cost the community treasury less and they increase the owner’s commitment to the flood protection project. Often, small

The City of Guthrie, Oklahoma has a rebate program for installation of tornado shelters and safe rooms. The City provides up to \$1,500 per house, which can cover the majority of the cost.

amounts of money act as a catalyst to pique the owner's interest to get a self-protection project moving.

The more common outside funding sources are listed below. Unfortunately, the last three are only available after a disaster, not before, when damage could be prevented. Following past disaster declarations, FEMA, the Illinois Emergency Management Agency (IEMA) and the Illinois Department of Natural Resources have provided advice on how to qualify and apply for these funds.

#### Pre-disaster funding sources

- FEMA's Pre-Disaster Mitigation (PDM) grants (administered by IEMA)
- FEMA's Flood Mitigation Assistance (FMA) grants (administered by IEMA)
- Community Development Block Grant (administered by the Department of Commerce and Economic Opportunity)
- Illinois Department of Natural Resources
- Conservation organizations, such as the Conservation Foundation and CorLands, although generally these organizations prefer to purchase vacant land in natural areas, not properties with buildings on them.

The Village of South Holland (in South Cook County) received national recognition for its rebate program to help property owners fund retrofitting projects to protect against surface and subsurface flooding. If a project is approved, installed, and inspected, the Village will reimburse the owner 25% of the cost up to \$2,500. Over 450 flood-proofing and sewer backup protection projects have been completed under this program. Perhaps not surprisingly, contractors have become some of the best agents to publicize this program.

#### Post-disaster funding sources

- Insurance claims
- The National Flood Insurance Program's Increased Cost of Compliance provision (which increases the claim payment to cover a flood protection project required by code as a condition to rebuild the flooded building)

#### Post-disaster funding sources, Federal disaster declaration needed

- FEMA's disaster assistance (for public properties, however, after a flood, the amount of assistance will be reduced by the amount of flood insurance that the public agency should be carrying on the property) (administered by IEMA)
- Small Business Administration disaster loans (for non-governmental properties)
- FEMA's Hazard Mitigation Grant Program (administered by IEMA)

**Acquisition agent:** The community can be the focal point in an acquisition project. Most funding programs require a local public agency to sponsor the project. The County or a municipality could process the funding application, work with the owners, and provide

some, or all, of the local share. In some cases, the local government would be the ultimate owner of the property, but in other cases the Forest Preserve District or other public agency could assume ownership and the attendant maintenance responsibilities.

CorLands (the Corporation for Public Land) is an organization that can help Northeastern Illinois communities. It purchases and holds certain lands until a government agency or other party can take possession.

**Mandates:** Mandates are considered a last resort if information and incentives aren't enough to convince a property owner to take protective actions. An example of a retrofitting mandate is the requirement that many communities have that downspouts be disconnected from the sanitary sewer line.

There is a mandate for improvements or repairs made to a building in the mapped floodplain. If the project equals or exceeds 50% of the value of the original building it is considered a "substantial improvement." The building must then be elevated or otherwise brought up to current flood protection codes.

Another possible mandate is to require less expensive hazard protection steps as a condition of a building permit. For example, many communities require upgraded electrical service as a condition of a home improvement project. If a person were to apply for a permit for electrical work, the community could require that the service box be moved above the base flood elevation or the installation of separate ground fault interrupter circuits in the basement.

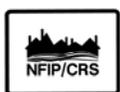


**Local implementation:** As discussed in Chapter 1 and Appendix D, there are hundreds of critical facilities, most of which have no special measures to protect them from flooding, tornadoes, and other natural hazards. One exception is Montgomery's Well 8 Water Treatment Plant. The Village retrofitted it by elevating key components above the flood level.

The Kane County Water Resources Department, the City of Aurora, and Village of Montgomery provide technical assistance to property owners interested in retrofitting.

Kane County, Aurora, Elgin and St. Charles have financial assistance programs for retrofitting, mostly to help residents deal with sewer backup and local flood problems. St. Charles provides 25% of the cost and Elgin funds 50%. These levels have proven successful in getting property owners motivated to protect themselves. South Elgin used a state grant to help 27 homes install overhead sewers.

Kane County, Montgomery, Aurora and Elgin have been acquisition agents, facilitating buyouts of homes after the 1996 and other floods.



**CRS credit:** Except for public information programs, the Community Rating System does not provide credit for efforts to fund, provide incentives or mandate property protection measures. The CRS credits are provided for the

actual projects, after they are completed (regardless of how they were funded or who instigated them).

On the other hand, in order to participate in the CRS, a community must certify that it has adequate flood insurance on all properties that have been *required* to be insured. The minimum requirement is to insure those properties in the mapped floodplain that have received Federal aid, as specified by the Flood Disaster Protection Act of 1973.

## 5.5. Repetitive Loss Properties

Chapter 2 explains the criteria for designation of the County’s repetitive loss areas. These properties deserve special attention because they are more prone to damage by natural hazards than any other properties in the County. Further, protecting repetitive loss buildings is a priority with FEMA and IEMA mitigation funding programs.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

The 18 repetitive loss areas were reviewed for the key factors that determine appropriate property protection measures. The criteria used are based on several studies that have identified appropriate measures based on flood and building conditions. While a cost/benefit study was not conducted on each property, these guidelines show which measures are cost-effective.

- “High hazard areas” are areas in the floodway or where the 100-year flood is two or more feet over the first floor.
- Buildings in high hazard areas or in less than good condition should be acquired and demolished.
- Buildings with basements and split level foundations in high hazard areas should be acquired and demolished. They are too difficult to elevate and the hydrostatic pressures on the walls from deeper flooding make them too risky to protect in place.
- Buildings subject to shallow flooding from local drainage should be protected through area-wide flood control or sewer improvement projects.
- Buildings in good condition on crawlspaces should be elevated or relocated.
- Buildings in good condition on slab, basement or split level foundations subject to shallow flooding (less than 2 feet) can be protected by barriers and dry floodproofing.
- Recent flood claims. Some properties have not had a flood insurance claim for 20 years, indicating that some measure has probably been put in place to protect the property from repetitive flooding.

These criteria are general and recommendations for individual structures should be made only after a site inspection. Other extenuating circumstances may also alter the recommendations. For example, the building in area 13 is an historic stone structure on the river. Its lower area could be wet floodproofed, providing partial flood protection without adversely affecting its historical appearance.

The results of this review are shown in the table below. Based on the review criteria, acquisition and elevation should be pursued in areas 7, 8, 9, 12 and 14. This does not mean that the entire areas should be bought out. Initial efforts should focus on the most floodprone properties and, in all cases, willing owners.

Kane County Repetitive Loss Areas							
City	Name/Street	No. of Bldgs	Flood years	Foundation Type	High * Hazard	Tentative Recommended Measure **	
1	Uninc. Aurora	7	81, 82, 83	Split-level	Yes	Drainage improvements have reduced repetitive flooding ***	
2	Aurora	1	78, 81, 82, 83, 85, 87, 96	Split level		Barrier/dry floodproof	
3	Aurora	2	85, 86, 90, 93, 96	Basement		Local drainage improvements	
4	Aurora	1	82, 83, 93, 96	Slab	Yes	Floodproof (only part of this large structure is floodprone)	
5	Aurora	1	79, 83, 84, 85, 87, 89, 90, 97, 00	Slab		Barrier/dry floodproof	
6	Aurora	1	83, 87	Basement		Barrier/dry floodproof	
7	Elgin	14	90, 97	Basement	Yes	Acquisition	
8	Uninc. East Dundee	40	88, 94	Crawlspace	Yes	Acquisition	
9	Uninc. St. Charles	17	79, 83, 86, 93, 94, 97	Crawlspace	Yes	Elevation	
10	Uninc. Sugar Grove	1	85, 87, 91, 93, 94	Slab	Yes	Acquisition	
11	Uninc. Aurora	7	87, 96	Slab		Barrier/dry floodproof	
12	Montgomery	45	79, 81, 83, 96	Basement		Local drainage improvements/ Barrier/dry floodproof	
13	Montgomery	1	96, 97	Basement	Yes	Elevation	
14	Montgomery	19	96, 97	Crawlspace	Yes	Acquisition	
15	North Aurora	2	5/78, 9/78	Walk out basement	Yes	Wet floodproof	
16	South Elgin	31	79, 88	Crawlspace	Yes	Elevation	
17	Algonquin	1	90, 95	Walk out basement	Yes	Acquisition/barrier ***	
18	Algonquin	1	79, 82	Crawlspace /Slab		Barrier/dry floodproof	
				Slab	Yes	Barrier/regrade ***	
				Basement	Yes	Acquire	

\* "High hazard" means properties are located in the floodway or the 100-year flood is two or more feet over the first floor.

\*\* "Tentative Recommended Measure" is based on data collected from a windshield survey. A more detailed examination of each building is needed before funds are spent on a project.

\*\*\* While in a high hazard area, the repetitive flooding was caused by local drainage problems. Source: Field surveys by French & Associates

## 5.6. Conclusions

1. There are several ways to protect individual properties from damage by natural hazards. The advantages and disadvantages of each should be examined for each situation.
2. Property owners can implement some property protection measures at little cost, especially for sites in areas of low hazards (e.g., shallow flooding, sewer backup, earthquakes, thunderstorms and winter storms). For other measures, such as relocation, elevation and safe rooms, the owners may need financial assistance.
3. Only 37% of the buildings in the County's floodplains are covered by flood insurance.
4. Local government agencies can promote and support property protection measures through several activities, ranging from public information to financial incentives to full funding.
5. It is unlikely that most government properties, including critical facilities, have any special measures to protect them from flooding, tornadoes, and other natural hazards.
6. Kane County is self-insured for all damage by floods and earthquakes and for damage from other hazards under \$250,000. The 16 municipalities in the risk management pools should have adequate insurance coverage for the natural hazards. The other municipalities may or may not have sufficient insurance coverage.
7. Property protection measures can protect the most damage-prone buildings in the County: repetitive loss properties.

## 5.7. Recommendations

1. Public education materials should be developed to explain property protection measures that can help owners reduce their exposure to damage by natural hazards and the various types of insurance coverage that are available.
2. Because properties in floodplains will be damaged sometime, a special effort should be made to provide information and advice to floodplain property owners. Special attention should be given to repetitive loss and high hazard areas.
3. All property protection projects should be voluntary. Other than State and Federally-mandated regulations, local incentives should be positive, such as providing financial assistance.
4. A standard checklist should be developed to evaluate a property's exposure to damage from the hazards most prevalent in Kane County: flooding, high winds, lightning, hail and power losses from downed lines. It should include a review of

insurance coverage and identify where more information can be found on appropriate property protection measures. The checklist should be provided to each agency participating in this planning process and made available to the general public.

5. Each public entity should evaluate its own properties using the standard checklist. A priority should be placed on determining critical facilities' vulnerability to damage and whether public properties are adequately insured.
6. Each public entity should protect its own publicly-owned facilities with appropriate mitigation measure(s).
7. Communities should establish cost sharing programs, such as rebates, to encourage low cost (under \$10,000) property protection measures on private property, such as:
  - Surface and subsurface drainage improvements,
  - Berms and regrading for shallow surface flooding,
  - Sewer backup protection
  - Relocating furnaces and water heaters out of basements
  - Tornado safe rooms
  - Installing lightning rods
8. The County and municipalities should seek State and Federal funding support for higher cost measures, such as elevation, relocation and acquisition of high priority properties. High priority properties are:
  - Those properties in repetitive loss areas 7, 8, 9, 12 and 14. If owners of these properties are interested, benefit-cost analyses should be run and outside funding should be applied for.
  - Critical facilities in the floodway or subject to flood depths of more than 2 feet

## 5.8. References

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6. *Guide to Flood Protection in Northeastern Illinois*, Illinois Association for Floodplain and Stormwater Management, 1997.
7. *The Homeowners Guide to Earthquake Safety*, California Seismic Safety Commission, 2000
8. *Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding*. Federal Emergency Management Agency, FEMA-312, 1998.
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11. Materials supplied by County offices and municipalities, Spring 2003.
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13. *Taking Shelter from the Storm: Building a Safe Room Inside Your House*, Federal Emergency Management Agency, FEMA-320, 1998.
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15. *Windstorm Mitigation Manual for Light Frame Construction*, Illinois Emergency Management Agency, 1997.

## Chapter 6. Resource Protection

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. In so doing, these activities enable the naturally beneficial functions of the land, such as, fields, floodplains or wetlands to be better realized.

Natural and beneficial functions of watersheds, floodplains and wetlands include the following:

- Reduction in runoff from rainwater and snow melt in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants, and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved though regulatory steps for protecting natural areas or natural functions. The regulatory programs are discussed in Chapter 4. Preventive Measures. This chapter covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Seven areas are reviewed:

- Wetland protection
- Erosion and sedimentation control
- River restoration
- Best management practices
- Dumping regulations
- Urban forestry
- Farmland protection

### 6.1. Wetland Protection

Wetlands are often found in floodplains and depressional areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality, and provide habitat for many species of fish, wildlife, and plants.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

Wetlands that are determined to be part of the waters of the United States are regulated by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (US EPA) under Section 404 of the Clean Water Act. Before a “404” permit is issued, the plans are reviewed by several agencies, including the Corps and the U.S. Fish and Wildlife Service. Each of these agencies must sign off on individual permits.

There are also nationwide permits that allow small projects that meet certain criteria to proceed without individual permits. Wetlands not included in the Corps' jurisdiction or that are addressed by a nationwide permit may be regulated against by local authorities.

If a permit is issued by the Corps or the County, the impact of the development is typically required to be mitigated. Wetland mitigation can include creation, restoration, enhancement or preservation of wetlands elsewhere. Wetland mitigation is often accomplished within the development site, however, mitigation is allowed off-site and sometimes in another watershed. The appropriate type of mitigation is addressed in each permit.



Some developers and government agencies have accomplished the required mitigation by buying into a wetland bank. Wetland banks are large wetlands created for the purpose of mitigation. The banks accept money to reimburse the owner for setting the land aside from development.

When a wetland is mitigated at another site there are drawbacks to consider. First, it takes many years for a new wetland to approach the same quality as an existing one. Second, a new wetland in a different location (especially if it's in a different watershed) will not have the same flood damage reduction benefits as the original one did.

A 1993 study by the Illinois State Water Survey concluded that for every one percent increase in protected wetlands along a stream corridor, peak stream flows decreased by 3.7 percent.



**Local implementation:** There are several programs active in protecting wetlands in Kane County. An example of one's public information effort is on the next page, showing one of the benefits of protecting and restoring wetlands – protecting against another natural hazard, West Nile Virus.

Most wetlands in Kane County are subject to the Section 404 regulations and the provisions of the Kane County Stormwater Ordinance. The Kane County ordinance leaves wetland protection to the Corps of Engineers where applicable.

If the Corps does not have jurisdiction or if the Kane County standards exceed the Corps', then the provisions of the County Ordinance apply. Wetlands within agricultural land that have farm subsidies are under the responsibility of the Natural Resources Conservation Service.

Algonquin, Huntley, East Dundee, Elgin, Batavia, and Montgomery issue permits for wetland activities under the County's authority, using a third party consultant to perform the technical review.

Kane County began working in 2001 with the Northeastern Illinois Planning Commission, the US EPA, the US Fish and Wildlife Service and other agency scientists and biologists to identify high-quality wetlands across the county. The project is called Advanced Identification of wetlands (ADID).

ADID aims to identify all wetlands within the county. Through field verification of the biology, habitat, water quality, groundwater, water supply, drainage, and stormwater functions, the most valuable wetlands in Kane County are identified and mapped. The ADID project was completed in 2003.

Both public and private wetland mitigation and restoration projects have been undertaken in Kane County. Several of these projects were constructed in conjunction with detention projects and they are highlighted in Chapter 8. Structural Measures.

The Kane County Forest Preserve District is responsible for large natural wetlands, such as the Dick Young Forest Preserve's Nelson Lake Marsh located in Batavia and Blackberry Townships. Currently, Kane County is coordinating an effort to restore more than 31 acres of the wetlands on the Dick Young Forest Preserve. The restoration effort includes the removal of drain tiles so that the natural wetland hydrology can be restored, allowing for the further development of wetland species and habitat. This effort is being funded from wetland violation money from the Corps and from direct funding from the County Board. Another large public wetland restoration site is the Braeburn Marsh Forest Preserve in Batavia and Geneva Townships.

An example of a large private wetland creation site is along Indian Creek near Kirk Road and Interstate 88, which is part of the development of an outlet mall in Aurora. This project also includes flood storage and stream restoration components. Indian Creek is converted from a straight ditch to a meandering stream through the created wetland.

### ***West Nile Virus and Wetlands***

#### ***Wetland predators lower mosquito populations, WNV risk***



West Nile is a mosquito-borne virus first detected in the United States in 1999 and in Illinois in 2001. Female mosquitoes transmit the virus mainly to birds, but also to other animals and occasionally to people. The threat to human health raises concerns about mosquito populations and the sites that breed them. **Some citizens are concerned that wetlands are part of the problem, but in fact, wetlands can be part of the cure.**

Healthy wetlands are home to fish, insects and birds that eat mosquitoes and keep their populations low. Furthermore, the species of mosquitoes responsible for transmitting West Nile Virus don't prefer wetlands but breed prolifically in stagnant water in discarded tires, birdbaths, and roof gutters. Such artificial containers lack the predators found in wetlands, and are located in or near urban areas, providing infected mosquitoes with easy access to human or animal hosts.

**The presence of West Nile Virus in Illinois makes it more important than ever to protect and restore wetlands. Healthy wetlands can control mosquito numbers in addition to providing wildlife habitat, preventing flooding and purifying water.**

*Read on to learn more about mosquitoes and wetlands and what you can do around your home and community to decrease the risk of WNV.*

*Source: Fox River Ecosystem Partnership, Wisconsin DNR*



Two wetland banks have been created in Kane County by a private developer through a permit from the Corps. One of the banks, located in the Otter Creek watershed, has been sold out. Two more banks are being planned. The purchase of the wetlands is open to agencies and developers throughout northeastern Illinois.



**CRS credit:** The Community Rating System focuses on activities that directly affect flood damage to insurable buildings. While there is no credit for relying on the Corps of Engineers' 404 regulations, there is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations.

## 6.2. Erosion and Sedimentation Control

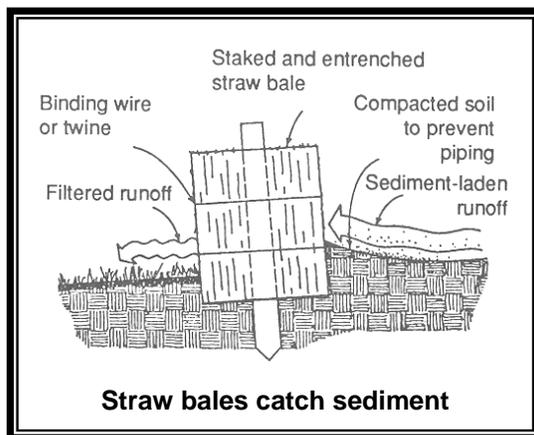
Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along streambanks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

Sediment suspended in the water tends to settle out where flowing water slows down. It can clog storm sewers, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands. When channels are constricted and flooding cannot deposit sediment in the bottomlands, even more is left in the channels. The result is either clogged streams or increased dredging costs.

Not only are the drainage channels less able to do their job, but the sediment in the water reduces light, oxygen, and water quality and often brings chemicals, heavy metals and other pollutants. Sediment has been identified by the US EPA as the nation's number one nonpoint source pollutant for aquatic life.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices.



If erosion occurs, other measures are used to capture sediment before it leaves the site. Silt fences, sediment traps and vegetated filter strips are commonly used to control sediment transport. Runoff from the site can be slowed down by terraces, contour strip farming, no-till farm practices, hay or straw bales, constructed wetlands, and impoundments (e.g., sediment basins and farm ponds). Slowing surface water runoff on the way to a

drainage channel increases infiltration into the soil and reduces the volume of topsoil eroded from the site.

Erosion and sedimentation control regulations mandate that these types of practices be incorporated into construction plans. They are usually oriented toward construction sites rather than farms. The most common approach is to require applicants for permits to submit an erosion and sediment control plan for the construction project. This allows the applicant to determine the best practices for the site.



**Local implementation:** Standards for soil erosion and sediment control during and following project construction are significant components of the Kane County Stormwater Ordinance. Erosion and sediment control planning is required in the initial site planning process. The Ordinance also places an emphasis on efforts that prevent and reduce erosion rather than having to control sediments that are created due to construction.



**CRS credit:** The Kane County Stormwater Ordinance’s erosion and sedimentation control provisions qualify for 35 points, the maximum credit for programs that do not address erosion from farmland.

### 6.3. River Restoration

There is a growing movement that has several names, such as “stream conservation,” “bioengineering” or “riparian corridor restoration.” The objective of these approaches is to return streams, streambanks and adjacent land to a more natural condition, including the natural meanders. Another term is “ecological restoration” which restores native indigenous plants and animals to an area.

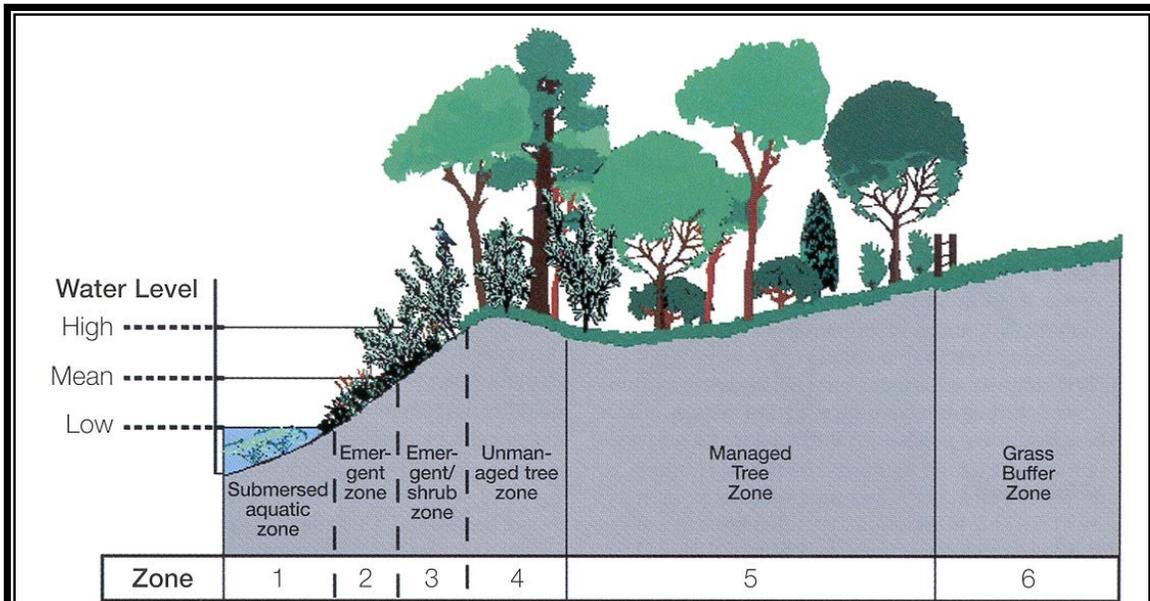
Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
	Thunderstorm
	Winter storm

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, and/or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.

In all, restoring the right vegetation to a stream has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and property value
- Prevents property loss due to erosion
- Provides recreational opportunities, such as hunting, fishing, and bird watching
- Reduces long term maintenance costs

The last bullet deserves special attention. Studies have shown that after establishing the right vegetation, long term maintenance costs are lower than if the banks were concrete. The Natural Resources Conservation Service estimates that over a ten year period, the combined costs of installation and maintenance of a natural landscape may be one-fifth of the cost for conventional landscape maintenance, e.g., mowing turf grass.



### Aquatic and riparian buffer plant zones

Different types of plants are used in different buffer zones along a channel. Zone 1 plants are normally submerged while zone 2 plants are inundated during much of the growing season. Zone 3 plants are water tolerant, but are flooded only during high water. By using the proper plants in each zone, they stabilize streambanks, filter polluted runoff, and provide habitat. *Source: Banks and Buffers – A Guide to Selecting Native Plants for Streambanks and Shorelines, Tennessee Valley Authority*

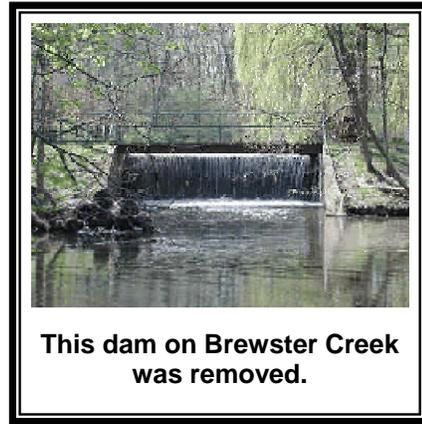


### Restored retention basin

The traditional design (left) uses steep slopes and rock rip-rap to stabilize the shore line. The site is plagued with geese. The basin on the right had similar problems, but was retrofitted using natural plantings. It provides a more attractive setting and the tall grasses have kept geese away. (Sites are in Lake County)



**Local implementation:** Kane County has been active in pursuing and completing restoration projects. A section of Brewster Creek was restored when the YWCA dam at Camp Tu-Endie-Wei south of South Elgin is was removed. This is was a pilot dam removal project in Illinois, as it allowed for a gradual drawdown of a dam reservoir over a period of a year or more. The gradual drawdown allowed a channel to reform in the sediment deposits that are behind the dam, encouraging a more stable, naturally vegetated stream bank.



A section of Indian Creek near Kirk Road and Interstate 88 (discussed on page 6-3) was also restored. The project took a portion of Indian Creek which was a straight ditch and converted it to a meandering stream through a large created wetland. This has resulted in more stable banks along the Creek and significant additional floodplain storage.

With funding from the US EPA, Kane County, and the villages of East Dundee, West Dundee and Carpentersville, sections of the Fox River and seven tributary streams to the Fox River were restored in 2003-2004. The project extends from the north side of Carpentersville to the south end of East and West Dundee. The project involved streambank stabilization, habitat improvement, and streamside vegetation improvement.



**CRS credit:** The Community Rating System focuses on activities that directly affect flood damage to insurable buildings. However, there are credits for preserving open space in its natural condition or restored to a state approximating its natural condition. There are also credits for channel setbacks, buffers and protecting shorelines.

## 6.4. Best Management Practices

*Point source* pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the U.S. and Illinois Environmental Protection Agencies. *Nonpoint source* pollutants come from non-specific locations and are harder to regulate.

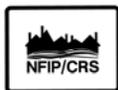
Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams.

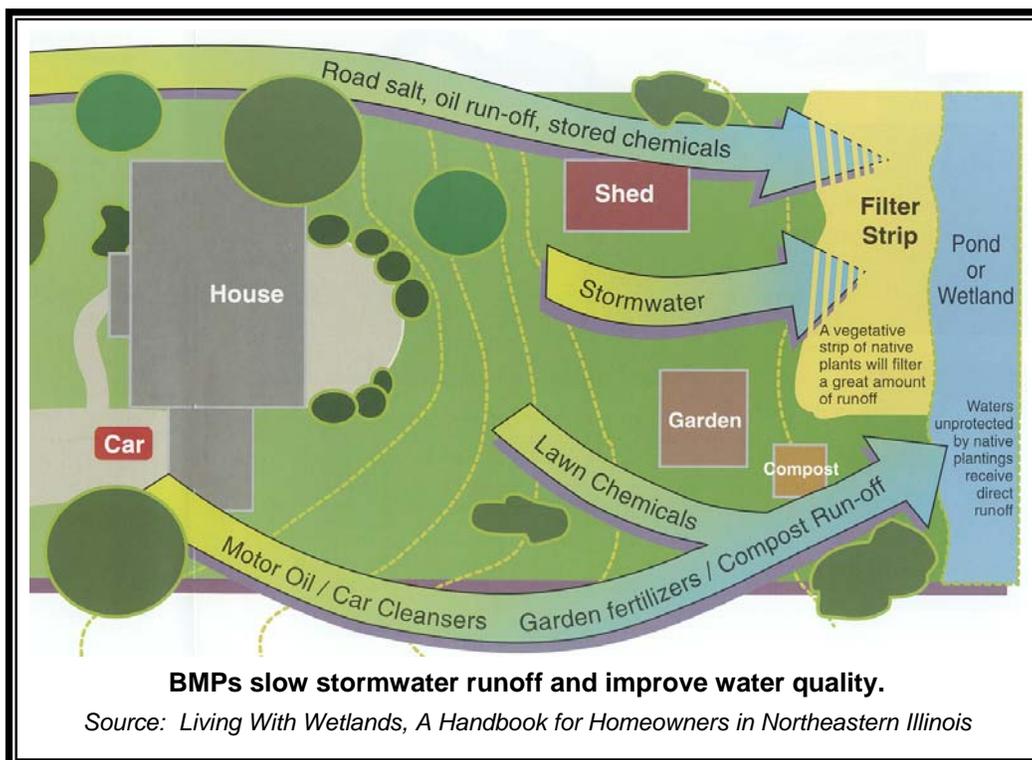
The term “best management practices” (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple use of drainage and storage facilities.



**Local implementation:** Best management practices have been incorporated throughout the Kane County Stormwater Ordinance. The County has also begun work to meet the requirements of the Clean Water Act and the NPDES Phase II (National Pollutant Discharge Elimination System) requirements.



**CRS credit:** The Kane County Stormwater Ordinance would receive up to 40 points for requirements that protect channel banks and lakeshores from development through setbacks or buffer zones and for requiring stormwater management facilities to incorporate BMPs.



## 6.5. Dumping Regulations

BMPs usually address pollutants that are liquids or suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' ability to convey or clean stormwater.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

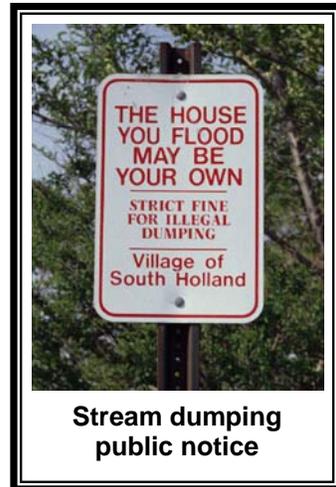
Many cities have nuisance ordinances that prohibit dumping garbage or other “objectionable waste” on public or private property. Waterway dumping regulations need to also apply to “nonobjectionable” materials, such as grass clippings or tree branches which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard not realizing that it is needed to drain street runoff. They may not understand how regrading their yard, filling a wetland, or discarding leaves or

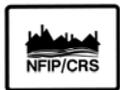
branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.



**Local implementation:** The Kane County Stormwater Ordinance addresses the obstruction of waterways. Although the ordinance does not address dumping directly, it does regulate “the storage of materials and the deposit of solid or liquid waste.” All such projects are prohibited if they cause an increase in flood heights.



Some communities, including Algonquin, Aurora, Batavia, Big Rock, East Dundee, Elburn, St. Charles, Sleepy Hollow, and West Dundee do have ordinances that prohibit the dumping of debris in or obstructing waterways.



**CRS credit:** The CRS provides up to 30 points for enforcing and publicizing a regulation that prohibits dumping in the drainage system. As currently written, the Kane County Stormwater Ordinance would not receive this credit.

## 6.6. Urban Forestry

The major damage caused by wind, ice and snow storms is to trees. Downed trees and branches break utility lines and damage buildings, parked vehicles and anything else that was under them. An urban forestry program can reduce the damage potential of trees. The cities in central Illinois are prone to ice storms and have initiated programs that select species that are resistant to ice and storm damage.

Hazards Addressed	
	Flood
Y	Tornado
	Earthquake
Y	Thunderstorm
Y	Winter storm

Urban foresters or arborists can select hardier trees which can better withstand high wind and ice accumulation. Only trees that attain a height less than the utility lines should be allowed along the power and telephone line rights-of-way. Just as important as planting the right trees is correct pruning after a storm. If not done right, the damaged tree will not heal properly, decay over the next few years, and cause a hazard in the future. A trained person should review every damaged tree to determine if it should be pruned or removed.



**Trees are the first victims of ice storms**

By having stronger trees, programs of proper pruning, and on-going evaluation of the trees, communities can prevent serious damage to their tree population. A properly written and enforced urban forestry plan can reduce liability, alleviate the extent of fallen trees and limbs caused by wind and ice build-up, and provide guidance on repairs and pruning after a storm. Such a plan helps a community qualify to be a Tree City USA.



Tree City USA is a program sponsored by The National Arbor Day Foundation in cooperation with the USDA Forest Service and the National Association of State Foresters. These standards were established to ensure that every qualifying community would have a viable tree management plan and program. They were also designed so that no community would be excluded because of size.

To qualify for Tree City USA, a town or city must meet four standards:

1. A tree board or department – Someone must be legally responsible for the care and management of the community's trees. This may be a professional forester or arborist, an entire forestry department, or a volunteer tree board.
2. A tree care ordinance – The ordinance must designate the establishment of a tree board or forestry department and give this body the responsibility for writing and implementing an annual community forestry work plan.
3. A community forestry program with an annual budget of at least \$2 per capita – A little investigation usually reveals that more than this amount is already being spent by the municipality on its trees.
4. An Arbor Day observance and proclamation

Source: [www.arborday.org/programs/treecityusa.html](http://www.arborday.org/programs/treecityusa.html)



**Local implementation:** Twelve Kane County municipalities have the designation of “Tree City USA.” As such, they have agreed to have a tree board or department, a tree care ordinance, and a community forestry program. Other communities in Kane County manage urban forestry through their public works departments. The Kane County Highway Department does regular maintenance along County rights-of-way. Commonwealth Edison inspects the utility lines on a rotating schedule throughout the County and when problems are found. Batavia, Geneva and St. Charles provide the electrical distribution within their corporate limits and provide the necessary tree inspection and maintenance.

Tree Cities, USA
Algonquin
Batavia
Elburn
Elgin
Geneva
Hampshire
Hoffman Estates
Sleepy Hollow
St. Charles
South Elgin
Sugar Grove
Wayne



**CRS credit:** Being a part of the National Flood Insurance Program, the CRS recognizes only activities that affect flood damage. It does not provide credit for projects or programs that only affect damage from other types of hazards.

## 6.7. Farmland Protection

Farmland protection is quickly becoming an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

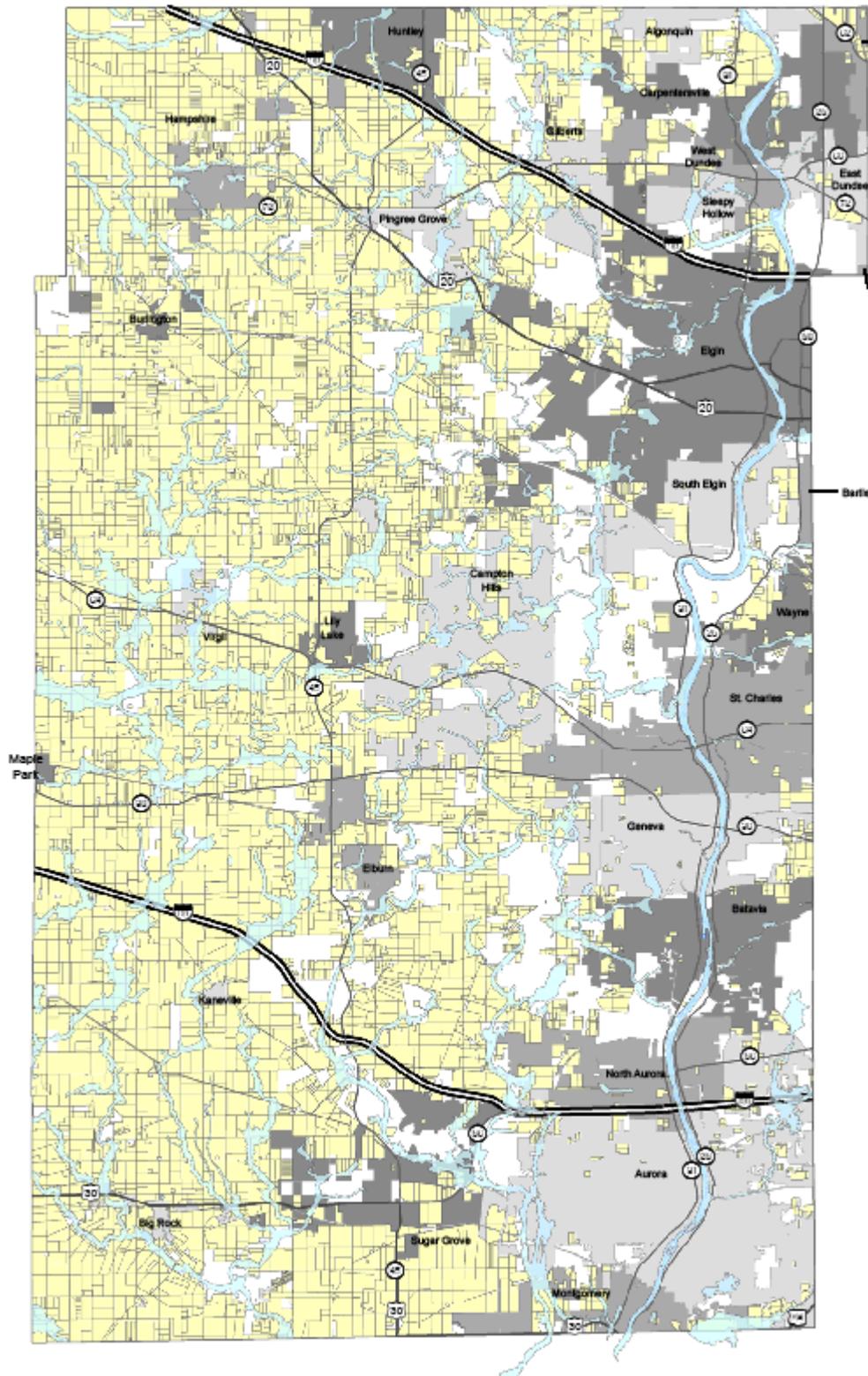
Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can create additional stormwater runoff and emergency management difficulties.

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land. The Farmland Protection Program in the United States Department of Agriculture’s 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, local governments and to nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land. Eligible land includes cropland, rangeland, grassland, pastureland, and forest land that is part of an agricultural operation. Certain lands with historical or archaeological resources are also included.



Map 6-1. Kane County Farmland



Legend: Yellow – farmland, Blue – floodplain

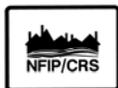
The hazard mitigation benefits of farmland protection are similar to those of open space preservation, discussed in Chapter 4. Preventive Measures:

- Farmland is preserved for future generations,
- Farmland in the floodplain keeps damageable structures out of harm's way,
- Farmland keeps more stormwater on site and lets less runoff downstream,
- Rural economic stability and development is sustained,
- Ecosystems are maintained, restored and/or enhanced, and
- The rural character and scenic beauty of the area is kept.



**Local implementation:** There are 192,000 acres of farmland in Kane County, of which, 22,800 are also floodplain. The important relationship between floodplains and farmland can be seen in Map 6-1 on page 6-12. Farmland protection is part of Kane County's 2030 Land Use Plan. The long term planning goal is for prime farmland to be preserved in the western townships.

With the assistance of farm owners, local officials and farm consultants, Kane County developed the state's first farmland protection program. The County Board has the authority to either make a fee simple purchase, acquire development rights, or accept donated land. With funding from the Farm Bill, tax revenue from the Grand Victoria Casino, and County funds, the County began purchasing development rights from interested farm owners in 2002. The County is anticipating additional federal funding. Currently, applications from farmland owners exceed the level of available funding. As of mid 2008 the county has agricultural conservation easements on 34 farms on 4,655 acres. This has been accomplished using \$18,053,800 in Riverboat funds and \$8,803,142 in Federal Farm and Ranchlands funding.



**CRS credit:** Credit is given to preserving open space in the floodplain, regardless of why it is being preserved. Credit is also provided for low density zoning of floodprone areas. Agricultural zones that require minimum 10 or 20 acre lots would qualify.

## 6.8. Conclusions

1. A hazard mitigation program can utilize resource protection programs to support protecting areas and natural features that can mitigate the impacts of natural hazards.
2. The current regulations on wetland protection, erosion and sediment control, and best management practices, have effective standards.
3. There are excellent examples of wetland protection and river and shoreline restoration projects managed by Kane County, the Kane County Forest Preserve District and the municipalities that demonstrate the benefits of these measures.

4. There is not a countywide ordinance that prohibits dumping in wetlands or other parts of the drainage system.
5. Some communities have urban forestry programs in place that can be effective against damage and power losses from wind and ice storms.
6. Preserving farmland in the floodplain and other hazardous areas will prevent damage to homes, businesses and other development.

## 6.9. Recommendations

1. All communities should enforce the wetland protection, erosion and sediment control and best management practices provisions of the County Stormwater Ordinance.
2. The public and decision makers should be informed about the hazard mitigation benefits of restoring rivers, wetlands and other natural areas. Myths about mosquitoes should be dispelled and restoration and protection techniques should be explained.
3. Each community should ensure that it has enforceable stream and wetland dumping regulations.
4. The public should be informed about the need to protect streams and wetlands from dumping and inappropriate development and the relevant codes and regulations.
5. Every community should implement an urban forestry program that qualifies them to become a Tree City, USA.
6. Municipal comprehensive plans, land use plans and zoning ordinances should incorporate open space provisions that will protect properties from flooding and preserve wetlands and farmland. The County's 20230 *Land Resource Management Plan* provides a guide for this. Subsequent County-wide plans should, too.

## 6.10. References

1. *2002 and 2007 Annual Report*, Kane County Stormwater Management Committee
2. *Banks and Buffers – A Guide to Selecting Native Plants for Streambanks and Shorelines*, Tennessee Valley Authority, 1997
3. *Best Management Practices Guidebook for Urban Development*, Northeastern Illinois Planning Commission, 1992.
4. *CRS Coordinator's Manual*, Community Rating System, FEMA, 2002.
5. *Environmental Consideration in Comprehensive Planning*, Northeastern Illinois Planning Commission, 1994.

6. *Illinois Hazard Mitigation Plan*, Illinois Emergency Management Agency, 2000.
7. Kane County Forest Preserve, National Arbor Day, and other websites.
8. *Kane County Stormwater Ordinance*, Kane County, Illinois, December 11, 2001.
9. *Living With Wetlands, A Handbook for Homeowners in Northeastern Illinois*, The Wetlands Initiative, 1998
10. *Making our Urban Forests Safer*, Alabama Cooperative Extension Service, 2001.
11. *Protecting Nature in Your Community*, Chicago Wilderness and Northeastern Illinois Planning Commission, 2000.
12. *Reducing the Impacts of Urban Runoff – The Advantages of Alternative Site Design Approaches*, Northeastern Illinois Planning Commission, 1997.
13. *Stormwater management – The Benefits of Alternative Approaches*, South Suburban Mayors and Managers Association, 2000.
14. *Stream and Wetland Protection: A Natural Resource Management Priority in Northeastern Illinois*, Northeastern Illinois Planning Commission, 1991.
15. *Stream Corridor Restoration Principles, Processes and Practices*, Federal Interagency Stream Restoration Working Group, 1998. Copies available through the USDA Natural Resource Conservation Service.
16. Survey of municipalities, Spring, 2003.

# Chapter 7. Emergency Services

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all municipal and/or county departments.

At the state level, programs are coordinated by the Illinois Emergency Management Agency (IEMA). Kane County emergency services are coordinated through the Kane County Office of Emergency Management (OEM) in Geneva.

The objective of preparing emergency plans is to define the capacity of County government to save the maximum number of lives, minimize injuries, protect property, and maintain and support economic activities essential to the survival and recovery from the emergency or disaster.  
*- Kane County Emergency Operations Plan*

Kane County municipalities that have emergency management programs coordinate them through their fire or police department or a separate emergency manager or Emergency Services and Disaster Agency coordinator. With one exception, when a municipality develops and adopts an emergency management plan, the plan is reviewed and approved by Kane County OEM for the State of Illinois. The exception is the City of Aurora, which is accredited directly by IEMA.

This chapter reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an oncoming problem (threat recognition) and goes through post-disaster activities.

## 7.1. Threat Recognition

Threat recognition is the key. The first step in responding to a flood, tornado, storm or other natural hazard is knowing when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

Hazards Addressed	
Y	Flood
Y	Tornado
	Earthquake
Y	Thunderstorm
Y	Winter storm

**Floods:** A flood threat recognition system predicts the time and height of the flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On larger rivers, including the Fox, the measuring and calculating is done by the National Weather Service which is in the U.S. Department of Commerce’s National Oceanic and Atmospheric Administration (NOAA). Support in NOAA’s efforts is provided by cooperating partners from state and local agencies.



Forecasts of expected river stages are made through the Advanced Hydrologic Prediction Service (AHPS) of the National Weather Service. Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio. NOAA Weather Radio is considered by the federal government as the official source for weather information.

On smaller rivers, locally established rainfall and river gages are needed to establish a flood threat recognition system. The National Weather Service may issue a “flash flood watch.” This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain or imminent. These events are so localized and so rapid that a “flash flood warning” may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

**Tornadoes and Thunderstorms:** The National Weather Service is the prime agency for detecting meteorological threats, such as tornadoes and thunderstorms. Severe weather warnings are transmitted through the Illinois State Police’s Law Enforcement Agencies Data System (LEADS) and through the NOAA Weather Radio System. As with floods, the Federal agency can only look at the large scale, e.g., whether conditions are appropriate for the formation of a tornado. For tornadoes and thunderstorms, local emergency managers can provide more site-specific and timely recognition by sending out National Weather Service trained spotters to watch the skies when the Weather Service issues a watch or warning.

**Winter Storms:** The National Weather Service is again the prime agency for predicting winter storms. Severe snow storms can often be forecasted days in advance of the expected event, which allows time for warning and preparation. Though more difficult, the National Weather Service can also forecast ice storms.



**Local implementation: Floods:** On the larger streams, the United States Geological Survey (USGS) operates stream and rain gauges in cooperation with the Illinois Department of Natural Resources and the Kane County Environmental Management Department. For example, the Illinois Department of Natural Resources monitors the Fox River at the McHenry Lock and Dam and transfers this data to the USGS. USGS provides stream stage and stream flow information for the following sites in Kane County:

Real-time stream gage readings for the sites listed to the right can be accessed on the internet at the USGS website, <http://il.water.usgs.gov/nwis-w/IL/> or <http://waterdata.usgs.gov/il/nwis/current>. This site tells the *current* stream conditions.

The National Weather Service is able to issue a specific *prediction* of when and how high the river will crest. It does this for the Fox River at Algonquin, which can be accessed at <http://www.crh.noaa.gov/lot/>. NWS can also issue more general flood statements on smaller streams throughout the County.

**Stream Gages on the USGS Website**

Fox River at Algonquin  
Fox River at South Elgin  
Fox River at Montgomery  
Tyler Creek at Elgin  
Ferson Creek near St. Charles  
Mill Creek near Batavia  
Blackberry Creek near Montgomery

Annex P of Kane County OEM's *Emergency Response Plan* addresses floods. Threat recognition, including weather and river conditions, are addressed in the annex. A "Pre-Emergency Operations Checklist" includes the web addresses for the stream gages at Algonquin, South Elgin and St. Charles. The stream gage in Algonquin, although not in the county, is used extensively to monitor the Fox River just north of the county line.

**Other Weather Hazards:** The threat of flash flooding can be foreseen by watching rain gages. There are many rain gages in Kane County that can be monitored.

Kane County also receives threat recognition information from the Illinois State Police who monitor the NOAA Weather Wire, or through monitoring of NOAA weather radios. The Illinois State Police disseminate weather threats through the LEADS system to 911 and other dispatch centers around the state. Police and fire stations, schools and other public facilities may also receive the LEADS alerts.

When conditions are appropriate, the Kane County OEM uses its formal organization of storm spotters. OEM conducts annual training on how to spot hazardous weather conditions and tornadoes. Hazardous weather is reported to the 911 Center.

### Rain Gage Website




Located in the Fox Valley Area

Fox River Watershed Real-Time USGS Gage Sites

**Welcome** to the Fox River Watershed Real-Time Gage Sites website. Here you will find links to each site's [gage information](#).

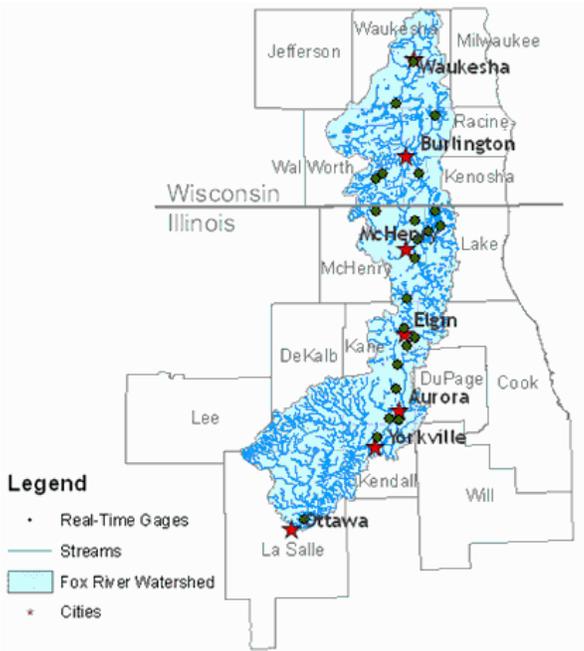
**Directions:** To access an individual site, click on its point on the map to the right and you will be linked to its [USGS real-time site](#).

**Flood Event Information:** USGS's Flood Event webpage is <http://il.water.usgs.gov/flooddata/>. Select the event date then type "0555" into the search box to retrieve all Kane County Fox River basin gage data.

**Questions** about the Fox River Watershed? Contact [Karen Kosky](#), Watershed Engineer

*This website was created on August, 2007 by Rob Kull in the Kane County Department of Environmental Management with assistance from Tom Nicoski at the Kane County GIS-Technologies Department.*

*Last Updated : 09/04/07  
By: Rob Kull*



**Legend**

- Real-Time Gages
- Streams
- Fox River Watershed
- ★ Cities

Source: [http://www.co.kane.il.us/kcstorm/FoxRiverGages/frg\\_main.htm](http://www.co.kane.il.us/kcstorm/FoxRiverGages/frg_main.htm)



**CRS credit:** Credit can be received for utilizing the gages listed on the previous page. The actual points are based on how much of the community’s floodplain is subject to flooding by the gauged stream. For example, South Elgin, being on the Fox River, would receive most of the possible credit while Elburn would receive none.

## 7.2. Warning

After the threat recognition system tells the OEM and municipalities that a flood, tornado, thunderstorm, winter storm or other hazard is coming, the next step is to notify the public and staff of other agencies and critical facilities. The earlier and the more specific the warning, the greater the number of people who can implement protection measures.

Hazards Addressed	
Y	Flood
Y	Tornado
	Earthquake
Y	Thunderstorm
Y	Winter storm

The National Weather Service issues notices to the public using two levels of notification:

- Watch:* conditions are right for flooding, thunderstorms, tornadoes or winter storms.
- Warning:* a flood, tornado, etc. has started or has been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- Outdoor warning sirens
- Sirens on public safety vehicles
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Door-to-door contact
- Mobile public address systems
- E-mail notifications



Multiple or redundant systems are most effective – if people do not hear one warning, they may still get the message from another part of the system. Each has advantages and disadvantages:

- Radio and television provide a lot of information, but people have to know when to turn them on.
- NOAA Weather Radio can provide short messages of any impending weather hazard or emergency and advise people to turn on their radios or televisions, but not everyone has a Weather Radio.

- Outdoor warning sirens can reach many people quickly as long as they are outdoors. They do not reach people in tightly-insulated buildings or those around loud noise, such as at a factory, during a thunderstorm, or in air conditioned homes. They do not explain what hazard is coming, but people should know to turn on a radio or television.
- Automated telephone notification services are also fast, but can be expensive and do not work when phone lines are down. Nor do they work for unlisted numbers and calling screener services, although individuals can sign up for notifications.
- Where a threat has a longer lead time (e.g., flooding along the Fox River), going door-to-door and manual telephone trees can be effective.

Just as important as issuing a warning is telling people what to do. A warning program should have a public information aspect. People need to know the difference between a tornado warning (when they should seek shelter in a basement) and a flood warning (when they should stay out of basements).

**Stormready:** The National Weather Service established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather related warnings for the public. To be officially StormReady, a community must:



- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

Being designated as a StormReady community by the Weather Service is a good measure of a community's emergency warning program for weather hazards. It is also credited by the Community Rating System.



**Local implementation:** The Kane County OEM and municipal emergency services are responsible for disseminating warning information to the public and notifying response personnel during an emergency. Once the threat is perceived, the County's 911 dispatch center then transmits the warnings to these offices, as well as schools, hospitals, government offices, business, and the general public through the following systems:

- The Emergency Alert Radio System (EARS) is a tone alert system designed to provide weather watch and warning information to schools, hospitals, government offices, business, and the general public.

- The Emergency Alert System (EAS) is a national warning system that utilizes broadcast radio and television stations and local cable television systems. In Kane County, activation of the EAS will only be initiated if the event affects a large area of the County such that it is impractical to warn affected residents using other means. The EAS works closely with radio stations WSCR (AM-670), WGN (AM-720), and WBBM (AM-780).
- The Emergency Alert System Emergency Management Network (EMnet). This is a satellite based digital state-wide messaging system that allows users to send secure messages to all six municipal Public Safety Answering Points, the county EOC and mobile command center, county fire departments, hospitals, and the County Health Department.
- Broadcast Fax, which has the capability of using 30 telephone lines to speed the faxes to the recipient list. A list of 150 recipients can be completed in just five minutes.
- Code RED is capable of placing up to 60,000 phone calls per hour to inform residents of what is taking place and provide important instructions on what to do next.

**Incorporated areas:** Municipalities are responsible for the installation and operation of warning sirens. Fire chiefs, mayors and police chiefs are authorized to activate these systems. Kane County OEM published *Guidelines for the Operation of Outdoor Warning Systems* to improve coordination and consistency in the use of sirens.

Aurora and South Elgin have provided most of their critical facilities (schools, hospitals, nursing homes and municipal facilities) with weather radios. Aurora also has its own municipally-owned AM station (1690) that broadcasts Weather Service notices and can be used to provide information to the public during and after a disaster.

**Rural areas:** Kane County OEM does not own or maintain any type of outdoor warning systems. Therefore, most unincorporated areas do not have warning sirens, although the Valley View subdivision has a siren which is operated by the city of St. Charles. For rural and unincorporated areas, Kane County OEM holds that the most effective means of warning are radio, television, and cable systems (EAS), the EARS tone alert radios and NOAA Weather Radios.

**NOAA Weather Radios**

NOAA Weather Radio is a nationwide network of radio stations that broadcasts warnings, watches, forecasts and other hazard information 24 hours a day. For Kane County, information comes from the National Weather Service office in Romeoville, Illinois.

NOAA weather radios can be very effective for notifying people, businesses, schools, care facilities, etc., of weather threats. They have a monitoring feature that issues an alarm when activated by the Weather Service.

OEM has recommended that all schools and manufactured home communities have Weather Radios. In 2002 the OEM received about 600 NOAA weather radios from IEMA. The radios were distributed to the Willow Lakes manufactured home community located in Elgin and to schools throughout the county.

**Special Needs Populations:** The Kane County Office of Emergency Management provides emergency and disaster early warning information on a request basis to special needs populations. Pocket paging services are available to provide emergency information to the hearing impaired. The AT&T Language Line is used, when appropriate, to provide emergency information to those who speak a foreign language.

**Stormready:** Kane County was Illinois' first StormReady County. Aurora has also received this recognition.



**CRS credit:** Community Rating System points are based on the number and types of warning media that can reach the community's floodprone population. Depending on the location, communities can receive up to 25 points for the sirens and the County's Emergency Alert Radio System and more points if there are additional measures, such as telephone trees. Being designated as a StormReady community can provide 25 more points.

### 7.3. Response

The protection of life and property is the foremost important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

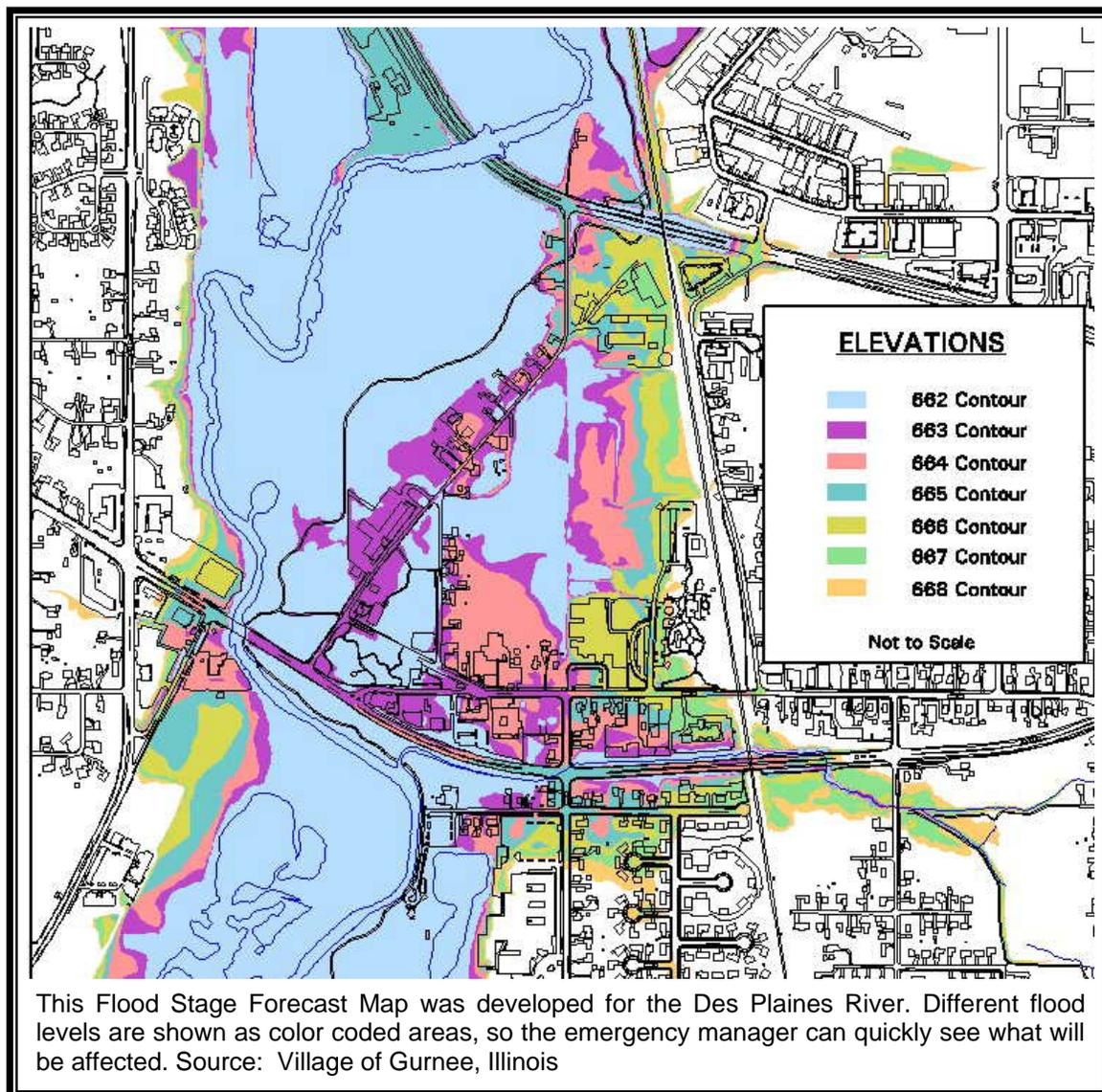
Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

- Activating the emergency operations center (emergency management)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (public works or Emergency Management)
- Ordering an evacuation (mayor or County Board Chairman)
- Holding children at school/releasing children from school (school district)
- Opening evacuation shelters (Red Cross or local authority)
- Monitoring water levels (engineering)
- Security and other protection measures (police)



An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Planning is best done with adequate data. One of the best tools is a flood stage forecast map that shows what areas would be under water at various flood stages (see example, below). Emergency management staff can identify the number of properties flooded, which roads will be under water, which critical facilities will be affected, etc.. With this information, an advance plan can be prepared that shows problem sites and determines what resources will be needed to respond to the predicted flood level.

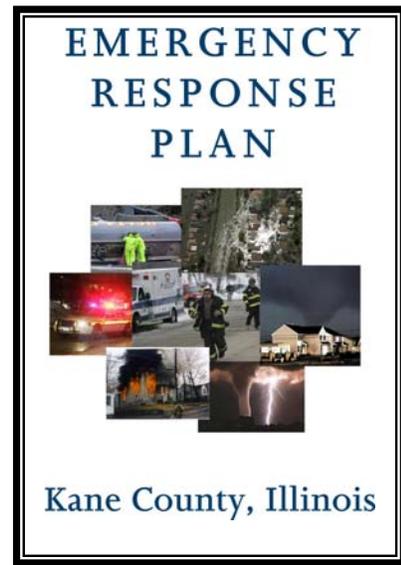


Emergency response plans should be updated annually to keep contact names and telephone numbers current and to make sure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner.



**Local implementation: Kane County:** The *Kane County Emergency Response Plan* is designed to present a common platform for coordination of major response activities for all types of natural and technological hazards. It establishes the Incident Management System which assigns responsibilities during a disaster, such as communications, evacuation and public health. Implementation of the plan relies on the combined effort of Kane County departments and municipal emergency management departments.

The *Emergency Response Plan* is augmented with annexes, standard operating procedures and other guidance documents that cover the details of various aspects of emergency response, such as communications, evacuation, sheltering, damage assessment, and severe weather



Annex P is specific to flooding. It includes checklists of things to do, but it is limited to the Fox River. It has a Pre-Emergency Operations Checklist with items like “Review county hazard analysis to determine possible locations of flood hazards.” The County should not wait for a flood to implement this checklist. Other checklists are more specific and keyed to various stages at the Algonquin gage.

**Kane County Municipalities:** Sixteen Kane County municipalities have or will have emergency operation plans. However, most are not as complete or as well organized as the County’s. State law requires an update and revision every two years, so many municipalities are currently in the process of plan development or revision. As communities update or develop plans, they are sent to OEM for review.

The table on the following page shows the office responsible for emergency response planning and management functions. Municipalities that do not have emergency operations plans rely on assistance from the Kane County Office of Emergency Management. If the severity or extent of an emergency were to exceed any municipality’s capability, the County is able to provide additional resources.



**CRS credit:** In its current configuration, the *Kane County Emergency Response Plan* and its Annex P would receive minimal CRS credit. Given the County’s geographic information system capabilities, a more effective annex that covered more areas of the County and more response activities is feasible and would qualify for more points.

<b>Kane County Emergency Management Plans and Emergency Operations Centers</b>					
<b>Community</b>	<b>Emergency Operations Plan</b>	<b>Office</b>	<b>Emergency Manager</b>	<b>Emergency Operations Center</b>	<b>Special Procedures for natural hazards?</b>
Kane County	Yes	Office of Emergency Management	Director of Office of Emergency Management	Public Safety Building	Flooding on the Fox River
Algonquin	under development	Police Department	Chief of Police	Village Hall	_____
Aurora	Yes	Community Safety	Emergency Management Coordinator	EMA Office, Police & Court Building	Yes
Batavia	No	ESDA	ESDA Director	Fire Station 1	No
Big Rock	No	_____	_____	_____	_____
Burlington	No	Fire Protection District	_____	Fire Protection District station	No
Campton Hills	under development	Police	_____	County	_____
Carpentersville	Yes	Fire	Fire Chief	Village Hall	No
East Dundee	No	_____	_____	County	No
Elburn	No	_____	County	County	_____
Elgin	Yes	Elgin OEM	Police Chief	Law Enforcement Facility	Dam failure plan
Geneva	Yes	ESDA	ESDA	Fire Station 1	No
Gilberts	under development	_____	_____	County	_____
Hampshire	Being revised	Village Manager	Trustee	Fire Protection District	Severe weather
Huntley	Yes	City Hall	Police Chief	County	_____
Lily Lake	No	_____	County	County	_____
Maple Park	No	_____	County	County	_____
Montgomery	Being revised	Police	Chief of Police	Police Station	No
North Aurora	No	Administration	Village Administrator	Fire Station	Severe weather
Pingree Grove	No	_____	County	County	_____
Sleepy Hollow	Being revised	ESDA	ESDA Coordinator	Village Hall	No
South Elgin	Yes	Emergency Management	EMA Director	City Hall	Advance notice of Fox flooding
St. Charles	Yes	ESDA	ESDA	City Hall	No
Sugar Grove	Yes	Police Department	Chief of Police	Village Hall	_____
Virgil	No	_____	County	County	_____
Wayne	No	Police Department	_____	Police Department	No
West Dundee	Yes	Fire Department	EMA Coordinator	Public Safety Center	Sever summer weather

ESDA = Emergency Services and Disaster Agency; EMA = Emergency Management Agency; OEM = Office of Emergency Management

## 7.4. Critical Facilities Protection

Critical facilities are discussed in Chapter 1. Protecting critical facilities during a disaster is the responsibility of the facility owner or operator. However, if they are not prepared for an emergency, the rest of the community could be impacted. If a critical facility is damaged, workers and resources may be unnecessarily drawn away from other disaster response efforts. If such a facility is adequately prepared by the owner or operator, it will be better able to support the community's emergency response efforts.

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

Most critical facilities have full-time professional managers or staff who are responsible for the facility during a disaster. Some have their own emergency response plans. Illinois state law requires hospitals, nursing homes, and other public health facilities to develop such plans. Many facilities would benefit from early warning, response planning, and coordination with community response efforts.



**Local implementation:** The County plan identifies emergency operations centers and hospitals. However, neither the County's nor most of the municipal plans have procedures for coordination with critical facilities during a warning or emergency response or for helping facility managers develop their own emergency response plans.

Aurora sends "first responders" and city crews to critical facilities. The City did this in the 1996 flood and will continue to do so, but it is not formally identified in its plan.



**CRS credit:** The Community Rating System gives the same weight to critical facility protection as it does to the rest of the community's flood response plan. CRS credit focuses on coordinating the community's efforts with the facilities' managers and helping them develop their own flood-specific emergency plans.

The County and the municipalities would receive 10 points for maintaining a current contact list. An additional 40 points are available if all the floodprone facilities developed their own flood response plans and coordinated them with government response efforts.

## 7.5. Post-Disaster Recovery and Mitigation

After a disaster, communities should undertake activities to protect public health and safety, facilitate recovery and help prepare people and property for the next disaster. Throughout the recovery phase, everyone wants to get "back to normal." The problem is, "normal" means the way they were before the disaster, exposed to repeated damage from future disasters.

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

Appropriate measures include the following:

Recovery actions

- Patrolling evacuated areas to prevent looting
- Providing safe drinking water
- Monitoring for diseases
- Vaccinating residents for tetanus
- Clearing streets
- Cleaning up debris and garbage
- Regulating reconstruction to ensure that it meets all code requirements

Mitigation actions

- Conducting a public information effort to advise residents about mitigation measures they can incorporate into their reconstruction work
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs
- Acquiring substantially or repeatedly damaged properties from willing sellers
- Planning for long term mitigation activities
- Applying for post-disaster mitigation funds

**Regulating reconstruction:** Requiring permits for building repairs and conducting inspections are vital activities to ensure that damaged structures are safe for people to re-enter and repair.

There is a special requirement to do this in floodplains, regardless of the type of disaster or cause of damage. The National Flood Insurance Program (and the County's stormwater ordinance) requires that local officials enforce the substantial damage regulations. These rules require that if the cost to repair a building in the mapped floodplain equals or exceeds 50% of the building's market value, the building must be retrofitted to meet the standards of a new building in the floodplain. In most cases, this means that a substantially damaged building must be elevated above the base flood elevation.

This requirement can be very difficult for understaffed and overworked offices after a disaster. If these activities are not carried out properly, not only does the community miss a tremendous opportunity to redevelop or clear out a hazardous area, it may be violating its obligations under the NFIP.



**Local implementation:** The Kane County OEM makes sure that federal, state and county regulations are implemented for health and safety. This includes the County Health Department testing water supplies and food services that were affected (Annex I of the *Kane County Emergency Response Plan*).

Annex G, Damage Assessment, of the County's *Emergency Response Plan*, provides a procedure for developing an inspection team and inspecting damaged structures and facilities. Building codes are to be enforced in unincorporated areas, and the annex highlights the need for municipalities to enforce their building codes. The pre-emergency checklist addresses floodplain regulations and mitigation opportunities. The recovery checklist also includes the following:

“Establish, if necessary, new ordinances and land use regulations to lessen the impact of future disasters. In the case of a flooding disaster this will be coordinated with the Kane County Stormwater Management Planning Committee.”

The larger municipalities have building inspection procedures through their building departments. West Dundee has the inspection procedures in its emergency plan. Geneva, St. Charles, Batavia, North Aurora and Elburn have signed a mutual aid agreement to help each other with building inspections after a disaster or emergency.

After the July 1996 flood, Montgomery created an “Ad-Hoc Flood Committee.”

The Ad-Hoc Flood Committee was established by the President and Board of Trustees to address the potential solutions introduced at a special public meeting held by the Village on August 21, 1996. The Village Board selected eight persons from the community to investigate the proposed solutions as to how best to prevent future flooding of homes and businesses located in the 100 year flood plain, prepare a recommendation and present them in this report. The following recommendations are the result of nine meetings plus extensive work by the staff of the Village. (*Report of the Ad-Hoc Flood Committee*, page 2)

The Committee met nine times over two months. It made eight recommendations, including acquiring and clearing flooded areas, drainage improvements, retrofitting, and increased upstream storage. The work paid off as Montgomery received one of the largest acquisition grants from the 1996 disaster.

## 7.6. Conclusions

1. The flood threat recognition system is best on the Fox River. For other streams, local officials will have to augment the National Weather Service's general statements of possible flooding and utilize the rain gage network.
2. The threat recognition system for severe weather hazards (tornadoes, thunderstorms, and winter storms) is as effective as the County can have for the cost.
3. The procedures and media that the County and municipalities use to disseminate warnings are adequate for the urbanized areas, but additional media improve the likelihood that people will receive a warning in time.

4. The *Kane County Emergency Operations Plan* and its municipal counterparts have overall guidance on responding to many different kinds of hazards. There are only a few additional documents that provide specific guidance for responding to individual natural hazards.
5. Some emergency response plans do not cover critical facilities that will be affected by various types of hazards.
6. There are no specific plans or guidance documents on post-disaster inspections and capitalizing on post-disaster mitigation opportunities.

## 7.7. Recommendations

1. Each community should appoint an emergency management coordinator or liaison to ensure smooth communications before, during and after warnings and emergencies.
2. The County and the individual municipalities should consider whether the exposure to flooding on their smaller streams warrants a local rain and stream gauging and flood threat recognition system.
3. The County should evaluate whether to increase the number of rain gages in the western townships and tie them all together to improve the warning capabilities for flash flooding. The data collected would also help in evaluating and designing storm drainage works.
4. Additional warning media are needed to advise people in the rural areas in a timely manner.
5. The public should be educated on what the sirens and warnings mean and what steps they should take to protect themselves, pursuant to the County's *Guidelines for the Operation of Outdoor Warning Systems*.
6. County and municipal emergency managers should review their emergency response plans and programs and:
  - a. Identify where additional activities are needed to respond to natural hazards. Flood stage forecast maps would help in areas subject to flooding.
  - b. Ensure they have access to information on all critical facilities and update that information annually.



- c. Incorporate post-disaster procedures for public information, reconstruction regulation and mitigation project identification.
- d. Conduct a table top exercise at least once a year (as required by State law).

## **7.8. References**

1. *CRS Coordinator's Manual*, Community Rating System, FEMA, 2002
2. *CRS Credit for Flood Warning Programs*, FEMA, 1999
3. *Flood Fighting*, Illinois Department of Transportation, Division of Water Resources, 1985.
4. *Guidelines for the Operation of Outdoor Warning Systems*, Kane County Office of Emergency Management, 2003.
5. *Guidelines on Community Local Flood Warning and Response Systems*, Federal Interagency Advisory Committee on Water Data, 1985
6. Information on StormReady communities can be found on the National Weather Service website, [www.nws.noaa.gov/stormready/](http://www.nws.noaa.gov/stormready/)
7. *Kane County Emergency Operations Plan*, Kane County Office of Emergency Management, 2003.
8. *Post-Flood Mitigation Procedures*, Village of South Holland, Illinois, 1997.
9. *Report of the Ad-Hoc Flood Committee*, Montgomery, Illinois, October 1996.

## Chapter 8. Structural Projects

Structural projects are usually funded by public agencies and constructed to protect people and infrastructure for damage due to natural hazards. Floodwater management is the primary focus of structural projects.

Structural projects have traditionally been used by communities to control or manage floodwaters. Structural projects keep flood waters away from an area. They are usually designed by engineers and managed or maintained by public works staff. Six approaches are reviewed in this chapter:

- Reservoirs and detention
- Levees and floodwalls
- Channel improvements
- Crossings and roadways
- Drainage and storm sewer improvements
- Drainage system maintenance

Structural projects offer advantages not provided by other measures, but as shown below, they also have shortcomings. The appropriateness of using structural flood control depends on individual project area circumstances.

<b>Pros and Cons of Structural Flood Control Projects</b>	
<u>Advantages</u>	<u>Shortcomings</u>
May provide the greatest amount of protection for land area used.	They disturb the land and disrupt natural water flows, often destroying wildlife habitat.
Because of land limitations, may be the only practical solution in some circumstances.	They require regular maintenance, which if neglected, can have disastrous consequences.
Can incorporate other benefits into structural project design such as water supply and recreational uses.	They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage.
Regional detention may be more cost-efficient and effective than requiring numerous small detention basins.	They can create a false sense of security as people protected by a project often believe that no flood can ever reach them.  Although it may be unintended, in many circumstances they promote more intensive land use and development in the floodplain.

Since structural flood control is generally the most expensive type of mitigation measure in terms of installation costs, maintenance requirements and environmental impacts, a thorough alternative assessment should be conducted before choosing a structural project.

In some circumstances smaller flood control measures may be included in a package of several recommended measures for a project area where non-structural measures would not be practical or effective.

Larger structural flood control projects have regional or watershed-wide implications and can be very expensive. Because of this, they are often planned, funded and implemented at a regional level by agencies, such as the Kane County Environmental and Building Management Department, the Illinois Department of Natural Resources, Office of Water Resources, the U.S. Army Corps of Engineers, and the USDA Natural Resources Conservation Service. Much of these agencies' work has been coordinated over the past 25 years by the Resource Coordination Policy Committee, an informal organization of watershed steering committees and government agencies.

Over the years, flood control studies have been conducted for the Fox River, Indian Creek and Blackberry Creek. Other Kane County watersheds have been studied by the agencies listed above, but the purpose of those studies has been to map the 100-year floodplain, not determine how to control floodwaters. The following flood control studies have been published:

- *Restudy of the Indian Creek Watershed*, V3 Companies of Illinois, Ltd., for Illinois Department of Natural Resources, Office of Water Resources, April 29, 2005, Revised March 3, 2006
- *Continuous Hydrologic Simulation and Flood-Frequency, Hydraulic, and Flood-Hazard Analysis of the Blackberry Creek Watershed, Kane County, Illinois*, United States Geological Survey, Report # 2005-5270.
- *Blackberry Creek Watershed Management Plan*, Blackberry Creek Watershed Resource Planning Committee, September 1999.
- *Our Community and Flooding, A Report on the Status of Floodwater Management in the Chicago Metropolitan Area*, Resource Coordination Policy Committee, 1998. This covers activities on the Fox River and two small areas of watersheds on the County's eastern boundary, Poplar Creek and the DuPage River.
- *Chain of Lakes Tributary (of Blackberry Creek) Floodplain Evaluation for the City of Aurora*, Consoer Townsend Envirodyne Engineers, Inc., January 1998.
- Village of South Elgin, Illinois, 2001 Eastside Stormwater Master Plan, Baxter & Woodman Consulting Engineers, October 2001.

These reports form the basis of the findings and recommendations in this chapter.



**CRS criteria:** The Community Rating System provides flood insurance discounts to those communities that implement various floodplain management activities that meet certain criteria. Comparing local activities to those national criteria helps determine if local activities should be improved. Structural flood control projects that provide 100-year flood protection and result in revisions to the

Flood Insurance Rate Map are not credited by the CRS in order to not duplicate the larger premium reduction provided by removing properties from the mapped floodplain.

In 2002, the CRS began crediting structural flood control projects that meet the following criteria:

- They must provide protection to at least the 25-year flood
- The design and construction must be certified by a licensed professional engineer
- They must meet certain environmental protection criteria
- They must meet Federal, State and local regulations, such as Corps of Engineers’ 404 permit and State dam safety rules requirements
- They must meet certain maintenance requirements

These criteria ensure that credited projects are well-planned and permitted. Any of the first five measures reviewed in this chapter would be recognized under Section 531 of the *CRS Coordinator's Manual*. Credit points are based on the type of project, how many buildings are protected, and to what flood protection level.

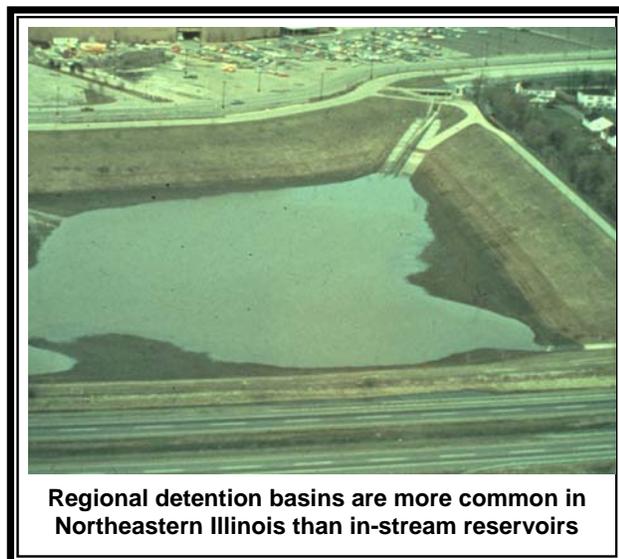
## 8.1. Reservoirs and Detention

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower the flood height by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could help mitigate a drought).

Reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the impacts of new development (i.e., more runoff).



Regardless of size, reservoirs protect the development that is downstream from the reservoir site. Unlike levees and channel modifications, they do not have to be built close to or disrupt the area to be protected.

Reservoirs are most efficient in deeper valleys where there is more room to store water, or on smaller rivers where there is less water to store.

In urban areas, some reservoirs are simply manmade holes, excavated to store floodwaters (see photo, previous page). In some areas, costs have been reduced by using abandoned quarries as reservoirs. Reservoirs in urban areas are typically constructed adjacent to streams (though usually outside of the floodplain). When built in the ground, there is no dam for these retention and detention basins and no dam failure hazard. Wet or dry basins can also serve multiple uses by doubling as parks or other open space uses.

There are several considerations when evaluating use of reservoirs and detention:

- There is the threat of flooding the protected area should the reservoir’s dam fail.
- There is a constant expense for management and maintenance of the facility.
- They may fail to prevent floods that exceed their design levels.
- Sediment deposition may occur and reduce the storage capacity over time.
- They can impact water quality as they are known to affect temperature, dissolved oxygen and nitrogen, and nutrients.
- If not designed correctly, they may cause backwater flooding problems upstream.



**Local implementation:** Several reservoirs have been built or are being planned. The larger ones are discussed here.

*Fox River Watershed.* The McHenry Lock and Dam in McHenry County controls the flows of the Fox River as it enters Kane County. The Lock and Dam is owned and operated by the Illinois Department of Natural Resources, Office of Water Resources. The Lock and Dam’s function is twofold. The McHenry Dam controls the water level of the Fox Chain-of-Lakes in Lake and McHenry Counties, which allows for boating and other recreation in the lakes. The McHenry Dam also allows the Chain-of-Lakes to act as a reservoir which controls the flows of the Fox River into Kane County to alleviate flooding. This dual purpose means that the upstream needs and the downstream needs have to be balanced with one another in severe flood conditions.

*Blackberry Creek Watershed.* In 2001, Aurora completed a reservoir and channel improvement project on Blackberry Creek from Galena Road to Jericho Road. The project protects over 150 homes in the Cherry Hills and San Souci Subdivisions. A series of lakes were constructed along the course of Blackberry Creek which provide 100-year flood storage (see photo). The project was enhanced by new pedestrian bridges for



the Illinois Prairie Path and by the development of wetland areas. The total project cost including bridge replacements and storm sewer improvement was \$2.5 million.

Currently, a Class I dam is proposed along Blackberry Creek Tributary D in Elburn as part of a development. If constructed as currently designed, the dam and the impoundment will provide regional flood control benefits.

*Indian Creek Watershed.* A flood control reservoir, located adjacent to Indian Creek and east of Farnsworth Road (south of Molitor Road), was completed in 1992 in the northeast portion of Aurora,. This 100-year capacity reservoir (310 acre-feet), protects 130 homes in Aurora and Aurora Township. It has performed well since its construction, though in the July 1996 flood it was completely inundated. The project was funded by the IDNR Office of Water Resources and sponsored by the City of Aurora. The estimated project cost was \$5.4 million.

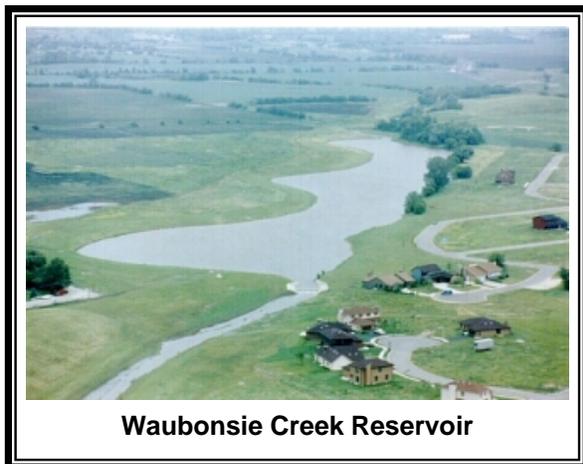
Also in the Indian Creek watershed, in 2004, a second major flood control and wetland restoration project was completed. As part of the Chicago Chelsea Mall development, a flood control project was constructed consisting of 80 acres of wetland mitigation, and 32 acre-feet of detention storage volume. The resulting project has helped remove additional downstream structures from the floodplain and keep residents dry during storm events.

*Mill Creek Watershed.* A wetland-detention project was constructed in 2002 along the McKee Tributary of Mill Creek in Batavia. This project served a dual purpose of protecting 50 to 75 existing homes from floodwaters and also served as the required detention for new development in the area. As development occurs around the area, developers reimburse Batavia for their share of the project. The design of the detention and wetlands allowed for the consolidation of 60 acres of greenspace and wetlands.

*Waubonsie Creek Watershed.* In 1984, the Oakhurst Lake-Patterson Lake reservoir and wetland project was completed in the Oakhurst Forest Preserve in Aurora. The reservoir was a joint project between the City of Aurora, the Kane County Forest Preserve and the Fox Valley Park District and was constructed to allow for separation of storm and sanitary sewers in the neighborhoods to the west of the Forest Preserve.

In 1979, a 50 acre-feet reservoir was completed along Waubonsie Creek in conjunction with a levee project to protect 60 – 100 homes in the Park View Estate and Marberry Manor subdivisions in the Village of Montgomery. The project was funded by IDNR's Office of Water Resources and sponsored by the Village.

The reservoir capacity was exceeded during the July 1983 flood event and both the reservoir and the levee were over-



**Waubonsie Creek Reservoir**

topped by the July 1996 flood. Though designed to the 100-year event (using TP-40) in 1979, the reservoir and the levee are no longer considered to be providing 100-year protection. This is due to an increased 100-year rainfall standard being used today (ISWS Bulletin 70 rainfall) and the significant upstream development in the watershed. Following the 1996 flood about 30 homes in the Park View Estates subdivision were acquired by Montgomery through a mitigation grant from IEMA.

*Countywide.* Since November 2000, detention has been required for all new development in Kane County. This means that small reservoirs are located throughout each watershed in conjunction with new residential and business development.

## 8.2. Levees and Floodwalls

Probably the best known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
	Thunderstorm
	Winter storm

Key considerations when evaluating use of a levee include:

- Removal of fill to compensate for the floodwater storage that will be displaced by the levee
- Internal drainage of surface flows from the area inside the levee.
- Cost of construction
- Cost of maintenance
- River access and views
- Creating a false sense of security (while levees may reduce flood damage for smaller more frequent rain events, they may also overtop or breach in extreme flood events and subsequently create more flood damage than would have occurred without the levee)

Levees placed along the river or stream edge degrade the aquatic habitat and water quality of the stream. They also are more likely to push floodwater onto other properties upstream or downstream. To reduce environmental impacts and provide multiple use benefits a setback levee (set back from the floodway) is the best project design. The area inside a setback levee can provide open space for recreational purposes and provide access sites to the river or stream.

Floodwalls perform like levees except they are vertical-sided structures that require less surface area for construction. Floodwalls are constructed of reinforced concrete, which makes the expense of installation cost prohibitive in many circumstances. Floodwalls also degrade adjacent habitat and can displace erosive energy to unprotected areas of shoreline downstream.



**Local implementation:** In 1979, a 3,000 foot levee was constructed in conjunction with the reservoir project along Waubonsie Creek discussed on the previous page. The project was funded by the IDNR Office of Water Resources

and sponsored by the Village of Montgomery.

Though having been designed to provide 100-year flood protection in 1979, the levee is now considered to provide a lower level of protection. It was overtopped during the July 1996 flood. Following the 1996 flood about 30 homes in the Park View Estates subdivision were acquired by Montgomery through a mitigation grant from IEMA.

To bring it up to current standards, it would have to be raised four feet and other improvements would have to be made. The entire project would cost over \$1.8 million.



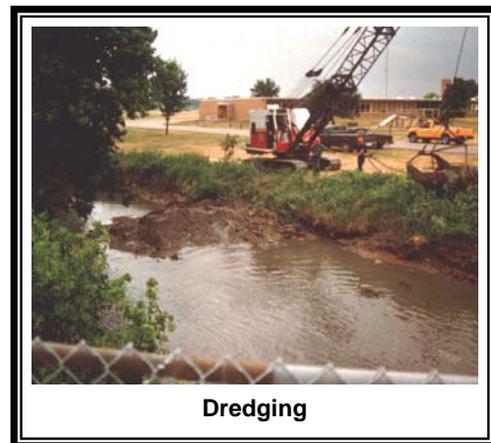
### 8.3. Channel Improvements

By improving channel's conveyance, more water is carried away at a faster rate. Three types of channel improvements are reviewed here: dredging the channel bottom; projects that make the channel wider, straighter or smoother; and diversion of high flows to another channel or body of water.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

**Dredging** is often viewed as a form of conveyance improvement. However, it has the following problems:

- Given the large volume of water that comes downstream during a flood, removing a foot or two from the bottom of the channel will have little effect on flood heights.
- Dredging is often cost prohibitive because the dredged material must be disposed of somewhere.
- Unless instream and/or tributary erosion are corrected upstream, the dredged areas usually fill back in within a few years, and the process and expense have to be repeated.
- If the channel has not been disturbed for many years, dredging will destroy the habitat that has developed.



- To protect the natural values of the stream, Federal law requires a Corps of Engineers permit before dredging can proceed. This can be a lengthy process that requires much advance planning and many safeguards to protect habitat.

Straightening, deepening and/or widening a stream or river channel, commonly referred to as “**channelization**” has traditionally been the common remedy for local drainage or flooding problems. Here are the concerns with this approach that need to be kept in mind:



**Channel work**

- Channelized streams can create or worsen flooding problems downstream as larger volumes of water are transported at a faster rate.
- Channelized streams rise and fall faster. During dry periods the water level in the channel is lower than it should be, which creates water quality problems and degrades habitat.
- Channelized waterways tend to be unstable and experience more streambank erosion. The need for periodic reconstruction and silt removal becomes cyclic, making channel maintenance very expensive.

On the other hand, properly sloped and planted channel banks are more aesthetically and environmentally appealing, and can prove cheaper to maintain than concrete ditches. See also the example on page 8-11.

A **diversion** is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During flood flows, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

Diversions are limited by topography; they will not work in some areas. Unless the receiving water body is relatively close to the floodprone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive. Where topography and land use are not favorable, a more expensive tunnel is needed.



**Local implementation:**

*Blackberry Creek Watershed.* In the southwest area of the City of Aurora, channel improvements were made along Blackberry Creek from Manchester Road to Jericho Road. These improvements were made in conjunction with the reservoir and lakes project constructed south of the Cherry Hills Subdivision and west of Orchard Road (see page 8-4). The reservoir and channel improvement were completed in 2001. They were constructed to protect homes in the Cherry Hills and San Souci Subdivisions.

In Montgomery, a rerouting of the Blackberry Creek overflow through Crescent Lake would relieve flooding in the area due to the undersized culverts at U.S. Route 30. Residential flooding occurs as the Blackberry Creek overflow floodwaters make their way to the Fox River. This project is under consideration and is not yet included in Montgomery's capital improvement plan.

*Indian Creek Watershed.* In northeast part of Aurora, a channel improvement project was constructed along Indian Creek from the I-88 Toll Road to Molitor Road and Molitor Road to Farnsworth Road. Around 8,400 feet of channel were modified and this, in conjunction with the reservoir project, protects 130 homes in Aurora and Aurora Township. This project was completed in 2002 and was funded by the IDNR Office of Water Resources and sponsored by the City of Aurora.

Also in the Indian Creek watershed, in 2004, a second major flood control and wetland restoration project was completed. As part of the Chicago Chelsea Mall development, a farmed ditch was re-meandered to a more natural historical flow pattern through an ecological corridor providing 200 additional acre feet of regional floodplain storage volume.

*Ferson-Otter Creek Watershed:* In 1982, a channel improvement project was completed along Otter Creek to protect properties in Elgin. Almost 5,300 feet of channel were modified. The project was funded by the IDNR Office of Water Resources and sponsored by the City of Elgin.

*Tyler Creek Watershed.* In unincorporated Kane County, the portion of the north branch of Tyler Creek from north of I-90 to west of the Union Pacific Railroad was dredged in 2001 to improve flow through the stream below the Windmill Meadow Subdivision. The \$22,000 cost of this project was shared between the Kane County Water Resources Department and the Village of Gilbert.

In 2003, a 1,500 feet channel dredging project is planned for the unincorporated section of the north branch of Tyler Creek from north of U.S. Route 20 to the Almora Heights Subdivision in Elgin to improve drainage. The cost estimate for the project is \$20,000.

*Eakin Creek Watershed.* In Rutland Township, the Kane County Water Resources Department dredged 3,700 feet of the South Branch of the Kishwaukee River near the Landing Subdivision in 2000. The cost of \$20,000 was shared between the County, the homeowners and the Landings Airport.

## 8.4. Crossings and Roadways

In some cases buildings may be elevated above floodwaters but access to the building is lost when floodwaters overtop local roadways, driveways, and culverts or ditches. Several of these are listed in Chapter 2. Depending on the recurrence interval between floods, the availability of alternative access, and the level of need for access, it may be economically justifiable to elevate some roadways and improve crossing points.

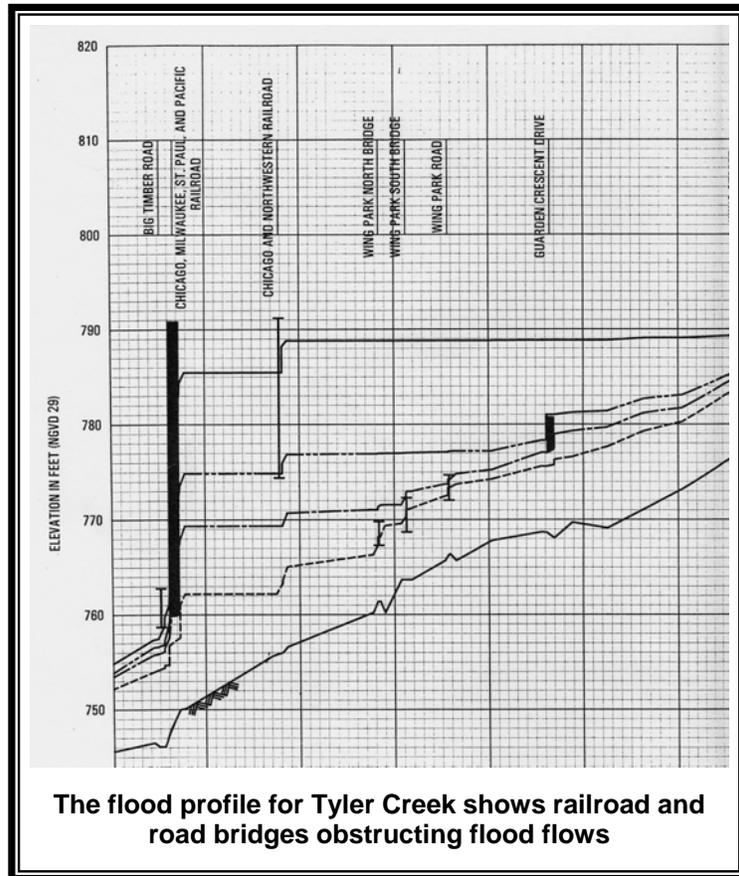
Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

For example, if there is sufficient downstream channel capacity, a small culvert that constricts flows and causes localized backwater flooding may be replaced with a larger culvert to eliminate flooding at the waterway crossing point. The potential for worsening adjacent or downstream flooding needs to be considered before implementing any crossing or roadway drainage improvements.



**Local implementation:** The following bridge or culvert improvement projects have been identified:

- Orchard Road in the Blackberry Creek watershed in Aurora. A widening of the bridge is being planned by Kane County Department of Transportation (KDOT).
- The replacement of the culvert under the Union Pacific Railroad at the Metra Station in Elburn at Blackberry Creek has been planned.
- The replacement of the culvert under the Union Pacific Railroad at Welch Creek in Elburn is being planned.
- Double 18-inch concrete culverts were replaced with double 36-inch concrete culverts on No Name Creek in East Dundee in 2002 . East Dundee has additional plans to replace double 18-inch CMP culverts about 100 feet upstream of this location.
- The improvement of the McCornack Road bridge over Tyler Creek is being planned in Rutland Township.
- Scott Road bridge at Welch Creek was replaced by KDOT following the 1996 flood (cost of \$268,000).
- The Eagle Road bridge at Tyler Creek could be elevated to prevent it from being overtopped during large flood events.



## 8.5. Drainage and Storm Sewer Improvements

Man-made ditches and storm sewers help drain areas where the surface drainage system is inadequate, or where underground drainageways may be safer or more practical. Storm sewer

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

improvements include installing new sewers, enlarging small pipes, and preventing back flows. Particularly appropriate for depressions and low spots that will not drain naturally, drainage and storm sewer improvements usually are designed to carry the runoff from smaller, more frequent storms.

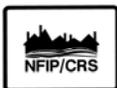
Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving stream or river has sufficient capacity to handle the additional volume and flow of water. To reduce the cumulative downstream flood impacts of numerous small drainage projects, additional detention or run-off reduction practices should be provided in conjunction with the drainage system improvements.

A combination of restored wetland detention, vegetated swales, infiltration trenches and other best management practices that increase infiltration (reducing runoff), and improve water quality can be implemented in conjunction with stormwater system improvements. As shown in the photos below, these projects can have multiple benefits.



**Local implementation:** Aurora and East Dundee have plans to do additional local drainage system improvements in the Blackberry Creek and Fox River watersheds, respectively. These efforts are to alleviate problems during heavy local rains.

The Kane County Water Resources Department addresses existing drainage problems in the unincorporated areas of the county. Drainage problems are evaluated and prioritized depending on the severity of the problem. The Water Resources Department can provide technical assistance and cost sharing on certain drainage improvement projects.



**CRS Criteria:** The Community Rating System credits capital improvement plans that fund drainage improvements that reduce the need for maintenance or that eliminate bottlenecks, logjams and other maintenance problems. Up to 50 points are provided.

## 8.6. Drainage System Maintenance

The drainage system may include detention ponds, stream channels, swales, ditches and culverts. Drainage system maintenance is an ongoing program to clean out blockages caused by an accumulation of sediment or overgrowth of weedy, non-native vegetation or debris, and remediation of streambank erosion sites.

Hazards Addressed	
Y	Flood
	Tornado
	Earthquake
Y	Thunderstorm
	Winter storm

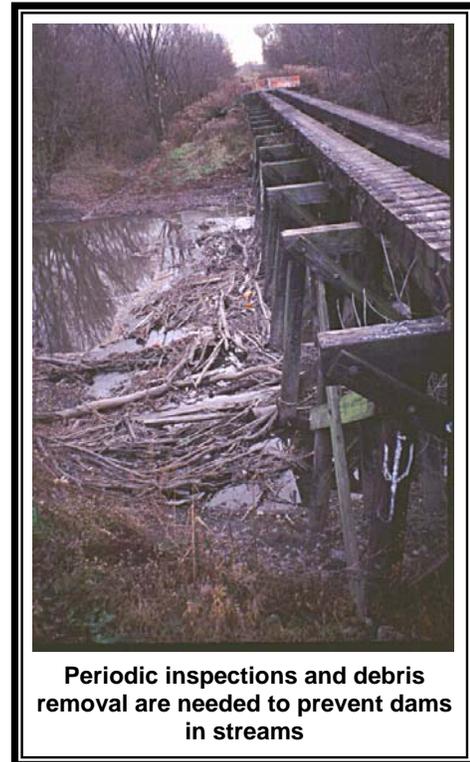
“Debris” refers to a wide range of blockage materials that may include tree limbs and branches that accumulate naturally, or large items of trash or lawn waste accidentally or intentionally dumped into channels, drainage swales or detention basins. Maintenance of detention ponds may also require revegetation or repairs of the restrictor pipe, berm or overflow structure.

Maintenance activities normally do not alter the shape of the channel or pond, but they do affect how well the drainage system can do its job. Sometimes it is a very fine line that separates debris that should be removed from natural material that helps form habitat. Therefore, written procedures that are consistent with state laws and environmental concerns are usually needed.

Government agencies usually accept responsibility for maintaining facilities on public property. However, in Illinois, the responsibility for drainage way maintenance on private property, when no easements have been granted, is with the individual private property owner. This often results in very little maintenance being accomplished.



**Local implementation:** Kane County and municipalities have maintenance responsibility over drainageways under their jurisdiction. Most Kane County communities inspect drainage systems and provide maintenance on an as needed basis. South Elgin has an annual program for cleaning drainage systems located downstream of detention basins. East Dundee is planning to formalize their stream maintenance program over the next year.



In the case of detention ponds, a property owners' association or the owner is responsible for maintenance on residential developments or commercial properties. Detention ponds on public properties are maintained by the appropriate government jurisdiction.



**CRS Criteria:** Community Rating System credit is provided for a formal drainage system inspection and maintenance program with published procedures that clearly identify what can be removed and what “debris” should be allowed to stay in natural channels. Up to 250 points are possible, but communities (like the County) that do not have formal written procedures and/or only respond on an as needed basis will not receive the credit.

## 8.7. Conclusions

1. Structural projects, especially reservoirs and channel improvements, have been used effectively to reduce flooding in urbanized areas of the county. They could be used further to address additional floodwater management areas of concern. However, it should be understood that they can have adverse impacts on downstream properties and on the environment. They can also be very expensive.
2. There are many locations where bridge or culvert replacement or enlarging would reduce flood heights. However, as with structural projects, such work could increase flood problems downstream.
3. Local drainage and stormwater flooding (both in and outside the floodplain) would benefit from drainage system improvements and a formalized drainage maintenance program.

## 8.8. Recommendations

1. Structural flood control projects, including farm drainage and bridge and culvert improvements, should be pursued, provided they meet the following criteria:
  - a. Each project's study looks beyond the immediate project site to ensure that no other properties will be adversely impacted.
  - b. Each project should be based on a watershed master plan or, at a minimum, coordinated with other projects in the same watershed.
  - c. Each project's study considers protecting the natural functions of the stream and floodplain, in addition to flood protection.
  - d. Each project's study considers alternative non-structural approaches to protect the affected properties from flood damage.
  - e. The design and construction is certified by a licensed professional engineer.
  - f. Opportunities for stream and natural areas restoration are incorporated wherever feasible.

- g. Communities and property owners that may be affected by the project are notified.
  - h. All relevant federal, state and local permits are obtained, including Corps of Engineer's 404 permits and IDNR floodway permits.
2. Each municipality and the Kane County Environmental Management Department should implement a formal and regular drainage system maintenance program modeled on CRS program guidance.

## **8.9. References**

1. *Blackberry Creek Watershed Management Plan*, Blackberry Creek Watershed Resource Planning Committee, September 1999.
2. *Chain of Lakes Tributary Floodplain Evaluation for the City of Aurora*, Consoer Townsend Envirodyne Engineers, Inc., January 1998.
3. *CRS Coordinator's Manual*, Community Rating System, FEMA, 2002
4. *CRS Credit for Drainage System Maintenance*, FEMA, 2002
5. *Flood Insurance Study, Kane County, Illinois and Incorporated Areas*, Federal Emergency Management Agency, December 20, 2002.
6. *Floodplain Management Study, Blackberry Creek and Tributaries*, USDA Natural Resources Conservation Service, June 1989.
7. *Floodplain Management Study, Indian Creek and Tributaries*, USDA Natural Resources Conservation Service, February 1986.
8. *Our Community and Flooding, A Report on the Status of Floodwater Management in the Chicago Metropolitan Area*, Resource Coordination Policy Committee, 1998.
9. Survey of municipalities and County offices, Spring, 2003.
10. *Village of South Elgin, Illinois, 2001 Eastside Stormwater Master Plan*, Baxter & Woodman Consulting Engineers, October 2001.

## Chapter 9. Public Information

A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take the steps necessary to protect themselves and others.

This chapter starts with activities that reach out to people and tell them to be advised of the hazard and some of the things they can do. It then covers additional sources of information for those who want to learn more.

### 9.1. Outreach Projects

Technical assistance and library resources are not of much use if no one knows they exist. An outreach project can remedy this. Sending notices to property owners can help introduce the idea of property protection and identify sources of assistance.

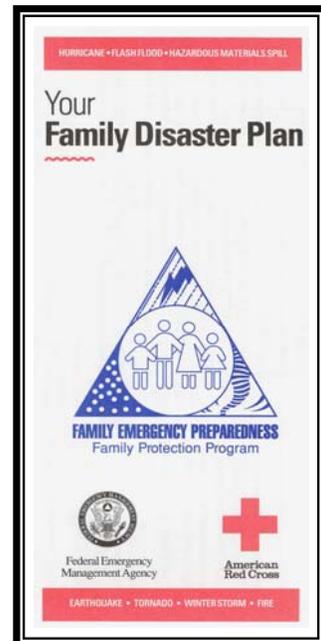
Outreach projects are the first step in the process of orienting property owners to property protection and assisting them in designing and implementing a project. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

**Community newsletters/direct mailings:** The most effective types of outreach projects are mailed or distributed to everyone in the community or, in the case of floods, to floodplain property owners.

Research has proven that outreach projects work. However, awareness of the hazard is not enough; people need to be told what they can do about the hazard, so projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

**News media:** Local newspapers can be strong allies in efforts to inform the public. Press releases and story ideas may be all that's needed to whet their interest. After a tornado in another community, people and the media become interested in their tornado hazard and how to protect themselves and their property. Local radio stations and cable TV channels can also help. These media offer interview formats and cable may be willing to broadcast videos on the hazards.

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm



**Other approaches:** Examples of other approaches include:

- Presentations at meetings of neighborhood, civic or business groups,
- Displays in public buildings or shopping malls,
- Signs in parks, along trails and on waterfronts that explain the natural features (such as the river) and their relation to hazards (such as floods),
- Brochures available in municipal buildings and libraries, and
- Special meetings such as floodproofing open houses.



**Local implementation:** Most communities in Kane County use a newsletter to communicate with their residents. They are listed in the table on the next page.

Hazard information and protection advice have been included. Articles, such as Sugar Grove's (below), also address technical assistance provided by community staff and any financial assistance that may be available. During a disaster these brochures are available for any library or community center.

The Village of South Elgin has a quarterly newsletter and regularly provides information on protective measures hazards that could affect the community and.

Feb/March 2008 Newsletter  
Protect Your Property against Flood Loss

April-May 2008  
Be Aware of Severe Weather Warnings

The American Red Cross has a variety of brochures and publications on safety measures to take for fires, floods, winter storms, heat, etc. Their publications are tailored for different age groups. The Red Cross also conducts specialized programs on topics such as "home alone safety," first aid and CPR, and what to do

The May 2006 issue of Sugar Grove's newsletter contained the following:

**W e a t h e r W a t c h**

The Village of Sugar Grove would like to remind residents to be observant when there is the possibility of severe weather. If threatening weather approaches, seek shelter in a basement or interior room. If you are outdoors, seek shelter in a ditch or low-lying area. Do not try to outrun a storm. The Village and surrounding areas are equipped with outdoor warning sirens that are activated in the event of approaching severe weather. The primary purpose of these sirens is to warn anyone that may be outdoors to seek shelter from the approaching storm. The National Weather Service tracks weather and broadcasts weather information 24 hours a day, seven days a week. National Weather Service broadcasts can be received on weather alert radios. Weather alert radios can provide immediate notification of severe weather or other emergencies by activating a tone when a watch or warning is issued. Weather alert radios are available at many electronic and department stores. You can also purchase a Weather Alert Radio from the Sugar Grove Police Department. Please call the Sugar Grove Police Department non-emergency number at 630/466-4526 for information. The Village also reminds you to remember these weather words:

A Severe Thunderstorm or Tornado **Watch** means that conditions are favorable for the development of severe weather, please listen to local radio or television stations for changes in status.

A Severe Thunderstorm or Tornado **Warning** means that a storm has been spotted or is indicated on radar and that you should take shelter immediately.

Kane County Public Information Activities				
Municipality	Community newsletter	Website	Website links for hazards	Technical assistance
Algonquin	Yes	Yes	Yes	No
Aurora	Yes	Yes	Yes	Yes
Batavia	Yes	Yes	Yes	Yes
Big Rock	Yes	Yes	Yes	No
Burlington	No	No	N/A	No
Campton Hills	Yes	Yes	Yes	No
Carpentersville	Yes	Yes	No	No
East Dundee	Yes	Yes	No	Yes
Elburn	No	Yes	No	No
Elgin	Yes	Yes	No	Yes
Geneva	Yes	Yes	Yes	Yes
Gilberts	Yes	Yes	Yes	Yes
Hampshire	No	Yes	No	No
Huntley	Yes	Yes	No	Yes
Kane County	No	Yes	Yes	Yes
Kaneville	No	Yes	No	No
Lily Lake	Yes	No	N/A	No
Maple Park	Yes	Yes	No	No
Montgomery	Yes	Yes	No	Yes
North Aurora	Yes	Yes	No	Yes
Pingree Grove	Yes	Yes	No	No
Sleepy Hollow	Yes	Yes	No	No
South Elgin	Yes	Yes	No	Yes
St. Charles	Yes	Yes	No	Yes
Sugar Grove	Yes	Yes	Yes	No
Virgil	No	No	No	No
Wayne	Yes	No	N/A	No
West Dundee	Yes	Yes	No	No



**CRS credit:** The Community Rating System provides up to 290 points for outreach projects on flood topics. 100 of those points are for having a public information program strategy. This *Plan* qualifies for the strategy credit (see Section 9.6).

## 9.2. Real Estate Disclosure

Many times after a flood or other natural disaster, people say they would have taken steps to protect themselves if only they had known they had purchased a property exposed to a hazard. Three

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

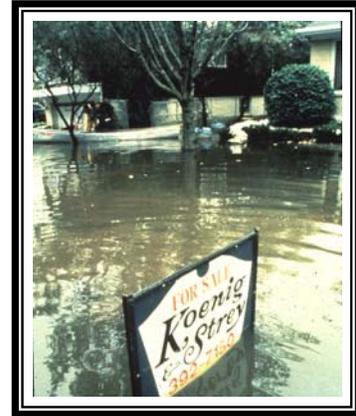
regulations, one federal and two state, require that a potential buyer of a parcel be told of their exposure to a hazard.

*Federal law:* Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building that the property is in a floodplain as shown on the Flood Insurance Rate Map.

Flood insurance is required for buildings located within the base floodplain if the mortgage or loan is federally insured. However, because this requirement has to be met only 10 days before closing, often the applicant is already committed to purchasing the property when he or she first learns of the flood hazard.

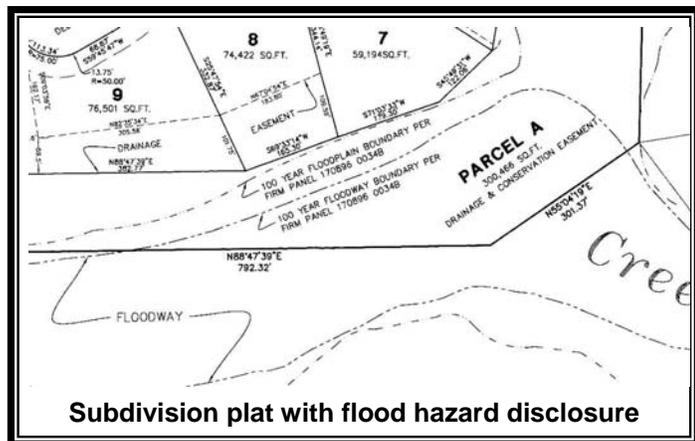
*Illinois Residential Real Property Disclosure Act:* This law requires a seller to tell a potential buyer:

- If the seller is aware of any flooding or basement leakage problem
- If the property is located in a floodplain or if the seller has flood insurance
- If the seller is aware of a radon problem
- If the seller is aware of any mine subsidence or earth stability defects on the premises
- If the seller is aware of any structural defects



This State law is not wholly reliable because the seller must be aware of a problem and willing to state it on the disclosure form. Due to the sporadic occurrence of flood events, a property owner may legitimately not be aware of potential flooding problems with a property being sold or purchased. Practices by local real estate boards can overcome the deficiencies of these laws and advise newcomers about the hazard earlier. They may also encourage disclosure of past flooding or sewer problems, regardless of whether the property is in a mapped floodplain.

*Illinois Compiled Statutes:* Chapter 55, Section 5/3-5029 requires that all subdivision plats must show whether any part of the subdivision is located in the 100-year floodplain (see example).



**Local implementation:** Chicago area real estate offices report that local agents follow the legal requirements. The shortcoming of this approach is that it is dependent on the seller, not on an independent check of the flood map.

All Multiple Listing Service (MLS) entries read “Flood insurance may be required.” This does not provide any help in disclosing the flood hazard. Even if Kane County wanted a change, the Service is a six county activity and many other real estate organizations would have to be convinced of the need to do it.



**CRS credit:** Communities would receive 10 points for the two state laws. Up to 46 more points are available if real estate agents implemented a program that checked the FIRMs before a property was listed and provided the flood hazard information to house hunters. Ten points would be provided if local real estate agents gave out brochures that advised people to check out a property’s hazards before they commit to a purchase.

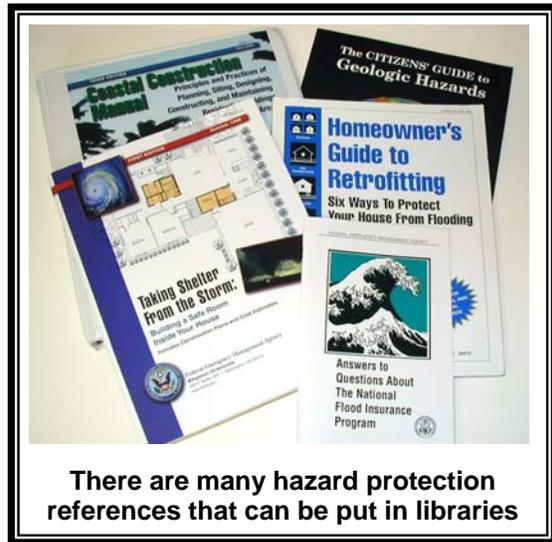
### 9.3. Library and Web Sites

The community library and local web sites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources. Books and pamphlets on hazard mitigation can be given to libraries, many of them obtained free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures, and other projects, which can augment the activities of the local government.

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

Today, web sites are becoming more popular as research tools. They provide quick access to a wealth of public and private sites and sources of information. Through links to other web sites, there is almost no limit to the amount of up to date information that can be accessed by the user.

In addition to on-line floodplain maps, websites can link to information for homeowners on how to retrofit for tornadoes, earthquakes and floods and a “FEMA for Kids” site. This website teaches children how to protect their home and what to have in a family disaster kit.



**Local implementation:** Kane County libraries have a variety of references on natural hazards. In communities on the County line, some libraries are in the DuPage system, which has a great deal of mitigation materials available.

Kane County has used its website to keep users updated on the progress of the Mitigation Planning Committee. The site provides links for the public to places such as the Red Cross, FEMA, and the National Weather Service’s updates on storm watches and warnings.

Communities with websites are listed in the table on page 9-3. Montgomery has placed a floodplain map on its website. Although the map is not regulatory, it does provide quick flood risk information to current and prospective residents. Most of the website links are for weather information or to FEMA and IEMA websites. Only the County's site has links to much information on how people can protect themselves and their properties.



**CRS credit:** The Community Rating System provides up to 30 points for having a variety of flood references in the local public library and up to 36 more for similar material on municipal web sites.

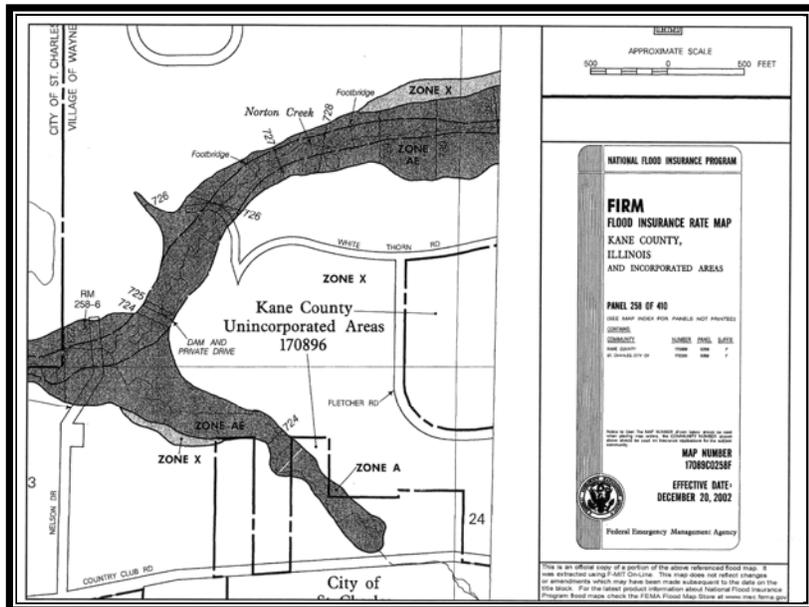
## 9.4. Technical Assistance

**Hazard information:** Many benefits stem from providing map information to inquirers. Residents and business owners that are aware of the potential hazards can take steps to avoid problems and/or reduce their exposure to flooding. Real estate agents and house hunters can find out if a property is floodprone and whether flood insurance may be required.

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

Communities can easily provide map information from FEMA's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is outside the mapped floodplain.

Communities often supplement what is shown on the FIRM with maps that complement and clarify the FIRM and information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never get wet.



**Property protection assistance:** While general information provided by outreach projects or the library helps, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in

construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track.

Building or public works department staff can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Recommend or identify qualified or licensed contractors
- Inspect homes for anchoring of roofing and the home to the foundation
- Provide advice on protecting windows and garage doors from high winds
- Explain when building permits are needed for home improvements

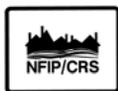


**Local implementation:** The Kane County Environmental Management Department provides advice and technical assistance to property owner associations, municipal governments and other local government units for areas that experience flooding on a watershed or regional scale. The Kane County Health Department provides technical guidance related to septic system failure and well contamination.

Most Kane County municipalities respond to inquiries about whether properties are in the floodplain, but few advertise this service. Some provide technical assistance. Aurora has one of the more active programs (see box).

The City of Aurora helps interpret floodplain maps, visits properties to advise property owners on how to protect themselves, and budgets \$200,000 annually to assist residents with installing backwater valves and overhead plumbing.

Following the 1996 flooding, Aurora held a floodproofing open house to quickly help the residents learn how to protect themselves from flooding, speak with FEMA representatives and find contractors to complete the work.



**CRS credit:** The Community Rating System provides 140 points for providing map information to inquirers. The community must keep the maps up to date. Up to 71 points are available for providing one-on-one flood protection assistance to residents and businesses and making site visits. Both services must be publicized.

## 9.5. Public Information Program Strategy

A public information program strategy is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended action plan of activities. A strategy consists of the following parts, which are incorporated into this plan.

- The local flood hazard – discussed in Chapter 2 of this plan.
- The property protection measures appropriate for a specific hazard – discussed in chapters 2 and 5.

Hazards Addressed	
Y	Flood
Y	Tornado
Y	Earthquake
Y	Thunderstorm
Y	Winter storm

## Flood Safety

- Do not walk through flowing water. Drowning is the number one cause of flood deaths. Currents can be deceptive; six inches of moving water can knock you off your feet. Use a pole or stick to ensure that the ground is still there before you go through an area where the water is not flowing.
- Do not drive through a flooded area. More people drown in their cars than anywhere else. Don't drive around road barriers; the road or bridge may be washed out.
- Stay away from power lines and electrical wires. The number two flood killer after drowning is electrocution. Electrical current can travel through water. Report downed power lines to the Police or Sheriff by calling 911.
- Look out for animals that have been flooded out of their homes and who may seek shelter in yours. Use a pole or stick to poke and turn things over and scare away small animals.
- Look before you step. After a flood, the ground and floors are covered with debris including broken bottles and nails. Floors and stairs that have been covered with mud can be very slippery.
- Be alert for gas leaks. Use a flashlight to inspect for damage. Don't smoke or use candles, lanterns, or open flames unless you know the gas has been turned off and the area has been ventilated.
- Carbon monoxide exhaust kills. Use a generator or other gasoline-powered machine outdoors. The same goes for camping stoves. Charcoal fumes are especially deadly -- cook with charcoal outdoors.
- Clean everything that got wet. Flood waters have picked up sewage and chemicals from roads, farms, factories, and storage buildings. Spoiled food, flooded cosmetics, and medicine can be health hazards. When in doubt, throw them out.
- Take good care of yourself. Recovering from a flood is a big job. It is tough on both the body and the spirit and the effects a disaster has on you and your family may last a long time.

- Flood safety measures appropriate for the local situation – discussed in the box on the next page.
- The public information activities currently being implemented within the community including those by non-government agencies – discussed in sections 9.1 – 9.4.
- Goals for the community's public information program – covered in Chapter 3.
- The outreach projects that will be done each year to reach the goals – in section 9.7's recommendations and Chapter 10's action plan.
- The process that will be followed to monitor and evaluate the projects – in Chapter 10's action plan.

**Public information topics:** At its June 19, 2003, meeting, the Natural Hazards Mitigation Planning Committee reviewed the various public information activities and the conclusions and recommendations of this chapter. An exercise was conducted to identify the most important topics that should be explained to the public. The exercise handout is included in Appendix E.

The results are shown below, with the number of “votes” for each topic. Where a person scratched out a topic, 1 point was deducted.

- |                                         |                                           |
|-----------------------------------------|-------------------------------------------|
| 14 Tornado safety precautions           | 2 Safety in vehicles                      |
| 12 Safety hazards during a storm        | 2 Whether a building is in a floodplain   |
| 12 Thunderstorm/lightning safety        | 2 Why channel maintenance is important    |
| 11 Emergency protection measures        | 2 Why sewer backup occurs                 |
| 10 Mosquito protection/eradication      | 1 Flood Insurance Rate Maps               |
| 10 Protecting water quality             | 1 Reporting dumping violations            |
| 9 Warning signals                       | 1 Rules against dumping in the river      |
| 8 Economic impact of natural hazards    | 1 Rules on building in the floodplain     |
| 8 Health hazards                        | 1 Status of flood control projects        |
| 8 Winter storm safety precautions       | 1 Status of implementing mitigation plan  |
| 7 Sources of assistance                 | 1 What other agencies are doing           |
| 6 Retrofitting a building for tornadoes | 1 Why it floods                           |
| 6 Safety hazards during floods          | 1 References at the village               |
| 5 Sewer backup protection measures      | 0 Beautifying the riverfront              |
| 5 What the County is doing              | 0 Floodproofing a business                |
| 4 How to evacuate during a flood        | 0 How to get out of buying insurance      |
| 4 Local drainage protection             | 0 Past disasters in the community         |
| 4 What the municipality is doing        | 0 Preparing a building for a winter storm |
| 3 Dealing with contractors              | 0 Reporting construction violations       |
| 3 Floodproofing a house                 | 0 Sewer backup insurance                  |
| 3 Preserving and protecting wetlands    | 0 Substantial damage regulations          |
| 3 References in the local library       | 0 What a flood insurance policy covers    |
| 3 Safety in buildings                   | 0 Who is responsible for flooding         |
| 3 When flood insurance must be bought   | -1 Earthquake safety precautions          |
| 2 Benefits of open space                | -1 Retrofitting for earthquake protection |
| 2 Making sure your yard drains          |                                           |

It can be seen that the most important topics to the Planning Committee are those related to life safety and public health. The second general set of topics relate to self-help, retrofitting, sources of assistance, etc.. This is consistent with the goals set in Chapter 3. The results also reflect the sentiment that earthquakes are the least of the hazards facing Kane County.

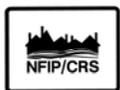
A second exercise was conducted to identify the media that would be most effective in conveying those messages. The exercise handout is included in Appendix E.



The results of the second exercise are shown below, with the number of “votes” for each topic. Where a person scratched out a topic, 1 point was deducted.

- 13 Village-wide newsletter
- 12 Web site with links to other sources
- 9 Newspaper articles
- 8 Educational programs in grade schools
- 7 Handouts/flyers at public places
- 7 References available in the library
- 5 Mass mailing to all residents
- 4 Cable TV notices
- 4 Newspaper supplements
- 4 Presentations at neighborhood meeting
- 3 Homeowner's flood protection handbook
- 3 Visits to a home by Village staff
- 2 Directory of County services for staff and the public
- 2 Mass mailing to all floodplain residents
- 2 Technical advice from Village staff
- 1 Educational programs in high schools
- 1 Educational programs in junior high
- 1 Floodproofing open houses
- 1 Presentations to organizations or clubs
- 1 Utility bill stuffers
- 1 Radio
- 0 Park/Forest Preserve district educational programs
- 0 Presentations to banks and lenders
- 0 Special events (e.g., “Flood Week”)
- 0 Telephone book/“Yellow Book”
- 1 Displays in home improvement stores
- 1 Presentations to contractors
- 1 Presentations to insurance agents
- 1 Presentations to real estate agents
- 1 Shopping mall displays
- 1 Videos/Cable TV programs

The results show that the Committee favors mass media, such as newsletters, newspapers and websites. Educational programs and library references underscore the interest in self-help.



**CRS credit:** The Community Rating System provides 100 points for a public information program strategy. Although not discussed before the exercises, the CRS provides the most credit for direct mailings to floodplain residents.

Credit also favors newsletters, website and libraries. Fewer points are given for other media, such as presentations at meetings and booths at shopping malls because they reach fewer people.

## 9.6. Conclusions

1. There are many ways that public information programs can be used so that people and businesses will be more aware of the hazards they face and how they can protect themselves. Many of them are currently being implemented by the County, municipalities, and Red Cross.
2. A community's staff can implement some of the public information activities. By making a few changes and formalizing its activities, a community can earn nearly 500 points under the Community Rating System.
3. Outreach projects, libraries and websites can reach a lot of people, but most communities are not including much hazard or mitigation information in their current activities.
4. The most important topics to cover in public information activities are:
  - Safety precautions during an emergency
  - Measures to protect health
  - Property protection measures one can take
  - What government agencies are doing and how they can help
5. The most appropriate ways to get the messages out are:
  - Articles in newsletters and mass mailings
  - Websites
  - Newspaper articles
  - Educational programs in schools
  - Handouts, protection guides
  - Library references
  - Technical advice and visits by staff

## 9.7. Recommendations

1. The following topics should be covered in public information activities.
  - How the area is exposed to natural hazards
  - What people should do to protect themselves and their health
  - What people can do to protect their property
  - What government agencies are doing and how they can help

2. Sample articles, with illustrations, on these topics should be prepared and distributed to all interested parties, such as public information offices, webmasters, permit offices, reception desks, and neighborhood organizations.
3. The following media should be used to convey these messages. They are listed in priority order as recommended by the Mitigation Planning Committee.
  - Articles in newsletters and mass mailings
  - Websites
  - Newspaper articles
  - Educational programs in schools
  - Handouts, protection guides
  - Library references
  - Technical advice and visits by staff
4. Each County office and municipality should review their current public information activities and incorporate the messages in them, where appropriate.
5. The County should provide an order form for local libraries to order free state and federal hazard mitigation publications.
6. Community websites should include information and links to other sites to cover as many topics as possible. It should also include a system for users to determine the flood hazard for their properties.

## **9.8. References**

1. *Are You Ready? A guide to Citizen Preparedness*, FEMA, 2002.
2. *CRS Coordinator's Manual*, Community Rating System, FEMA, 2002.
3. *CRS Credit for Outreach Projects*, Federal Emergency Management Agency, 2002.
4. *Floodproof Retrofitting: Homeowner Self-Protective Behavior*, Shirley Bradway Laska, University of Colorado, 1991.
5. Municipal websites and questionnaires, Spring 2003.
6. *Protecting Nature in Your Community*, Chicago Wilderness and Northeastern Illinois Planning Commission, 2000.
7. *Stormwater Management Public Information Resource Guide*, South Suburban Mayors and Managers Association, 1999

## Chapter 10. Action Plan

The culmination of the Kane County *Natural Hazards Mitigation Plan* is this Action Plan. The general direction of the overall program is outlined here. Specific activities pursuant to the general direction are detailed in Sections 10.1 – 10.3. These sections assign recommended projects and deadlines to the appropriate agencies.

The overall directions can be summarized under the five goals established in Chapter 3:

- Goal 1. Protect the lives and health of the citizens of Kane County from the effects of natural hazards.
- Goal 2. Encourage self-help and self-protection measures to mitigate the effects of natural hazards on private property.
- Goal 3. Protect critical facilities and public infrastructure with public funds.
- Goal 4. Identify specific projects to mitigate damage where cost-effective and affordable.
- Goal 5. Reduce the number of repetitively damaged existing structures

The seven guidelines set parameters on the mitigation measures reviewed, the recommendations at the end of chapters 4 – 9 and the action items in this chapter.

- Guideline 1. Focus natural hazards mitigation efforts on tornadoes, floods, thunderstorms and winter storms.
- Guideline 2. Encourage people to assume some responsibility for their own protection.
- Guideline 3. New developments should not create new exposures to damage from natural hazards.
- Guideline 4. Local initiatives should focus on protecting citizens and public property.
- Guideline 5. Seek county, state, and federal support for special projects.
- Guideline 6. Preserve open space in hazardous areas, especially where they are sensitive natural areas and agricultural land.
- Guideline 7. Be consistent with existing plans.

General recommendations appear at the end of Chapters 4 – 9 for each of the six mitigation strategies. This chapter converts those general recommendations to specific action items, generally following the same order of mitigation strategy as Chapters 4 – 9.

Each action item starts with a short description. The next four subheadings list the responsible agency, the deadline for accomplishing the action item, the costs and the benefits. A table summarizing the responsible agencies and deadlines is on page 10-3.

All of the action items can be tied to the above listed goals and guidelines and the recommendation(s) in Chapters 4 – 9. These relationships are shown in the matrix on page 10-14. The recommendations and the discussions in the earlier chapters provide more background and direction on these action items.

Section 10.1 addresses general program items and projects. Section 10.2 lists the public information action items and Section 10.3 reviews additional tasks needed to administer and support *Plan* implementation. The table on the next page summarizes the 17 action items, the responsible agencies and the deadlines for implementing them.

Several action items refer to the Mitigation Committee. A plan is worthless if there is no instrument for ensuring that it is carried out. Accordingly, the creation of a permanent Mitigation Coordinating Committee was proposed to monitor the implementation of the *Plan*, report to the County Board and municipalities on its progress, and recommend revisions to this *Plan* as needed. This is explained in action item 16. Sections 10.4 and 10.5 provide proposed resolutions for the County Board and City Councils/Village Boards to pass to put the Action Plan in effect within their jurisdiction. Each jurisdiction that adopts this plan should identify mitigation programs and projects that could be implemented within their jurisdiction. As budgets and grant funding are constantly changing, jurisdictions should identify mitigation projects even if funding is not currently available. Jurisdictions have made significant progress implementing many of the action items identified in this chapter. Their progress is outlined in each of the yearly reports to the county board and can be accessed on the Kane County Natural Hazards Preparedness website at <http://www.co.kane.il.us/hazards/>.

## 10.1. Program Action Items

### Action item 1. Building Code Improvements

Adopt the latest International series of codes, the new national standard that is being adopted throughout the country. Code revisions should be pursued to strengthen new buildings against damage by high winds, tornadoes and hail. Requiring tornado “safe rooms” in certain structures should be considered. Any code revisions should be consistent with the efforts undertaken by multi-community organizations of building department staff.

*Responsible agency:* Kane County Development Department and building departments for those municipalities that have not adopted the I-Codes (see table, page 4-4). The organizations of building department staff should take the lead on drafting new code language.

*Deadline:* Adoption of the I-Codes: 18 months after publication of the next version. This will allow “the bugs” to be worked out of the I-Codes, which has been a concern of many communities and will allow full review of the changes by each community. 18 months is also an appropriate time for reviewing and adopting later revisions to the I-Codes.

*Cost:* Staff time.

*Benefits:* This will improve the hazard protection standards for new construction and will ensure a consistent set of building standards across the County. It will also assist communities to improve their BCEGS rating.

## **Action item 2. Improved Code Enforcement**

Develop and conduct training for building department staff on the natural hazards aspects of the International Codes, regulation of mobile home installation, and the County stormwater ordinance and its flood protection, wetland protection, erosion and sediment control and best management practices provisions.

*Responsible agency:* Kane County Development and Environmental and Building Management Departments to develop training. Municipal building staff to participate.

*Deadline:* Conduct the first class by October 31, 2004 and then conduct classes as needed.

*Cost:* Staff time

*Benefits:* A better educated staff will pay more attention to the details of factors vital to natural hazard mitigation when they review plans and inspect sites, such as ensuring that a structure is securely connected to the foundation. Training will also ensure that staffs understand new I-Code provisions, the County's stormwater ordinance and their responsibilities under the National Flood Insurance Program. A regular training program can improve BCEGS scores, too.

## **Action item 3. Review of Plans and Development Regulations**

When they are up for revision, comprehensive plans, land use plans, and zoning and subdivision ordinances should incorporate mitigation provisions, especially:

- Open space provisions that will protect properties from flooding, preserve wetlands, and enhance groundwater infiltration;
- Appropriate farmland preservation measures;
- Standards for streets and water systems that facilitate access and use by fire and emergency equipment;
- Requirements to bury utility lines; and
- Mandating storm shelters in new mobile home parks.

*Responsible agency:* Kane County Development and Environmental and Building Management Departments, municipal planning, zoning, engineering and community development departments.

*Deadline:* When the relevant plans and ordinances are up for review.

*Cost:* Staff time

*Benefits:* By incorporating mitigation provisions into other plans and regulations, more offices will be implementing mitigation activities, hazardous areas will be avoided, and new developments will be better protected.

#### **Action item 4. Facility Audits**

Develop a checklist to evaluate a property's exposure to damage from the hazards of flooding, high winds, lightning, hail and power losses from downed lines. Include a review of insurance coverage and identify where more information can be found on the property protection measures recommended by the audit. Evaluate all critical facilities (other than bridges) using the checklist. Should major work be needed to protect a facility, and it can be shown that the project would be cost-effective, funding assistance could be applied for from FEMA or IEMA. This would be a one-time project to audit the current critical facilities. New facilities would be reviewed when they are permitted.

*Responsible agency:* Development of the checklist and repository of the reports: Kane County Office of Emergency Management. Audit of County-owned facilities and facilities in unincorporated areas: Development Department. Offices to do the municipal audits to be designated by the community's adopting resolution (see Section 10.5). Coordinate development of the checklist and audits of schools with the Kane County Regional Office of Education.

*Deadline:* Have the checklist developed by March 31, 2004. Do at least 20% of the facilities within each jurisdiction each year after. Kane County Office of Emergency Management secured a grant for a contractor to conduct the facility audits for the entire county. The facility audits began in 2005 and continued until late 2006.

*Cost:* Staff time. If one person were to do this work for the entire county, over 700 facilities would need to be checked. Assuming 2 sites are audited per working day, it would take more than two years to complete the work. One year's cost would be \$100,000 for salary, fringe benefits, transportation, training, and supplies. This approach would ensure that the 200 – 250 top priority critical facilities were audited.

*Benefits:* Keeping critical facilities operational during and after a natural disaster is vital to public health and safety. This action item would provide a summary for each facility on its exposure to damage by natural hazards and a general blueprint of what could be done to reduce that exposure. It is hard to put a dollar value on potential damage averted, but damage to even one facility could exceed \$100,000 in repair costs and the ripple effect on other people and property.

For example, the Indian Creek study discussed on pages 2-15 and 2-16 noted that flooding of a nursing home would cause \$125,000 in damage. This dollar figure does not include the danger that residents are exposed to when flooded or when a nursing home has to be evacuated. An audit might find a cost-effective way to protect the building to the extent that an evacuation would not be needed. An audit would have identified the exposure of Algonquin's Historic Village Hall parking lot to flash flooding and

mitigation measures could have prevented the \$130,000 in damage to Village vehicles that were incurred during the storm of July 1993 (see table, page 2-39).

#### **Action item 5. Retrofitting Incentives**

Establish a program of technical assistance and financial incentives to encourage property protection measures on private property, such as:

- Surface and subsurface drainage improvements,
- Swales and regrading for shallow surface flooding,
- Sewer backup protection
- Relocating furnaces and water heaters out of basements
- Tornado safe rooms
- Installing lightning rods

Technical assistance needs to be supported with financial assistance, such as rebates or cost sharing, similar to the programs administered by the Cities of Aurora, Elgin and St. Charles and the Kane County Water Resources Department. There are other Chicago suburban programs that would also help as models.

*Responsible agency:* Kane County Environmental and building Management and Water Resources Department. Municipal offices to be designated by the community's adopting resolution (see Section 10.5).

*Deadline:* Each jurisdiction is encouraged to establish a program as part of the next fiscal year's budget cycle.

*Cost:* The level of effort depends upon the size of the community. Based on the size of the programs in the Cities of Aurora, Elgin and St. Charles, 5/100 of 1% of the municipality's budget (0.0005) would be a good target. The Kane County Water Resources Department already has a budget for similar projects. It should be noted that road-related drainage improvement projects can be funded by Motor Fuel Tax budgets.

*Benefits:* Using a 25% rebate level, for every dollar spent by the community, \$4 will be spent to protect a property from damage. Communities have found this approach to protect against local drainage and sewer backup problems to be a real cost saver compared to public works projects to control drainage or replace sewer pipes.

#### **Action item 6. Repetitive Loss Projects**

Protect the buildings in repetitive loss areas 7, 8, 9, 12 and 14. These are the top priority areas based on the flood hazard and type of construction, as explained in the criteria on page 5-12. Acquisition is the recommended property protection approach for areas 7, 8, 9, and 12 and elevation is recommended for areas 9, 12 and 14. Properties in the other repetitive loss areas could be protected by retrofitting measures that could be funded for much less under the cost share program proposed in action item 5.

The specific measure to use on each property should be determined by an audit of the building and the owner's preferences. In each case, no action should be taken without the owner's full willing cooperation.

*Responsible agency:* Kane County Environmental and Building Management Department (repetitive loss areas 8 and 9) and the appropriate office in Elgin (area 7) and Montgomery (areas 12 and 14). A mitigation grant application should be coordinated by the Kane County Environmental and Building Management Department.

*Deadline:* Plans should be prepared and reviewed with the property owners 2 – 3 months before the funding agencies' application deadlines.

*Cost:* \$650,000 would acquire the 5 – 6 worst properties. \$500,000 or 75% of the cost would come from a mitigation grant.

*Benefits:* FEMA and IEMA only fund projects where the benefits are shown to exceed the costs. A benefit/cost analysis must be run for each property in order to qualify for FEMA funds.

#### **Action item 7. Drainage Maintenance**

Implement a formal and regular drainage system maintenance program. This would involve mapping the local drainage system, determining which areas can be accessed for inspection and maintenance, preparing procedures modeled on CRS program guidance, conducting an annual inspection and removing debris as needed. It would include educating and working with homeowner associations and other non-governmental entities responsible for maintenance on their own properties.

The procedures would treat natural streams different from drainage ditches and developed areas different from vacant lands. Enforcing stream and wetland dumping regulations should also be a part of the program.

*Responsible agency:* Kane County Water Resources Department, municipal public works departments, township road districts, drainage districts. The Kane County Environmental and Building Management Department to provide support as per the annual stream maintenance program resolution. The Kane County Transportation Department to be responsible for maintenance of roadside ditches under its jurisdiction

*Deadline:* Original deadline to model procedures prepared by the Water Resources Department by March 31, 2004. Continue to update and implement the drainage system maintenance program

*Cost:* Staff time

*Benefits:* An obstruction to a channel, such as a plugged culvert, can result in overbank flooding during a small rainstorm. By inspecting and maintaining the drainage system, potential flood problems can be identified and corrected before the next big rain. A

proactive preventive activity like this can prevent \$1,000's in flood damage, closed streets and threat to people.

### **Action item 8. Urban Forestry**

Implement an urban forestry program that qualifies the municipality to become a Tree City, USA. To qualify for Tree City USA, a city or village must meet four standards, which are explained in more detail on page 6-10:

- A tree board or department
- A tree care ordinance
- A community forestry program with an annual budget of at least \$2 per capita
- An Arbor Day observance and proclamation

For the nine municipalities that are already Tree City, USA, designees, this action item is to maintain their eligibility.

*Responsible agency:* To be designated by the municipality's adopting resolution (see Section 10.5).

*Deadline:* Each jurisdiction is encouraged to incorporate urban forestry into the next budget cycle.

*Cost:* \$2 per capita, staff time

*Benefits:* In addition to improving a community's appearance, an active urban forestry program will address the major problems caused by winter storms and high winds – loss of power, telephone and cable services and damage to vehicles and buildings due to falling trees or limbs.

### **Action item 9. Flood Threat Recognition**

Continue current funding of rain and stream gages throughout county. Review the gauging network, especially the western rural areas, to determine if additional rain and stream gages are necessary. This work would identify any potential new sites where gages would be most productive and estimate the cost of installing and maintaining them. It should also review the costs of developing a central real time gage monitoring capability which would allow flood and flash flood predictions.

*Responsible agency:* Kane County Environmental and Building Management Department.

*Deadline:* Complete the initial analysis by October 31, 2004, and then continue to update the flood threat recognition program

*Cost:* Staff time

*Benefits:* Early recognition of an impending flood can save lives and prevent property damage. For example, 10 minutes of lead time could allow evacuation of a parking lot or installation of emergency protection measures. The data collected would also help in evaluating watershed plans and models and designing storm drainage works.

### **Action item 10. Improved Emergency Response**

Conduct a review of emergency response plans and programs to:

- Ensure that each municipality has an emergency management coordinator or liaison.
- Identify where additional activities are needed to respond to natural hazards, especially activities that can be undertaken after a flood warning and before the flood arrives.
- Ensure there is adequate and current information on critical facilities.
- Incorporate post-disaster procedures for public information, reconstruction regulation and mitigation project identification.
- Conduct a table top exercise at least once a year
- Identify what rural areas could use additional warning capabilities.

*Responsible agency:* Kane County Office of Emergency Management. Municipal leads to be designated by the municipality’s adopting resolution (see Section 10.5).

*Deadline:* Incorporate the review in the biennial emergency plan revision process.

*Cost:* Staff time

*Benefits:* Some communities have no plan and others are revising theirs. Very few have special procedures for natural hazards (see table on page 7-10). An emergency response plan that has been carefully prepared, that utilizes all available data on the hazards and their potential impact, and that is regularly exercised will greatly improve local disaster response capabilities.

### **Action item 11. Flood Control Projects**

Implement flood control projects, including farm drainage improvements and projects to improve bridges and culverts, where they prove to be the most appropriate approach to reduce flood damage. Such projects need to meet the criteria listed in Section 8.8, especially the first two – ensuring no adverse impacts on other properties and coordinating projects on a watershed basis.

*Responsible agency:* Kane County Water Resources and Environmental and Building Management Departments, municipal public works departments, State, County and township transportation departments.

*Deadline:* N/A. This is an ongoing activity.

*Cost:* The cost of each project will vary. This action item calls for ensuring the projects meet the criteria set in Section 8.8.

*Benefits:* The benefits of each project will vary. This action item calls for ensuring the projects meet the criteria set in Section 8.8. Several of those criteria assure that adverse impacts will not be transferred on to neighboring or downstream properties.

## **10.2. Public Information Strategy**

### **Action item 12. Hazard Mitigation Materials**

Prepare background information, articles, and other explanations of hazard mitigation topics, including:

- The natural hazards that threaten Kane County
- What the sirens and warnings mean
- Safety and health precautions
- What government agencies are doing and how they can help
- The hazard mitigation benefits of preventive measures
- The procedures that should be followed to ensure that new developments do not create new problems.
- The need to protect streams and wetlands from dumping and inappropriate development.
- The hazard mitigation benefits of restoring agricultural drainage and rivers, wetlands and other natural areas.

These materials are to be provided to County, municipal, school, and private offices for use in presentations, newsletter articles, webpages, brochures and other outreach projects.

*Responsible agency:* Kane County Office of Emergency Management, Water Resources Department, and municipalities. The Red Cross should provide technical advice.

*Deadline:* Have the draft materials for the first topics ready by March 31, 2004 and then continue to expand the materials.

*Cost:* Staff time

*Benefits:* By preparing a master set of locally pertinent articles and materials, each interested office only has to select the most appropriate media and distribute the messages. By simply inserting an article in a newsletter or putting it on the website, the local level of effort is greatly reduced, which increases that likelihood that the messages will get out. The messages will also be technically correct and consistent throughout the County.

### **Action item 13. Outreach Projects**

Prepare and disseminate outreach projects based on the materials provided under action item 12. Such projects should include articles in newsletters, news releases, directed mailings, handouts, websites, and displays. Different media should be used for the following audiences:

- The general public
- Floodplain residents
- Developers and builders
- Farm owners and operators
- Decision makers
- Schools and teachers

*Responsible agency:* Kane County Office of Emergency Management. Municipal leads to be designated by the municipality's adopting resolution (see Section 10.5). The Red Cross should also participate.

*Deadline:* Have the draft materials for the first topics ready by March 31, 2004 and then continue to distribute materials developed from action item 12 above.

*Cost:* Most projects will only cost staff time, such as newsletter articles and websites. Others, such as directed mailings and brochures, will have printing and/or postage expenses.

*Benefits:* There are many benefits to having a well-informed public. For example, deaths from lightning have steadily decreased over the years because people are more aware of what they should and should not do. More self-help and self-protection measures will be implemented if people know about them and are motivated to pursue them.

### **Action item 14. Property Protection References**

Provide building departments, libraries and other interested offices with a list of references on property protection that can be ordered for free from state and federal offices. Include a request that they make the references available for public use. A special effort should be made to identify references on insurance, floodproofing and other methods of flood protection.

Concurrently, identify websites that provide property protection information and provide their addresses to the County and municipal webmasters.

*Responsible agency:* Kane County Office of Emergency Management. The Red Cross should provide technical advice.

*Deadline:* Originally was December 31, 2003. Continually provide an updated list of references as needed.

*Cost:* Staff time.

*Benefits:* As with the other public information activities, this action item helps inform the public. It provides the greatest assistance to those people who want to learn more about property protection and take the right steps to reduce their exposure to damage by natural hazards.

### **10.3. Administrative Action Items**

This section reviews the additional action items that are needed to administer and support the recommendations of the two previous sections.

#### **Action item 15. *Plan Adoption***

Adopt this *Natural Hazards Mitigation Plan* by passing the resolution in Section 10.4 or 10.5, as appropriate. The County's resolution creates the Mitigation Coordinating Committee which is described in the next action item. The municipal resolutions adopt each action item that is pertinent to the community and assigns a person responsible for it.

*Responsible agency:* County Board, Village Boards and City Councils

*Deadline:* November 30, 2003 and after each five year review and update

*Cost:* Staff time

*Benefits:* Formal adoption of the plan ensures that County and municipal staffs are authorized and instructed to implement the action items. Adoption is also a requirement for recognition of the plan by mitigation funding programs and the Community Rating System.

#### **Action item 16. *Mitigation Coordinating Committee***

The Natural Hazards Mitigation Planning Committee has been converted to a permanent advisory body in the County's original resolution to adopt this *Plan*. The Committee:

- Act as a forum for hazard mitigation issues,
- Disseminate hazard mitigation ideas and activities to all participants,
- Monitor implementation of this Action Plan, and
- Report on progress and recommended changes to the County Board and each municipality.

The Committee does not have any powers over staff or the municipalities. It is purely an advisory body. Its primary duty is to collect information and report to the County Board, the municipalities, and the public on how well this *Plan* is being implemented. Other

duties include reviewing mitigation proposals, hearing resident concerns about flood protection and related matters, and passing the concerns on to the appropriate entity.

The Mitigation Committee is, in effect, Kane County's hazard mitigation conscience, reminding the member agencies and municipalities that they are all stakeholders in the plan's success. The resolution charges it with seeing the *Plan* carried out and recommending changes that may be needed. While it has no formal powers, its work should act as a strong incentive for the offices responsible for the action items to meet their deadlines.

*Responsible agency:* The Kane County Office of Emergency Management, with the Environmental and Building Management Department providing staff support.

*Deadline:* The evaluation reports are due on the anniversary of the date the *Plan* is adopted by the County Board. An annual evaluation of the plan's implementation is required for credit under the Community Rating System. A five year update is required for continuing credit of this *Plan* under the Community Rating System and FEMA's mitigation funding programs.

*Cost:* Staff time.

*Benefits:* Those responsible for implementing the various recommendations have many other jobs to do. A monitoring system helps ensure that they don't forget their assignments or fall behind in working on them. The *Plan* should be evaluated in light of progress, changed conditions, and new opportunities.

### **Action item 17. Community Rating System**

Host a workshop to review floodplain management activities currently undertaken and those recommended by this *Plan* (see the paragraphs on CRS credit at the end of the discussion of each mitigation measure in chapters 4 – 9). Participants will determine whether to apply for a Community Rating System flood insurance premium rate discount. If so, they would submit an application. Currently only St. Charles, Bartlett and Hoffman Estates are participants.

*Responsible agency:* Kane County Environmental and Building Management Department. Municipal leads to be designated by the municipality's adopting resolution (see Section 10.5). Technical support and a workshop can be provided by the Insurance Services Office.

*Deadline:* Conduct a workshop for the County and all municipalities to review their activities and prepare an application by March 31, 2004.

*Cost:* Staff time.

*Benefits:* There are many benefits to CRS participation, as explained in the document, *CRS Application*. In addition to saving residents money, it has been shown to provide an

effective incentive to implement and maintain floodplain management activities, even during times of drought.

Action Items and Responsible Agencies																	
	1. Building Code Improvements	2. Improved Code Enforcement	3. Plans & Development Regs	4. Facility Audits	5. Retrofitting Incentives	6. Repetitive Loss Projects	7. Drainage Maintenance	8. Urban Forestry	9. Flood Threat Recognition	10. Improved Emergency Response	11. Flood Control Projects	12. Hazard Mitigation Materials	13. Outreach Projects	14. Property Protection References	15. Plan Adoption	16. Mitigation Coordinating Comm.	17. Community Rating System
Kane County																	
County Board															X		
Office of Emergency Mgmt.				X						X		X	X	X		X	
Environmental and Building Mgmt.		X	X		X	X	X		X		X					X	X
Water Resources					X		X				X					X	
Development	X	X	X	X												X	
Transportation							X				X					X	
Municipalities																	
City Council/Village Board															X		
Designated department(s)	X	X	X	X	X	X	X	X		X	X		X			X	X
Townships							X				X					X	
Drainage Districts							X										
IDOT											X						
Red Cross												X	X	X		X	

### Action Items, Goals, Guidelines and Recommendations

	1. Building Code Improvements	2. Improved Code Enforcement	3. Plans & Development Regs	4. Facility Audits	5. Retrofitting Incentives	6. Repetitive Loss Projects	7. Drainage Maintenance	8. Urban Forestry	9. Flood Threat Recognition	10. Improved Emergency Response	11. Flood Control Projects	12. Hazard Mitigation Materials	13. Outreach Projects	14. Property Protection References
<b>Goals</b>														
1. Protect lives and health	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2. Encourage self-help				X	X	X		X	X	X		X	X	X
3. Protect critical facilities			X	X			X	X	X	X	X			
4. Identify special projects				X	X	X					X			
5. Reduce repetitive losses	X	X	X	X	X	X	X		X	X	X	X	X	X
<b>Guidelines</b>														
1. Focus on most common hazards	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2. Encourage responsibility				X	X	X	X	X				X	X	X
3. New developments	X	X	X									X	X	
4. Protect citizens and public property				X	X		X	X	X	X	X	X	X	X
5. Seek support				X		X								
6. Preserve open space		X	X								X	X	X	
7. Be consistent with existing plans	X	X	X							X				
<b>Recommendations</b>														
Ch. 4. Preventive Measures	12 3	3 6	4 5									7	7	
Ch. 5. Property Protection				45 6	3 7	3 8						1	1 2	
Ch. 6. Resource Protection		1	6				3	5				24	24	
Ch. 7. Emergency Services									2 3	14 6		5		
Ch. 8. Structural Projects							2				1			
Ch. 9. Public Information												1 2	12 34	5 6

This table relates the 14 program and public information action items to the 5 goals and 7 guidelines of this *Plan*. The goals and guidelines are stated in full on pages 3-5, 3-6 and 10-1. The table also shows the relation between the action items and the recommendations at the end of chapters 4 – 9. For example action item 1, Building Code Improvements, supports goal 1, guidelines 1, 3 and 7, and recommendations 1, 2 and 3 at the end of chapter 4.

## Appendix A. Original 2003 Committee Participants

The Natural Hazards Mitigation Planning Committee had many participants. Communities were encouraged to send different staff members, depending on the subject matter to be discussed at each meeting.

The participants included elected officials (3 Village presidents and 3 Village trustees), Village administrators, Village clerks, police and fire chiefs, and department heads. Departments represented included public works, emergency management, engineering, building, planning/development, police and fire. The following table lists who attended at least one meeting and what office they represented. The table on page 1-3 shows who attended at least three meetings.

Community/Organization	Representative	Office
Algonquin, Village of	Michele Zimmerman	Public Works
Algonquin, Village of	Craig Arps	Building Department
American Red Cross of Greater Chicago	Mary Anne Hoeller	Disaster Specialist
American Red Cross, Fox River Chapter	Ken Robertson	Executive Director
Aurora, City of	Mark Flaherty	Emergency Mgmt.
Aurora, City of	Daryl Devick	Public Works
Batavia, City of	Steve Scheffel	City Engineer
Batavia, City of	Don Gatske	Public Works
Big Rock, Village of	Doug Porch	Village President
Big Rock, Village of	Sandy Bell	Citizen volunteer
Burlington, Village of	Mary Ann Wilkison	Village Clerk
Burlington, Village of	Debra Walsh	Village Trustee
Burlington, Village of	Maureen Little	Village Trustee
Carpentersville, Village of	Jon Mensching	Fire
East Dundee, Village of	David Kitzmiller	Public Works
Elburn, Village of	David Morrison	Village Administrator
Elgin, City of	Chad Butzow	Public Works
Elgin, City of	John Loete	Public Works
Geneva, City of	Betty Collins	Emergency Mgmt.
Gilberts, Village of	Jerry Fuscome	Public Works
Gilberts, Village of	Michael Joswick	Police
Gilberts, Village of	Cheryal Callahan	Village Administrator
Gilberts, Village of	Nancy Chapoton	Village Engineer
Hampshire, Village of	Ed Szydowski	Village Trustee
Huntley, Village of	Keith Mallegni	Fire
Huntley, Village of	John Ciombor	Police
Huntley, Village of	Keith Schaedel	Public Works
Huntley, Village of	Charles Sass	Village President

<b>Community/Organization</b>	<b>Representative</b>	<b>Office</b>
Kane County	Phil Bus	Development
Kane County	Alan Choutka	Emergency Mgmt.
Kane County	Steve Garrison	Environmental Mgmt.
Kane County	Karen Kosky	Environmental Mgmt.
Kane County	Jason Verachtert	GIS Technologies
Kane County	Fred Carlson	Public Health
Kane County	Bob Skidmore	Transportation
Kane County	Souts Thavong	Water Resources
Kane County	Paul Schuch	Water Resources
Kane-DuPage Soil & Water Cons. District	Barbara Sheffer	District Director
Lily Lake, Village of	Heather Gravlin	Village Clerk
Maple Park, Village of	Claudia Tremaine	Village Clerk
Montgomery, Village of	Mike Pubentz	Public Works
North Aurora, Village of	Mike Glock	Public Works
North Aurora, Village of	Dan Nelson	Emergency Mgmt.
Poplar Creek Watershed Planning Comm.	Deb Perryman	
Schrader & Associates	Laura Ross	
Sleepy Hollow, Village of	Jim Montalbano	Police
Sleepy Hollow, Village of	Stephen Pickett	Village President
South Elgin, Village of	Richard Babica	Public Works
St. Charles Township	Ron Johnson	Highway Commissioner
St. Charles, City of	Greg Chismark	City Engineer
St. Charles, City of	Craig Hanson	Emergency Mgmt.
Sugar Grove, Village of	Brad Sauer	Police
The Conservation Foundation	Ksenia Rudensiuk	Watershed Programs
Virgil, Village of	Jean Hardt	Village Clerk
Virgil, Village of	Evelyn Yagen	Former Vill. Treasurer
Wayne, Village of	Carol Schoengart	Intergovern'l Liaison
Wayne, Village of	Daniel Callahan	Police
West Dundee, Village of	Tom Lutzow	Fire
West Dundee, Village of	Frank Buhrmann	Fire

## Appendix B. Public Involvement Activities

As discussed in Section 1.1, Kane County's mitigation planning included several efforts to seek public input into the planning process. This appendix includes examples from five of those efforts.

1. Both the Chicago Tribune and the Kane County Chronicle covered the project and reporters attended several of the meetings. On the next two pages are examples of some of their stories.
2. A special website was established ([www.co.kane.il.us/hazards/](http://www.co.kane.il.us/hazards/)) to explain the program and to solicit public input. Several of the site's pages are shown, starting on page B-4. On page B-6 is the list of meetings. For each past meeting, the user can click the date and see that meeting's minutes. On page B-9 is a copy of the form that any member of the public could complete and e-mail to the planners.
3. Each municipality conducted its own publicity of the planning process and invited its residents to provide input. On page B-11 is an example of the notice that the Village of Burlington posted in public places.
4. The announcement for the September 4 public meeting is included on page B-12. This is the news release that was provided to all participants. They were encouraged to distribute it to local media in addition to the official release by the County. Examples of the subsequent articles are on the following pages.
5. The final public meeting was held on September 4. The last pages in this appendix are the minutes from that meeting.

# New panel to plan for natural disasters

## Committee in charge of minimizing damage

By TOM SCHLUETER  
Kane County Chronicle

GENEVA — Residents of northeast Illinois are no strangers to bad weather.

The National Climatic Data Center lists 84 serious weather events such as high winds, tornadoes, flooding, excessive heat or cold since 1990 the agency deemed worthy of recording.

Kane County is forming a committee whose charge is to write up plans to minimize damage caused by those weather events.

"The county has been interested in pursuing programs that ensure floods don't happen," watershed engineer Karen Kosky said.

The county will be eligible to apply for money from the Federal Emergency Management Agency if it develops a mitigation plan, Kosky said.

Flooding is not the only nat-

ural disaster the Hazard Mitigation Planning Committee will work on, but the July 1996 flood, when 17 inches of rain inundated the southern part of the county, still is a fresh memory.

Floods can be the most expensive natural disaster, and the NCDA lists the July flood as having caused \$14.5 million in damages.

Tornadoes, lightning and blizzards also can wreak havoc on residents.

Hazard mitigation could include retrofitting or relocating the occupants of buildings in the flood plain, designing building codes to guard against storm damage or making sure emergency services are ready to go in case of a disaster.

Although FEMA distributes money to disaster victims, mitigation revenue would be used before a disaster strikes and to minimize its effects.

"FEMA will look at how the county is prepared for a disaster," Kosky said.

The committee will meet the first Thursday of each month for the next eight months. The public is welcome to attend.

The county's Web site has a public input form on which residents can recite the problems and experiences with natural disasters and to provide suggestions for hazard mitigation.

The Web address is [www.co.kane.il.us/hazards/](http://www.co.kane.il.us/hazards/).

Thursday's meeting will be an introductory gathering in hopes of increasing municipal officials' interest.

"The big thing is the buying-in of the communities," said Donald Bryant, director of Kane County Office of Emergency Management. "We're trying to get all the county on the same page."

Unless a city or village can develop its own plan, it will not be eligible for mitigation revenue, she said.

Kosky said representatives of the Red Cross, local chambers of commerce and home-builders will be asked to serve on the committee.

"The goal is to get potential committee members interested," Kosky said.

*Kane County Chronicle, December 8, 2002*

# County on the lookout for disaster stories

**Information from public will go to Hazard Mitigation Planning Committee**

By TOM SCHLUETER  
Kane County Chronicle

GENEVA — Kane County residents who have suffered from a natural disaster are being asked to tell their stories. The information taken from the public will be used in writing the county's Hazard Mitigation Planning Committee.

"It's not just along the Fox River. It's not just the area west of Route 47. It's the whole county," said French Wetmore, president of French & Associates, the consulting firm helping the county write the plan.

Councils that do not write a plan

The planning committee met Thursday for the second time. Committee members are from Kane County's Environmental Management Department, Office of Emergency Management, Health Department, Geographic Information Systems Department, as well as representatives from the county's 28 municipalities.

Although an electronic input form for the purpose of gathering information from the public has been available for a month on the county's Web site, no one has filled one out. The committee also wants to develop a list of "critical" facilities from each city and village.

A critical facility could be a wastewater treatment plant, police station, the largest business in town or a bridge or intersection.

See DISASTER, page 2

The committee wants anecdotal reports from residents who have suffered damage from floods, winds or winter storms.

The damage does not have to be part of larger widespread disaster. "There have been a lot of incidents not declared disasters," said Alan Choupka of the Kane County OEM.

Localized property damage from a thunderstorm microburst or downed utility lines from an ice storm would qualify, he said.

by November 2004 will not be eligible for mitigation money from the Federal Emergency Management Agency.

The committee met Thursday for the second time. Committee members are from Kane County's Environmental Management Department, Office of Emergency Management, Health Department, Geographic Information Systems Department, as well as representatives from the county's 28 municipalities.

**Disaster**  
Continued from page 1

Other critical facilities would include schools, places where people gather, such as theaters and casinos, utilities and hazardous material sites.

Once that information is gathered, the critical sites can be mapped by the county's GIS Department. The maps would then be distributed to all the municipalities.

Wetmore said FEMA records going back to 1983 show there have been 433 claims made for flood damage in Kane County. The claims averaged \$11,928 for structural damage and \$5,061 for damages to contents.

The biggest danger to humans is while they are in their cars. Most people killed in floods were in their cars at the time.

"It doesn't take much water over the top of a highway to wash a car away," Wetmore said.

**Flu**

Kane County Chronicle, January 3, 2003

## Kane County Natural Hazards Planning



[Committee Information](#)  
schedule, agenda, minutes

[Status Report](#)

[Public Input](#)

[More Information](#)

[Links](#)

### Background

Kane County is subject to natural hazards that threaten life and health and have caused extensive property damage. Floods struck the County in 1996, blizzards in 1999 and 2000, and tornadoes in 1990, 1991 and 1993. While these hazards are acts of nature, the impacts on residents, public facilities, businesses, and private property can be diminished through hazard mitigation planning.

The Kane County Department of Environmental Management and Office of Emergency Management are jointly undertaking a Natural Hazards Mitigation Plan for the County. This Plan will identify activities that can be undertaken by both the government and the private sector to reduce the safety hazards, health hazards, and property damage caused by floods, tornadoes, earthquakes, thunderstorms and winter/ice storms.

The work is being coordinated by a Hazard Mitigation Planning Committee, created by the Kane County Board on November 12, 2002. The Committee's members include representatives of County offices, interested municipalities, property owner associations, and public organizations. For a full list of participating committee members, see the Committee Information (link to "Committee Information" page) section of this website.

### What is Hazard mitigation?

"Hazard mitigation" means doing everything that can be done to reduce the impacts of natural hazards on people and property. Reducing impacts from hazards does not imply controlling the hazards themselves – preventing floodwaters or stopping tornadoes for example. These hazards are natural phenomena and cannot be stopped. Mitigation generally means adjusting what people do to prepare for, or in reaction to, these natural activities.

There are a variety of mitigation measures. They are organized under six general strategies:

- Structural flood control projects – e.g., levees, reservoirs, channel improvements
- Property protection – e.g., relocation out of harm's way, retrofitting buildings, insurance
- Preventive – e.g., zoning, building codes, and other development regulations

- Emergency services – e.g., warning, sandbagging, evacuation
  - Natural resource protection – e.g., wetlands protection, urban forestry programs
  - Public information – e.g., outreach projects, technical assistance to property owners
- 

[TOP OF PAGE](#)



## Committee Information

### Meetings

Beginning December 5, the Hazard Mitigation Planning Committee will meet on the first Thursday of each month in Building A of the [Kane County Government Center](#) (see [map](#)), at 10:30 a.m. The meetings are open to the public. The draft plan is expected to be ready for public and municipal review in August, 2003.

### Appointed Members Serving on the Hazard Mitigation Planning Committee:

Agency/ Municipality	Name
Kane Co. Environmental Mngmnt. Dept.	Steve Garrison
Kane Co. Office of Emergency Mngmnt.	Alan Choutka
Kane Co. Development Dept.	Phil Bus
Kane Co. Water Resources Dept.	Paul Schuch
Kane Co. Division of Transportation	Bob Skidmore
Kane Co. Health Department	Fred Carlson
Kane Co. GIS Technologies Dept.	Tom Nicoski
Burlington, Village of	Mary Ann Wilkison
Carpentersville, Village of	Jon Mensching
Gilberts, Village of	Michael Joswick
Sleepy Hollow, Village of	Stephen Pickett
South Elgin, Village of	Richard Babica
Sugar Grove, Village of	Brad Sauer
Wayne, Village of	Carol Schoengart
Schraeder & Associates	Laura Ross

### [Current Agenda](#)

#### Meeting Schedule & Topics

**December 5:** Organizational meeting, review public involvement and coordination efforts, and identify sources of hazard data

**January 2:** Hazard assessment (what are the hazards facing us?)

**February 6:** Problem assessment (what can the hazards do to us?)

**March 6:** Goal setting, structural projects (e.g., reservoirs, channel improvements)

**April 3:** Property protection (retrofitting existing buildings, insurance, etc.) **\*\*This meeting has been cancelled\*\***

**May 1:** Preventive activities (plans, codes and regulation of new development)

**June 5:** Review of Chapters 6 and 8.

**June 19:** Review of Chapters 5,7 and 9.

**July 3:** Natural resource protection, public information **\*\*This meeting has been cancelled\*\***

**August 7:** Action plan, overall plan review

**September 4:** Public meeting, final plan review, recommendation to the County Board, city councils and village boards

[TOP OF PAGE](#)

[ [Natural Hazards Planning](#) ]



[KANE COUNTY, Illinois](#)

Page modified



777 Fabyan Parkway  
Geneva, Illinois 60134  
PH: (630) 232-5985  
FAX: (630) 232-7408  
<http://www.kcoem.org>



**Kane County  
Department of  
Environmental  
Management**

719 Batavia Avenue  
Geneva, Illinois 60134  
PH: (630) 208-5118  
FAX: (630) 208-5137  
<http://www.co.kane.il.us/>

# Kane County Hazard Mitigation Plan Status Report

**To:** Municipalities, Agencies and Organizations Interested in Hazard Mitigation  
**From:** Tim Harbaugh, Director, Kane County Environmental Management  
Donald Bryant, Director, Kane County Office of Emergency Management  
**Date:** 12/26/2002  
**Re:** Hazard Mitigation Planning Status Report

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As announced by County Board Chair Mike McCoy, Kane County is preparing a multi-hazard mitigation plan. It will review the dangers and damage posed to us by flooding, tornadoes, earthquakes, thunderstorms, and winter/ice storms. It will identify activities that can reduce our exposure to these hazards or mitigate their impact on us.

The effort got off to a good start at the first meeting on Thursday, December 5. Over 40 people attended, representing County departments, municipalities, and stakeholders. To date, the following municipalities have formally adopted the Mitigation Planning Process through formal resolution:

Burlington	South Elgin
Carpentersville	Sugar Grove
Gilberts	Wayne
Sleepy Hollow	

These communities will participate in the development of the county-wide plan and, once the plan is complete, will meet state and federal hazard mitigation grant programs' planning prerequisite. All Kane County municipalities have been sent a sample resolution and have been invited to participate.

Stakeholder groups have been invited to participate. Stakeholder (non-profit, non-governmental, etc.) groups which are interested in participating will provide the committee a letter or resolution indicating intent to participate. Groups that do not formally join the committee can still be kept abreast of its activities through e-mail.

The committee will meet on the first Thursday of each month, through September 2003. More information on the committee's membership, activities, meeting minutes, and schedule can be found on the website, <http://www.co.kane.il.us/hazards/index.htm>.

Our next activity will be to collect data on the five hazards and how they impact us. Everyone is invited to submit the public input form which is on the website. Municipalities will be sent a data collection form.

For more information, contact:

- Karen Kosky, Environmental Management, at 630/208-8665, [koskykaren@co.kane.il.us](mailto:koskykaren@co.kane.il.us)
- Alan Choutka, Emergency Management at 630/208-2050, [choutka@kcoem.org](mailto:choutka@kcoem.org)

## Public Input

Thank you for your interest in the Kane County Natural Hazards Mitigation Planning Project!

- **Have you had personal experience with a natural hazard in Kane County?**  
Use our [public input form](#) to tell us about your experiences with natural hazards and your suggestions for hazard mitigation activities the County could undertake.
- **Hazard Mitigation Planning Committee meetings are open to the public.**  
See the [Committee Information](#) section of this website for more information on dates, times, and location. The draft plan is expected to be ready for public review in August, 2003. Watch this website for more information.

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[ [Natural Hazards Planning](#) ]



## Kane County, Illinois Natural Hazards Planning Input Form

*Have you had personal experience with a natural hazard in Kane County?* Use this input form to tell us about your experiences with natural hazards and your suggestions for hazard mitigation activities the County could undertake.

Your thoughts and experiences are important to this planning effort! Please complete this form and send it electronically to the planning team. Use a separate form if you have been affected by more than one hazard and/or at more than one location in Kane County.

<b>In what city or township did the incident occur:</b>	<input type="text" value="Select township"/>
<b>In what Zip code did the incident occur:</b>	<input type="text"/>
<b>Type of hazard</b> (check one):	
<input type="checkbox"/> Flood	<input type="checkbox"/> Tornado
<input type="checkbox"/> Earthquake	<input type="checkbox"/> Winter/ice storm
<input type="checkbox"/> Thunderstorm/lightning	
<b>Date of incident:</b>	<input type="text"/>
<b>Type of damage</b> (check all that apply):	
<input type="checkbox"/> Personal injury/health problem	<input type="checkbox"/> Damage to building
<input type="checkbox"/> Damage to vehicle(s)	<input type="checkbox"/> Lost business or work
<input type="checkbox"/> Damage to yard, landscaping	<input type="checkbox"/> Other: <input type="text"/>
<b>Approximate dollar damage:</b>	<input type="text"/>
<b>Percentage of the recovery costs covered by insurance:</b>	<input type="text"/>
<b>Recommendations or suggestions for the Hazard Mitigation Planning Committee:</b>	
<div style="border: 1px solid black; height: 80px; width: 100%; position: relative;"> <div style="position: absolute; top: -15px; right: -15px; border: 1px solid black; background-color: #f0f0f0; padding: 2px;"> <span style="font-size: 10px;">▲</span>  <span style="font-size: 10px;">▼</span> </div> <div style="position: absolute; bottom: -15px; left: -15px; border: 1px solid black; background-color: #f0f0f0; padding: 2px;"> <span style="font-size: 10px;">◀</span> <span style="font-size: 10px;">▶</span> </div> </div>	

Thank you for your input! Please check back on this website occasionally for more information about the Kane County Natural Hazards Mitigation Planning effort.

<input type="button" value="Submit Form"/>	<input type="button" value="Clear Form"/>
--------------------------------------------	-------------------------------------------

## Links

For more information on natural hazards and ways to protect against them, check the following websites:

### All hazards

10 Step Planning Process Summary

<http://www.colorado.edu/hazards/informer/infrmr1/infrmr1a.htm>

Fact sheets

<http://www.fema.gov/fima/how2.shtm>

Red Cross family disaster planning

<http://www.redcross.org/services/disaster/beprepared/familyplan.html>

### Flood protection

<http://www.fema.gov/pdf/hazards/flddam.pdf>

*Homeowner's Guide to Retrofitting: Six Ways to Protect Your House From Flooding*

[http://www.fema.gov/mit/tsd/dl\\_rfit.htm](http://www.fema.gov/mit/tsd/dl_rfit.htm)

*Protecting Building Utilities From Flood Damage*

<http://www.fema.gov/hazards/floods/pbuffd.shtm>

### Flood insurance

<http://www.fema.gov/nfip/cost1.htm>

<http://www.fema.gov/nfip/flood.htm>

### Earthquakes

<http://www.fema.gov/hazards/earthquakes/eqmit.shtm>

<http://www.fema.gov/pdf/hazards/ertdam.pdf>

### Tornadoes

<http://www.fema.gov/hazards/tornadoes/prskit328.shtm>

### Thunderstorms and lightning

<http://www.fema.gov/hazards/thunderstorms/>

### Winter storms

<http://www.fema.gov/hazards/winterstorms/>

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[TOP OF PAGE](#)

[ [Natural Hazards Planning](#) ]



[KANE COUNTY, Illinois](#)



**VILLAGE OF BURLINGTON**  
175 WATER STREET  
P.O. BOX 205  
BURLINGTON, IL. 60109-0205  
847-683-2237  
847-683-2283 - Village Clerk, Mary Ann Wilkison  
847-683-2283 Fax



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## **TO ALL AREA RESIDENTS:**

The Village of Burlington is participating with Kane County in developing a Countywide Hazard Mitigation Plan.

We are interested in information that any resident would have regarding any damage that has been done following an ice or snow storm, lightening or rain storm including hail damage within the last 20 years. The types of information that we are interested in documenting would be:

- Damage to a residence (not vehicle damage) due to hail, flooding, or electrical outage.
- Approximate dates of storm and impact to a residence or the Village.
- If there was an electrical outage that was caused as a result of a winter storm or rain or wind storm we are interested in that information.
- If you suffered any monetary loss due any of the above, the County Hazard Mitigation Committee would be interested in including this information in the development of this plan.

Please call Village Clerk, Mary Ann Wilkison, if you have any of the above information. **847-683-2283** You may also drop off any information at the Village Hall in the water drop box or send by e-mail to [burlingtonclerk@aol.com](mailto:burlingtonclerk@aol.com).

Participation in developing this plan will allow the Village to be eligible for Federal funding in the event of a natural disaster.

Thank you!

## Public Meeting News Release

For Immediate Release

The Kane County Natural Hazards Mitigation Planning Committee announces the completion of its *Natural Hazards Mitigation Plan*. This has been a nine month effort that reviewed the major hazards to which the County is exposed: floods, tornadoes, earthquakes, thunderstorms and winter/ice storms.

The Committee evaluated a variety of measures that can reduce exposure to the dangers and damage posed by the hazards, and selected 17 action items to be implemented by the County and municipal governments. The resulting *Plan* (including an executive summary) is available for review on the County's website, [www.co.kane.il.us/hazards](http://www.co.kane.il.us/hazards) (after August 11).

A public meeting will be held at 10:30 a.m., Thursday, September 4, 2003, at the Kane County Government Center, Geneva, Building A. Comments may be submitted at the public meeting or to:

Steve Garrison  
Department of Environmental Management  
719 Batavia Avenue  
Building A  
Geneva, IL, 60134  
630/208-5117  
[garrisonsteve@co.kane.il.us](mailto:garrisonsteve@co.kane.il.us)

The Mitigation Planning Committee will meet after the public meeting, review any desired changes, and recommend a mitigation plan for adoption by the County Board and the individual city councils and village boards.

METRO 8-8-03 Chicago Tribune

# Kane's hazard-preparedness plan completed

By William Presecky  
Tribune staff reporter

A committee of Kane County volunteers from public and private agencies announced Thursday that it has completed a draft plan to help the county deal with floods, tornadoes and other natural disasters.

The final chapter of the 10-chapter draft, which is scheduled to be available for public review beginning Monday, was adopted Thursday by representatives of the agencies that made up the county's Hazard Mitigation Planning Committee. In ad-

dition to identifying and suggesting ways to correct shortcomings in Kane's ability to prepare for and prevent damage from natural hazards, the plan is a mandatory prerequisite for the county and its municipalities to be eligible for federal disaster funding.

French Wetmore of French & Associates Ltd., a Park Forest-based consultant, coordinated the nine-month effort, with staff support from the county's Office of Emergency Management, Department of Environmental Management and the Forest Preserve District.

A public meeting on the plan is set for 10:30 a.m. Sept. 4 in the Kane County Government Center in Geneva. The County Board is expected to adopt the final plan by Oct. 14. Each municipality will set its own schedule for adopting the plan, Wetmore said.

After Nov. 1, local governments applying for federal disaster funding will be required to have an approved plan in place, he said. To qualify for federal postdisaster funds, local governments must adopt a plan by Nov. 1, 2004, Wetmore said.

Besides meeting the federal

requirements, "the objective of the plan is to give you a sense of what's out there [in Kane]," Wetmore said.

He said federal analysts have previewed Kane's plan. "They think overall that the plan is in pretty good shape," Wetmore said.

The final chapter is an "action plan" and includes 17 recommendations. Those range from adopting the latest building codes to developing a checklist for evaluating nearly 900 critical facilities in Kane for their exposure to damage from various hazards. "Should major

work be needed to protect a facility (such as a hospital or water-treatment plant), and it can be shown that the project would be cost-effective, funding assistance could be applied for from federal and state emergency management agencies," the plan said.

The proposal focuses heavily on five major natural hazards facing Kane: floods, tornadoes, earthquakes, thunderstorms and winter/ice storms.

Winter/ice storms are projected to have a 100 percent likelihood of occurring in a given year.

## Park district chief's job applications; will narrow list

ture, education or related fields.

Rice said the applications are being reviewed by Joseph Bannon Sr. and will be narrowed down to ten. Bannon will then send questions to the ten candidates.

She said Bannon will meet with park board members Wednesday, Sept. 17, to discuss the ten candidates, and to narrow the list to five.

These five will be brought in for interviews by the board and Bannon before a finalist is chosen, Rice said.

The salary for the new director is expected to be in the mid \$80,000 range. The new director also will receive an "excellent" benefits package, board members said. Gray's salary this past year was \$80,500.

The director is governed by policies, regulations, and plans set by the board which he must abide by in his planning,

organizing, directing and evaluating the day-to-day park business and planning for the district.

The director also must coordinate park district plans with those of other local and regional organizations and keep the board informed on all policy and major program matters as well as administrative or operating situations that affect the district's performance.

The director must be an active representative of the district within the community and act as a liaison between the district's board and staff.

There is no residency requirement for the director, Rice said.

The search firm will be paid \$7,000 for its work, according to its agreement with the board.

### Natural hazards mitigation plan topic for public meeting Sept. 4

The Kane County Natural Hazards Mitigation Planning Committee has completed a Natural Hazards Mitigation Plan.

The plan is the product of a nine month effort that involved a review of the major hazards to which the county is exposed, including floods, tornadoes, earthquakes, thunderstorms and winter/ice storms.

The committee evaluated a variety of measures that can reduce exposure to the dangers and damage posed by the hazards, and selected 17 action items to be implemented by the county and municipal governments. The resulting plan (including an executive summary) is available for review on the county's web site ([www.co.kane.il.us/hazards](http://www.co.kane.il.us/hazards)) and at Montgomery Village Hall located at 1300 S. Broadway.

A public meeting will be held at 10:30 a.m., Thursday, Sept. 4, at the Kane County Government Center, Building A, Geneva. Comments may be submitted at the public meeting or to: Steve Garrison, Department of Environmental Management, 719 Batavia Avenue, Building A, Geneva, IL 60134, 630/208-5117 or e-mailed to: [garrisonsteve@co.kane.il.us](mailto:garrisonsteve@co.kane.il.us)

The Mitigation Planning Committee will meet after the public meeting, review any desired changes and recommend a mitigation plan for adoption by the county board and the individual city councils and village boards.

Minutes of the Kane County  
Hazard Mitigation Planning Committee

Public Meeting

September 4, 2003

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A public meeting was convened on Thursday, September 4, 2003, at 10:30 a.m. in the County Board Room, Bldg. "A", Kane County Government Center, Geneva, Illinois, to answer any questions the public may have concerning the draft *Natural Hazards Mitigation Plan* for Kane County. Committee members in attendance were:

Laura Ross, Chair	Alan Choutka	Mary Ann Hoeller	Brad Sauer
Craig Arps	Mark Flaherty	Ron Johnson	Paul Schuch
Sandy Bell	Steve Garrison	Keith Mallegni	Ed Szydlowski
Frank Buhrmann	Don Gatske	David Morrison	Claudia Tremaine
Fred Carlson	Mike Glock	Doug Porch	Jason Verachtert
John Ciombor	Heather Gravlin	Mike Pubentz	John Whitehouse
Greg Chismark	Jean Hardt	Ken Robertson	Mary Ann Wilkison

Also present:

Tim Harbaugh, Dir., Environmental Management Department  
Don Bryant, Dir., Office of Emergency Management  
Sam Gallucci, Campton Township Highway Commissioner  
French Wetmore, Consultant (French & Assoc.)  
Members of the Public  
Members of the Press

### **Introduction**

Chairwoman Ross convened the public portion of the meeting at 10:30 a.m. and extended a welcome to all those in attendance. A vote of thanks was accorded to the committee, municipalities, private agencies, public agencies and all the individuals who worked on the Plan. She also thanked the County Board for their commitment to public health and safety and property, for funding, and for providing staff to assist the committee in its work.

Before moving to an overview of the Mitigation Plan, the chair spoke briefly on the formation of the Hazard Mitigation Planning Committee which came about as a result of a joint undertaking by the county's Department of Environmental Management and Office of Emergency Management to create a Natural Hazards Mitigation Plan for Kane County. Any community that intends to remain eligible for federal mitigation funds must have an approved Hazard Mitigation Plan. In accordance with the Stafford Disaster Assistance Act and Section 104 of the Disaster Mitigation Act, mitigation planning is now a requirement for both pre- and post-disaster federal mitigation funds. After November 1, 2003, all communities must have an approved Mitigation Plan to be eligible for pre-disaster funds. More critical is the requirement that after November 1, 2004, no government agency without an approved Mitigation Plan can apply for post-disaster mitigation funds.

Given the county's history of natural disaster occurrence, combined with the new federal regulations, it became imperative that local governments understand mitigation planning for present and future benefits. Chairwoman Ross stated the ability to access federal funding assistance and qualify for Community Rating System flood insurance discounts is at the heart of the Kane County Hazard Mitigation Plan which meets the federal requirements for local governments. The Community Rating System (CRS) permits communities to realize immediate cost savings through discount flood insurance and rates for residents.

Introductions were followed by an overview of the *Natural Hazards Mitigation Plan* ("Plan") by consultant French Wetmore. The chair asked that technical questions be directed to Mr. Wetmore during the regular business portion of the meeting. A PowerPoint presentation is available on a CD-Rom for viewing by local governments. The Plan itself is approx. 100 pages. The Plan and a 6-page Executive Summary are posted on the county's web site. All are available to the public via the web site or by contacting either the Dept. of Environmental Management or the Office of Emergency Management.

### **Overview of the Natural Hazards Mitigation Plan**

Mr. Wetmore reiterated that after November 1, 2003, communities will not be able to apply for pre-disaster federal money to mitigate the impact of natural disasters on public or private property without a plan that meets FEMA criteria. In addition, the Corps of Engineers must have a Flood Plain Management Plan in order to get funding for a Corp project. A Mitigation Plan can also help in getting CRS credit. The Hazard Mitigation Planning Committee ("Committee"), formed in November 2002, has worked to put together a document (the "Plan") that would meet the requirements of all three of these programs. That aside, Wetmore stressed that a Mitigation Plan is simply a good idea as it will help communities. After commenting on committee's approach to the work and noting that a variety of planning criteria was used, Wetmore offered a chapter by chapter overview of the Plan. The following were of particular note:

- Of the 28 municipalities in Kane County, 24 have signed on to participate in the Plan and have passed their own resolutions. Of the four that did not sign on, three of those are, for the most part, in another county. The fourth was Pingree Grove. Essentially, all Kane County communities that have exposure have signed on.
- Seven hazards were initially identified as being significant in terms of mitigation: Base Flood, 10-Year Flood, Dam Failure, Tornadoes, Earthquakes, Thunderstorms and Winter Storms. Of those, four were identified as being significant to Kane County and of primary concern: Tornadoes, Floods, Thunderstorms and Winter Storms. Committee's work focused not only on what causes the hazards but the likelihood of their occurring and the impact on property, critical facilities and the local economy. Committee's findings are documented in the Plan and eventually culminated in a definitive mitigation program to reduce the impact of hazards on health, safety and property damage.
- Goals and guidelines have been established to assist participants with the planning process and are set down in Chapter 3 of the Plan.
- Critical facilities (e.g. hazardous material sites, hospitals, police and fire stations, utilities, schools, places of assembly, bridges) have been inventoried using the Office of Emergency Management's facility data base and other municipal reports. Charts and maps were developed showing the distribution of these facilities throughout Kane County and will be used extensively for analysis purposes, such as proximity to a flood plain and exposure to hazards.

- Six mitigation strategies were explored. These are activities that both public and private sectors can undertake to reduce exposure to hazards. Examples: *Preventive Measures* - zoning, building codes; *Property Protection* - retrofitting buildings, insurance; *Emergency Services* - warning, sandbagging; *Natural Resource Protection* - wetlands protection, forestry programs; *Structural Projects* - flood control projects; and *Public Information* - outreach and technical assistance to property owners. The Plan provides a comprehensive look at each and sets down objectives. Dollar figures have been identified where possible.
- From a federal standpoint, repetitive losses are a concern. The Plan addresses the impacts of these losses on businesses, the economy, health and the likelihood of their reoccurrence. The main concern is to protect buildings in the repetitive loss areas (identified in the Plan). Another concern is drainage maintenance, especially in low lying areas as this is a key factor in the Community Rating System. The CRS calls for the county and each municipality to review their floodplain management tactics (current ones and those recommended in this plan) and then decide whether to apply for flood insurance premium discounts for its citizens.
- All of the above has culminated in an Action Plan which requires adoption of the Natural Hazards Mitigation Plan by resolution. It is expected that the county's resolution will create a Mitigation Planning Committee. The resolutions from each municipality will adopt the various action items that are pertinent to that community and designate a contact person. A list of the 17 Action Items and the responsible agencies are provided in the Mitigation Plan. It is the recommendation of the Natural Hazards Mitigation Planning Committee that it be converted to a permanent advisory body that would act as a forum for hazard mitigation issues.

The next steps in the process will be to receive public comment, submit the Plan for County Board review and then to local and state agencies for review. Adoption and implementation of the Plan conclude the process.

## **Public Comment**

The chair invited comment first from local officials and then from members of the general public:

Sam Gallucci, Campton Township Highway Commissioner Comm. Gallucci noted that only a small portion of Campton Township is incorporated: the Village of Elburn and the Village of Lily Lake. The majority of residents live in unincorporated areas. The township Board has asked, in terms of the Plan, if unincorporated areas are also covered or does the township need to submit a Plan to the state and federal governments to receive funds in event of an emergency. He is aware that other commissioners have the same concern and asked how they should handle that. Mr. Wetmore said the mandate is for general purpose local governments with planning and zoning authority which means that townships do not have a Plan mandate. The county Plan will cover the unincorporated areas. Mr. Wetmore said there will be no extra work required of the townships other than participating in the drainage maintenance. It was his opinion that highway folks should be involved with drainage problems that affect township roads but said the townships would not be required to take any other formal activities. He also stated this would apply equally to school districts and other local governments except for municipalities and the county which must adopt the Plan. Comm. Gallucci's second concern dealt with the township's highways and roads in the event of another 100-year rain or serious snowstorm this winter. It was his understanding from Mr. Wetmore's earlier remarks that a Mitigation Plan must be in place by

November 1 of this year (in order to be eligible for funds) and a Plan must be in place by November 2004 (in order to apply for funds). Mr. Wetmore stated that is true for certain kinds of money and clarified that the above dates are requirements for the county and its municipalities, not townships. There was further clarification from the chair that Campton Township will automatically be covered for all pre- and post-mitigation funding once the Mitigation Plan is adopted by the County Board: the unincorporated areas will be covered by the county and the incorporated areas will be covered by the municipality. Mr. Wetmore concurred with that statement.

There were no comments from the general public.

### **Written Comments**

Mr. Wetmore circulated and reviewed the following four written comments submitted earlier:

*FEMA*, submitted 8/20/03 - A copy of the draft Plan was sent to the State of Illinois who in turn forwarded it to the Federal Emergency Management Agency for additional review. The letter from Christine Stack, Chief of Community Mitigation Programs Branch, was characterized as containing good feedback. In the letter, FEMA has requested more attention on the repetitive losses. They have also asked to be provided with a certified copy of the adopting resolution by the county and each municipality.

*Betty Collins, City of Geneva*, submitted 8/30/03 - In her role as committee member and Emergency Services Director of Geneva, Ms. Collins tendered a statement of support for the Mitigation Plan and encouraged adoption by all participating bodies.

*Dave Kitzmiller, Village of East Dundee*, e-mailed 9/03/03 - Also a committee member and Public Works Director for East Dundee. Mr. Kitzmiller advised that the Board of Trustees for the Village of East Dundee have made no comment(s) other than they are pleased with the plan, the thought put into it and all the details.

*Rich Babica, Village of South Elgin*, e-mailed 9/03/03 - Committee member and Director of Public Works for the Village of South Elgin. Also supportive, advising that the Village Board has no major issues with the Plan.

There being no further comment, the chair called the public portion of the meeting adjourned at 11:08 a.m.

Jean Weems

Recording Secretary

# Appendix C. Kane County Hazard Analysis 2001

– Prepared by the Kane County Office of Emergency Management, July 11, 2001

## Introduction

Disasters caused by natural hazards have become increasingly costly, not only for the disaster victims but also for all taxpayers. From 1989 to 1993, the average annual loss from disasters was \$3.3 billion nationally. Over the past four years, that average has increased to \$13 billion annually.

During the last decade, new records were set for the most costly natural disasters in the United States. The costs of major disasters to our communities go well beyond those damages that are directly sustained. Recovery from disasters requires resources to be diverted from other important public and private programs, and adversely impacts the productivity of our workforce. The magnitudes of these losses are most appropriately considered at local, rather than national levels.

As the costs of disasters continue to rise, it becomes more and more evident that pre-disaster steps must be taken to reduce the damage and destruction to our communities. This strategy is known as mitigation.

## Purpose

In support of local mitigation programs and to help address the rising costs associated with natural disasters, the Federal Emergency Management Agency (FEMA) has encouraged the emergency management community to become more proactive in reducing the potential for losses before a disaster occurs.

Identifying the hazards that face a community is the first step in reducing the community's vulnerability. Hazard analysis involves identifying all of the hazards that potentially threaten a community and analyzing them individually to determine the degree of threat they pose.

A comprehensive hazard analysis determines:

- What hazards threaten the community.
- How often they are likely to occur.
- How severe the situation is likely to get.
- Their likely effect on the community.
- How vulnerable is the community to the threat.

The information identified in the hazard analysis is used to develop both mitigation plans and emergency response plans. A typical hazard analysis consists of five objectives:

- Identify the hazards.
- Profile each hazard.
- Develop a community profile.
- Compare and prioritize the hazards.
- Create and apply scenarios.

## **Demographics**

Kane County is located in northeastern Illinois twenty miles west of the City of Chicago. According to the year 2000 census figures, the population of Kane County is 404,119 with a population growth rate of 27.3% since the 1990 census.

The County covers approximately 520 square miles and has a population density of 777.2 persons per square mile.

While much of the land area in the County is classified as rich agricultural land, most of the population, about 85%, are located in the urban area concentrated along the Fox River Valley.

Northern Illinois Planning Commission estimates that the County's population will reach 427,000 by the year 2010. They also indicate that the number of households in Kane County will increase 35% in the same time period. This will significantly increase urban density and further complicate the process of emergency planning.

Kane County is served by four railroads; Union Pacific, Illinois Central, I&M Railink, and the Burlington Northern. Metra provides commuter rail service to Chicago.

Primary highway transportation routes within the County include Interstate 88 and US 30 (east to west), Interstate 90 (northwest to southeast), State routes 25, 31, and 47 (north to south), and State routes 72, 64, and 38 (east to west).

The County is bisected by the Fox River to the east, running north to south. It is navigable to small water craft for over eight months during the average year. It is also bisected, north to south, by a four lane divided county highway located in the center part of the county.

## **Hazard Rating Process**

During the development of this hazard analysis, all events which could pose a threat to Kane County were analyzed and rated according to history, vulnerability, maximum threat, and probability of occurrence. The events which were identified as high priority in terms of significant threat, and for which preparedness, planning, and mitigation efforts are required, are listed.

In determining and ranking hazards, the following criteria was used:

## **History**

Each hazard was rated based on the number of occurrences in the County within the last 21 years.

**Low** = 0 to 1 occurrence

**Medium** = 2 to 3 occurrences

**High** = more than 3 occurrences

If the hazard was relatively new, or there was no history available, the history was rated as low.

## **Vulnerability**

Estimates of vulnerability were derived by considering;

Where people live in relation to the hazard, what the land is being used for and the value of the property in or near the risk area. The rating was then based on the percent of population which might be killed, injured, or contaminated and all property that might be destroyed, damaged, or contaminated.

**Low** = less than 1%

**Medium** = 1% to 10%

**High** = more than 10%

## **Maximum Threat**

Examines the “worst-case scenario” in terms of the worst conceivable impact to human life and property which could result from an occurrence.

**Low** = less than 5% of the population and property affected. (<20,200)

**Medium** = 5% to 25% of the population and property affected. (20,200–101,000)

**High** = more than 25% of the population and property affected. (>101,000)

## **Probability**

Estimate of the likelihood that an event will occur within Kane County. Rated according to chances per year of occurrence.

**Low** = 1 or less

**Medium** = 2 to 5

**High** = greater than 5

## Hazard Ranking

Each event was scored to identify high priority hazards. Each of the four criteria was assigned a numerical value depending on the rating (low, medium, or high). Since some criteria are considered to be more important than others, a weighting factor was used to balance the total score.

HAZARD	HISTORY	VULNERABILITY	MAXIMUM THREAT	PROBABILITY	OVERALL SCORE
Tornado / Micro Burst	High	High	High	High	High
Flash Flood	High	High	Medium	Medium	High
Flood	High	High	Medium	Medium	High
Thunderstorm	High	Medium	Medium	High	High
Haz-Mat Spill	High	Medium	Medium	High	High
Ice Storm	High	High	Medium	Low	Medium
Railway Accident	High	Medium	High	Low	Medium
Winter Storm	High	Medium	Medium	Medium	Medium
Air Accident	High	Medium	Medium	Low	Medium
Earthquake	Low	High	High	Low	Medium
Haz-Mat Storage Accident	High	Medium	Medium	Low	Medium
High Temp Insufficient Rainfall	Medium	Medium	Medium	Medium	Medium
Nuclear Attack	Low	High	High	Low	Medium
Terrorist Attack	Low	High	High	Low	Medium
Dam Failure	Low	Medium	High	Medium	Medium
Ice Jams	High	Low	Low	Medium	Low
NiGas Interruption	Low	Medium	High	Low	Low
Industrial Accident	Low	Medium	Low	Low	Low

*Hazards are rated in order of priority. Highest rated hazard is listed first.*

## Historical Data

The potential for a variety of hazards that could affect the population and public or private property exists in Kane County. The most significant occurrences for the past 21 years are listed below.

*(NOTE: Hazardous Materials releases are not included in this table)*

06-07-80	1338 HRS. TORNADO TOUCHDOWN / F0
07-16-80	0255 Hrs. Tornado Touchdown / F2
06-15-81	Flooding / Federal Declaration
05-15-82	1400 Hrs. Tornado Touchdown / F0
12-07-82	Flooding / Federal Declaration
06-15-83	High Temps-Insufficient Rainfall / State Declaration
07-06-83	Torrential Rains-Flooding / State Declaration
08-21-86	Flash Flooding / Federal Declaration
01-15-88	Flooding & Ice Jams / State Declaration
08-28-90	Tornado Touchdown / Federal Declaration
05-05-91	1618 Hrs. Tornado Touchdown / F1
03-15-93	Flooding / State Declaration
07-02-93	Tornado Touchdown / F0 – Flooding / Federal Declaration
05-20-96	Flooding along Fox River / State Declaration
07-18-96	Flash Flooding – south end of county / Federal Declaration
02-21-97	Flash Flooding - Elgin area
06-25-98	Heat Emergency / State Declaration
01-01-99	Blizzard 12 inches in 24 Hrs. / Federal Declaration
06-20-99	Flash Flooding - Hampshire Township
12-10-2000	Snow Emergency / Federal Declaration

## **Hazard Summary**

Kane County is susceptible to numerous potential hazards. Nineteen of these have been determined to be hazards that could have a significant effect on the population and public and/or private property. Five of these have been identified as high priority hazards, the most severe of which are weather related and as such are uncontrollable by human intervention.

The highest priority hazards have been defined in this analysis. The Kane County Emergency Operations Plan specifically addresses disaster response to these threats. Additional potential hazards with lower priorities could also require an emergency response. In most cases, the organization, capabilities, resources, and procedures necessary to meet the threat of high priority hazards would be adequate and appropriate for these lesser threats. This disaster analysis will be the foundation for developing and improving Kane County's disaster response capabilities, preparedness plans, and mitigation efforts.

## **Appendix D. Critical Facilities**

This appendix lists the critical facilities that are summarized in the table on page 1-12. Most are plotted on the maps at the end of Chapter 1, although some addresses were incomplete or otherwise could not be located on the County geographic information system maps. The Office of Emergency Management has additional details on each site, including the contact person and phone number.

These lists do not include critical facilities located in the communities on the County line that are outside the County.

These lists are subject to change over time as facilities change and communities revise their determinations as to what is “critical.”

For security reasons, this appendix is not included in the version of the Plan that is available to the public. For more information, contact the Kane County Office of Emergency Management.

## **Appendix E. Public Information Strategy Exercise**

At its June 19, 2003, meeting the Natural Hazards Mitigation Planning Committee reviewed the various public information activities and the conclusions and recommendations of this chapter. An exercise was conducted to identify the most important topics that should be explained to the public. A second exercise identified the media that would be most effective in conveying those messages.

The next two pages are the handouts used for these exercises. The tallies of the results are shown on page 9-8. They were discussed at the August 7 Committee meeting and formed the basis for the final action plan.

## Public Information Topics

There are a variety of messages that can be delivered to property owners, businesses, school children and other members of the “public.” The following are listed in alphabetical order.

Please review these messages and check off the **10** that you think are the most important. Scratch out any messages that should not be used and feel free to suggest different words.

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>— Beautifying the riverfront</li> <li>— Benefits of open space</li> <li>— Dealing with contractors</li> <li>— Earthquake safety precautions</li> <li>— Economic impact of natural hazards</li> <li>— Emergency protection measures</li> <li>— Flood Insurance Rate Maps</li> <li>— Floodproofing a business</li> <li>— Floodproofing a house</li> <li>— Health hazards</li> <li>— How to evacuate during a flood</li> <li>— How to get out of buying flood insurance</li> <li>— Local drainage protection</li> <li>— Making sure your yard drains</li> <li>— Mosquito protection/eradication</li> <li>— Past disasters in the community</li> <li>— Preparing a building for a winter storm</li> <li>— Preserving and protecting wetlands</li> <li>— Protecting water quality</li> <li>— References in the local library</li> <li>— Reporting construction violations</li> <li>— Reporting dumping violations</li> <li>— Retrofitting a building for tornado protection</li> <li>— Retrofitting for earthquake protection</li> <li>— Rules against dumping in the river</li> <li>— Rules on building in the floodplain</li> <li>— Safety hazards during floods</li> </ul> | <ul style="list-style-type: none"> <li>— Safety hazards during a storm</li> <li>— Safety in buildings</li> <li>— Safety in vehicles</li> <li>— Sewer backup insurance</li> <li>— Sewer backup protection measures</li> <li>— Sources of assistance</li> <li>— Substantial damage regulations</li> <li>— Status of flood control projects</li> <li>— Status of implementing the mitigation plan</li> <li>— Thunderstorm/lightning safety precautions</li> <li>— Tornado safety precautions</li> <li>— Warning signals</li> <li>— What a flood insurance policy covers</li> <li>— What the municipality is doing</li> <li>— What other agencies are doing</li> <li>— What the County is doing</li> <li>— When flood insurance must be purchased</li> <li>— Whether a building is in a floodplain</li> <li>— Who is responsible for flooding</li> <li>— Why channel maintenance is important</li> <li>— Why it floods</li> <li>— Why sewer backup occurs</li> <li>— Winter storm safety precautions</li> <li>— Other: _____</li> <li>— Other: _____</li> <li>— Other: _____</li> <li>— Other: _____</li> </ul> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Public Information Media

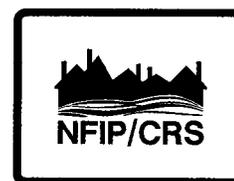
There are many different ways to convey the messages about floods and other hazards. The following are listed in alphabetical order.

Please review these media and check off the **5** that you think are the most important. Scratch out any media that should not be used and feel free to suggest different ones.

- Cable TV notices
- Displays in home improvement stores
- Educational programs in grade schools
- Educational programs in high schools
- Educational programs in junior high
- Floodproofing open houses
- Handouts/flyers at public places
- Homeowner's flood protection handbook
- Mass mailing to all residents
- Mass mailing to all floodplain residents
- Newspaper articles
- Newspaper supplements
- Park/Forest Preserve district educational programs
- Presentations at neighborhood meeting
- Presentations to banks and lenders
- Presentations to contractors
- Presentations to insurance agents
- Presentations to organizations or clubs
- Presentations to real estate agents
- References available in the library
- Shopping mall displays
- Special events (e.g., "Flood Week")
- Technical advice from Village staff
- Telephone book/"Yellow Book"
- Utility bill stuffers
- Videos/Cable TV programs
- Village-wide newsletter
- Visits to a home by Village staff
- Web site with links to other sources
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

## Appendix F. The Community Rating System

The Federal Emergency Management Agency’s National Flood Insurance Program (NFIP) administers the Community Rating System (CRS). Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented.



A community receives a CRS classification based upon the credit points it receives for its activities. It can undertake any mix of activities that reduce flood losses through better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs.

There are ten CRS classes: class 1 requires the most credit points and gives the largest premium reduction; class 10 receives no premium reduction (see table). A community that does not apply for the CRS or that does not obtain the minimum number of credit points is a class 10 community.

Twenty-nine Illinois communities participate, including Bartlett (class 8), Hoffman Estates (class 7), and St. Charles (class 9).

Class	Points	Premium Reduction	
		In Floodplain	Outside Floodplain
1	4,500+	45%	10%
2	4,000–4,499	40%	10%
3	3,500–3,999	35%	10%
4	3,000–3,499	30%	10%
5	2,500–2,999	25%	10%
6	2,000–2,499	20%	10%
7	1,500–1,999	15%	5%
8	1,000–1,499	10%	5%
9	500– 999	5%	5%
10	0 – 499	0	0

**Program incentive:** The CRS provides an incentive not just to start new programs, but to keep them going. If Kane County or a municipality were to join the CRS, there are two requirements that would “encourage” it to implement flood mitigation activities.

First, the community would receive CRS credit for this *Plan* when it is adopted. To retain that credit, though, the County must submit an evaluation report on progress toward implementing this *Plan* to FEMA by October 1 of each year. That report must be made available to the media and the public.

Second, the community must annually recertify to FEMA that it is continuing to implement its CRS credited activities. Failure to maintain the same level of involvement in flood protection can result in a loss of CRS credit points and a resulting increase in flood insurance rates to residents.

It is expected that this undesirable impact of loss of CRS credit for failure to report on the plan’s progress or for failure to implement flood loss reduction projects will be a strong encouragement for a Kane County community to continue implementing this *Plan* in dry years when there is less interest in flooding.

## **Kane County CRS Credit**

The table on the next page identifies where Kane County and its municipalities can expect to receive CRS credit, based on the activities reviewed and recommended in this *Plan*. A community can improve one class for each 500 points. A range of points is shown where the score varies according to local conditions and the community's level of effort. Points are approximate.

There are additional prerequisites for CRS participation (e.g., the community must be cleared by FEMA as being in full compliance with the requirements of the National Flood Insurance Program). There are also requirements for several of the activities. For example, credit for 320, reading Flood Insurance Rate Maps for inquirers, is dependent on the community publicizing the service.

The likely scores for Kane County municipalities range from 1,138 to 2,500. With at least 1,000 points, the County and most communities can be expected to enter the CRS as a Class 8. Depending on their level of activity, some communities could be as high as a Class 5. Class 5 is the best classification that has been received to date in the Midwest.

## **Benefits of CRS participation**

In addition to the direct financial reward for participating in the Community Rating System, there are many other reasons to participate in the CRS. As FEMA staff often say, "if you are only interested in saving premium dollars, you're in the CRS for the wrong reason."

The other benefits that are more difficult to measure in dollars:

1. The activities credited by the CRS provide direct benefits to Kane County residents, including:
  - Enhanced public safety;
  - A reduction in damage to property and public infrastructure;
  - Avoidance of economic disruption and losses;
  - Reduction of human suffering; and
  - Protection of the environment.
2. A community's flood programs will be better organized and more formal. Ad hoc activities, such as inspecting for drainage problems, will be conducted on a sounder, more equitable basis.
3. A community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.

	Activity/Element	Plan Section	Points
	<b>300 Series: Public Information</b>		
310	Maintaining FEMA Elevation Certificates on new buildings		56 – 100
320	Reading Flood Insurance Rate Maps for inquirers	9.4	140
330	Designing and distributing outreach projects	9.1	10 – 190
	Implementing the public information program strategy	9.5	100
340	Real estate disclosure laws and practices	9.2	10
350	References in the public library	9.3	20 – 30
	Flood protection information in the community's website	9.3	10 – 36
360	Flood protection technical assistance	9.4	0 – 71
	<b>400 Series: Mapping and Regulations</b>		
410	Providing additional flood data or mapping to State standards		200
420	Preserving open space in the floodplain	4.5	38 – 200
430	Higher standards for floodplain regulations	4.6	200 – 250
	Regulating mobile home parks	4.2	0 – 50
	Higher standards for new subdivisions	4.4	0 – 25
	Adoption of the International series of building codes	4.1	0 – 50
	Building Code Effectiveness Grading Schedule (BCEGS) class	4.1	0 – 40
	Planning and zoning to preserve floodplain open space	4.3	0 – 100
440	Maintaining flood maps on a geographic information system (GIS)		0 – 100
	Maintaining elevation reference marks and old flood maps		0 – 50
450	Retention and detention requirements for new developments	4.6	50 – 95
	Erosion and sediment control requirements for new developments	4.6	30
	Best management practices and water quality regulations	4.6	25
	<b>500 Series: Flood Damage Reduction</b>		
510	Floodplain management or natural hazards mitigation plan	1.1	200
520	Acquiring and relocating 20 buildings	5.1	0 – 100
530	Retrofitting or otherwise protecting 20 buildings	5.2, 8	0 – 84
540	Formal drainage system maintenance program	8.6	0 – 250
	<b>600 Series: Flood Preparedness</b>		
610	Flood warning and response program, Fox River	7.1 – 7.4	0 – 140
	Flood warning and response program, other streams	7.1 – 7.4	0 – 140
630	Levee safety program		0
630	State dam safety program		59
	Dam failure emergency response plan		0 – 100

4. Technical assistance in designing and implementing a number of activities is available at no charge from the Insurance Services Office.
5. A community would have an added incentive to maintain its flood programs over the years. The fact that its CRS status could be affected by the elimination of a flood-related activity or a weakening of the regulatory requirements for new developments would be taken into account by the governing board when considering such actions.
6. The public information activities will build a knowledgeable constituency interested in supporting and improving flood protection measures.
7. Every time residents pay their insurance premiums, they are reminded that the community is working to protect them from flood losses, even during dry years.

More information on the Community Rating System can be found at

[www.fema.gov/nfip/crs.shtm](http://www.fema.gov/nfip/crs.shtm)

# Appendix G. County and Municipal Resolutions

## 1. Kane County resolution for September 2003 Plan

STATE OF ILLINOIS

COUNTY OF KANE

RESOLUTION NO. 03 - 308

### ADOPTION OF THE KANE COUNTY NATURAL HAZARDS MITIGATION PLAN AND ESTABLISHMENT OF A KANE COUNTY HAZARD MITIGATION COMMITTEE

WHEREAS, on October 13, 1998, the Kane County Board passed Resolution No. 98-251 adopting the KANE COUNTY STORMWATER MANAGEMENT PLAN (the "Plan") pursuant to 55ILCS 5/5-1062 which established goals to minimize and reduce stormwater damages to existing structures and land use in order to maximize the protection of public health, safety, and welfare, and identify and develop revenue sources to complete the goals and objectives; and

WHEREAS, the mission of the Kane County Office of Emergency Management includes the charge to "identify hazards and vulnerabilities, whether natural or man made, within the corporate limits of Kane County, and provide programs to eliminate or reduce the effects of such threats ..."; and

WHEREAS, on September 10, 2002, the Kane County Board passed Resolution No. 02-281 approving the development of an Natural Hazard Mitigation Plan; and

WHEREAS, a Natural Hazard Mitigation Plan for Kane County will be required beginning in November 2003 to receive any state or federal mitigation funding such as flood prone property improvement or buyout funds; and

WHEREAS, the County of Kane is subject to flooding, tornadoes, winter storms, and other natural hazards that can damage property, close businesses, disrupt traffic, and present a public health and safety hazard; and

WHEREAS the Natural Hazards Mitigation Planning Committee, comprised of representatives from the County, municipalities and stakeholder organizations, has prepared a recommended Natural Hazards Mitigation Plan that reviews the options to protect people and reduce damage from these natural hazards; and

WHEREAS, the recommended Natural Hazards Mitigation Plan has been widely circulated for review by the County's residents and federal, state and regional agencies and has been supported by those reviewers.

NOW, THEREFORE BE IT RESOLVED by the Kane County Board that:

1. The *Natural Hazards Mitigation Plan* is hereby adopted as an official plan of Kane County.
2. The Mitigation Coordinating Committee is hereby established as a permanent advisory body. It shall be composed of representatives from the following groups, as appointed by the County Board Chairman and approved by the County Board:
  - a. The following County offices and departments:
    - 1) Environmental Management
    - 2) Emergency Management
    - 3) Development
    - 4) Water Resources
    - 5) Transportation
  - b. Those municipalities that pass a resolution to adopt the *Natural Hazards Mitigation Plan* and that send a representative to attend the meetings of the Committee.

- c. Representatives of other interested agencies, organizations and associations appointed by the Chair of the County Board to represent the stakeholders in hazard mitigation and the general public.
3. The Committee shall meet as often as necessary to prepare or review mitigation activities and progress toward implementing the *Natural Hazards Mitigation Plan*. It shall meet at least once each year to review the status of ongoing projects.
4. The schedule of Committee meetings shall be posted in appropriate places. All meetings of the Committee shall be open to the public.
5. By November 30 each year, the Committee shall prepare an annual evaluation report on the *Mitigation Plan* for the County Board and the municipalities. The report will cover the following points:
  - a. A review of the original plan.
  - b. A review of any natural disasters that occurred during the previous calendar year.
  - c. A review of the action items in the original plan, including how much was accomplished during the previous year.
  - d. A discussion of why any action items were not completed or why implementation is behind schedule.
  - e. Recommendations for new projects or revised action items. Such recommendations shall be subject to approval by the County Board and the affected municipality's governing boards as amendments to the adopted plan.
6. The director of each County office identified as "responsible agency" for the *Mitigation Plan's* action items shall ensure that the action item is implemented by the listed deadline subject to fiscal and staff time constraints.
7. The Environmental Management Department and the Office of Emergency Management shall provide staff support for the Committee's work.

Passed by the Kane County Board on October 14, 2003.

  
\_\_\_\_\_  
Clerk, County Board  
Kane County, Illinois

  
\_\_\_\_\_  
Chairman, County Board  
Kane County, Illinois

Vote:  
Yes 24  
No 0

10MitigationPlan

## 2. Municipal resolutions for September 2003

The Kane County Office of Emergency Management has a copy of the resolution from each municipality that adopted the September 2003 plan. The OEM will also maintain a copy of all resolutions from future plan updates. The following is a list of the municipalities that passed a resolution adopting the September 2003 plan.

<b>Municipality</b>	<b>Date Passed</b>
Algonquin, Village of	11/04/03
Aurora, City of	01/13/04
Batavia, City of	10/20/03
Big Rock, Village of	11/03/03
Burlington, Village of	10/20/03
Campton Hills, Village of	01/20/09
Carpentersville, Village of	10/07/03
East Dundee, Village of	11/17/03
Elburn, Village of	10/20/03
Elgin, City of	04/14/04
Geneva, City of	01/05/04
Gilberts, village of	11/04/03
Hampshire, Village of	10/02/03
Huntley, Village of	10/23/03
Lily Lake, Village of	10/20/03
Maple Park, Village of	11/04/03
Montgomery, Village of	11/10/03
North Aurora, Village of	12/08/03
Sleepy Hollow, Village of	01/05/04
South Elgin, Village of	10/20/03
St. Charles, City of	11/17/03
Sugar Grove, Village of	11/18/03
Virgil, Village of	11/13/03
Wayne, Village of	02/03/04
West Dundee, Village of	11/03/03

3. Kane County resolution for January 2009 Plan  
Will be added upon resolution passing.

4. Municipal resolutions for January 2009 Plan  
Will be added upon resolution passing.