

Natural Hazards Mitigation Plan

Kankakee County, Illinois

2018



Natural Hazards Mitigation Plan

Kankakee County

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Chapter 1. Introduction

1.1. Background

Kankakee County is subject to natural hazards that threaten life, safety, health, and welfare and cause extensive property damage. Some recent examples include:

Flooding that caused the Kankakee and Iroquois Rivers to rise above flood stage sixteen times since 1990.

Snow storms in 1999 and 2001 that resulted in emergencies declared by the President.

Severe thunderstorms and tornadoes in 2004 that caused the President to declare the County a disaster area.

To better understand these hazards and their impacts on people and property, and to identify ways to reduce those impacts, the Kankakee County Regional Planning Department undertook this *Hazard Mitigation Plan*.

öHazard mitigationö 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.



Flooding off of Blackhawk Trail, April 2013

“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 a requirement for Federal mitigation funds under Section 104 of the Disaster Mitigation Act of 2000 (42 USC 5165). 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). FEMA also recognizes plans through its Community Rating System, a program that reduces flood insurance premiums (discussed in Section 1.5).

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* addresses the eight major natural hazards facing Kankakee County:

Overbank flooding	Winter storms
Local drainage problems	Thunderstorms
Tornadoes	Drought/extreme heat
Earthquakes	Wildfire

This *Plan* 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.

1.2. 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 and other participating governmental bodies by studying the overall damage potential and ensuring that public funds are well spent.

The Task Force: This *Hazard Mitigation Plan* was developed under the guidance of a Mitigation Advisory Task Force. All municipalities within Kankakee County were invited to participate in the plans update. The municipalities that chose to participate are listed in the table to the right.

The Kankakee County Regional Planning Commission (RPC) hosted the meetings of the Hazard Mitigation Task Force and the 15 members of the RPC were at the meetings and where considered members of the taskforce.

Municipal Participation
Community
Aroma Park
Buckingham
Chebanse
Grant Park
Hopkins Park
Manteno
Unincorporated. County
Fire District Participation
Kankakee FD
Grant Park FPD
Manteno FPD
Momence FPD
Other Participants
Regional Planning Commission
Kankakee County Health Dept.
Kankakee County Sheriff's Dept.

Mitigation Advisory Task Force 2018		
Participant	Agency/Organization	
County Offices		
Chad Gessner	Sheriff's Department	
Steve Marion	Planning Department . Building Division	
Delbert Skimerhorn	Planning Department	
Michelle Sadler	Planning Department	
John Bevis	Health Department	
Municipalities		
Ray Cummins	Mayor	Village of Buckingham
Ryan Marion	Building Inspector	Village of Manteno
Gerry Morgan	Village Trustee	Village of Grant Park
Julie Pasel	Village Trustee	Village of Chebanse
Mark Hodge	Mayor	Village of Hopkins Park
Other Agencies and Organizations		
Rich Shrorts	Grant Park Fire Protection District	
Jaff Bruno	Kankakee City Fire Department	
Scott O'Brien	Manteno Township Fire Protection District	
Steve Lambert	Momence Fire Protection District	

The Task Force initially met on January 18, 2018. The Table to the right depicts the plan's update schedule that was followed by the Task Force. Technical support for the planning effort was provided by the County's Planning and Health Departments, and the County Emergency Services and Disaster Agency (EMA).

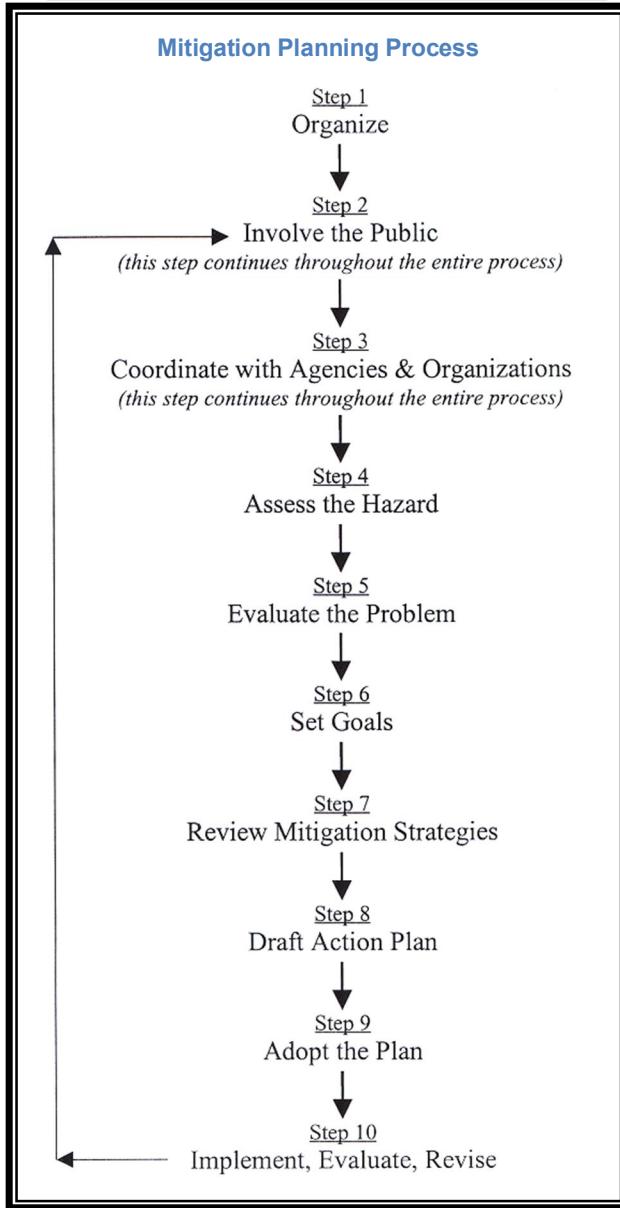
Planning process: The Mitigation Advisory Task Force followed a standard 10-step process, based on FEMA's guidance and requirements. This process is

Task Force Meetings		
Date	Steps	Topics
1/18/18	1-2	Organize / set goals
2/22/18	3-4	Hazard analysis, goals, property protection, emergency management, preventative measures, and action plan.
3/15/18	5	Evaluate the Problem
4/19/18	5	Evaluate the Problem
5/17/18	6	Set Goals
6/21/18	6	Set Goals
7/21/18	7	Review Strategies
8/16/18	8	Draft Action Plan

summarized in the flow chart to the right.

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, examples of which public involvement efforts can be seen in Appendix A. They included:

- Contact with Task Force members and their organizations
- A standing invitation to attend Task Force meetings
- Press releases.
- A special website, <http://planning.k3county.net/hmplan2013.html>. The site included updated information on the Task Force's meetings and encouraged interested parties to submit information about their experiences through an online survey.





June 26, 2013, Planning, Zoning, & Agriculture Committee meeting

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 and the Local Emergency Planning Committee. This plan complements those efforts and, as noted in later chapters, builds on their recommendations.

During the planning process of this update, contacts were made with regional, state, and federal agencies and organizations.

Federal Emergency Management Agency, Region V
Illinois Emergency Management Agency
Illinois Department of Natural Resources, Office of Water Resources
Kankakee County Farm Bureau
Kankakee County Soil and Water Conservation District
Kankakee River Basin Commission
Kankakee River Valley Chamber of Commerce
National Weather Service

Direct discussions with several of these agencies did prove quite helpful.

On July 6, 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 July 23, 2013, public meeting. This notice also went to all municipalities in the County, all 17 townships, the adjoining counties of Iroquois, Ford, Livingston, Grundy, and Will, and Lake and Newton Counties, Indiana.

Hazard assessment and problem evaluation: The Task Force tackled steps 4 and 5 of the planning process concurrently during the February 22 and March 15 meetings. The

hazards reviewed include those locally reported and all natural hazards listed in the state's *Hazard Mitigation Plan*. The hazard data and their impact on the County are covered in Chapters 2 and 3 of this *Plan*.

Goals: The Task Force reviewed the goals of the Plan at the May 17th meeting. The goals were then drafted and revised at the June 21st meeting. The results are discussed in Chapter 4 of this *Plan*.

Mitigation Strategies: The Mitigation Advisory Task Force considered everything that could affect the impact of the hazards and reviewed a wide range of alternatives. The Task Force's work and the subsequent plan document explored five general strategies for reaching the goals. These strategies are the subject of Chapters 5 & 9 in this *Plan*.

- Preventive ó e.g., zoning, building codes, and other development regulations
- Property protection ó e.g., relocation out of harm's way, retrofitting buildings
- Emergency services ó e.g., warning, sandbagging, evacuation
- Structural projects ó e.g., levees, reservoirs, channel improvements
- Public information ó e.g., outreach projects, technical assistance

Action plan: After the many alternatives were reviewed, the Task Force 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 *Hazard Mitigation Plan*.

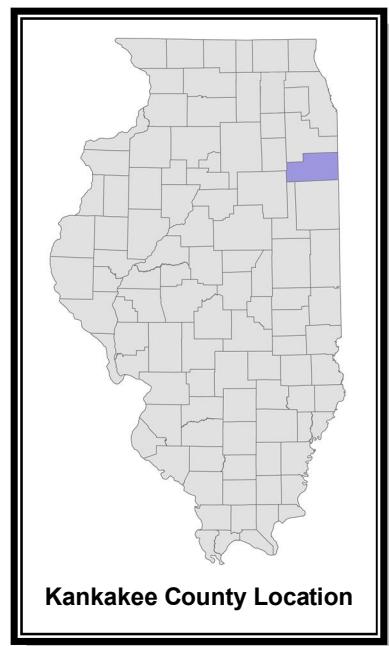
It should be noted that this Plan serves only to recommend mitigation measures. Implementation of these recommendations depends on adoption of this *Plan* by the Kankakee County Board and the city council or board of trustees of each participating municipality. It also depends on the cooperation and support of the offices designated as responsible for each action item.

1.3. The Setting

Kankakee County is located in northeastern Illinois, 60 miles south of the City of Chicago (see map). The County measures 38 miles east to west and 20 miles north to south. It covers 680 square miles.

Kankakee County is flat, a legacy of the great glaciers that spread across Illinois. Its main topographic feature is the Kankakee River and its largest tributary, the Iroquois. The Kankakee River has a drainage area of 5,280 square miles, of which 60% is in Indiana. The Iroquois River basin accounts for 2,175 square miles or 2/5 of the Kankakee's basin.

The area was originally settled by the Pottawatomie Indians, until a treaty in 1832 relocated them to a



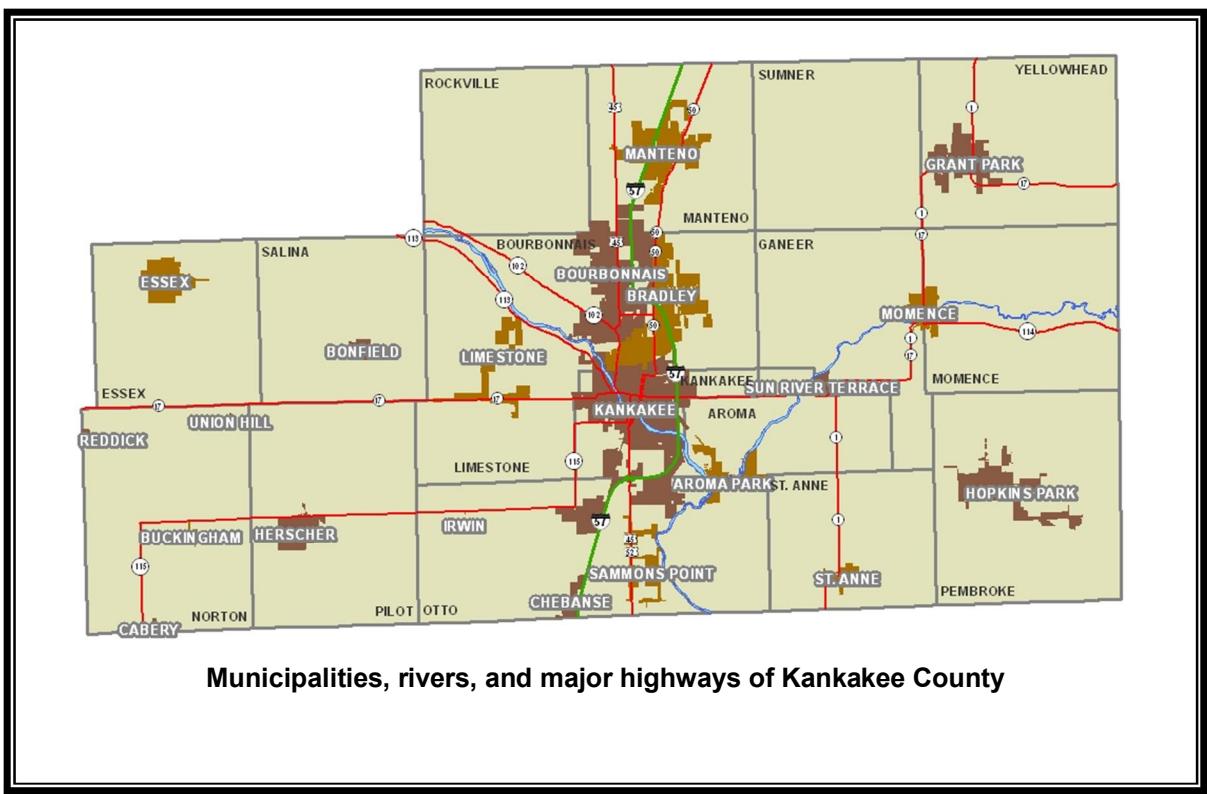
reservation in Iowa. White settlers followed soon after. They drained the flat, wet prairie lands and planted corn and wheat.

The first permanent city was Momence, established around a mill on the Kankakee River in 1846. Bourbonnais was settled in 1850 by French Canadians. Growth took off after the Illinois Central Railroad laid tracks in 1853 and established Kankakee Depot where the tracks crossed the river. Within two years, this community became the County Seat.

After the 1870s, the County's economic base of agriculture was diversified with industry. By 1909, the value of manufacturing amounted to half the value derived from farm production. In 1877, the area was selected as the site for a State mental hospital. Now called the Shapiro Developmental Center, it has been the County's largest employer for many years.

The 1992 *Comprehensive Plan* reported that 93% of the County's land area is devoted to agriculture. Of the balance, 4% is incorporated, 2.4% is residential, and the remainder devoted to commercial, industrial or public uses.

Kankakee County has a population of 113,449, most of whom live within municipal boundaries. The 21 municipalities within the County account for 74.7% of the County's population. The municipalities of Bourbonnais, Bradley, Kankakee and Manteno account for nearly 62% of the County's population in 2010.



1.4. 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.

Critical facilities are not strictly defined by any agency. Generally, they fall into two categories:

- Buildings or locations vital to public safety and the disaster response and recovery effort
- Buildings or locations that, if damaged, would create secondary disasters



It was suggested at the meetings, that the Com Ed Critical Facilities Portal could be used by local government leaders. This is an already developed tool that provides needed information in times of crisis. Local governments wishing to use the Portal will need to get approved access from Com Ed.

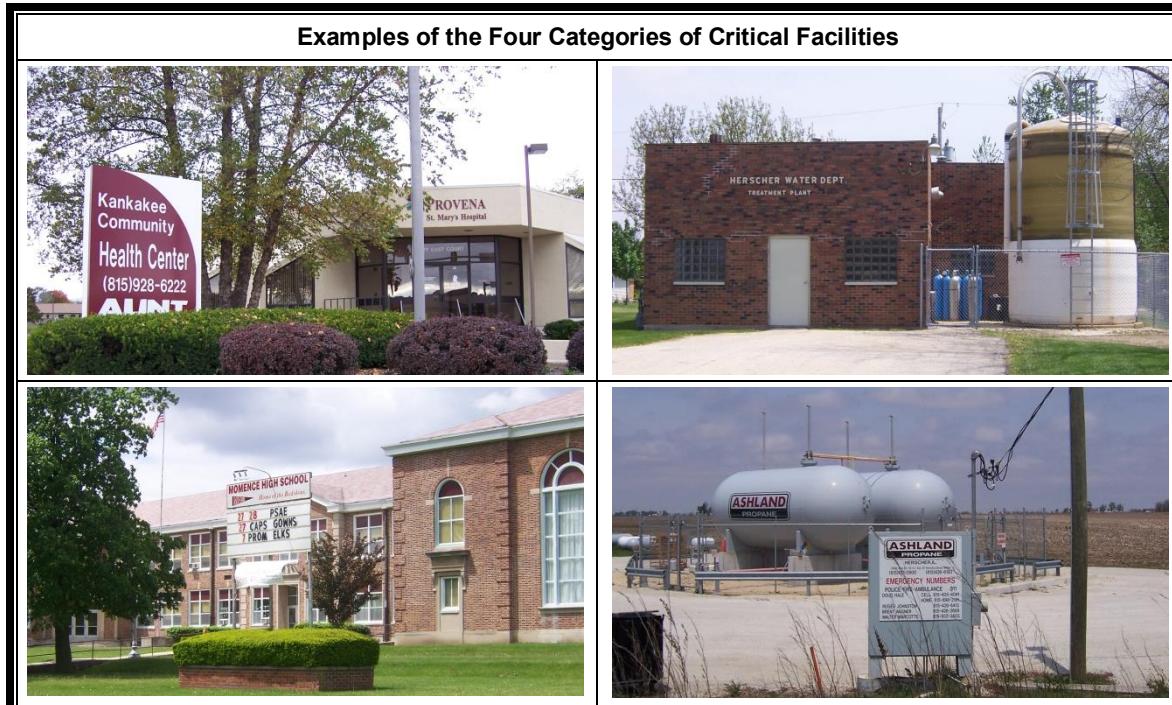
For this mitigation planning effort, four categories of critical facilities were used:

1. Public safety: police, fire, corrections, and health care
2. Utilities: power stations, water treatment, and wastewater treatment
3. Schools (also emergency shelters)
4. Hazardous materials facilities

A fifth, “other” category was used to include facilities like village halls, radio stations, and dams. The complete list of the facilities was reviewed by the Task Force but is not included with this *Plan*. It is kept by County EMA.

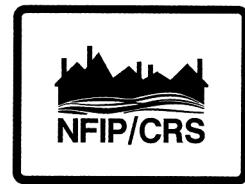
The distribution of these facilities is shown in the table to the right. Chapter 3 discusses critical facilities that are impacted by the natural hazards reviewed in Chapter 2. For some hazards, such as floods, affected critical facilities can be readily identified since we can predict where a flood is likely to be. For other hazards, such as tornadoes, the impact on critical facilities can only be broadly identified.

Distribution of Critical Facilities						
	Public Safety	Utilities	Schools	Hazardous Materials	Other	Total
Aroma Park	2	2	1			5
Bonfield	1		1			2
Bourbonnais	2	4	11	3	1	21
Bradley	2	3	5	3	2	15
Buckingham	1	2			1	4
Chebanse	2	2	2	2	2	10
Essex	1					1
Grant Park	2	3	3	1	3	12
Herscher	2	2	2	3		9
Hopkins Park	4	2	3			9
Kankakee	16	5	21	12	9	63
Manteno	4	9	5	1		17
Momence	3	1	6	2		12
Sun River Terrace	1	2				3
Uninc. County	1	5	2	11	2	21
K. Com. College	0	0	1	0	0	1
Total	44	42	63	38	20	207



1.5. The Community Rating System

As discussed in Chapters 2 and 3, flooding and local drainage problems have a great impact on Kankakee County and its municipalities. A mitigation plan for a floodprone community should be coordinated with the credits that are possible under the Community Rating System (CRS).



The CRS is part of FEMA's National Flood Insurance Program (NFIP). 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. The CRS provides an incentive not just to start new mitigation programs, but to keep them going.

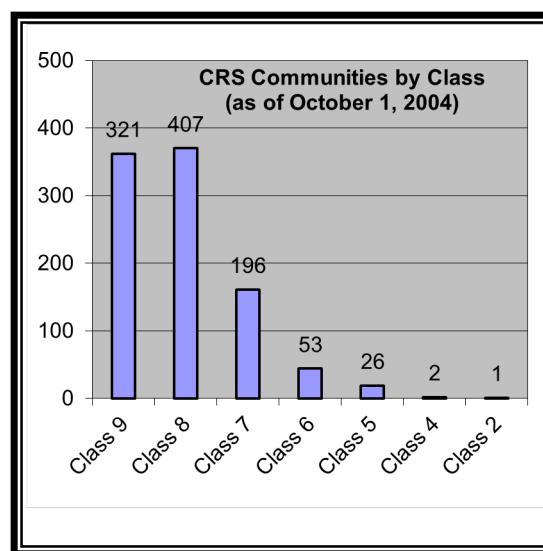
There are ten CRS classes: class 1 requires the most credit points and gives the largest premium reduction; class 10 receives no premium reduction (see table). A community that does not apply for the CRS, or that does not obtain the minimum number of credit points, is a class 10 community.

Of the 21,000 communities in the NFIP, just 1,211 participate in the CRS, 56 in Illinois (including Adams and Sangamon Counties). None of the Kankakee County communities participate at this time.

To continue to receive its credit, a 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.

Benefits of CRS participation: There are many reasons to participate in the CRS in addition to the direct financial reward to flood insurance policy holders. As FEMA staff often say, "if you are only interested in saving

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



premium dollars, you're in the CRS for the wrong reason.ö

The other benefits that are more difficult to measure in dollars include:

1. The activities credited by the CRS provide direct benefits to 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 are better organized and more formal. Ad hoc activities, such as responding to drainage complaints rather than an inspection program, are conducted on a sounder, more equitable basis.
3. A community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.
4. Technical assistance in designing and implementing a number of activities is available at no charge from the Insurance Services Office.
5. The public information activities build a knowledgeable constituency interested in supporting and improving flood protection measures.
6. A community has 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 should be taken into account by its governing board when considering such actions.
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
<http://training.fema.gov/EMIWeb/CRS/>

1.6. References

1. *Comprehensive Plan*, Kankakee County, Illinois, 1992 & 2005.
2. Data supplied by municipalities and County offices.
3. *Example Plans*, FEMA/Community Rating System, 2002
4. *Getting Started – Building Support for Mitigation Planning*, FEMA, FEMA-386-1, 2002
5. Kankakee County web site, <http://www.k3county.net>

6. *State and Local Plan Interim Criteria Under the Disaster Mitigation Act of 2000*, FEMA, 2002

Chapter 2. Hazard Profile

This chapter provides basic data on the natural hazards that face Kankakee County. Eight natural hazards were selected for this assessment. They were either listed in the State's Hazard Profile or identified by the Mitigation Advisory Task Force as having affected the County in recent history.

Overbank flooding	Winter storms
Local drainage problems	Thunderstorms
Tornadoes	Drought/extreme heat
Earthquakes	Wildfire

This chapter has eight sections, one for each hazard. Each section begins with a description of the hazard. This is followed by a summary of historical occurrences in the County, the frequency or likelihood of future occurrences and where they occur. Chapter 3, Vulnerability Assessment, reviews the impacts of the hazards on property, the economy, and people.

2.1. Overbank Flooding

The hazard: The most damaging floods occur along rivers and streams. Runoff from rain and snowmelt flows overland to storm sewers and ditches. These flow into larger ditches and streams. Almost all of Kankakee County runoff eventually flows into the Kankakee River.

The Kankakee River flows from the east from Indiana, through the center of the County, and then northwest into Will County, where it joins the Des Plaines River to form the Illinois River. Some of the far western part of the County drains to the Mazon River, which flows into Grundy County and on to the Illinois River.

The Kankakee River's major tributaries are:

Iroquois River, which flows from the south and joins the Kankakee at Aroma Park. The Iroquois is by far the largest tributary and accounts for 2/5 of the Kankakee River watershed.

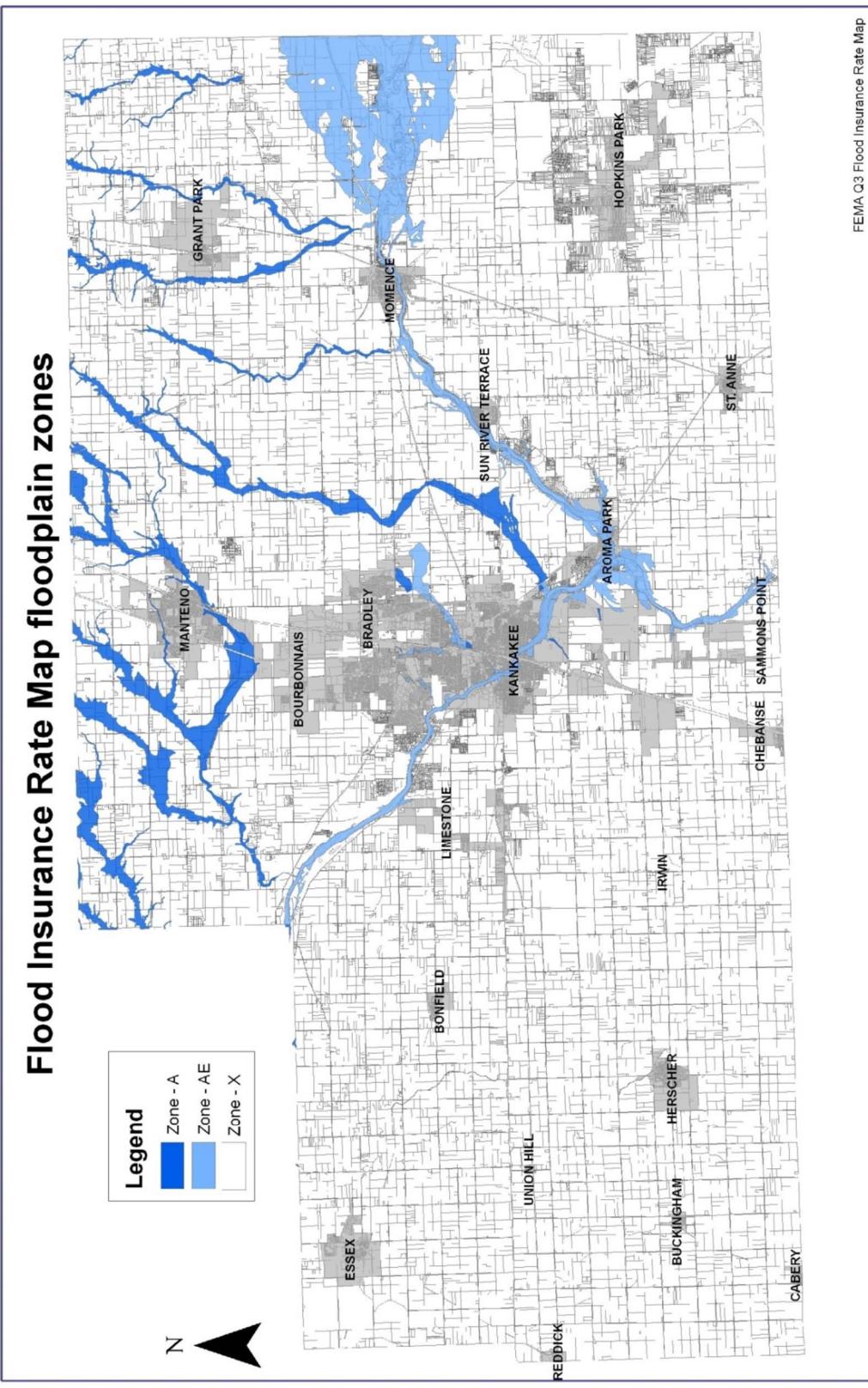
Baker Creek/Exline Slough, which flows from the north and into the Kankakee between Aroma Park and Kankakee

Soldiers Creek, which flows through Bradley and Kankakee from the northeast
Rock Creek and Forked Creek which drain the area around Manteno and
Rockville Township

Horse Creek, which drains the western 1/3 of the County and flows north to join the Kankakee in Will County

Location: When a ditch or river has too much water, it overflows onto the adjacent land, i.e., the floodplain. The Kankakee River and its tributaries' floodplains are shown on the

map on the next page. This map is taken from the Flood Insurance Rate Map (FIRM) prepared by FEMA.



The width and depth of floodplains vary depending on the local topography. The map shows the very wide floodplain on the Kankakee upstream of Momence where the channel meanders through a very flat area of Illinois and Indiana. The Kankakee's floodplain is relatively narrow where it flows through the towns of Momence, Sun River Terrace, and Kankakee.

It must be noted that FEMA did not map the smaller streams in the western third of the County. Some of these areas have flooded (see photo), but they are not even shown as approximate floodplains on the FIRM. Chapter 5, section 5.5, discusses the need for a new Flood Insurance Rate Map for the County.

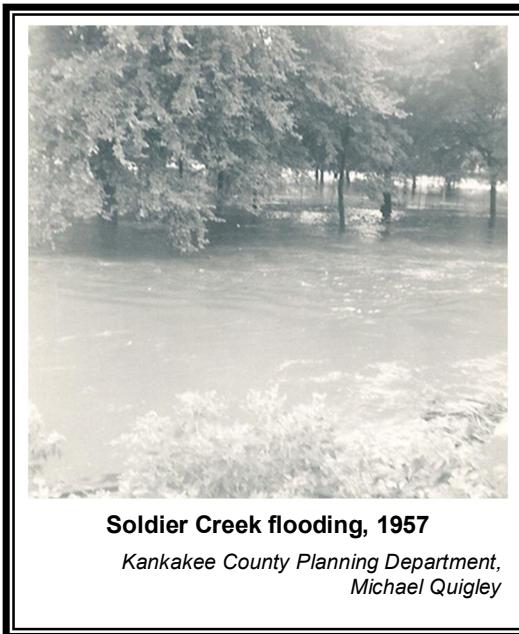


Causes: Overbank flooding in these floodplains is caused by one or more of three factors:

- 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.

Precipitation: Kankakee County receives an average of 36 inches of rain each year, including an annual average of 22 inches of snow (generally, 7–10 inches of snow has the equivalent water content of one inch of rain). However, it is not spread out evenly over the year. While most of it comes in the summer, the amount of rain that falls varies from storm to storm and varies over an area.

The amount of rain that causes a flood can vary, too. A heavy local storm that dumps several inches in a small area could cause a flood on a small stream. Several days of steady rain, especially on saturated or frozen ground, can also cause a flood on a larger river.



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 manmade. Natural obstructions, like log jams, can be cleared out or are washed away during larger floods. The greater problem is manmade obstructions, which tend to be more permanent. They are discussed in Chapter 5's section on floodplain regulations.

Historically, the most common cause of the largest floods on the Kankakee River has been ice jams. There are generally two types of ice jams:

Frazil ice freezes the river and forms a dam.

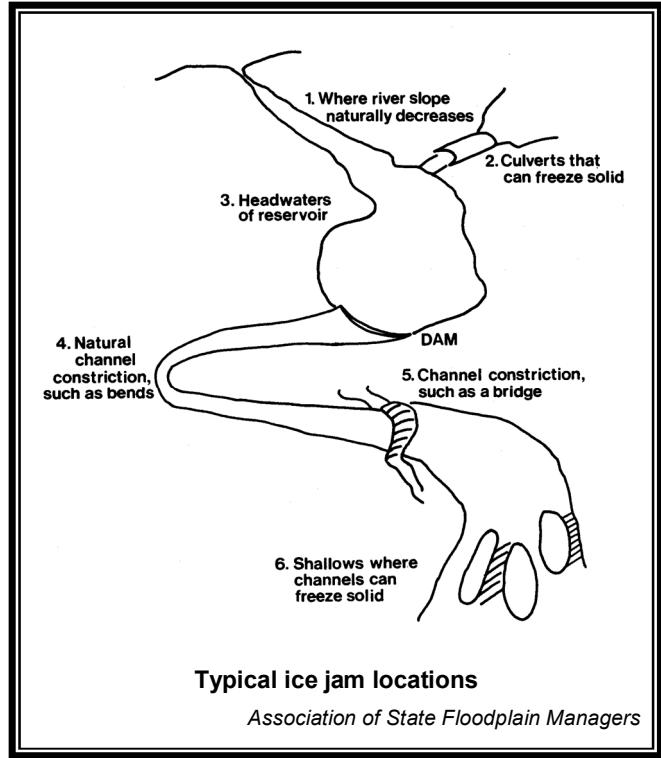
When warm weather and rain break up frozen rivers or any time there is a rapid cycle of freezing and thawing, broken ice floats downriver until it is blocked by an obstruction such as a bridge or shallow area.

In both cases, 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 (see photo, page 3-4).



Ice jam flood on the Iroquois River, March 1979

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.

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. 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 ó 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 ó 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.

The Illinois Department of Natural Resources (IDNR) Dam Safety Section has only two dams in Kankakee County in its inventory:

The North Branch Soldiers Creek dam is a Class I dam because it is 13 feet high and upstream of a residential area. It is owned by the City of Bradley. IDNR inspections report that it has been well maintained.

The low head dam in the Kankakee River in Kankakee is rated as a Class III.

Based on this information, it is concluded that the potential for damaging flooding caused by a dam failure in Kankakee County is low.

Historical events: There are three gages that record historical flood heights in Kankakee County. Each has a set óflood stageö that identifies the level that a river becomes troublesome. More information from these gages is shown on graphs on page 2-7. Here are some summary facts and figures:

Kankakee River at Momence:

Flood stage: 5.0 or elevation 614.18.

Records go back to 1915. Since then, the river's annual record height has exceeded flood stage in 44 years, or an average of every two years.

Highest flood of record: 10.51 on March 6, 1979, caused by a combination of high flows and an ice jam.

The six worst floods exceeded a stage of 7.0. All of them were in January early March and related to ice jams.

Iroquois River near Chebanse:

Flood stage: 16.0 or elevation 611.99.

Records since 1924. This gage has recorded the Iroquois River exceeding flood stage in 19 years, or an average of once every four years.

Highest flood of record: 21.68 on March 7, 1979, caused by backwater due to an ice jam on the Kankakee River.

There were ten floods that exceeded a stage of 18.0. Half of them were related to ice jams.

It should be noted that this gage is no longer in service, as of June 1, 2013, due to Federal budget cuts.

Kankakee River at Wilmington:

Flood stage 5.0 or elevation 515.86.

Records go back to 1915. Since then, the river's annual record height has exceeded flood stage in 74 years, or four years out of every five.

Highest flood of record: 16.7 in 1883 and 1887 (date not recorded) and 15.41 on May 13, 1933.

The eight highest floods of record exceeded a stage of 13.0. Three of them were related to ice jams.

Other streams have also flooded, but we do not have dependable gage records. According to the Flood Insurance Studies for Bradley and Bourbonnais, Soldier Creek and the North Branch Soldier Creek flooded in 1957, 1959, and 1974. A flood control project since then have greatly reduced its potential for overbank flooding (see Chapter 8).

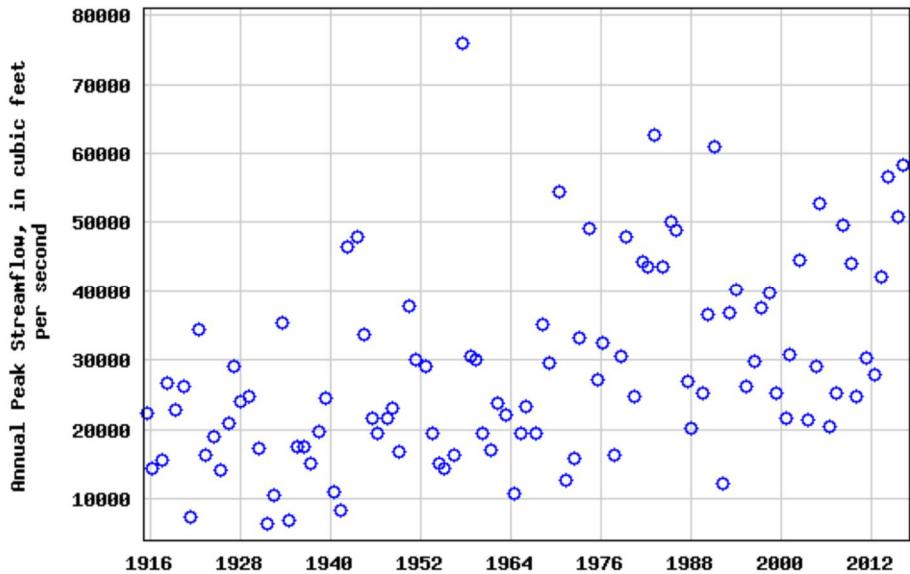


Soldier Creek flooding, 1957



Kankakee River flooding, 2005

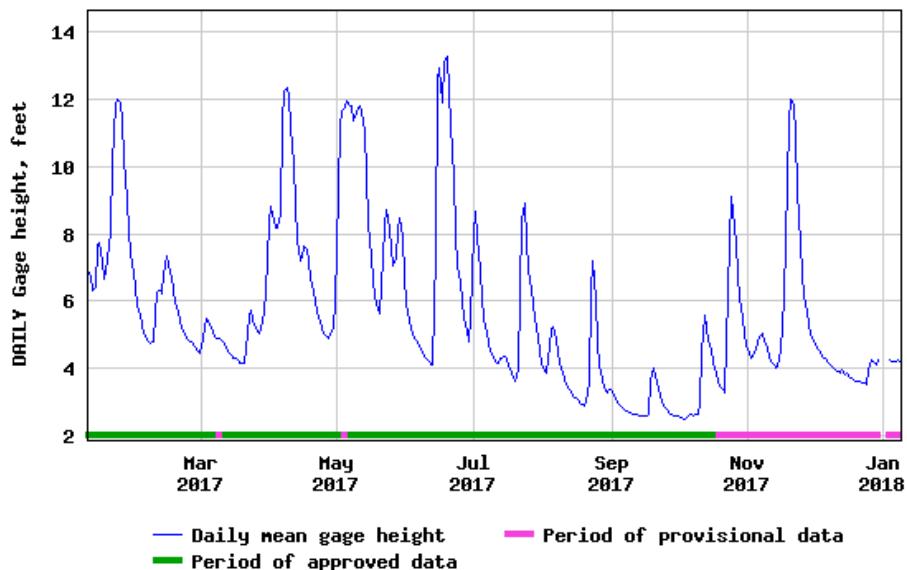
Kankakee County Planning Department, Michael Quigley



Historic Streamflow, Kankakee River at Wilmington

This graph shows the annual high flows for the Wilmington gage. This record is based on the discharge, i.e., the amount of water flowing past the gage. Therefore, backwater flooding caused by ice jams are not fully reflected on this graph. The data show that there is no pattern to flooding over the years, such as a long wet or dry spell. The flood of record on the Kankakee River was in July 1957. It was estimated at a 750-year recurrence interval.

US Geological Survey



Gage Heights, Iroquois River near Chebanse, March 2017 – January 2018

A reduction in funding due to sequestration for the U.S. Geological Survey's National Stream flow Information Program (NSIP) during the last half of FY 13 has resulted in the shutdown of the precipitation gage at this stream gage.

US Geological Survey

Frequency: Past floods are indications of what can happen in the future, but flood studies and mitigation plans are based on the *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.

Kankakee 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).

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 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. FEMA maps (called Flood Insurance Rate Maps, or FIRMs) the floodplain covered by the base flood the Special Flood Hazard Area or A Zone. The A Zones for Kankakee County are shown on the map on page 2-2.

Floodway: 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 5.

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	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.

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.

The average floodway velocities for the Kankakee and Iroquois Rivers and Soldier Creek generally range from less than one foot per second to 6 feet per second. Velocities are highest at the downstream end of the Kankakee, especially downstream of Rock Creek where the base flood drops at a rate of 8 feet per mile. At one point, the average floodway velocity is 12.2 feet.

At the upstream end of the Kankakee and on the Iroquois, the land is flatter and velocities are lower. Upstream of Momence, the river drops less than one foot per mile and the average floodway velocities are less than one foot per second.

Velocities of less than five feet per second are 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.



**The Kankakee River at the Route 17 bridge,
normal flow, October 2004**



**The Kankakee River at the Route 17 bridge,
flood flow, January 2005**
Kankakee County Planning Department

2.2. Local Drainage Problems

The hazard: Flooding can also occur in yards and streets when rainwater cannot flow into a ditch or storm sewer. These problems are usually caused by heavy local rains and are often not related to overbank flooding or floodplain locations.

Local drainage flooding is shallow with little or no velocity, so it is not as life threatening or destructive as overbank flooding. However, because it occurs more frequently, can affect many areas of the County, and can disrupt traffic, it often gets more attention.

Location: There are three general types of areas with local drainage problems:

Flat terrain with few or no natural drainage outlets. After a rain or snowmelt, water stands until it can drain or evaporate. The southeast corner of Kankakee County has such terrain as noted by the öX500ö zone designations on the map on page 2-2. Areas of 100 acres or more are wet in the spring and fall.

Built up areas where the drainage system has been disrupted. For example, basements can flood when regrading sends rainwater toward the house instead of away from it.

Urbanized areas where the manmade system of storm sewers and ditches are inadequate to carry the increased amounts of runoff that results when fields and farms are replaced with impervious surfaces. In some cases, the sanitary sewers take on stormwater and back up into basements.

Historical events: The National Climatic Data Center lists 90 thunderstorms worth reporting in Kankakee County since 1950. However, detailed data on such storms is not available from a national database. In response to the call for input to this planning effort, some residents submitted öhazard data collection formsö that told of their experiences. Examples include:

In April 1996, a local storm caused sewer backup to a home in Bradley.

A homeowner in Bourbonnais reports chronic water problems, including seepage and sewer backup, since the house was purchased in June 2004.

A homeowner in Aroma Park, on Bridge Street, reports yearly flooding of their property.

A homeowner in Bourbonnais reports localized drainage problems including below grade habitable space flooding in 2008.



The Mayor of Hopkins Park has indicated several areas in or near the Village with chronic local drainage issues.

Frequency: Local drainage problems can be caused by small storms and therefore occur more frequently than overbank flooding. With 90 reported thunderstorms over 55 years, it is concluded that storms severe enough to cause local drainage problems occur at least once each year.

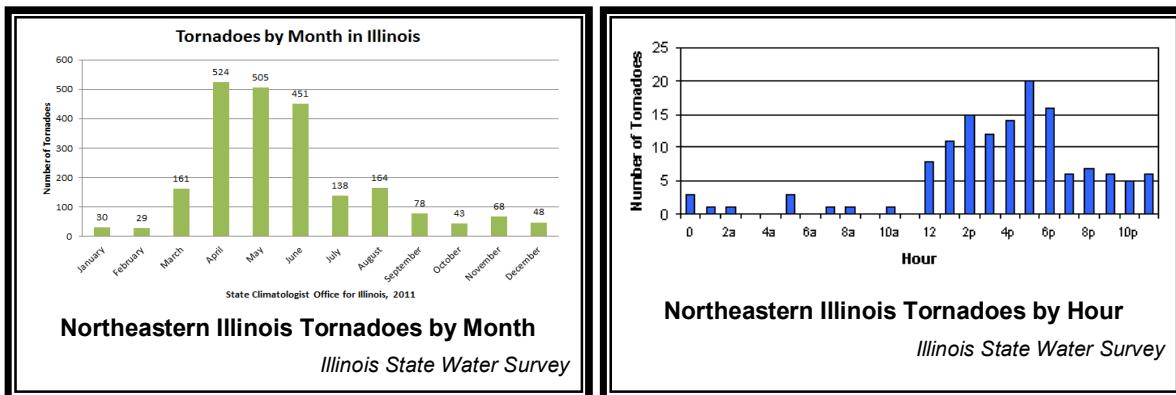
2.3. Tornadoes

The hazard: 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.

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 northeastern Illinois 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 in the afternoon.



Fujita Tornado Scale

- F0 Gale tornado 40-72 mph, chimney damage, tree branches broken
- F1 Moderate tornado 73-112 mph, mobile homes pushed off foundations or overturned
- F2 Significant tornado 113-157 mph, considerable damage, mobile homes demolished, trees uprooted
- F3 Severe tornado 158-206 mph, roofs and walls torn down, trains overturned, cars thrown around
- F4 Devastating tornado 207-260 mph, well-constructed walls leveled
- F5 Incredible tornado 261-318 mph, homes lifted off foundation and carried considerable distances, autos carried as far as 100 meters

Tornadoes are classified as F0 through F5, based on wind speed and damage levels using the Fujita Tornado Scale

Historical events: In the past fifty five years, Kankakee County has had 34 recorded tornadoes. These are listed in the table below. The table shows that Kankakee County has not had a killer tornado since 1963. The events over the last 22 years have caused relatively little property damage. However, that does not mean the area is safe, as can be attested to by two more recent and deadly tornadoes in northeastern Illinois.

On August 28, 1990, at 3:30 pm a tornado 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. It cut a path of destruction 20 miles long and from 200 yards to half a mile wide. Its impacts are highlighted on the next page.

More than 1,200 homes and buildings in Will County 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.

In April 20, 2004, a tornado hit the small town of Utica in LaSalle County. Older buildings in the downtown were destroyed and eight people were killed (most of them taking shelter in the older buildings). Three tornadoes touched down in Kankakee County on the same day, one causing extensive damage in an industrial area south of Kankakee (see photos, page 3-11), although there was no official report on the amount of damage.

On June 5, 2010, an EF1 tornado developed about 5 miles southwest of Kankakee or 3 miles south of Limestone. The brief tornado caused damage to a farm just north of the intersection of 5000 W Road and 3000 S Road. Several trees were up-rooted. A machine shed on the property was destroyed along with farm equipment and vehicles. A quonset building was damaged and a fence was blown over. Damage was estimated at \$500,000.

Again on June 5, 2010, an EF3 tornado began 3 miles northwest of St. Anne. The tornado developed just west of 6000E Road and tracked to the east, where it produced damage to a home and a garage along the road. At this location, a single family home collapsed upon itself, leaving it inhabitable. The garage sustained damage to its roof and exterior walls. The tornado was rated EF2 with winds estimated at around 113 mph.

The tornado continued to move to the east northeast, where it increased in intensity as it encountered yet another family home at the intersection of Route 1 and 4000S Road. This home and the garage/barn next to it sustained considerable damage, leaving the home inhabitable. The damage to the home consisted of all the walls collapsing, with all remaining debris from the house tossed to the northeast. The garage walls collapsed with the contents tossed to the east. Two four-wheelers and a four-door automobile inside the garage were lifted and flipped over as the tornado passed. Further north along Route 1, there was minor structural damage to a couple of homes and several trees uprooted. Damage at this location was rated EF3 with winds estimated at around 142 mph and a path width of 175 yards.

As this tornado continued to the northeast, it lost its intensity as it came across another residence at the intersection of 4000S Road and 8500E Road. Here, a house sustained partial damage to its roof with several surrounding trees having limbs sheared at the top. The tornado weakened at this point, and damage was rated EF1 with winds estimated at around 97 mph and a path width of 50 yards.

The tornado moved to the northeast through a wooded area, causing damage to many trees along its way. The more significant damage occurred near the intersection of 13000E Road and Gamble Road in the Hopkins Park area, where several healthy large hardwood tree tops were sheared or broken. Some homes were damaged by falling trees. The tornado continued to weaken and damage was rated EF1, with winds estimated at around 88 mph, and a path width of 50 yards. It was along 13000E Road where the tornado appeared to lift, with no other damage evident beyond this point.

Kankakee County Tornado Events					
Date	Time	Magnitude	Number of Deaths	Number Of Injuries	Property Damage
1/25/1950	9:00 p.m.	F2	0	0	\$250,000
4/07/1954	3:16 p.m.	F3	1	13	\$250,000
5/26/1955	4:30 p.m.	F1	0	0	\$250,000
6/14/1957	3:00 p.m.	F1	0	0	\$25,000
6/16/1960	3:00 p.m.	F1	0	0	\$3,000
4/17/1963	3:55 p.m.	F4	1	50	\$2,500,000
9/04/1969	5:20 p.m.	F2	0	0	\$25,000
6/16/1973	5:30 p.m.	F0	0	0	0
6/09/1974	7:44 p.m.	F1	0	0	0
3/12/1976	1:35 p.m.	F3	0	0	\$250,000
6/25/1978	12:15 p.m.	F1	0	0	0
4/02/1982	11:40 p.m.	F3	0	15	\$25,000,000
6/22/1990	5:25 p.m.	F2	0	0	\$250,000
3/22/1991	10:53 p.m.	F1	0	0	\$2,500,000
3/27/1991	4:10 p.m.	F1	0	0	0
5/10/1995	1:07 p.m.	F0	0	0	0
4/19/1996	5:25 p.m.	F0	0	0	0
4/19/1996	6:01 p.m.	F0	0	0	0
5/18/2000	5:10 p.m.	F0	0	0	0
5/18/2000	5:10 p.m.	F0	0	0	0
5/30/2003	7:34 p.m.	F0	0	0	0
4/20/2004	6:18 p.m.	F2	0	0	0

4/20/2004	6:35 p.m.	F1	0	0	0
4/20/2004	7:03 p.m.	F0	0	0	0
5/24/2006	4:20 p.m.	F1	0	0	\$75,000
6/03/2007	11:47 a.m.	EF0	0	0	0
6/07/2008	4:18 p.m.	EF1	0	0	0
3/08/2009	12:56 p.m.	EF1	0	0	\$40,000
3/08/2009	1:00 p.m.	EF1	0	0	\$30,000
6/05/2010	9:02 p.m.	EF1	0	0	\$500,000
6/05/2010	9:18 p.m.	EF3	0	1	\$600,000
6/05/2010	9:19 p.m.	EF1	0	0	\$75,000
5/25/2011	8:04 a.m.	EF1	0	0	\$250,000
6/20/2011	5:14 a.m.	EF0	0	0	\$100,000
11/17/2013	1:01 p.m.	EF1	0	0	0
6/30/2014	9:33 p.m.	EF1	0	0	\$50,000
6/22/2015	9:12 p.m.	EF1	0	0	0
7/17/2016	8:48 p.m.	EF1	0	0	0

National Climatic Data Center (NCDC) Storm Events Database

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.



WHEATLAND PLAINS

Destroyed: 12 homes
Damaged: 50 homes
Estimated damage: More than \$9.2 million

PLAINFIELD

Destroyed: 55 homes
Major damage: 55 homes
Minor damage: 150 homes
Estimated damage: More than \$9.5 million
Deaths (on U.S. 30): 3

ALONG ILLINOIS 59

Damaged: Several strip malls
Estimated damage: \$3.5 million

PLAINFIELD SCHOOLS

Destroyed: High School, Grand Prairie Elementary School and district administration center
Estimated damage: \$60 million
Deaths: 3

ST. MARY IMMACULATE

Damaged: grade school, church, rectory and convent
Estimated damage: \$6 million
Deaths: 3

CRYSTAL LAWNS

Destroyed: 69 homes
Major damage: 104 homes
Minor damage: 220 homes
Estimated damage: Over \$15 million
Deaths: 2

Died later from injuries related to the tornado: 3

CRESTHILL LAKES

Destroyed: 3 buildings (more than 100 apartments)
Estimated damage: \$5 million
Deaths: 8

CEDARWOOD DRIVE

Deaths: 2

WARWICK ESTATES

Destroyed: 50 homes
Major damage: 26 homes
Minor damage: 5 homes
Estimated damage: More than \$6 million
Deaths: 2

COLONY WEST

Destroyed: 12 townhomes
Estimated damage: \$2.2 million

ELIZABETH COURT

Destroyed: 3 apartment buildings
Estimated damage: \$300,000

PEERLESS ESTATES

Destroyed: 75 homes
Major damage: 26 homes
Minor damage: 122 homes
Estimated damage: \$15.4 million

LILY CACHE

Destroyed: 55 homes
Major damage: 52 homes
Minor damage: 75 homes
Estimated damage: \$11.5 million
Death: 1

BRIDALWREATH

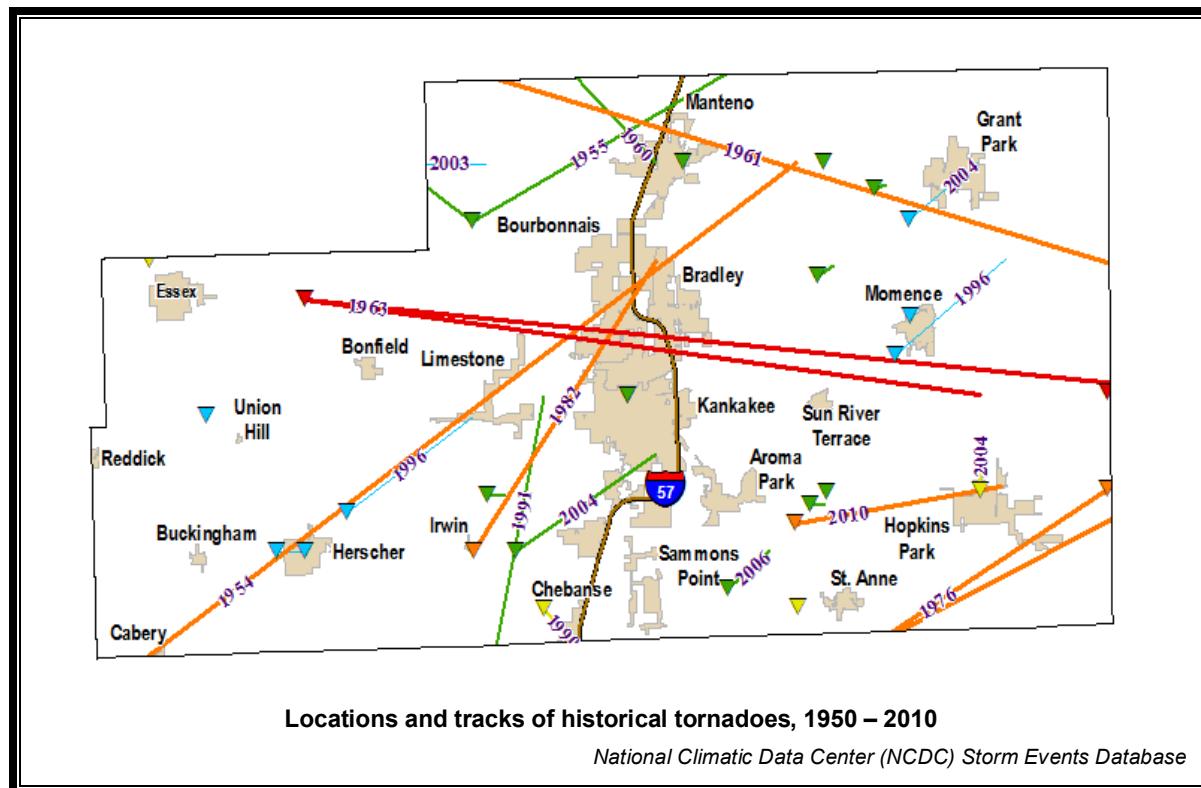
Destroyed: 3 homes
Major damage: 14 homes
Minor damage: 74 homes
Estimated damage: \$2.7 million

These areas sustained scattered damage. No damage estimates have been released.



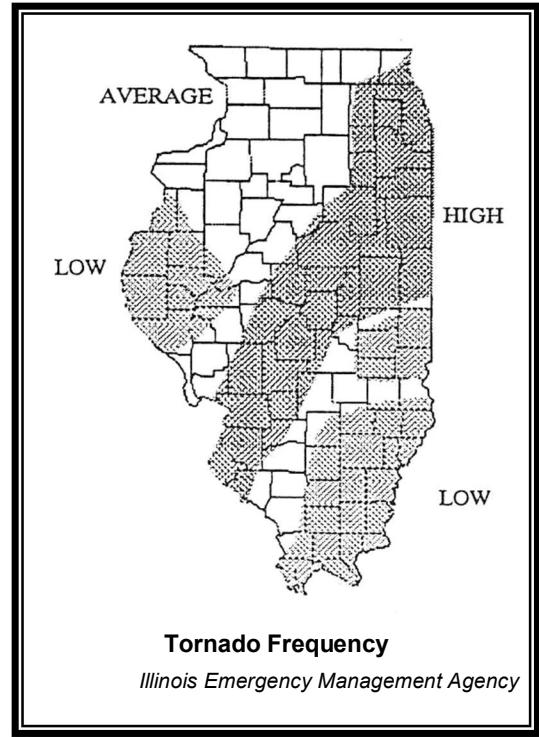
Chicago Tribune, August 28, 1990

Location: The tornadoes listed in the table on page 2-13 are plotted on the map below. This shows that a tornado can strike anywhere in the County. No area is safe.



Frequency: Illinois sees an average of 26 tornadoes each year, but there are no official recurrence intervals calculated for tornadoes. Kankakee County has had 34 of the 1,944 tornadoes recorded in Illinois between 1950 and 2013. Kankakee 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 34 occurrences over 60 years, the likelihood of a tornado hitting somewhere in the county is 0.566 (56.6%) in any given year. Assuming a tornado affects one square mile and there are 680 square miles in Kankakee County, the odds of a tornado hitting any particular square mile in the County is 0.566 in 680 (1 in 1,201) each year or a .0008% annual chance.



2.4. Earthquakes

The hazard: 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 of an earthquake. The energy released by an earthquake is sent through the earth to the ground surface.

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.

An earthquake's Intensity (MMI) 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.

Earthquake Measurement Scales		
Mercalli	Richter	Felt Intensity
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.

Multi-Hazard Identification and Risk Assessment

The old flat-lying, intact bedrock of the central United States behaves as a good transmitter of the earthquake's energy, and tremors can be felt hundreds of miles away. By contrast, the young, broken up bedrock of the West Coast allows the energy to dissipate quickly, which keeps the effects of the earthquake more localized.

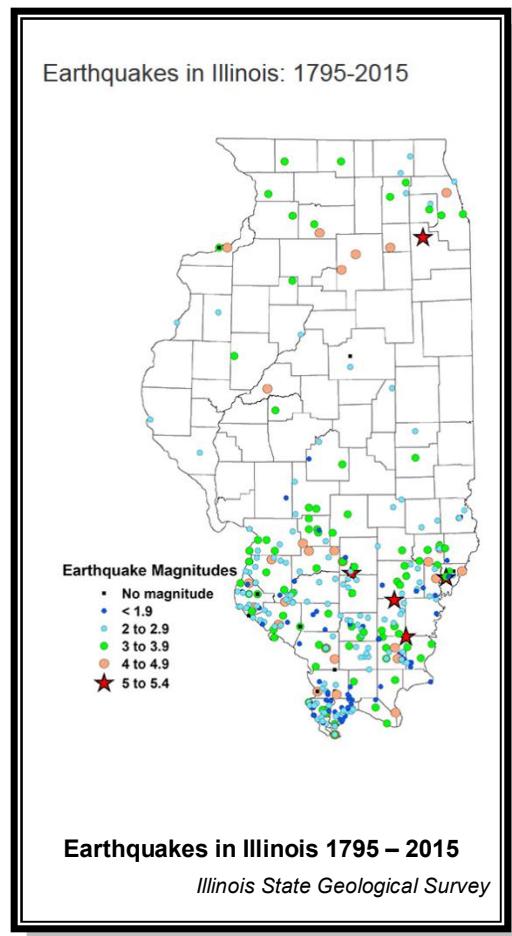
Earthquakes can trigger other types of ground failures which could contribute to the damage, such as landslides and liquefaction. In the latter situation, shaking can mix groundwater and soil, liquefying and weakening the ground that supports buildings and severing utility lines. This is a special problem 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. 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 XI, but in Kankakee County the Intensity may be observed as a IV.

Historical events: In the United States, the most frequent reports of earthquakes come from the West coast, but the largest earthquakes in the lower 48 states occurred in Missouri in 1811 and 1812 along the New Madrid Faults. 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.

Six of these quakes were larger than a magnitude of 7 on the Richter Scale and two were near magnitude 8. They totally destroyed the town of New Madrid and caused the land to roll in visible waves. They 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.

Earthquakes have occurred throughout Illinois. There was a report of a quake at Fort Dearborn (Chicago) in August 1804.



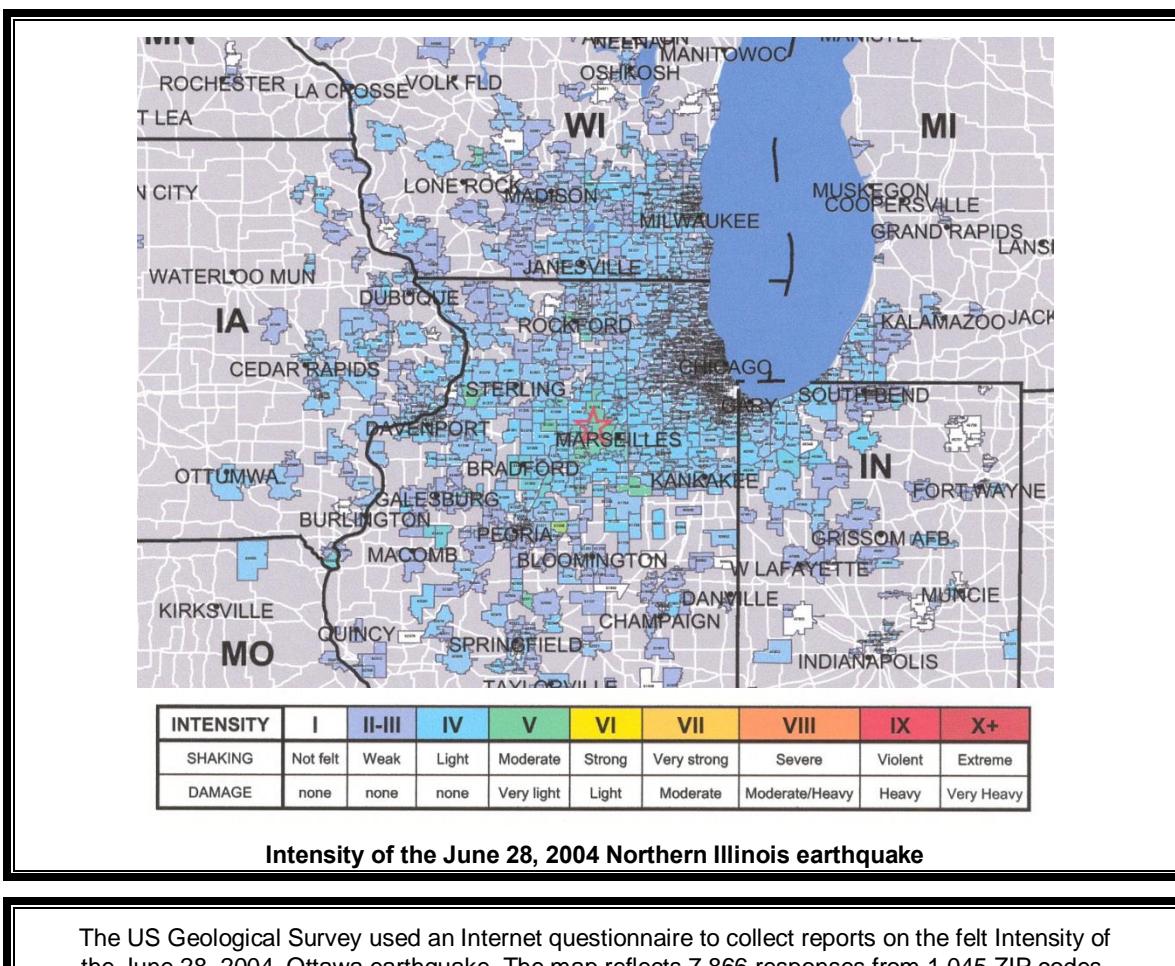
The US Geological Survey website, "Earthquake History of Illinois" provides this account of one of the largest:

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. [Gas line connections broke at Aurora. [The magnitude of this event is estimated at 5.1 and had a reported Intensity of VII.]

On June 28, 2004, an earthquake struck northern Illinois. It was centered near Ottawa and registered as a magnitude 4.5 on the Richter Scale. The measured Intensity is shown in the map, below. Kankakee County residents reported weak to light shaking (Mercalli scale III and IV) and no damage.

On January 2, 2006, an earthquake registering as a magnitude of 3.6 struck Illinois approximately 2 miles north / northwest of the Village of Equality.

On April 18, 2008 a magnitude 5.4 earthquake struck Illinois 20 miles south / southeast of the Village of Olney. This earthquake originated in the Wabash Valley Seismic Zone.



Location: It is important to note that the level of damage is dependent on the location of the earthquake. The location of historical earthquakes in northeastern Illinois and the rest of the state, shows that earthquakes may be much closer to Kankakee County than ones associated with the New Madrid Seismic Zone. These are shown in the map on page 2-16. A smaller earthquake event closer to Kankakee may cause as much damage as a large event in the New Madrid Seismic Zone. Kankakee County felt an MMI Intensity of V VI from the 1909 quake in Will County and less from the 2004 Ottawa earthquake.

All of Kankakee County is susceptible to earthquake damage. However, in Illinois, structures built on thick, loose sediments of river flood plains are more likely to be damaged than structures on glacial till (stiff, pebbly clay) or bedrock. In fact, seismic Intensity may increase one or more units on the Modified Mercalli Intensity Scale, if loose sediments are present. Also, loose sandy sediments with high moisture content can turn to liquid - quick sand type state - (liquefaction) when shaken enough. (Illinois State Geological Survey) Therefore, the floodplain map on page 2-2 shows the areas in Kankakee County where the earthquake hazard is greatest.

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 recent earthquakes felt in Illinois over the last 20 years are listed in the table to the right. None of these caused much damage in the affected areas of the state.

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) will occur in this lifetime.

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
4.5	June 28, 2004	8 miles NNW of Ottawa, IL
3.6	Jan. 2, 2006	2 miles NNW of Equality, IL
5.4	April 18, 2008	20 miles SSE of Olney, IL

Illinois Hazard Mitigation Plan

According to the Central U.S. Earthquake Consortium, Kankakee County is in an earthquake Intensity zone of IV (MMI Scale) for a 8.0-magnitude earthquake along the New Madrid Seismic Zone. The latest forecasts by the U.S. Geological Survey and the Center for Earthquake Research and Information of the University of Memphis estimate a 7% – 10% probability over a 50 year time period of a repeat of a major earthquake like those that occurred in 1811-1812 (which likely had magnitudes of between 7.5 and 8.0).

For a magnitude 6.0 and greater earthquake, there is a 25-40% chance in 50 years. As noted in the table on page 2-15, this level of quake would be felt by many, but would cause minor damage.

Therefore, on the whole, the probability of a damaging quake hitting Kankakee County in any given year is considered at 1% (0.01) or less.

2.5. Winter 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. 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.



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 below. In addition to the problems caused by the snow storm is the subsequent melting and possible flooding.

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.

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. 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: The last twenty-four years' winter storms are listed in the table to the right. Kankakee County received Presidential snow emergency declarations for the storms in January 1999 and December 2000.

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.

From December 10 through December 31, 2000, the cumulative effects of severe winter storms caused extensive road closures, school closings and hazardous road conditions and severely taxed snow removal resources. During this time period, the Chicago area received a record 41.3 inches of snow.

Location: Winter storms affect the entire county.

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, most of these would hit Kankakee County, although ice storms are more common in the central part of the state,

Kankakee County Winter Storms

Date	Type	Deaths *
2/22/1994	Heavy Snow	0
12/08/1995	Winter Storm	0
1/09/1997	Winter Storm	0
1/15/1997	Winter Storm	5
12/09/1997	Heavy Snow	0
3/09/1998	Heavy Snow	0
1/01/1999	Heavy Snow	1
3/08/1999	Heavy Snow	0
1/19/2000	Heavy Snow	0
12/11/2000	Winter Storm	0
12/13/2000	Heavy Snow	0
1/30/2002	Winter Storm	0
3/02/2002	Winter Storm	0
12/24/2002	Winter Storm	0
1/21/2005	Heavy Snow	0
2/06/2007	Winter Storm	0
2/25/2007	Winter Storm	0
12/15/2007	Heavy Snow	0
12/31/2007	Heavy Snow	0
1/29/2008	Winter Storm	0
1/31/2008	Winter Storm	0
2/01/2008	Winter Storm	0
1/14/2009	Winter Storm	0
12/11/2010	Winter Storm	0
1/20/2012	Winter Storm	0
3/5/2013	Winter Storm	0
1/4/2014	Heavy Snow	0
1/26/2014	Winter Storm	0
2/1/2014	Heavy Snow	0
2/4/2014	Heavy Snow	0
2/17/2014	Heavy Snow	0
2/1/2015	Heavy Snow	0

* Note: these storms affected several counties so the deaths may not have been in Kankakee County.

National Climatic Data Center (NCDC)
Storm Events Database

where temperatures are warmer. Therefore, the odds of a winter storm hitting Kankakee County in any given year are 1:1 or a 100% chance.

2.6. Thunderstorms

The hazard: Severe 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. Thunderstorms can bring four hazards:

- Flooding
- Lightning
- High winds, tornadoes and microbursts
- Hail

The National Weather Service classifies a thunderstorm as “severe” if:

- Its winds reach or exceed 58 mph,
- It produces a tornado, or
- It drops surface hail at least 0.75 inch in diameter.

The effects of flooding caused by local storms is covered under the earlier sections on local drainage problems.

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.



Thunderstorms bring lightning

Tornadoes are discussed in a previous section. High winds include downbursts and microbursts. These are strong, concentrated, straight-line winds created by falling rain and sinking air that can reach speeds of 125 mph.

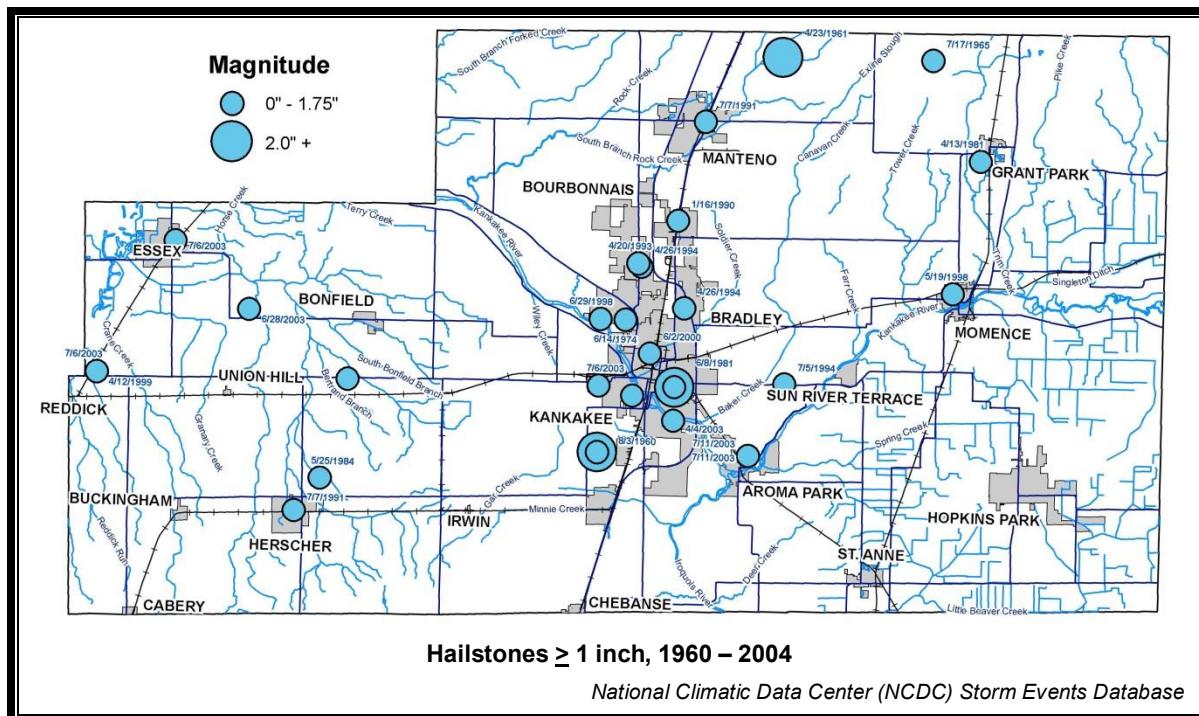
Microbursts are caused by a downward rush of cool descending air from a thunderstorm. The air rushing to the ground may look like a cloud. Once the air strikes the ground at a high speed, the air has to go somewhere which is usually in all directions. The horizontal spreading of this air along the ground is termed straight line winds. These winds may be 100-150 miles per hour which is as strong as an F1 or F2 tornado.

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. In April 1961, several six inch hail stones were reported in Kankakee.

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 thunderstorm systems can travel intact for distances in excess of 600 miles.

Historical events: The National Climatic Data Center (NCDC) records show 138 reported occurrences of thunderstorms and high winds in Kankakee County since 1950, 54 with winds of 50 knots or greater.

The NCDC reports 72 hail storms in Kankakee County since 1960. Those with reported hailstones of one inch or larger are plotted on the map below.



A resident in Bonfield reported lightning that damaged a building in July 2002 and hail large enough to cause damage in a storm in April 1996. Other areas of the County reported lightning, hail, and wind damage from past storms.

On May 30, 2008, hail to the size of tennis balls was reported covering the ground near Main Street and Route 50. School roofs were damaged including heating and cooling units. Two school greenhouses were also damaged. Windows were also broken on some houses and businesses.

Location: Thunderstorms and lightning can affect any location in Kankakee County. Some thunderstorms cover several counties. As noted in the map above, hail can fall

anywhere. The higher density of reported hailstones in the metropolitan area is likely due to the presence of more people to witness it.

Frequency: The Kankakee County area averages 60 ó 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 Kankakee County are 1 to 1 or 100%.

2.7. Drought/Extreme Heat

The Hazard: Drought is a period of less than usual precipitation. Drought is often accompanied by extreme heat and the impacts of a drought are aggravated by high temperatures, so the two hazards are discussed together.

There are four classes of drought, based upon what is impacted by the shortage of water:

Meteorological Drought: Less precipitation than an expected average or normal amount based on monthly, seasonal, or annual time scales.

Hydrologic Drought: Less stream flows and reservoir, lake, and groundwater levels.

Agricultural Drought: A reduction in soil moisture enough to affect plant life, usually crops.

Socioeconomic Drought: A reduction in water supply to the extent that demand exceeds the supply.

The Palmer Drought Severity Index (PDSI) is an attempt to compare weekly temperature and precipitation readings over a defined climatic region in order to identify periods of abnormally dry (or wet) weather. These PDSI readings reflect the relative disparity between moisture supply (precipitation and soil moisture) and demand (evapotranspiration, soil recharge and runoff needs) for a particular region based upon what is considered normal for the area.

The index is used to evaluate scope, severity, and duration of abnormal weather. Based on the PDSI, the State's *Hazard Mitigation Plan* designates Kankakee County and most of central and northern Illinois as having a õguardedö hazard level for drought. Southern Illinois is generally more vulnerable to drought due having to soils that hold less water.

Extreme heat for a region is temperatures that hover 10 degrees or more above the average high temperature for several weeks. Kankakee County has an õelevatedö hazard rating for extreme heat in the State's *Hazard Mitigation Plan*.

Historical events: In September 1983, all 102 Illinois counties were proclaimed State disaster areas as a result of high temperatures and insufficient precipitation beginning in mid-June. The most severe drought in recent years was 1988, when rainfall was 88 percent of normal (less than 50 percent of the April through August normal rainfall).

A smaller drought occurred in the northern two-thirds of the State in May 1992. Although it only lasted through the month of May, Chicago, Moline and Rockford recorded the driest May on record, and Springfield and Peoria their second driest.

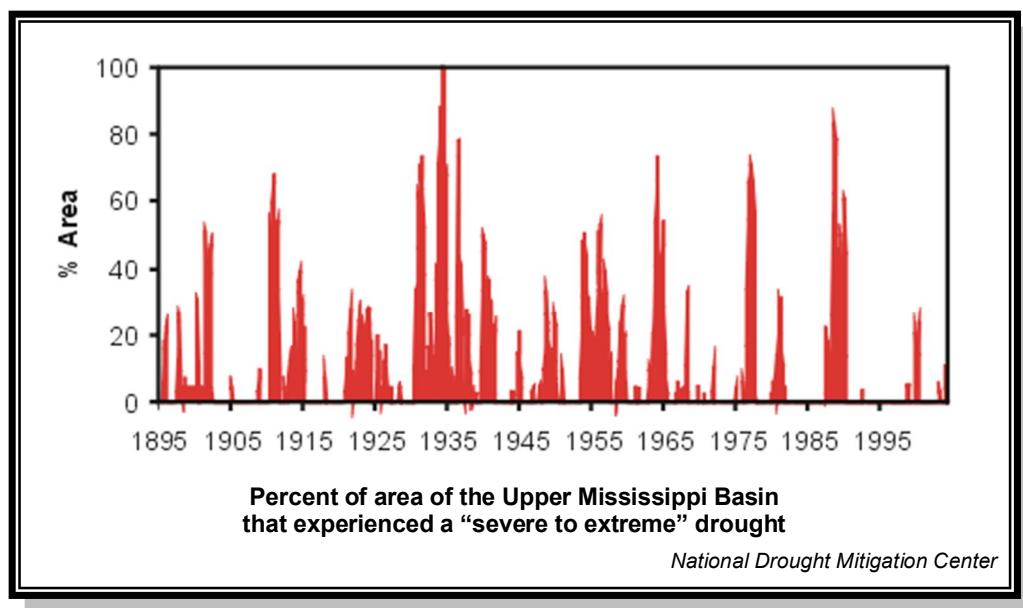
The summer of 1995 saw a heat wave that caused a record number of deaths and injuries in northeastern Illinois from such a phenomenon. This time, there was no accompanying drought, but high humidity that, combined with the high temperatures, created severe hardships on those with breathing and heart troubles.

In 1999, Cook County experienced another heat wave that closely matched the 1995 event, but the death toll was greatly reduced. A paper written by the State Water Survey, attributes much of the reduction in deaths to mitigation efforts, such as education by the news media and monitoring procedures for the urban elderly. (*Illinois Natural Hazard Mitigation Plan*, page III-66)

During the months of June, July, August, and September of 2012, Kankakee County experienced drought conditions along with much of the rest of northern Illinois. This drought was the 4th driest on record at Chicago's O'Hare Airport.

Location: Droughts and heat waves occur throughout the County.

Frequency: The State's *Hazard Mitigation Plan* reports that droughts like the one in 1988 occur about once every 21 years. The graph below shows the amount of the Upper Mississippi Basin that experienced a drought over the last 110 years. The worst period was the 1930s, when the Dust Bowl hit the central United States. This graph shows a frequency of drought every 10 to 20 years.



“The time we have until the next heat wave is unknown, but all of the major reports on global warming indicate that an increase in severe heat waves is likely. (Illinois Natural Hazard Mitigation Plan, page III-66).

This plan uses 15 years as the frequency for recurrence of a drought or extreme heat. This is an annual recurrence rate of 0.067.

2.8. Wildfire

The Hazard: Wildfires are uncontrolled fires that spread through vegetation, such as forests or grasslands. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the area for miles around.

Wildfires are a natural process, vital to restoring appropriate vegetation to an area. They are a natural hazard when they threaten built up areas.

People start more than four out of every five wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires.



Wildfire behavior is based on three primary factors, fuel, topography, and weather. The type, and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. Topography affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the rate of speed at which the fire travels. Fire moves faster in hilly areas and up steep slopes.

Weather affects the probability of wildfire and has a significant effect on its behavior. Areas that have experienced prolonged droughts are at the highest risk of wildfires. Temperature, humidity and wind (both short and long term) affect the severity and duration of a fire.

Historical events: The State's Hazard Mitigation Plan does not identify wildfires as a hazard severe enough to address. The National Climatic Data Center has no reports of wildfires in Kankakee County since 1950. Other databases report only major fires of national significance.

The table to the right lists the number of reported fire district calls that responded to wildfires in recent years. Local reports note that there have been wildfires in the southeastern part of the County, especially in Pembroke and St. Anne Townships.

The Illinois State Fire Marshall's office reviewed reported statistics from the wildfires of 2004. It noted that

Wildfire Calls		
Year	Pembroke	St. Anne
2000	30	20
2001	29	15
2002	18	9
2003	20	6
2004	29	10
	126	60

St. Anne Fire Protection District

where the causes could be determined, they were almost all of human origin, such as smoking and outdoor burning of vegetation or debris.

Since 2005, Kankakee County has had 3460 brush fires. Of these 483 have been in Pembroke Township and 219 have been in St. Anne Township.

A typical fire is reported here:

Brush fires whipped by shifting winds raged across a square mile of Pembroke Township Tuesday afternoon, threatening buildings and challenging fire departments from a three-county area.

No injuries resulted in the blaze which began around 11:30 a.m. Fire crews continued to engage the spreading conflagration until around 6:30 p.m., said Momence Fire Chief Dave Horn.

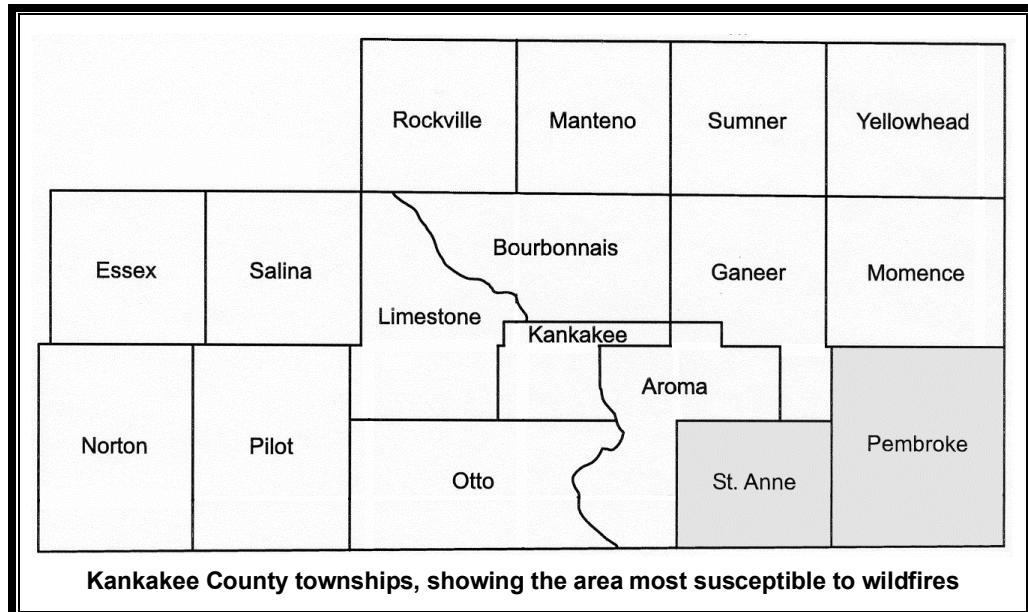
Horn's department was among the host of fire units responding to the scene. Others included Pembroke, Essex, Beecher, Limestone, Bradley-Bourbonnais, Chebanse, St. Anne, Aroma Park, Grant Park and Papineau.

Horn said the fire swept across a weed and grass choked area extending from 3000S to 2000S and from 15000E to 14000E roads.

Cause of the fire remains under investigation. In past springs, brush fires have often been sparked by open trash burning on windy days. No one was injured and Horn said no buildings were thought to have been lost.

– Kankakee Daily Journal, April 6, 2005

Location: By definition, wildfires occur outside urban areas, although they may threaten developed properties on the urban/rural fringe. In Kankakee County, most events have been in Pembroke and St. Anne Townships, highlighted in the township map, below.



Frequency: Based on the figures in the table on the previous page, Pembroke Township can expect an average of 60 wildfires each year and an average of 27 will hit St. Anne Township. These are the fires that will be large enough to call the fire department.

While many of the fires were extinguished before they damaged homes, businesses or vehicles, at least 20 homes have been reported destroyed by fire between 2000 and 2005. These two townships should expect a fire severe enough to damage or destroy one home each year.

2.9. References

1. Flood Insurance Study, FEMA:
 - City of Kankakee, May 5, 2003
 - Kankakee County (unincorporated areas), December 20, 2002
 - Village of Bourbonnais, March 29, 1978
 - Village of Bradley, May 5, 2003
 - Village of Momence, November 20, 1996
 - Village of Sun River Terrace, April 16, 1997
2. Earthquake materials provided by the Illinois Geological Survey.
3. *Floodplain Management Home Study Course*, Illinois Association for Floodplain and Stormwater Management, 2000.
4. *Illinois Natural Hazard Mitigation Plan*, Illinois Emergency Management Agency, 2004.
5. Interview with Illinois Department of Natural Resources, Dam Safety Office
6. Kankakee Daily Journal articles
7. *Multi-Hazard Identification and Risk Assessment*, Federal Emergency Management Agency, 1997.
8. National Lightning Safety Institute website, www.lightningsafety.com
9. National Oceanic and Atmospheric Administration, National Climatic Data Center, www.ncdc.noaa.gov/oa/climate/climatedata.html
10. Reports from Mitigation Advisory Task Force members and residents
11. Tornado Project Online, at web address: www.tornadoproject.com
12. *Understanding Your Risks – Identifying Hazards and Estimating Losses*, FEMA 386-2, 2001
13. University of Nebraska website, www.hprcc.unl.edu/nebraska/U_S_SEVERE.html
14. US Geological Service, river gage streamflow records, nwis.waterdata.usgs.gov/usa/nwis/peak

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Chapter 3. Vulnerability Assessment

Chapter 2 reviewed the hazards that face Kankakee County. If they struck vacant land, there would not be much cause for concern. Because the County has over 100,000 residents and thousands of homes, businesses and critical facilities, the potential for damage and deaths can be high.

This chapter reviews how vulnerable Kankakee County is to property damage, adverse impact on the local economy, and threats to public health and safety. The potential for property damage is measured in dollars. It accounts for how much is exposed to damage and the likelihood of damage occurring.

Except where noted, this assessment does not include the municipalities that did not participate in the planning process.

A four step process was followed to calculate the cost to Kankakee County of the hazards reviewed in Chapter 2:

- Step 1: Inventory appropriate categories of property subject to damage
- Step 2: Determine the exposure of the properties and people to the hazards
- Step 3: Determine the cost of various levels of damage to the properties
- Step 4: Calculate the impact, based on the exposure and the probability of occurrence

Sections 3.1 and 3.2 review the first step. Sections 3.3 – 3.10 describe the exposure of people and property to each hazard. Section 3.11 summarizes the findings.

3.1. Properties

The chapter is based on the assumption that natural hazards do not damage land, only manmade structures. Therefore, we reviewed four categories of buildings to assess the County's vulnerability to property damage:

- Single family homes
- Manufactured homes
- Multi-family structures
- Non-residential

The last includes government buildings, commercial properties, factories, churches, and schools. Critical facilities are included in this last category, too, in order to simplify the dollar calculations of property damage. The impact of a critical facility being damaged is considered in the discussions on impact on safety and health.

While these categories may appear to be general, they are sufficient for our planning purposes: to assess the relative vulnerability of properties to the hazards facing Kankakee County.

The number of buildings in each category is shown in the table to the right. These figures came from 2010 US Census block data and municipal boundaries in the County's geographic information system (GIS). In some cases, Census data were refined by a review of the GIS'aerial photographs. The numbers have also been reviewed and refined, as needed, by each municipality and the College.

FEMA's HAZUS software and US Census data provided replacement costs for buildings in Illinois in 2010. These figures were adjusted to account for three years of inflation, compared to recent area sales, and rounded off to the following:

Single family homes:	\$161,000
Manufactured homes:	\$45,000
Multi-family structures:	\$858,000
Non-residential:	\$2,980,000

The value of contents is taken from guidance in FEMA's *Understanding Your Risks*, page 3-11. For residential structures, contents are valued at 50% of the building's value. For non-residential structures, 100% is used. These numbers are used in the following sections when calculating contents damage.

Buildings in Kankakee County					
	Single Family Homes	Manufactured Homes	Other Residential	Non-Residential	Total
Aroma Park	300	0	6	10	316
Bourbonnais	6,497	0	2,002	59	8,558
Bradley	4,913	45	1,427	58	6,443
Kankakee	6,943	288	3,606	247	11,084
Manteno	2,147	584	619	18	3,368
Momence	1,083	0	247	8	1,338
Sun River Terrace	152	10	22	2	186
Uninc. County	8,700	2,055	109	108	10,972
Total	30,735	2,982	8,038	617	42,372
Municipalities not participating in the mitigation plan are not included					

3.2. Other Impacts

One cannot put dollar figures on the impact of a hazard on the community and on individual people. Therefore, three subjective measures of low, moderate, and high are used here for:

- Overall economic impact on businesses, transportation and the tax base
- Safety hazard, including threat to critical facilities
- Health hazard, including threat to critical facilities, such as water and wastewater treatment plants

In section 3.11, these subjective statements are converted to numerical values to facilitate incorporating the frequency or risk of a hazard hitting somewhere in the County.

3.3. Overbank Flooding

Buildings: Using US Census block data and floodplain boundaries in the County's GIS, the table to the right was produced. The numbers were refined by a review of the GIS's aerial photographs and community input. This table shows that most of the floodprone buildings in Kankakee County are single-family residences.

Buildings undergo a variety of stresses and damage when flooded:

- Impacts on the sides of the building from velocity flows and debris, such as ice (next page),
- Hydrostatic pressure that can break walls and floors and even float a structure,
- Scouring that undercuts a building's foundation,

Deterioration of materials, such as insulation and wallboard, the decompose when wet (next page),

Warping of wet wood that is dried too fast, and

Deposits of sediment and other contaminants.

Floodplain Buildings					
	Single Family Homes	Manufactured Homes	Other Residential	Non-Residential	Total number
Aroma Park	67	0	1	3	71
Bourbonnais	264	0	27	8	299
Bradley	269	0	17	3	289
Kankakee	388	1	56	54	499
Manteno	0	0	0	10	10
Momence	49	1	3	0	53
Sun River Terrace	15	0	0	0	15
Uninc. County	1,832	127	5	11	1,963
K. Com. College	0	0	0	0	0
Total	2,872	129	109	89	3,199



Soldier Creek flood damage, 1957

*Kankakee County Planning Department,
Michael Quigley*



Kankakee River ice jam damage, 1982

French & Associates

The table to the right shows the number and dollar values of flood insurance claims by community. Communities not in the National Flood Insurance Program (NFIP) are not listed. Chebanse and Sun River Terrace are in the NFIP, but no claims have been paid there. It can be noted that in a community where there is deep river flooding, like Aroma Park, average claim payments are higher than for a community on smaller streams, like Manteno.

A detailed review of flood insurance claims and other damage data had been conducted for a nearby community with similar average claims. Using these historical figures, bringing them up to 2005 costs and accounting for contents damage, deductibles, and deeper flooding during a 100-year flood, resulted in an average building damage figure of \$20,000 (*Natural Hazards Mitigation Plan*, Calumet City, Illinois, page 2-7).

Flood Insurance Claims, 1978 – 2004				
	Single-Family		Other	
	Number	Average	Number	Average
Aroma Park	6	\$6,037	2	\$2,002
Bourbonnais	5	\$1,588		
Bradley	2	\$21,355		
Kankakee	36	\$5,781	1	\$1,760
Manteno	3	\$1,280	1	\$4,690
Momence	27	\$3,776		
Uninc. County	208	\$6,324	3	\$8,218
Totals	287	\$5,979	7	\$5,015

FEMA



Structural flood damage includes broken walls and damage to insulation and wallboard

This figure accounts for debris removal, cleaning, repairing the floors, and replacing walls, insulation, wooden doors, electrical services, furnace, washer, dryer, and contents. It does not include damage to vehicles, landscaping, swimming pools, and other uninsurable items.

An analysis of Kankakee County claims since 1995 showed that the more recent claim payments have been 40% greater. Further, unlike Calumet City which has many homes subject to shallow flooding, much of the exposure to flooding in Kankakee County is to homes very close to the Kankakee and Iroquois Rivers. Because of the increase in value of buildings on the larger rivers and the deeper flooding and ice jam hazard, the \$20,000 figure was increased to \$40,000 as the average cost to repair a flooded home.

A figure of \$30,000 is used for manufactured homes. Even though their replacement cost is lower than single family homes, a little water can do a lot of damage.

These figures show that damage to single-family homes is approximately 30% of the building's replacement cost. Extrapolating on this percentage, produces the dollar damage figures for multi-family and non-residential buildings. It should be noted that this is the *average*. Buildings close to the river will receive much more damage while buildings at the edge of the base floodplain will suffer less.

Extrapolating on these figures and the number of floodplain buildings in the table on page 3-3 produced dollar figures for the 100-year flood for each community with a mapped floodplain. These figures are shown in the table on page 3-7.

Economic impacts: Floods cause other problems that aren't so easy to identify or measure. Businesses are closed when they are flooded, they lose their inventories, people can't get to them or the employees are busy protecting or cleaning up their flooded homes. However, there are not very many businesses in the floodplain.

Roads and bridges are flooded and there is a cost of flood fighting and recovery that is borne by the communities. Repetitively flooded areas tend to deteriorate over time and property values go down, resulting in a social cost.

Flooded farm fields can mean loss of the season's crops. This is primarily an impact on the County, but the area of floodplain that is farmed is a relatively small percentage of the total.

Overall economic impact of a 100-year flood: moderate. Because there are no non-residential properties in Sun River Terrace's floodplain, its economic impact is low.

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, next page). 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. Electrocution is a cause of flood deaths, claiming lives in flooded areas that carry a live 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 and safety 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. With the gages and National Weather Service river level predictions, there can be lead time on the Kankakee and Iroquois Rivers to allow protective steps 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.

Overall safety hazard: Moderate.

Health: Three general types of health problems accompany floods. The first comes from the water itself. Floodwaters carry whatever was on the ground that the stormwater runoff picked up, including dirt, oil, and farm and industrial chemicals.

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 (see photo). A building that is not thoroughly and properly cleaned becomes a health hazard, especially for small children and the elderly.



The third problem is the long-term psychological impact of having been through a flood, seeing one's home damaged and irreplaceable keepsakes destroyed. There is a long-term problem for those who know that their homes can be flooded again. The resulting strain on floodplain residents takes its toll in the form of aggravated health and mental health problems. Children are particularly susceptible to this post-traumatic stress.

Overall health hazard: Moderate.

Critical facilities: The following critical facilities are in the base floodplain (A Zone):

Kankakee: Aqua Illinois water treatment plant on Cobb Boulevard. One of three facilities that provide potable water to Kankakee, Bradley, Manteno, Aroma Park and Grant Park. In 2003, emergency sandbagging saved the site from inundation by high water, although the site has since been floodproofed (see page 6-6).

Kankakee: KRMA regional wastewater treatment facility

Kankakee: County Highway Department offices

Aroma Park: Fire protection district fire station

Sun River Terrace: wastewater treatment facility

If flooded, the water and wastewater treatment facilities would be shut down, thereby giving a high overall health hazard for Kankakee and Sun River Terrace. While Aroma Park's fire station is in the floodplain, it is high enough to have time to evacuate the vehicles in case of a flood, so the operations could continue at a different location.

Kankakee Community College has some of its main building in the 500-year floodplain (X500 Zone). There would be no property damage from the 100-year flood, but there would be some economic costs and a minor safety and health hazard.

Overbank Flood Vulnerability					
	Property Damage	Economic Impact	Safety Hazard	Health Hazard	
Aroma Park	\$5,146,000	Mod	Mod	Mod	
Bourbonnais	\$22,392,000	Mod	Mod	Mod	
Bradley	\$16,682,000	Mod	Mod	Mod	
Kankakee	\$68,146,000	Mod	Mod	High	
Manteno	\$7,500,000	Mod	Mod	Mod	
Momence	\$2,638,000	Mod	Mod	Mod	
Sun River Terrace	\$600,000	Low	Mod	High	
Uninc. County	\$85,940,000	Mod	Mod	Mod	
K. Com. College	\$0	Low	Low	Low	
Total	\$209,044,000				

Note on FEMA Flood Insurance Claims Data: Insurance claim data was requested for this update but was not obtained in time for publication. Therefore the 2004 statistics were not adjusted for increase in claims, however, the percentages and trends remain representative of Kankakee County's overbank flooding problem.

3.4. Repetitive Losses

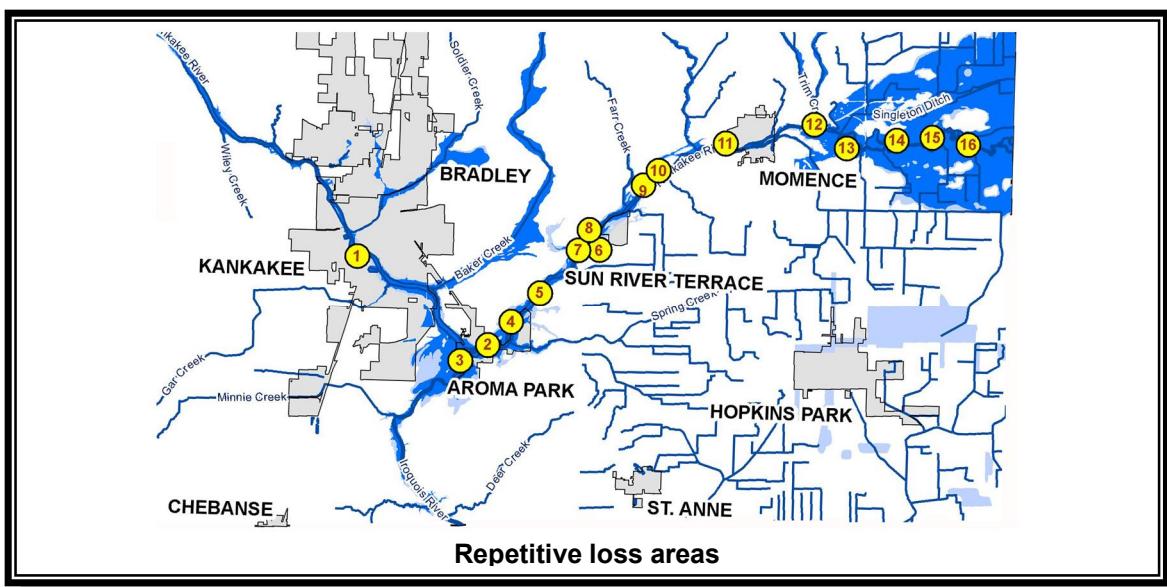
There are several different definitions of a repetitive loss property.⁶ This *Plan* uses the Community Rating System's definition, in part because data are readily available: a repetitive loss property is one which has received two flood insurance claim payments for at least \$1,000 each since 1978. 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 mitigation grant 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 currently 65 repetitive loss properties listed for Kankakee County on FEMA's BureauNet. Of these, 53 are in the unincorporated area of Kankakee County, 3 are in the Village of Aroma Park, 4 are in the City of Momence, and 5 are in the City of Kankakee. This is a dramatic increase from the previous plan where Kankakee County had 37 repetitive loss properties in unincorporated Kankakee County and one each in the City of Kankakee and Aroma Park.

The Privacy Act prohibits publishing the exact locations or addresses of insured properties in a public document. However, the previous plan grouped these properties into 16 repetitive loss areas for analysis. The additional 28 properties added to the plan were assigned to the existing 16 repetitive loss areas. No new repetitive loss areas were added to the plan. For reference, a repetitive loss *area* contains one or more properties on the FEMA list plus adjacent properties that have the same or similar exposure to flooding and flood damage. The general locations of these areas are shown on the map below.

Of the 28 new repetitive loss properties, 3 could not be located due to address deficiencies, 2 were elevated, and 1 was demolished.



Repetitive Loss Areas			
Area	Bldgs	Zone	Months Flood Claims Submitted
1	1	X Zone	3/79, 3/84
2	6	Floodway	3/79, 6/81
3	31	Floodway	3/79, 3/98, 2/84, 2/85, 3/98, 5/02, 1/05
4	4	Floodway	3/79, 2/84, 2/85, 12/96, 1/99, 5/02, 1/05
5	1	Fringe/X	3/79, 2/85
6	2	Floodway	3/79, 2/85, 1/99, 1/05
7	3	Floodway	3/79, 2/85, 1/99
8	1	Floodway	3/79, 2/85
9	14	Floodway	3/79, 6/81, 2/82, 3/82, 2/85, 11/90, 12/90, 1/93, 1/91, 7/96, 2/97, 6/97, 3/98, 1/99, 5/02, 1/05
10	22	Fringe/ Floodway	3/79, 4/81, 1/82, 3/82, 4/82, 2/85, 11/85, 11/90, 2/91, 1/93, 6/93, 5/96, 7/96, 2/97, 6/97, 3/98, 5/02
11	1	X Zone	3/79, 2/82
12	3	Fringe	3/79, 6/81
13	10	Floodway	3/79, 6/81
14	28	Floodway	3/79, 6/81, 2/82, 5/83, 2/85
15	2	Floodway	3/82, 2/85
16	13	Floodway	2/82, 12/90

Note: Repetitive loss buildings were added to Areas 2, 3, 9, 10, 12, 14 & 16 but information on the date of flood claims was unavailable for this update. It is assumed any claims on these properties occurred between 2005 and 2013.

As seen in the table above, the 16 areas range in size from one building that appears to be the only one subject to repetitive flooding to 31 similarly situated properties. All of them are on the Kankakee River, except for number 3, which is on the Iroquois.

All but two of the areas are in the base or 100-year floodplain. Areas 1 and 11 are in the X Zones, but are right next to the mapped floodplain and were flooded when the Kankakee River flooded. Most of the rest of the areas are in the regulatory floodway, i.e., the central portion of the floodplain adjacent to the channel. Two areas (5 and 10) are borderline.

The dates in the öyears floodedö column are taken from flood insurance claims that were submitted for both the repetitive loss properties and the other properties in the same area. The larger areas had more claims. While nine of the areas have not had any claims since February 1985, they still had at least two floods during a preceding 10 year period and therefore qualify as repetitive losses.

Properties can be removed from FEMA's list if it can be shown that there has been a flood control project or the building has been removed or retrofitted. It should be noted that at least one of the properties on FEMA's list has been cleared and at least one has been elevated above the flood level. Three of them were for sale when they were visited in May 2005. Two appeared to have been vacant for some time. Additionally, between 2005 and 2013 two repetitive loss structures have been raised and one has been demolished.

While individual properties on the FEMA list may have been mitigated, each area still has one or more properties subject to the same degree of flood damage and are considered õrepetitive loss properties in waiting.ó Mitigation of these properties is discussed in Chapter 6, section 6.7.

3.5. Local Drainage Problems

Buildings: All communities are equally susceptible to local drainage problems. For planning purposes, it is estimated that 1% of each communityõs buildings are subject to local drainage problems.

Between 1978 and 2005, there have been 55 flood insurance claims paid for properties located outside the mapped floodplain. Because there were no floods greater than 100-year recurrence interval during this time, it is concluded that these claims were for local drainage problems. These 55 claims had an average payment of \$4,868 or 2/3 the average claim for properties flooded in the mapped floodplain. This coincides with the Calumet City studyõs findings. The average damage to a building from local drainage is projected to be \$6,000. This is much less than the figure for overbank

flooding, because the latter is based on a deeper 100-year flood.

Local Drainage Problems Vulnerability					
	Property Damage	Economic Impact	Safety Hazard	Health Hazard	
Aroma Park	\$18,960	Low	Low	Low	
Bourbonnais	\$513,480	Low	Low	Low	
Bradley	\$386,580	Low	Low	Low	
Kankakee	\$665,040	Low	Low	Low	
Manteno	\$202,080	Low	Low	Low	
Momence	\$80,280	Low	Low	Low	
Sun River Terrace	\$11,160	Mod	Low	Low	
Uninc. County	\$658,320	Low	Low	Low	
Total	\$2,535,900				

Local drainage problems are considered the same each year and the dollar value of the damage is the same for residential and non-residential properties. The table for local drainage problems uses 1% of the communityõs buildings times \$6,000 to calculate a total dollar property cost.

Economic impacts: Street ponding is usually not severe enough to close a street to traffic, at least not to emergency vehicles. Disrupted traffic and businesses that may be closed for a few hours means a low economic impact. However, several of the smaller communities have reported that maintaining drainage ways and roadside ditches is quite a drain on their budgets.

Overall economic impact: Larger communities: Low; smaller communities: Moderate.

Safety and health hazards: These problem storms do not kill or injure anyone. There are few reported health problems, although some septic systems, especially in repetitively

flooded areas, need work. As reported by one Bourbonnais resident, the potential for mold problems increases with repetitive flooding.

Safety and health hazard: Low.

3.6.Tornadoes

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

Manufactured homes,
Homes on crawlspaces (more susceptible to lift), and
Buildings with large spans, such as shopping malls, gymnasiums and factories, as seen by the damage below, which was caused by the tornado that hit south of Kankakee in April 2004.



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 structure's 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 of many residential structures occurred where the framing was attached to the foundation or when



**Tornado damage to residences
Utica, Illinois, 2004**

nails were the primary connectors between the roofing and the walls. 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.

It can be seen that some types of structures, especially manufactured housing, are more susceptible to damage. This would include the west campus of Kankakee Community College, which has four temporary wood frame buildings and a steel veneer Butler building. This is one critical facility that would expose many people to injury.

While some types of structures, especially manufactured homes, are more susceptible to damage, all *areas* of Kankakee County are equally exposed to the tornado threat. It is estimated that an *average* tornado in the County would cause destruction and damage to 5% of each community's buildings and their contents at an average of 50% damage. Ten percent of the manufactured homes would be 100% damaged. Again, this is an average. While, a tornado that hit a shopping center would cause more damage, one that hit a park or farm fields would cause less.

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 1990 Plainfield tornado post-disaster damage report stated that at least 50 businesses were destroyed.

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 largest expenses are for repairs to public facilities and clean up and disposal of debris. Most public facilities are insured, so the economic impact on the local treasury may well be small. However, some public buildings, such as schools and fire stations, may be particularly susceptible to damage because of their long roof spans.

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.

Overall economic impact: High

Safety: The tornado section in Chapter 2 notes that two people have been killed by tornadoes in Kankakee County since 1950.

The 1990 Plainfield twister caused 28 deaths and the 2004 Utica tornado killed eight people.

The major hazard from tornadoes is physical injury from flying debris or being in a collapsed building or mobile home. Within a building, flying debris or missiles are generally stopped by interior walls.

Based on national statistics for 1970 ó 1980, for every person killed by a tornado, 25 people were injured and 1,000 people received some sort of emergency care. The 1990 Plainfield twister injured 350 people.

The number of people who live in mobile homes is far smaller than the number that live in permanent a home however they have practically the same number of deaths.

Overall safety hazard: High

Health: 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. However, these problems would be localized.

Overall health hazard: Low

Tornado Vulnerability				
	Property Damage	Economic Impact	Safety Hazard	Health Hazard
Aroma Park	\$3,018,750	High	High	Low
Bourbonnais	\$65,205,000	High	High	Low
Bradley	\$49,495,250	High	High	Low
Kankakee	\$71,156,750	High	High	Low
Manteno	\$49,127,750	High	High	Low
Momence	\$10,867,500	High	High	Low
Sun River Terrace	\$1,456,000	High	High	Low
Uninc. County	\$97,230,000	High	High	Low
Total	\$347,557,000			

3.7. Earthquakes

Buildings: Generally, wood frame buildings and structures on solid ground fare best during an earthquake. Wood frame buildings are flexible enough to withstand some ground shaking and swaying. Evaluations of recent earthquakes found that a greater amount of damage was primarily caused by or attributed to:

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

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

In addition to the building type, damage is related to the underlying soils. Buildings on stiff soils fare better than those on loose or sandy soils, which will amplify earthquake shaking. These soils 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, causing the building to settle, sometimes unevenly.

Given the relatively low threat of a quake at a MMI scale of VII or greater, the threat to buildings in Kankakee County would be limited to large, older, unreinforced masonry structures. These are found in every community, especially in the older downtown areas. The dollar damage estimate is 2% of the value of 25% of the communities’ non-residential buildings (no damage to contents).



Economic impact: As with tornadoes, the major impact of an earthquake on the local economy is damage to businesses and infrastructure. Given the relatively minor amount of damage expected, the overall economic impact is considered: Low.

Safety: 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.) 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.

Because the greatest potential for loss of life is to people within a collapsing building or outside where one may be struck by part of a falling wall or chimney, the threat to residents is directly related to the condition of the buildings and the expected quake

energy. Other life safety threats include collapsing roads and bridges, fires from ruptured gas lines, and release of hazardous chemicals from broken storage tanks or trucks. However, given the minor effects of a Modified Mercalli Intensity of VII, the likelihood of such damage is low.

Overall safety hazard: Moderate

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.

Overall health hazard: Low

Earthquake Vulnerability				
	Property Damage	Economic Impact	Safety Hazard	Health Hazard
Aroma Park	\$149,000	Low	Mod	Low
Bourbonnais	\$879,100	Low	Mod	Low
Bradley	\$864,200	Low	Mod	Low
Kankakee	\$3,680,300	Low	Mod	Low
Manteno	\$268,200	Low	Mod	Low
Momence	\$119,200	Low	Mod	Low
Sun River Terrace	\$29,800	Low	Mod	Low
Uninc. County	\$1,609,200	Low	Mod	Low
Total	\$7,599,000			

3.8. Winter Storms

Buildings: Historically, roofs would collapse due to heavy snow loads, but most buildings in Kankakee 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.

A dollar figure of \$1,000 is used to represent the damage to a structure and its contents from water due to ice seepage and/or broken water lines. The table page 3-17 bases the dollar damage to buildings on \$1,000 in damage to $\frac{1}{2}$ of 1% of each community's buildings.

Economic impact: Being in a Northern climate, businesses in Kankakee County are prepared for the average winter storm. The major impacts of snow and ice storms on property are to utilities and roads. Power lines and tree limbs can be coated with heavy ice resulting in disrupted power and telephone service. Loss of power means businesses and stores must close down. The Village of Chebanse reported that the March 1991 ice storm knocked out power for five days.

Loss of access due to snow or ice covered roads has a similar effect. However, it still costs to keep the streets open. Kankakee County received a Presidential snow emergency for the storms of January 1999 and December 2000. FEMA provided \$250,000 and \$200,000 in Public Assistance to Kankakee County communities, townships, and schools. Chebanse reported extraordinary public expenses to shelter travelers when I-57 is closed by the State Police during winter storms.

Overall economic impact: Larger communities: Low; smaller communities: Moderate

Safety: Winter storms bring hazardous driving and walking conditions and heart attacks from shoveling snow. Even small accumulations of ice can be dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces. 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.

The table in Chapter 2& section on winter storms shows that six people have been killed by winter storms that have affected Kankakee County over the last ten years. The table to the right shows that winter storms have led to more deaths in Illinois than any other natural hazard except extreme heat. Certain populations are especially vulnerable to the cold, including the elderly, the homeless, and lower income families with heating problems.

Overall safety hazard: Moderate

Health: Winter storms bring extreme cold, due to low temperatures and loss of heat during power outages. 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.



Above ground lines are especially susceptible to damage by ice storms.

Matthew Masek, University of Nebraska

Injuries Related to Cold

- ó 50% happen to people over 60 years old
- ó More than 75% happen to males
- ó About 20% happen at home

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

Overall health hazard: Moderate

Winter Storm Vulnerability				
	Property Damage	Economic Impact	Safety Hazard	Health Hazard
Aroma Park	\$1,580	Mod	Mod	Mod
Bourbonnais	\$42,790	Low	Mod	Mod
Bradley	\$32,215	Low	Mod	Mod
Kankakee	\$55,420	Low	Mod	Mod
Manteno	\$16,840	Low	Mod	Mod
Momence	\$6,690	Low	Mod	Mod
Sun River Terrace	\$930	Mod	Mod	Mod
Uninc. County	\$54,860	Low	Mod	Mod
Total	\$211,325			

3.9. Thunderstorms

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. The Village of Chebanse lost its siren when lightning struck it in April 2004.

Straight line winds will damage roofs, overturn or push mobile homes off foundations, push autos off the road and may destroy attached garages. Straight line winds are the leading cause of wind related damage. Although they do not receive as much recognition as tornado events, high winds cause more damage year-to-year than tornadoes.

Hail can inflict severe damage to roofs, windows and siding, depending on hailstone size and winds. Hail caused property damage over \$73 million and crop damage over \$5 million in the last 53 years in Illinois (*Illinois Hazard Mitigation Plan*, page III-25). Two residents reported experience with hail damage to their roofs, vehicles and landscaping that cost them \$5,000 - \$6,000.

One study of insured losses from hail 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).

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). 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.

For this *Plan*'s purposes, thunderstorms are estimated to cause \$5,000 in damage to 1% of each community's buildings each year from wind, hail and lightning. No damage is expected to contents.

Economic impact: Thunderstorms can impact transportation and utilities. Airplanes have crashed when hit by downbursts or lightning. 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. However, many buildings have lightning rods and back up power systems that can recover quickly.

Overall economic impact: Low

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.

Lightning kills more people than tornadoes. Most lightning fatalities and injuries occur outdoors at recreation events and under or near trees. Nationwide it is estimated that 25 million cloud-to-ground lightning flashes occur each year, 1,000 people are injured, 52 are killed (*Illinois Hazard Mitigation Plan*, page III-25). A related concern is the damage to critical facilities. Buckingham lost its siren's control board two times in four years due to lightning strikes.

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.

Hail occurs frequently in Illinois averaging 74 times a year or 3,951 times since 1950. There have been no deaths, but 23 injuries.

Overall safety hazard:
Moderate

Thunderstorm Vulnerability				
	Property Damage	Economic Impact	Safety Hazard	Health Hazard
Aroma Park	\$15,800	Low	Mod	Low
Bourbonnais	\$427,900	Low	Mod	Low
Bradley	\$322,150	Low	Mod	Low
Kankakee	\$554,200	Low	Mod	Low
Manteno	\$168,400	Low	Mod	Low
Momence	\$66,900	Low	Mod	Low
Sun River Terrace	\$9,300	Low	Mod	Low
Uninc. County	\$548,600	Low	Mod	Low
Total	\$2,113,250			

Health: No special health problems are attributable to 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.

Overall health hazard: Low

3.10. Drought/Extreme Heat

Buildings: There is little or no damage to structures caused by drought, high temperatures or humidity.

Economic impact: During a period of drought and/or extreme heat, there will be a higher demand for water and electricity. Both of these can be supplied in the municipalities with no economic disruption. In rural areas and villages on water from shallow wells, rationing or lawn watering bans may be needed.

The greater impact is to agriculture. There are no available figures on the cost of drought or heat to Kankakee County. The 1988 drought/heat wave resulted in \$382 million in disaster relief payments to landowners and farmers throughout the state. While not the major factor it used to be, agriculture is still important to the County's economy. A severe drought would have a ripple effect on other sectors, especially in the rural areas.

Overall economic impact: Moderate

Safety: Heat kills by pushing the human body beyond its limits. Normally the body's internal thermostat produces perspiration that evaporates to cool and regulate the body's temperature to 98.6 degrees. Sweating does nothing to cool the body unless the water is removed by evaporation. High humidity retards this process. The combination of heat and humidity is measured as the heat index

Heat Index/Heat Disorders	
Heat Index	Possible Heat Disorders (for people in higher risk groups)
130° or higher	Heat stroke/sun stroke, highly likely with continued exposure
106° - 130°	Sun stroke/heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
90 ° -108°	Sun stroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity
80 ° - 90°	Fatigue possible with prolonged exposure and/or physical activity

Heat waves kill more people in the United States than all other natural disasters combined (New York Times, August 13, 2002). The article goes on to state that a University of Delaware study indicated that 1,500 American city dwellers die each year because of heat compared with 200 from tornadoes, earthquakes and floods combined.

Overall safety hazard: High

Health: Young children, the elderly, those who are sick, overweight or have alcohol problems and men in general (because they sweat more and become more quickly dehydrated) are more susceptible to extreme heat. Usually the victims have been overexposed to heat or have over-exercised for their age and physical condition. Stagnant atmospheric (humid and muggy) conditions and poor air quality can induce heat-related illnesses.

Drought/Extreme Heat Vulnerability				
	Property Damage	Economic Impact	Safety Hazard	Health Hazard
All communities	0	Mod	High	Mod

In addition to air quality, concrete and asphalt store heat longer and gradually release the heat at night which produces higher nighttime temperatures. Therefore, people living in urban areas may be at a greater risk than people in rural regions.

Overall health hazard: Moderate

3.11. Wildfire

Buildings: Given the nature of wildfires and the limits of firefighting capabilities during a wildfire, a building that catches fire is considered destroyed. There would be no structures suffering partial damage. Because this hazard has been limited to the southeast part of the County, only Hopkins Park and the unincorporated areas are considered affected. Because most development in the urban-wildland interface is of single family homes, the primary type of structure exposed to wildfire damage is a single family home. As noted in section 2.8, it is expected that on the average each year two homes will be destroyed by wildfires. For this cost estimate, it is assumed that one single family home (and its contents) will be burned in Hopkins Park and one in the unincorporated areas on the average each year.



Buildings are generally destroyed by wildfires

FEMA

Economic impact: There has been little or no economic impact of wildfires to urban development. Local government expenses are limited to firefighting, traffic control, and clean up. A federal disaster declaration is unlikely, so all costs are funded locally. During a mutual aid call in 2003, the Salina Township Fire District lost a brush truck fighting a fast moving wildfire. It cost the District \$65,000 to replace, although 70% was covered by insurance (the contents were not insured, costing an additional \$15,000).

Overall economic impact: low.

Safety: Wildfires in Kankakee County have not killed or injured anyone (so far), so the life safety threat is low. Fires are hazardous to residents and fire fighters, though.

Overall safety hazard: low.

Health: There is a health problem with smoke, but people can avoid that hazard.

Overall health hazard: low.

Wildfire Vulnerability				
	Property Damage	Economic Impact	Safety Hazard	Health Hazard
Aroma Park	\$0	Low	Low	Low
Bourbonnais	\$0	Low	Low	Low
Bradley	\$0	Low	Low	Low
Hopkins Park	\$241,500	Low	Low	Low
Kankakee	\$0	Low	Low	Low
Manteno	\$0	Low	Low	Low
Momence	\$0	Low	Low	Low
Sun River Terrace	\$0	Low	Low	Low
Uninc. County	\$241,500	Low	Low	Low
K. Com. College	\$0	Low	Low	Low
Total	\$483,000			

3.12. Summary Tables

The following tables are for the entire County, including all participating municipalities. Similar tables can be created for any individual community.

Buildings: There are over 40,000 buildings in the planning area subject to some level of damage from the eight natural hazards. In the table below, the damage figures for one occurrence (taken from the tables earlier in this chapter) are multiplied times the annual chance of an occurrence (taken from the öfrequencyö sections in Chapter 2). The result is the expected average annual damage.

The flood damage figures are for the 100-year flood for each community with a mapped floodplain. In fact, these communities are flooded more frequently than once every 100 years (frequency of 0.01). Severe floods have occurred on the average every 10 years. To account for more frequent flooding of areas smaller than the 100-year floodplain, a frequency of 0.033 is used in the table below.

Building Damage Summary			
Hazard	Building Damage from Single Occurrence	• Annual Chance	Average Annual Damage
Overbank flooding	\$209,044,000	0.0330	\$6,898,452
Local drainage	\$2,535,900	1.0000	\$2,535,900
Tornadoes	\$347,557,000	0.0006	\$208,534
Earthquakes	\$7,599,000	0.0100	\$75,900
Winter storms	\$211,325	1.0000	\$211,325
Thunderstorms	\$2,113,250	1.0000	\$2,113,250
Drought/Heat	\$0	0.0670	\$0
Wildfire	\$483,000	1.0000	\$483,000
Total			\$10,413,111

Economic impact: The subjective measures for overall economic impact of ölow,ö ömoderate,ö and öhighö were converted to numerical values of 10, 50 and 100. These are multiplied times the annual chance of occurrence to produce a number that represents the relative impact of that hazard on the City's businesses, transportation and tax base.

Overall Economic Impact				
Hazard	Overall Impact	Frequency	Economic Score	
Overbank flooding	Mod	50	0.0330	1.65
Local drainage	Low	10	1.0000	10.00
Tornadoes	High	100	0.0006	0.06
Earthquakes	Low	10	0.0100	0.10
Winter storms	Mod	50	1.0000	50.00
Thunderstorms	Low	10	1.0000	10.00
Drought/Heat	Mod	50	0.0670	3.35
Wildfire	Low	10	0.5000	5.00

Impact on safety and health: In the following table, the subjective measures for overall safety and health impacts of low, moderate, and high are converted to numerical values of 10, 50 and 100. These are multiplied times the annual chance of occurrence to produce a number that represents the relative impact of that hazard on people. The safety and health scores are added together to get a combined score the represents the impact of the hazard on people.

Overall Safety and Health Impact									
Hazard	Safety			Health			Comb Score		
	Impact	Freq.	Score	Impact	Freq.	Score			
Overbank flooding	Mod	50	0.0330	1.65	Mod	50.0	0.0330	1.65	3.30
Local drainage	Low	10	1.0000	10.00	Low	10.0	1.0000	10.00	20.00
Tornadoes	High	100	0.0006	0.06	Low	10.0	0.0006	0.01	0.07
Earthquakes	Mod	50	0.0100	0.50	Low	10.0	0.0100	0.10	0.60
Winter storms	Mod	50	1.0000	50.00	Mod	50.0	1.0000	50.00	100.00
Thunderstorms	Mod	50	1.0000	50.00	Low	10.0	1.0000	10.00	60.00
Drought/Heat	High	100	0.0670	6.70	Mod	50.0	0.0670	3.35	10.05
Wildfire	Low	10	0.5000	5.00	Low	10.0	0.5000	5.00	10.00

3.13. Conclusions

1. The natural hazard that causes the most property damage is overbank flooding. Local drainage and thunderstorms come in second. The expected average annual property damage from tornadoes, earthquakes, winter storms and drought/heat is relatively minor. Wildfires deserve attention in Pembroke and St. Anne townships.
2. Tornadoes cause the most economic disruption. However, on a regular basis, winter storms are more disruptive and cost local governments more than the other hazards.
3. Tornadoes and drought/heat kill more people, but from an overall safety and health concern, more attention should be given to winter storms and thunderstorms.
4. In most cases, the relative amount of property damage, economic disruption and safety and health threat is the same throughout the county. The exceptions are:

Overbank flooding affects the County, Kankakee City, Bradley and Bourbonnais the most. Affected to a lesser extent are Aroma Park, Manteno, Momence, and Sun River Terrace. The other municipalities have no mapped overbank flood hazard.

Repetitive flood losses (using the flood insurance definition) are almost all along the Kankakee River, in the unincorporated areas of the County.

Wildfires are a concern primarily for Hopkins Park and the unincorporated areas in the southeast corner of the County.

3.14 References

1. Data from various National Weather Service websites
2. Field surveys of repetitive loss areas, May 2005.
3. Flood insurance claims records, Federal Emergency Management Agency
4. *Hail Loss Potential in the US*, Insurance Institute for Property Loss Reduction, 1995.
5. *HAZUS-MH*, FEMA loss estimation software, 2005.
6. *Illinois Natural Hazard Mitigation Plan*, Illinois Emergency Management Agency, 2004.
7. Institute for Business & Home Safety (IBHS), www.ibhs.org/
8. *Multi-Hazard Identification and Risk Assessment*, Federal Emergency Management Agency, 1997.
9. *Natural Hazards Mitigation Plan*, Calumet City, Illinois, 2005
10. *Surface Transportation Weather Applications*, Paul Pisano and Lynett C. Goodwin, undated
11. *The Public Health Consequences of Disasters*, U.S. Department of Health and Human Services, Public Health Service, 1989.
12. *Understanding Your Risks – Identifying Hazards and Estimating Losses*, FEMA 286-2, 2001

Chapter 4. Goals

Goals are needed for this planning effort to guide the review of the possible mitigation measures. This Plan needs to make sure that the recommended actions are consistent with what is appropriate for Kankakee County. Mitigation goals need to reflect community priorities and be consistent with other plans for the County.

4.1. County Plan Goals

The County adopted its current Comprehensive Plan on November 8, 2005. The plan includes five elements that cover land use/growth management, transportation, economic development, public facilities, and environmental resources. The Plan sets general policy guidelines and principles for future development.

The 2005 Plan has several long range goals for each element of the plan. Each has more specific statements. The goals and the statements relevant to natural hazards mitigation planning are listed here:

1. Provide locations for adequate urban development in Kankakee County while minimizing impacts to natural resources (prime agricultural soils, forests, and riparian areas) and maximizing available public services (roads, sewer, water, and police and fire protection).
 - Preserve the rivers, floodplain and forested areas of the County for recreational use, open space, and compatible commercial and residential use
 - Limit development to areas of suitable soil types and support agriculture by limiting non-agricultural uses
2. Promote a range of housing choices throughout Kankakee County
 - Encourage programs that support rehabilitating housing stock
 - Encourage ~~fill~~+development
 - Encourage energy efficient and water conserving construction
3. Maintain and enhance the existing County transportation system
 - Integrate multi-modal transportation planning with land use and economic development
 - Improve corridor access
4. Preserve the integrity of the Kankakee River as a sustainable source of water and as an environmental, recreational, and economic resource
5. Safeguard the County's environmental features and natural resources
 - Manage storm water, floodplains and wetlands
6. Provide adequate water and wastewater facilities that support new development
 - Ensure a supply of high-quality drinking water
7. Achieve a stable economy that includes business diversity

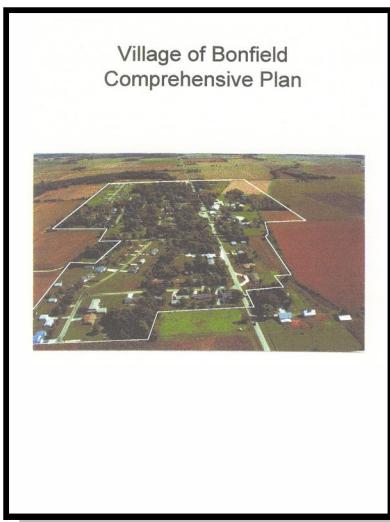
4.2. Municipal Plan Goals

Several municipalities have their own comprehensive plans which reflect similar concerns. For example, Bonfield's 1998 plan includes the following goal and action statements:

Land Use

Goal: Provide adequate development opportunities while recognizing environmental constraints such as soil types with severe development limitations

Action #3: Require the submission of a comprehensive drainage plan provided by the developer for proposed subdivision developments



Economic Development

Action #4: Update and enforce zoning and building regulations to ensure high quality developments and safe buildings

Housing

Goal: Maintain a quality housing stock

Action #3: Explore the possibility of a Village sponsored housing rehabilitation program to encourage the updating of the existing housing stock

Action #5: Develop an effective code enforcement program to ensure the preservation and rehabilitation of the existing housing stock

Community Resources and Public Facilities

Action #6: The Village will require developers of land to financially participate in road and drainage improvements, to and from their development

As another example, the City of Kankakee's 1997 Comprehensive Plan has the following:

Land Use Goals

- c. Maintain and rehabilitate existing housing stock.

Transportation Goals

- 7. Promote traffic safety.

Community Facility Goals

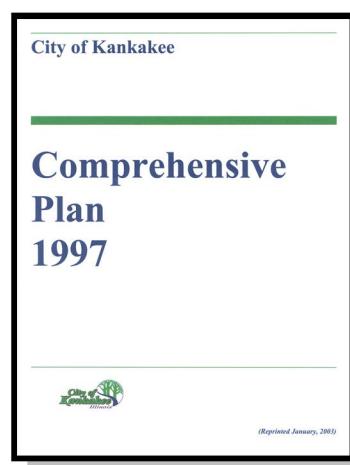
- 6. Review and upgrade sewer system treatment and storm drainage.

Housing Goals

- 1. Maintain the quality of existing housing stock.

Economic Development Goals

- 7. Maximize the Kankakee River as a recreational resource.



As this mitigation plan was being updated, a new comprehensive plan for the City of Kankakee is being completed.

4.3. Goal Setting

At its June 21, 2013 meeting, the Mitigation Advisory Task Force members were given two handouts. The first was designed to help set the stage for mitigation planning. It asked öWhat would you most like to see in Kankakee Countyøs future?ö The second handout asked öWhat should be the goals of our mitigation program?ö

Each handout had a list of possible answers plus space for the respondent to add others. These two handouts appear on the next two pages. Each Task Force member checked off his or her top five choices on the handout. The next two pages show the number of members who selected each response.

These handouts were used in the original plan and the top answers given this time were similar to the ones given in 2005. As seen by the tallies on the next two pages, many of the possible responses were selected. A few subjects had a lot of support:

- Educating children and keeping them in the area
- Improving businesses and job opportunities
- Protect peopleøs lives
- Protect critical facilities
- Protect public services
- Protect utilities

Several of these priority areas coincide with the 2005 Comprehensive Planøs goals and goals stated in municipal comprehensive plans.

The Mitigation Advisory Task Force reviewed the results of the handouts from 2013 at its May 17, 2018 meeting and felt that the results were still valid. A new handout and questionnaire was not performed.

Goals Exercise 1.

What would you most like to see in Kankakee County's future?

Here are possible answers to this question, listed in alphabetical order. Pick the five that you think are most important. You may reword them or add new ones if you want.

- 8 Educated children
- 0 Improved air quality
- 3 Improved roads and transportation
- 1 Improved water quality
- 7 Improved/more businesses
- 1 Improved/more cultural facilities
- 0 Improved/more housing
- 9 Improved/more job opportunities
- 0 Improved/more open space
- 1 Improved/more public transportation
- 1 Improved/more recreation facilities
- 0 Improved/more shopping
- 1 Improved/stronger agricultural sector
- 0 Less new development
- 0 Less traffic congestion
- 3 More knowledgeable residents
- 1 New development confined to areas already developed
- 3 Preserved historical/cultural sites
- 2 Special attention given to elderly/disabled
- 1 Special attention given to farmers
- 2 Special attention given to lower income areas
- 0 Special attention given to minority neighborhoods
- 0 Special attention given to newer shopping areas
- 3 Special attention given to older business areas
- 2 Younger people staying/moving into the area
- 1 Other: Natural Resources-Improve & Promote
Other: _____
Other: _____

Goals Exercise 2.

What should be the goals of our mitigation program?

Here are possible answers to this question, listed in alphabetical order. Pick the five that you think are most important. You may reword them or add new ones if you want.

- 2 Help people protect themselves
- 3 Make sure future development doesn't make things worse
- 0 Maximize the share paid by benefiting property owners
- 3 Maximize use of state and federal funds
- 2 Minimize property owners' expenditures
- 0 Minimize public expenditures
- 1 New developments should pay the full cost of protection measures
- 0 Protect businesses from damage
- 0 Protect cars and other vehicles
- 1 Protect centers of employment
- 6 Protect critical facilities
- 1 Protect farms, crops and livestock
- 0 Protect forests
- 1 Protect homes
- 0 Protect new/future buildings
- 7 Protect people's lives
- 3 Protect public health
- 6 Protect public services (fire, police, etc.)
- 2 Protect repetitively flooded areas
- 2 Protect roads, streets and bridges
- 0 Protect scenic areas, greenways, etc.
- 3 Protect schools
- 0 Protect shopping areas
- 5 Protect utilities (power, phone, water, sewer, etc.)
- 1 Protect wetlands/environmentally sensitive areas
- 1 Restrict development in hazardous areas

Other: _____

Other: _____

Other: _____

4.4. Goals

Based on the comprehensive planning goals and the input from the Mitigation Advisory Task Force members, and surveys from the municipalities and citizens the Task Force determined that the goals from the original plan were still relevant. The following goals statements were adopted by the Task Force:

1. Protect the lives, health, safety, and welfare of the people of Kankakee County from the dangers of natural hazards.
2. Place a priority on protecting public services, including critical facilities, utilities, roads, and schools and encourage their construction outside of the floodplains.
3. Educate people about the hazards they face and the ways they can protect themselves, their homes, and their businesses from those hazards.
4. Manage future development to minimize the potential for damage from natural hazards and adverse impacts on other properties.
5. Preserve and protect the rivers and floodplains of the County by considering stricter development regulations within our floodplains.
6. Encourage and work with FEMA to expand the study of our floodplains in the unmapped portions of the county.

Chapter 5. 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:

Planning and zoning
Subdivision regulations
Building codes
Manufactured housing regulations

Floodplain management
Stormwater management
Water use management

One measure of the effectiveness of these activities is their scoring under the Community Rating System (CRS). While the CRS score may not account for special local conditions, it does provide a good measuring stick to compare local programs with national models. At the end of the discussion on each measure is a CRS credit section that explains the likely scores for a Kankakee County community.

Development in Kankakee County: One reason preventive measures are important is because Kankakee County is growing. Between the 2000 and 2010 Censuses, the County's population increased by 9%. According to the comprehensive plan for the County, recent growth is largely due to south suburban Chicago's economic expansion. If the proposed third Chicago area airport or the Illiana Expressway are constructed in southern Will County, even more growth can be expected.

Most recent growth has taken place within the municipalities, especially those along the Interstate 57 corridor. Nonresidential development is staying close to highway access and areas such as enterprise zones and the Illinois Diversatech Industrial Park (east of Manteno, on former state hospital property).

Residential development is also concentrating in and around Bradley, Bourbonnais, and Manteno. However, more subdivisions are springing up in the unincorporated areas of the County. The largest amount of growth has occurred in Bourbonnais and Limestone Townships, north and west of Kankakee. These two townships accounted for 40% of the building permits issued in the County between 1980 and 2003. In fact, in the 2000 Census, Bourbonnais Township passed Kankakee Township as having the most population in the County.

The fastest growing communities, 2000 & 2010, were (in order) Manteno, Bradley, and Bourbonnais. Small town resources can be strained to serve this growth, although the extension of water and sewer services to many areas in recent decades has greatly helped.



In addition to new development, there has been a substantial amount of redevelopment. A prime concern in hazard mitigation has been conversion of riverfront summer cabins to year-round residences.

In sum, there is growth in the urban fringe and in rural areas and redevelopment in floodplains. Now is the time to ensure that such development is protected from natural hazards and does not increase the threat of the hazards to other properties.

5.1. Planning and Zoning

Planning and zoning activities direct development away from problem areas, especially floodplains and naturally sensitive areas. They do this by allowing land uses that are more compatible to the natural conditions of the land. Use of the land can be tailored to match the land's hazards, typically by reserving hazardous areas for parks, greenways, golf courses, backyards, wildlife refuges, natural areas, or similar activities with a low potential for damage from flooding.

Comprehensive Plans: These plans are the primary tools used by communities to address future development. They can reduce future damage 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.

Generally, a plan has limited authority. It reflects what the community would *like to see* happen. Its utility is that it guides other local measures, such as capital improvement programs, zoning ordinances, and subdivision regulations.

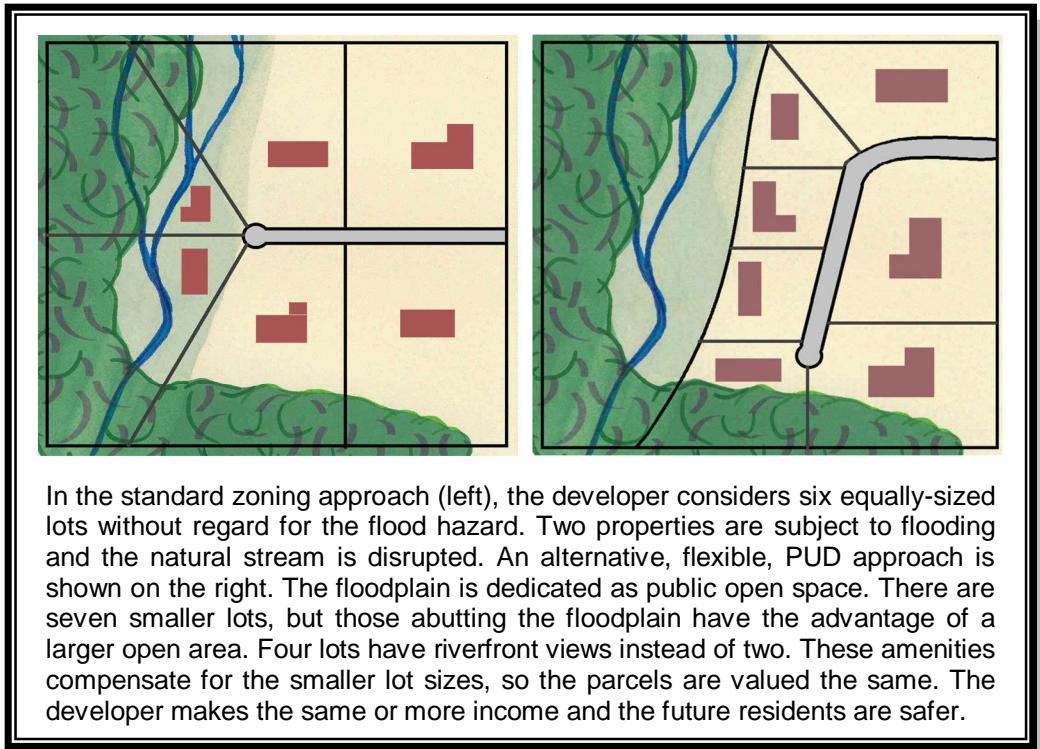
Zoning: A zoning ordinance regulates development by dividing a community into zones or districts and setting development criteria for each zone or district. Zoning codes are considered the primary tool to implement a comprehensive plan's guidelines for how land should be developed.

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.



A zoning ordinance should designate flood-prone lands for agricultural, conservation, or other uses that suffer minimal damage from a flood.

One way to encourage such flexibility is to use the planned unit development (PUD) approach. The PUD approach allows the developer to easily incorporate 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 improvements: Another planning activity relates to public expenditures. For example, a community can discourage development in hazardous areas by not extending water and sewer services there. Capital improvement plans could designate wetlands and floodplains as priorities for acquisition or set aside for public parks and recreation areas.





Local implementation: The table below summarizes the findings of a review of plans and zoning ordinances adopted by the County and the municipalities. They were reviewed for five concerns:

1. Does the community have a comprehensive or land use plan? If so, when was it adopted?
2. Does the plan address natural hazards?
3. Does the plan's future land use map reflect floodprone areas?
4. Does the community have a zoning ordinance? If so, when was it adopted?
5. Does the zoning district map reflect floodprone areas?

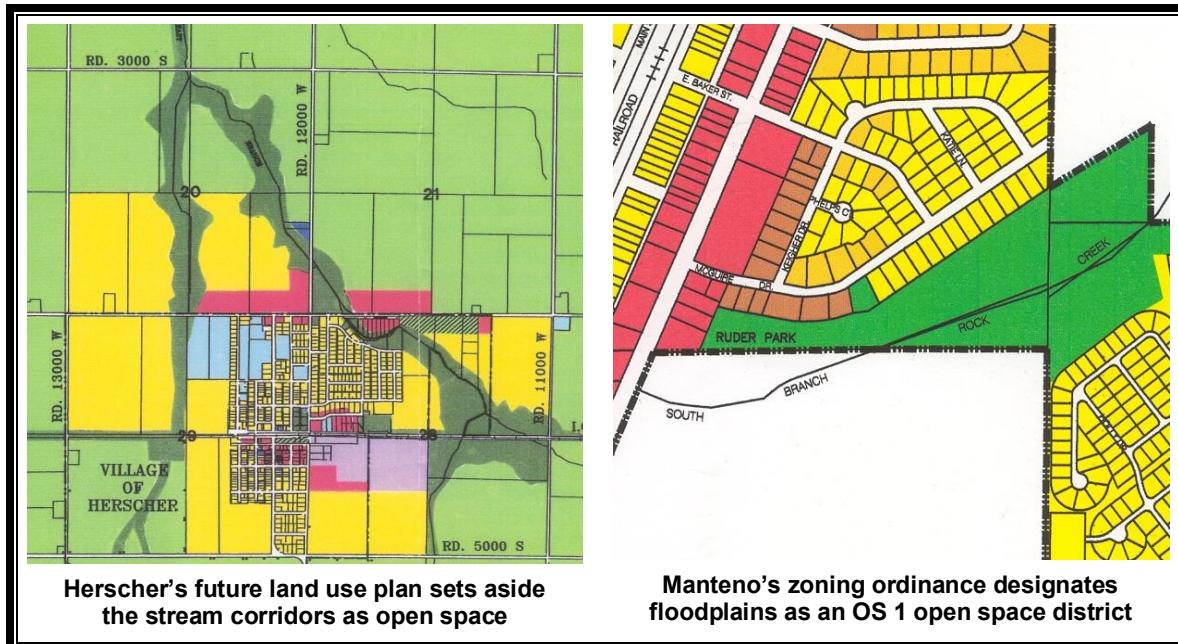
Planning and Zoning Regulations					
	Date of Comprehensive Plan	Plan Addresses Natural Hazards?	Future Land Use Map Reflect Floodplain?	Date of Zoning Ordinance	District Map Reflect Floodplain?
Aroma Park	1974	Yes	Yes	2003	Yes
Bourbonnais	2013	No	Yes	2001	No
Bradley	2007	No	Yes	2004	No
Kankakee	1997 ¹	No	Yes	1995	No
Manteno	2007	No	Yes	1999	Yes
Momence	2011	No	Yes	1986	No
Sun River Terrace	None	N/A	N/A	1980	No
Uninc. County	2005	Yes	No	1996	No

Municipalities not participating in the mitigation plan are not included
N/A means that the community does not have a plan, a zoning ordinance, or a floodplain map.
Note 1: the community is preparing or revising its plan or zoning ordinance.

Plans: Some of the smaller towns' plans were prepared in the late 1980s and early 1990s by the County planning department. These recognize mapped and unmapped flood-prone areas and areas with problem soils. Their future land use maps call for these areas to be set aside as parks or open space. A good example of this is Herscher's 1993 comprehensive plan (see below) which also called for a greenway along Horse Creek.

Zoning: As seen by the table on the previous page, most of the zoning ordinances have no special district for the floodplain areas. Often, zoning ordinances reflect existing development patterns, so if the floodplain had already been built up, the map does not show any special protection measures for future development.

An exception to this is Manteno's zoning ordinance which has designated much of its floodplains as an open space district. Because both its land use plan and its zoning ordinance have recognized the hazardous area and set standards to limit development there, the Village will prevent future flood problems.



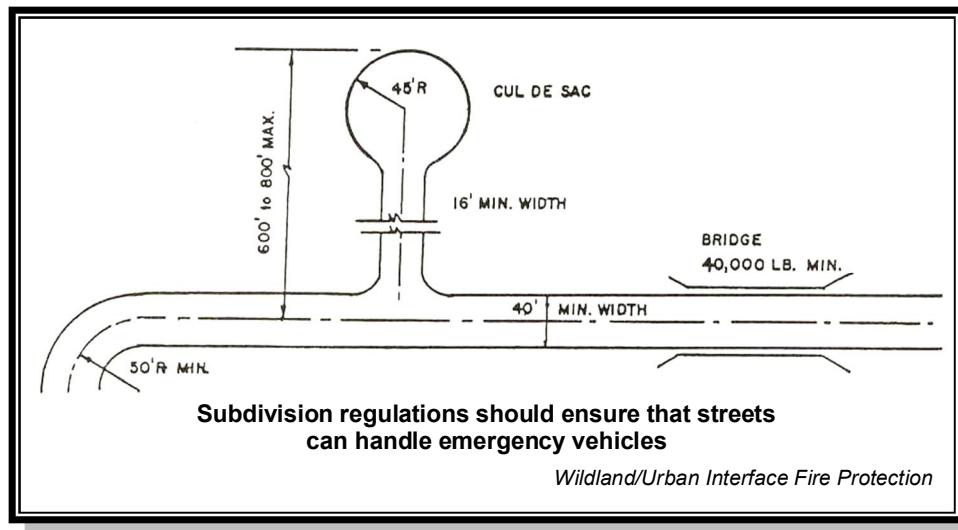
 **CRS credit:** There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Up to 100 points are provided for regulations that encourage developers to preserve floodplains or other hazardous areas from development. There is also considerable credit for having open space or low density zoning in the floodplain. Aroma Park, Manteno, and the County would qualify for some of this credit.

5.2. Subdivision Regulations

Subdivision regulations come into effect where the land use plan and zoning ordinance have identified where various land uses are appropriate. They govern the development of large vacant areas that the developer intends to subdivide into individual lots. If the zoning for a site allows buildings, subdivision regulations set the construction standards for the streets, utility lines, drainage, and other infrastructure.

Subdivision regulations can include the following hazard protection standards:

Requiring that the final plat show all hazardous areas (see example, page 9-5),
Setting road standards for passage of firefighting equipment and snow plows,
Requiring power or phone lines to be buried,
Establishing minimum water pressures needed for firefighting,
Requiring that each lot be provided with a building site above the flood level, and
Requiring that all roadways be no more than one foot below the flood elevation.



 **Local implementation:** The table on the next page summarizes a review of the Countyøs and municipalitiesø subdivision regulations. For the communities with such regulations, three indicators of attention to natural hazards were looked for:

1. If there are street width and cul-de-sac dimensions similar to those illustrated above.
2. Whether new developments are required to set aside drainage ways as public easements to facilitate maintenance that will prevent local drainage problems. An example of such a requirement appears on the next page.
3. Whether utility lines have to be buried, which will protect them from damage by wind and winter and ice storms. In some cases, the regulations state that utilities be placed underground öwhenever applicable.ö

Grant Park's subdivision regulations provide a good example of the typical drainage easement provision:

4.5.2 Drainage easements. When a subdivision is traversed by an established stream, established drainageway, or channel, there shall be provided a stormwater easement or drainage right-of-way conforming substantially to the course of such stream, established drainage way, or channel. The location, width, alignment, and improvement of such easement shall be subject to the approval of the plan commission provided that such easement shall be not less than 20 feet in width. Where ditch drainage is used in lieu of storm sewers, as may be permitted in this chapter, the easement shall be of sufficient width to allow future construction of a storm sewer main adequate to carry the ultimate runoff of the watershed as determined by current hydrological records.

Subdivision Regulations				
	Date of Ordinance	Street Standards	Drainage Easements	Utilities Buried
Aroma Park	1972	VI.1	VI.3.(B)	VI.8
Bourbonnais	1995	30-8.(a)	30-8.c	30-9.b19
Bradley	1973 ¹	18-58	18-59	None ¹
Kankakee	2002	5.34.A.11	5.4.C	5.39.A
Manteno	1994	10-8-4	10-5-5	None
Momence	1997	10-4-2	10-4-6	None
Sun River Terrace	None	N/A	N/A	N/A
Uninc. County	2009	17-38	17-37-3	17-37-2

The numbers refer to the ordinance section numbers.
 Note 1. Community is working on new subdivision regulations
 Note 2. Village adopted the County's regulations.

The table shows that every ordinance has street and cul de sac standards that facilitate access by emergency vehicles. Such standards have been around a long time due to the traditional attention to fire protection. Most, but not all, communities require easements adjacent to drainage ways and buried utility lines.



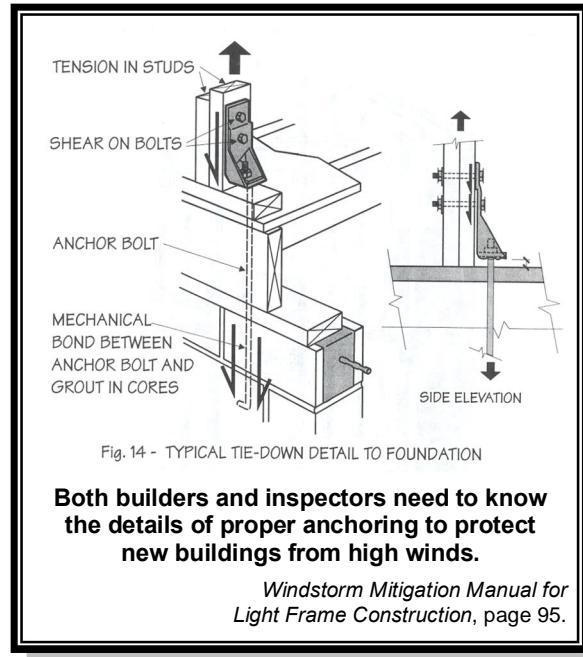
CRS credit: Up to 25 points are provided for requiring that new streets in a floodplain be elevated to no more than one foot below the flood elevation. There are no CRS credits for requirements for hazards other than flooding.

5.3. Building Codes

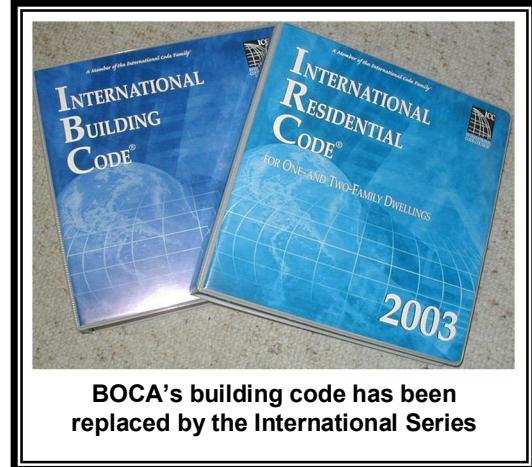
Building codes provide one of the best methods of addressing all the hazards in this plan. They are the prime measure to protect new property from damage by earthquakes, tornadoes, high winds, and snow storms. When properly designed and constructed according to code, the average building can withstand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

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) and shaking caused by earthquakes,
- 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 have used 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.



The International Codes have a section on flood protection that communities must adopt separately. However, these building code standards are not as stringent as the minimum floodplain management requirements of the State or many local ordinances.

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 and some nails missed penetrating roof rafters. 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 Kankakee County and the BCEGS rating for each community. The latter provides summary data on the status of administration of the building codes.

The table shows that some communities have both current building codes and good enforcement. 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. Other communities have codes that are now outdated, or will be outdated if they are not revised before the next BCEGS review. The County intends to do this. Those communities that are listed as using the County's code would also have to adopt the new version to maintain their BCEGS classification.

As a government agency, Kankakee Community College is somewhat exempt from local building codes. Its larger projects must be approved by the Illinois Capital Development Board. Its construction specifications for smaller projects reference the 1999 BOCA code.

GUIDE TO OBTAINING A BUILDING PERMIT



Kankakee County Planning Department
Building Division
189 E. Court St., Room 201
Kankakee, IL 60901
815.937.2940
Fax: 815.937.2974
Hours: M-F 8:30-4:30
www.k3county.net/plan.html

**An informed public helps
building code administration**

Building Codes and BCEGS Scores				
Community	Building Code	BCEGS Scores		BCEGS Class
		Adopted Code	Code Administration	
Aroma Park	BOCA	15.00 ¹	38.45 ²	9/9
Bourbonnais	International . 2006	15.00 ¹	56.87 ²	4/4
Bradley	International . 2003	Did not participate in BCEGS survey		
Hopkins Park	International . 2006	No Report		
Kankakee	International . 2015	8.00 ³	29.09 ⁴	4/4
Manteno	International . 2015	8.00 ³	28.25 ⁴	6/6
Momence	%Kankakee County\$+	8.00 ³	16.67 ⁴	7/99
Sun River Terrace	%Kankakee County\$+	5.51 ¹	8.40 ²	9/9
Uninc. County	International - 2015	8.00 ³	30.29 ⁴	4/4

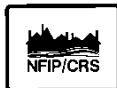
Note 1. Score is out of a maximum of 15 points for adopting the latest building code. A community using BOCA or %Kankakee County\$+code will lose its score at the next cycle visit if it does not adopt the current International series of codes.

Note 2. Score for administration, inspections, staff training, etc., is out of a max of 85 points.

Note 3. Score is out of a maximum of 8.

Note 4. Score is out of a maximum of 54.50 for residential administration, inspections, staff training, etc.

Summer 2013 Survey of municipalities, Insurance Services Office, Inc.



CRS credit: 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 100 points are possible. For example, based on the data in the table, Bourbonnais would receive 90 points, but Momence would receive no credit.

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.

5.4. Manufactured Housing Regulations

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.

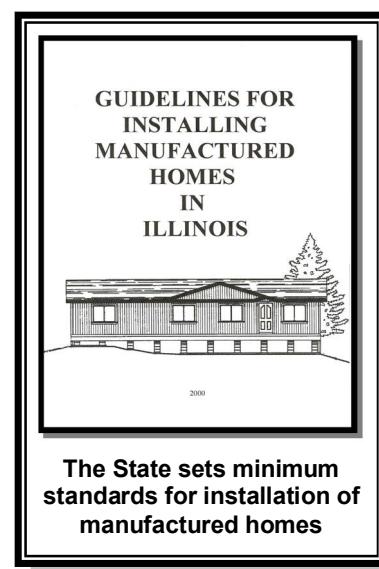
As noted in Chapter 3, the greatest mitigation concern with mobile homes and manufactured housing is protection from damage by wind. The key to local mitigation of wind damage to manufactured housing is their installation.

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 uplift and overturning forces to the foundation. Unfortunately, they also found that building officials were often unaware of the manufacturer’s installation guidelines.

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 tie-down code. The Department of Public Health conducts inspections only if complaints are made regarding an installation. The Department also regulates manufactured housing parks, but not in home rule communities.

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



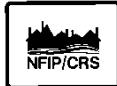


Local implementation: As noted in Section 3.1, there are over 3,000 manufactured homes in Kankakee County. The County has the second highest number of such homes per capita in the state.

Local governments have relied on the State program to ensure that these are properly protected from wind. Communities with floodplain regulations must require manufactured homes, including those in parks or communities, to meet the flood protection regulations. For example, Manteno and Kankakee do not inspect for tie downs, but do ensure that sheds, garages, and decks in their manufactured housing communities meet all applicable codes. Kankakee County requires permanent foundations for these structures under County jurisdiction.



Kankakee County manufactured housing community



CRS credit: Up to 15 points are provided for enforcing the floodplain management requirements in existing manufactured housing parks. 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.

5.5. Floodplain 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. A floodplain management program has two major components: a floodplain map and development regulations.

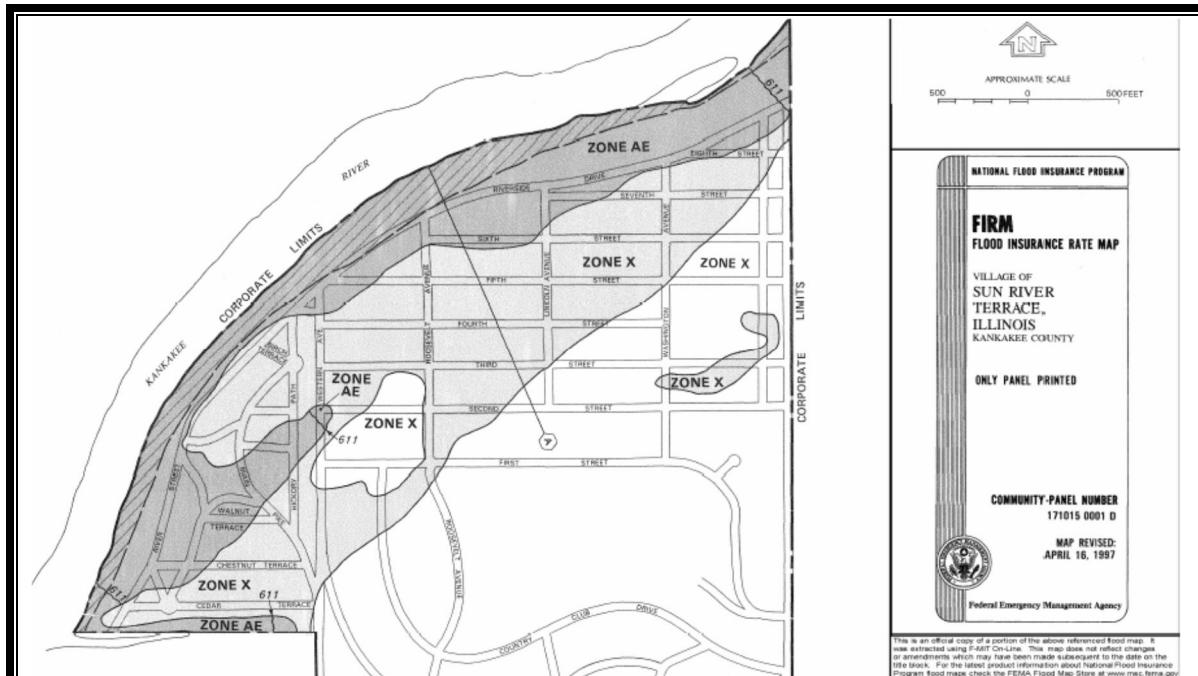
Floodplain map: The official map for floodplain management regulations is the FEMA Flood Insurance Rate Map (FIRM). Each community is given a FIRM and a Flood Insurance Study text that explains the technical study that prepared the map. FIRMs prepared before 1986 were accompanied by a Flood Boundary Floodway Map that shows the regulatory floodway, where IDNR permits are required. Since 1986, the floodway has been delineated on the FIRM.

An example of an older FIRM is shown at the top of the next page. It illustrates some of the problems people have using the FEMA maps. Concerns have included:

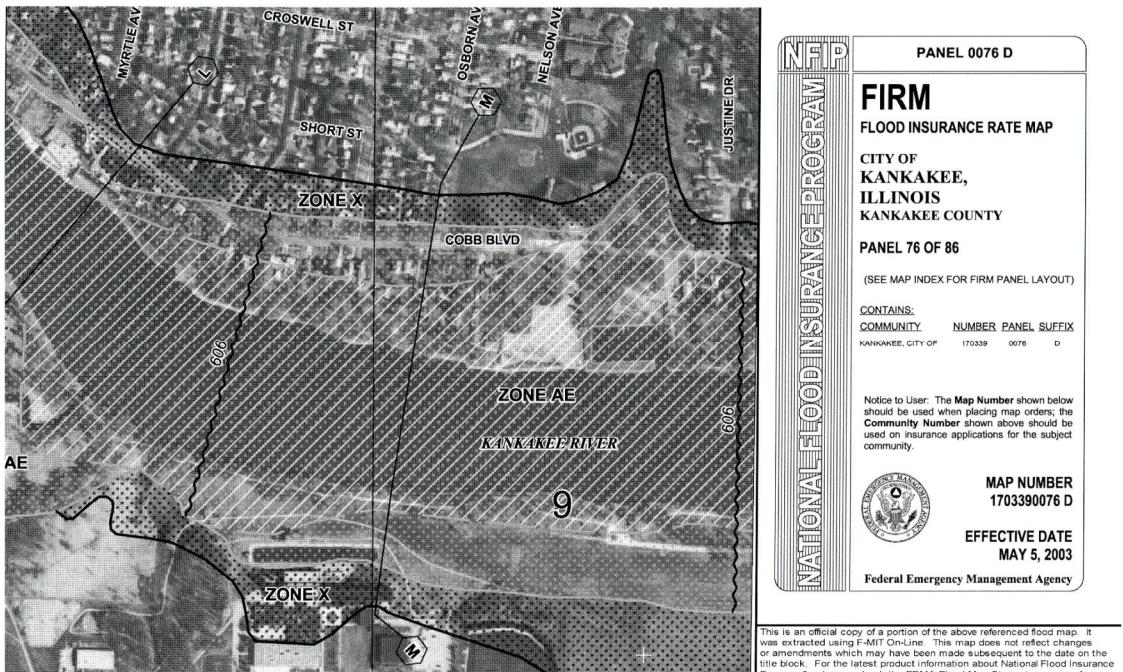
They are for individual communities, so areas outside a municipality's corporate limits are shown on the county's map. This makes regulating areas to be annexed difficult and sometimes the data on the two different maps may disagree.

The maps for counties and larger communities need multiple panels, so a user must shuffle from an index to different panels to locate a site.

Old and New FIRM Formats



Older FIRM: the information on Sun River Terrace's FIRM stops at the Village limits



New FIRM: Kankakee's FIRM is on an aerial photo base map, making it easier to locate buildings

Older maps show only streets, stream channels, and railroads. It can be difficult to determine whether individual buildings are in or out of the regulatory floodplain or floodway.

Maps are based on the rainfall data, flood information, and study techniques in effect at the time of the study. Such data and techniques have greatly improved in the last 10 ó 20 years, but are not reflected on the official maps in effect.

It is expensive to keep paper maps up to date to reflect new subdivisions, corporate limits changes, or new flood data. FEMA's budgets have not allowed it to restudy or remap areas as frequently as many map users would like.

As shown at the bottom of the previous page, newer FIRMs provide more detail, but they still have the other shortcomings of paper maps that are not kept up to date with changing ground features and flood data. In 2010, FEMA adopted a new Flood Insurance Study for Kankakee County and along with the study a new set of modernized FIRMs were created. These FIRMs are available as paper maps as well as digital, online versions. The County has included the new FIRMs in their Geographic Information System.

Development regulations: FEMA's National Flood Insurance Program (NFIP) and the Illinois Department of Natural Resources set minimum requirements for regulating development in the floodplain. These are summarized on the following page.

On both the Sun River Terrace and Kankakee maps, the floodway is shown with slanted lines. The floodway is the central part of the floodplain, including the channel, which must be reserved to carry flood flows. Floodwaters are deeper and move faster in the floodway. If the floodway is obstructed by development, such as fill or a small bridge opening, floodwaters will back up or be diverted onto other properties. State permits are required for floodway development projects to ensure that this does not happen.



Local implementation: While there is a state permit program, IDNR depends on local code enforcement offices to advise developers when and where a state permit is needed. Therefore, local programs are the key to good floodplain management.

There are eight communities in Kankakee County that have flood hazard areas mapped by FEMA. They have all joined the National Flood Insurance Program. A ninth community, Chebanse, has also joined, even though it does not have a mapped floodplain.

Floodplain map: The areas covered by FEMA's Flood Insurance Rate Maps are shown in the map on page 2-2. One prominent shortcoming of these maps is that the western half of the County was never included. These smaller streams have flooded (see photo of Horse Creek, page 2-3), but there is no public map of the hazard and therefore no regulatory requirements for new development.

The FEMA mapping standard has been to only map a floodplain in a rural area if the stream drains 10 square miles or more. Since the original 1970's maps, the urban fringe has expanded into areas once considered rural. As a result, much development occurs in

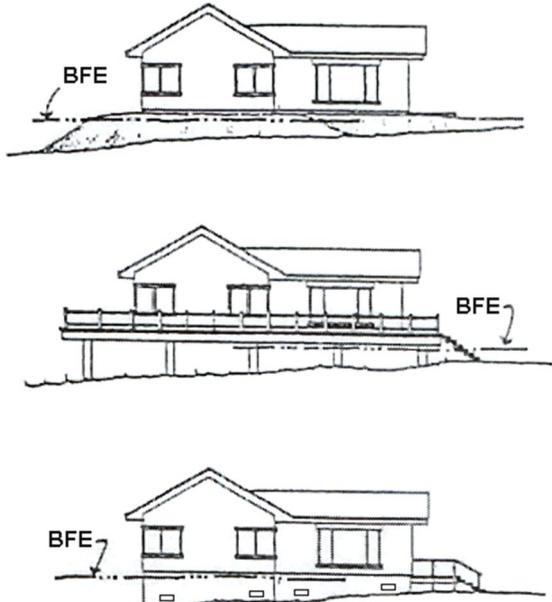
floodprone areas that were not mapped. A good example of this is shown in the FIRM excerpt on page 5-16.

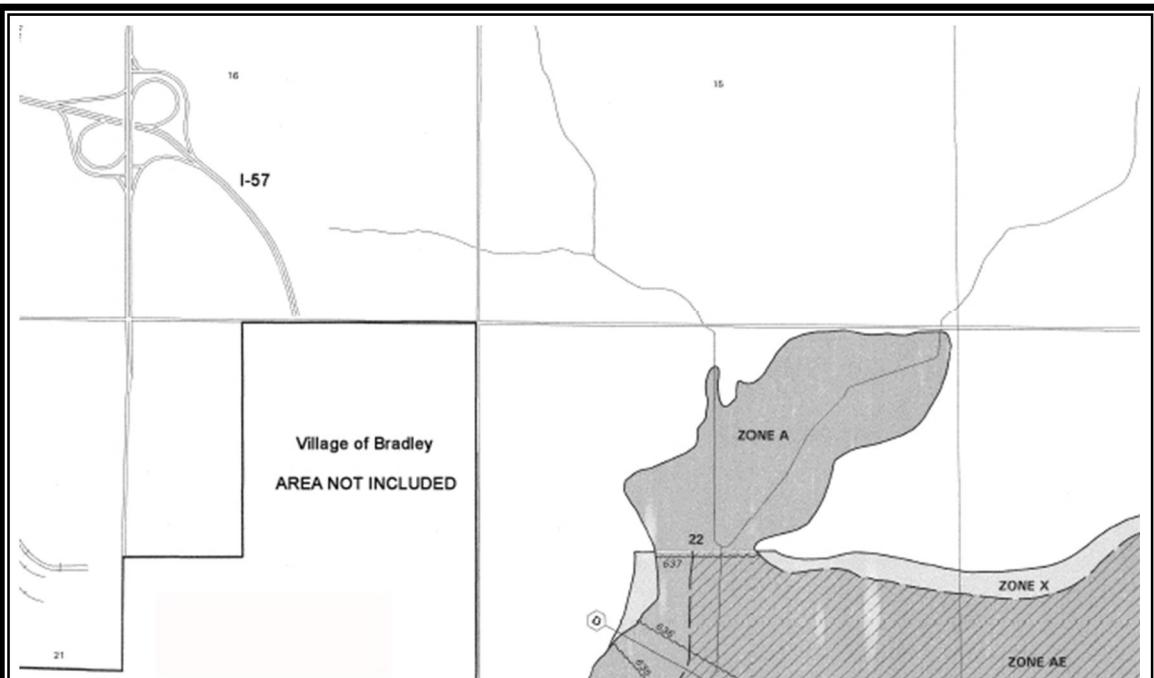
National and State Floodplain Management Requirements

The National Flood Insurance Program (NFIP) is administered by the Department of Homeland Security's Federal Emergency Management Agency (FEMA). As a condition of making flood insurance available for their residents, communities that participate in the NFIP agree to regulate new construction in the area subject to inundation by the 100-year (base) flood. The floodplain subject to these requirements is shown as an A Zone on the Flood Insurance Rate Map (FIRM) (see the map on page 2-2).

The Illinois Department of Natural Resources (IDNR), Office of Water Resources, has authority to prevent development projects from adversely affecting other properties. Additional floodplain regulatory requirements may be set by local law.

1. All development in the A Zone must have a permit from the community. ~~Development~~ is defined as any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.
2. Development along a river or other channel cannot obstruct flows so as to cause an increase in flooding on other properties. To ensure this, an analysis must be conducted to measure the cumulative effect of the proposed development, when combined with all other existing and anticipated development. The analysis is submitted to IDNR as part of an application for a state floodway permit.
3. New buildings may be built in the floodplain, but they must be protected from damage by the base flood. The lowest floor of residential buildings must be elevated to or above the base flood elevation (BFE). The illustrations to the right show three typical ways this is done: on fill, on piers, or on a flow-through crawlspace. Nonresidential buildings must be either elevated or floodproofed.
4. A ~~substantially improved~~ building is treated as a new building. The regulations define ~~substantial improvement~~ as any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. This requirement also applies to buildings that are substantially damaged.





Example of previous problems with Kankakee County Flood Insurance Rate Maps

- Roads and floodplains disappear beyond the corporate limits (%area not included+).
- Recent features are not shown, such as changes in corporate limits, new roads and streets around the I-57 interchange, and the Northfield Square shopping mall.
- The 10 square mile drainage area standard for rural areas means that floodplains on the urban fringe are not mapped.

All seven mapped communities received their first FIRM in the 1970s. A new study of the Kankakee and Iroquois Rivers was published in a 1996 Flood Insurance Study and was the basis for FIRMs for the communities on those two rivers. It is important to note that the 1996 study assumed there would be no ice jams. The County's Flood Insurance Study states:

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail. (page 8)

Because of this approach, the regulatory flood elevations for the Kankakee and Iroquois Rivers do not state the true flood hazard. For example, the official base flood elevation at the Chebanse gage on the Iroquois River is 617 feet above sea level. Floods went higher than this in 1913 and 1979 and came within a foot in 1933. As noted on page 2-6, recorded floods have gone higher than 614 feet ten times. Half of those, including the 1979 flood, were due to ice jams. It should be noted that the new 2010 Flood Insurance Study does not take ice jams into consideration.

Since the previous plan's adoption, Kankakee County has adopted a new set of Digital-FIRMs that are countywide and overlaid on aerial photography. However, the current system is not perfect and improvements could be made. In short, the regulatory floodplain maps and data for Kankakee County communities:

Do not include the western third of the County,
Do not include smaller drainage areas in the urban fringe, and
Understate the flood hazard because ice jams are ignored.

Development regulations: All eight communities have an obligation to FEMA to enforce the floodplain management requirements within their jurisdictions. Periodic visits by IDNR or FEMA ensure that the regulations are kept current.

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 conduct Community Assistance Visits (CAV) to verify that staff understand and are enforcing the floodplain regulations. The table on the next page shows the status of the most recent CAVs. 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 and they were subsequently corrected.

The Community Assistance Visit reports recommended that most of the communities coordinate their floodplain regulations closer with their building code programs. Several communities needed to update their ordinances to include some new requirements. No new development was found in Momence's floodplain and the State CAV staff was impressed with the County's administration.

In 2000, the Illinois Association for Floodplain and Stormwater Management initiated a Certified Floodplain Manager program. To be a CFM®, a local permit official must pass an extensive test and meet certain continuing education requirements. Communities with CFMs have been shown to have better floodplain management programs. Currently, Bourbonnais and Manteno have Certified Floodplain Managers on their regulatory staffs and Bradley's consulting engineer is a CFM. Until recently, the County had two CFMs on staff but was forced to reduce that number to one due to budgetary constraints.



CRS credit: CRS credit is provided for higher mapping and regulatory standards. Credit is based on how those standards exceed the minimum NFIP requirements. State mapping standards mean that most communities could receive 100 or 150 points for the way their floodways were mapped.

Floodplain Management Programs							
	FIRM Date	Date of CAV	Major problems	Minor problems	Procedures OK?	Ordinance OK?	Problems corrected?
Aroma Park	2010	2000	9	1	No	No	No
Bourbonnais	2010	2000	3	2	No	No	Yes
Bradley	2010	2000	1	4	No	No	Yes
Kankakee	2010	2002	0	2	Yes	Yes	Yes
Manteno	2010	2000	1	1	No	No	Yes
Momence	2010	2000	0	0	No	Yes	Yes
Sun River Terrace	2010	No recent CAV					
Uninc. County	2010	2001	0	3	Yes	Yes	Yes

The seven mapped NFIP communities' regulations are based on an IDNR model ordinance. These have several requirements that exceed the national minimums:

Buildings must be elevated to a level one foot above the base (100-year) flood elevation.

Fill must meet certain standards to protect it from erosion and scour,

Hazardous materials may not be stored in the floodplain, and

Under certain circumstances, building additions must be protected from flooding, even if they are not substantial improvements.

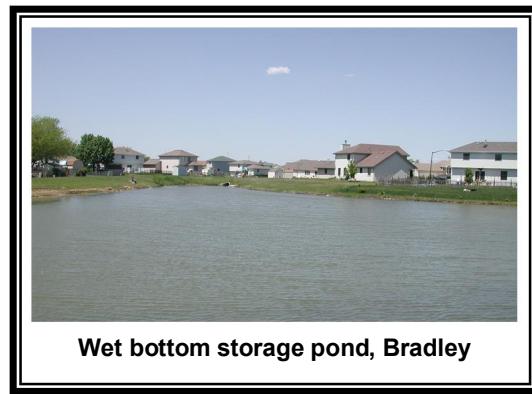
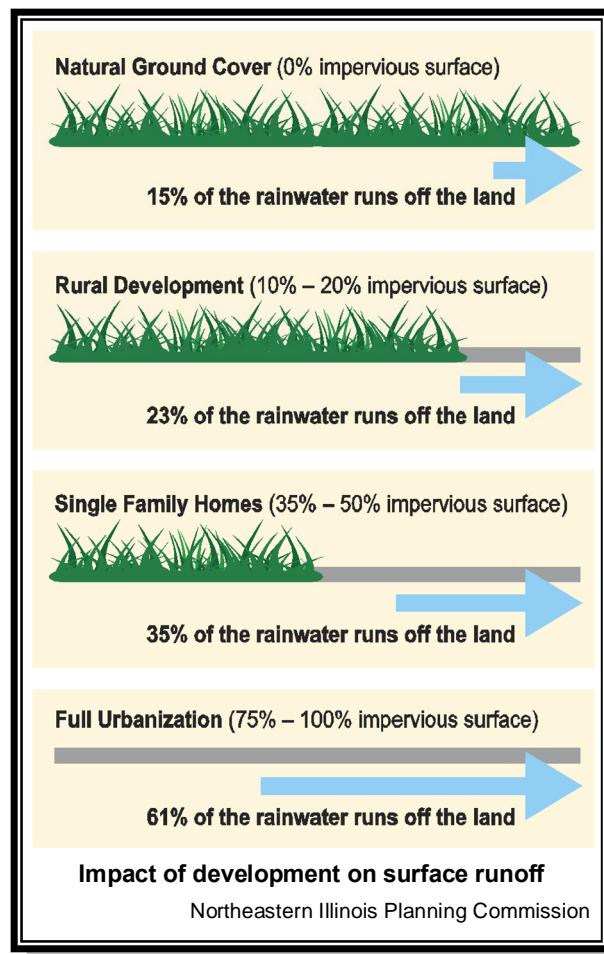
The County and the six mapped municipalities would receive at least 300 points for their floodway maps and regulatory provisions and up to 50 points for having a Certified Floodplain Manager administering their floodplain management ordinances.

5.6. Stormwater Management

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). Impervious surfaces, such as streets and rooftops, shed more water than natural ground cover. This runoff is speeded to the receiving streams by storm sewers and drainage ditches. As a result, there is more water reaching the streams and getting there faster. This can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality.

Retention/detention: Stormwater management regulations require developments to ensure that the post-development peak runoff will not be greater than under pre-development conditions. To meet this requirement, developers build retention or detention basins to minimize the increases in the runoff rate caused by their development. Stormwater management requirements for storage basins are generally found in ordinances governing subdivisions and larger new developments. Many developments utilize wet or dry basins as landscaping amenities. Larger detention basins are more effective than smaller ones, which drain relatively quickly. In some cases, advance community planning identifies the most effective location for a basin and requires developers to contribute funds for it in lieu of constructing on-site detention.

Water quality: There is a second aspect to stormwater management: protecting or improving the quality of the stormwater runoff that flows to the rivers. Non-point source pollutants are carried by stormwater into the receiving streams (point source pollution comes from municipal and industrial wastewater systems). Non-point source pollutants include sediment, lawn fertilizers, pesticides, farm chemicals, and oils from street surfaces and industrial areas.

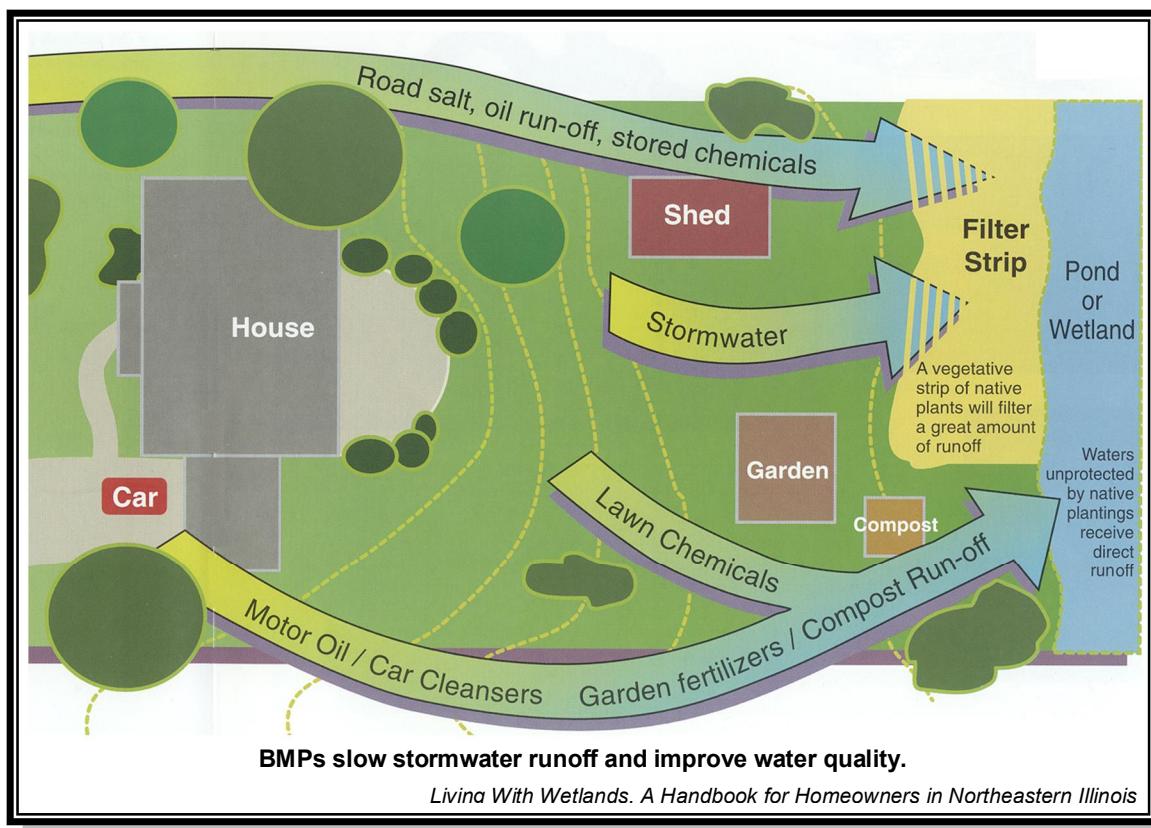


Wet bottom storage pond, Bradley

Stormwater management water quality measures are known as “best management practices” or BMPs. BMPs are technologies or engineering approaches that can be incorporated into retention and detention basins, drainage-ways, and other parts of new developments. They hold and clean stormwater runoff by filtering it or letting pollutants settle to the bottom of a basin before it is drained (see graphic below).

Erosion and sedimentation control: One of the largest sources of water pollution is sedimentation. Because farmland and construction sites are usually bare, stormwater runoff can erode soil, sending sediment into downstream waterways. Sediment tends to settle where the river slows down, such as where it enters a lake. Sedimentation will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters. Not only are the drainage channels less able to carry flood flows, but the sedimentation in the water reduces light, oxygen, and water quality.

BMPs to reduce erosion and sedimentation have two principal components: minimize erosion with vegetation and capture sediment before it leaves the site. Slowing runoff on the way to a drainage channel increases infiltration into the soil and controls the loss of topsoil from erosion and the resulting sedimentation. Runoff can be slowed down by BMPs such as vegetation, terraces, sediment fences, ditch checks, and impoundments such as sediment basins and wetlands.



Under the National Pollution Discharge Elimination System (NPDES), municipalities located in urban areas as defined by the Census Bureau are required to obtain NPDES permit coverage for discharges from their municipal separate storm sewer systems. The NPDES requirements are explained in the box, below. They encourage communities to require developers to implement BMPs and to incorporate them into their own activities, such as street sweeping.

NPDES Stormwater Management Water Quality Requirements

Section 402 of the Clean Water Act directed the U.S. Environmental Protection Agency to develop and implement a program to prevent harmful pollutants from being released into the nation's surface water from sources such as wastewater treatment plants, agricultural operations, and stormwater drainage. The program (the National Pollutant Discharge Elimination System or NPDES) is administered by the Illinois Environmental Protection Agency.

Affected communities that operate a storm drainage system must obtain a permit to discharge their stormwater drainage into a local water body. To get the permit, the community must have a local stormwater management program that includes these components, most of which are also important to good floodplain management practices.

1. Public education and outreach on stormwater impacts.
2. Public involvement and participation.
3. Identification and elimination of illicit discharges to storm sewers.
4. Control of construction site runoff.
5. Control of stormwater runoff from development.
6. Reduction of pollutant runoff from local government operations.

The NPDES permit specifies what can be discharged, how the level and type of pollutants in the water are to be monitored and reported, and other provisions.

Wetlands: Wetlands are natural features that provide both stormwater quantity and quality benefits. They receive and store floodwaters, thus slowing and reducing downstream flows. 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. They also serve as a natural filter, which helps to improve water quality, and provide habitat for many species of fish, wildlife, and plants.



Local implementation: Most Kankakee County communities have had stormwater management requirements in their subdivision ordinances for some time. However, each has had different criteria and their standards are somewhat out of date. To rectify this, the metropolitan communities and the County formed a Stormwater Technical Advisory Committee which developed a model stormwater management ordinance. This ordinance meets or exceeds the NPDES water quality requirements. It requires:

A grading and drainage permit for all construction projects, except single family homes and most land disturbing activities that affect less than 5,000 square feet (Section 2.II.A and B)

- Soil erosion and sedimentation control for construction sites, Section 2.I.D
- Retention and detention basins to manage the 2- and 100-year storms, Section 3.II.A
- Encouragement to incorporate measures to remove pollutants in retention and detention basins (Sections 3.III.G and I)

The ordinance sets the following hierarchy of BMPs for site and drainage plans:

- A. Preserving Regulatory Floodplains, Flood Prone and Wetland Areas
- B. Minimizing Impervious Surfaces on the Property
- C. Utilizing Storm Water Wetlands, Grassed Swales and Vegetated Filter Strips
- D. Infiltrating Runoff On-Site
- E. Providing Stormwater Retention Facilities
- F. Providing Wet Bottom or Wetland Detention Facilities
- G. Providing Dry Detention Facilities
- H. Constructing Storm Sewers
- I. Protecting Water Quality Through Multiple Uses

The NPDES requirements explained on the previous page affect five municipalities, five townships, and the County. Here is the status of their compliance as of April 2013:

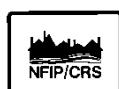
Filed plan, program permitted: Aroma Township, Bourbonnais, Bourbonnais Township, Bradley, Kankakee, Kankakee Township, Kankakee County, Kankakee River Metropolitan Agency, Limestone Township

No permit required: Aroma Park

Have not filed: Otto Township, Manteno

It can be seen that all the major metropolitan communities have complied with the NPDES requirements and are administering their stormwater management water quality programs.

Large areas of the Kankakee and Iroquois Rivers watersheds are preserved as wetlands and wildlife habitat, especially in Indiana. Wetlands are protected by IDNR and Corps of Engineer regulations, but there are no special local requirements. However, the County has begun a watershed planning effort to identify appropriate water quality activities for individual areas. The first plan was completed for the Trim Creek watershed in northeastern Kankakee County and southeastern Will County.



CRS credit: CRS credit is provided for the following stormwater management regulations:

- Design standards for retention and detention basins,
- Requirements for erosion and sedimentation control,
- The requirement to incorporate best management practices into plans for stormwater management facilities, and
- Requiring the community to accept responsibility to inspect retention and detention basins and ensure that needed maintenance is done.

The County and all municipalities that adopt the new model ordinance should receive credit for all but the last regulation. Up to 380 points are could be awarded.

5.7. Water Use Management

Floodplain and stormwater management focus on activities that prevent human development from increasing the danger and damage caused by too much water. Water use management includes similar activities to prevent human development from aggravating problems that occur when there is too little water, i.e., during a drought.

There are three kinds of water use management approaches: ensure that new development has a minimal impact on water supplies, regulate water use, and manage the water supplies themselves. New development measures include requiring water saving plumbing fixtures in new buildings, encouraging landscaping and trees that do not need a lot of water, and providing incentives for developments like golf courses to use recycled water. Land use plans and zoning ordinances can limit the amount of impervious surfaces in aquifer recharge areas, such as floodplains.

The use of water can be regulated by each local government. In times of drought, many communities enforce sprinkler bans or limit lawn watering to alternate days. Setting water rates so that large users are charged proportionally more can also encourage conservation.

Water supplies include lakes, reservoirs, ground water aquifers, and larger rivers. State or local regulations can restrict how much water is taken from these supplies to ensure that there is enough for all users. This is especially important for groundwater supplies that take a long time to recharge.

The use of Lake Michigan as a water supply is strictly regulated by the Illinois Department of Natural Resources pursuant to a US Supreme Court order designed to limit diverting too much water from the Great Lakes. Western states, where water is in shorter supply, have extensive regulations governing how much water can be removed from the ground and rivers. Some states require a minimum lot size before a well permit is issued.



Local implementation: Other than the standard building code requirements and sprinkler bans, there are no special municipal or County water use regulations. While laws regulating groundwater withdrawals and maintaining minimum river flows have been recommended for Illinois, they have not been enacted.

One reason for the lack of water use management measures in the area is that there is no perception of an immediate threat or clear understanding of the possible measures that could be applied. On the other hand, being on Chicago's urban fringe, there is a growing concern that Kankakee River water supply may be diverted to supply areas such as Joliet, Third Airport, and urban centers outside the Kankakee River watershed resulting in a shortage for area homes and farms and adverse impact on river habitat and recreation. More information on the long range threat and alternative solutions is needed.

5.8. Conclusions

1. The communities with the greatest amount of growth potential would benefit the most from these preventive activities, i.e., Kankakee, Bradley, Bourbonnais, Aroma Park, Manteno, and the County (for unincorporated areas).
2. Only a few of the land use plans and zoning ordinances address floodplains and the need to preserve hazardous areas from intensive development.
3. Most communities have appropriate hazard protection provisions in their subdivision regulations.
4. 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.
5. The County, many communities, and Kankakee Community College have older building codes and have not adopted the International Code series, which provides better protection from natural hazards.
6. Based on the national Building Code Effectiveness Grading Schedule (BCEGS), administration of building codes by the County and several municipalities could be improved.
7. State administration of installation of manufactured homes does not guarantee that they will be adequately tied down or protected from flooding and other hazards.
8. Protecting future development from flood damage is dependent on an accurate and useful map of flood hazard areas. Even with Map Modernization, the Flood Insurance Rate Maps in Kankakee County have the following shortcomings:
 - They do not include the western third of the County,
 - They do not include smaller drainage areas in the urban fringe, and
 - They underestimate the flood hazard because ice jams are ignored.
9. Most communities are doing a good job of administering their floodplain management obligations but having Certified Floodplain Managers on staff would improve their programs.
10. A good stormwater management program will help prevent increased flooding and drainage problems caused by new development and will improve water quality. The new model stormwater management ordinance will greatly help.
11. More information on water use management measures and their applicability to Kankakee County is needed.

5.9. Recommendations

1. Municipal comprehensive plans, land use plans and zoning ordinances should incorporate open space provisions that will protect properties from flooding and preserve wetlands.
2. As they are being reviewed and revised, subdivision regulations should include language that requires new developments to have buried utility lines and storm shelters in new manufactured housing communities.
3. All communities should adopt the latest International series of building codes, the new national standard that is being adopted throughout the country. If they don't, they will lose their current classification under the Building Code Effectiveness Grading Schedule (BCEGS).
4. All communities should work to improve their BCEGS rating. Class 7, 8, and 9 communities should reach at least a Class of 6 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. Class 6 or better communities should strive to improve by one class.
5. 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.
6. Local code administration offices should make sure that manufactured homes are being properly installed to protect them from wind damage and that all provisions of their floodplain management regulations are being enforced.
7. All shortcomings of the current Flood Insurance Rate Maps should be corrected.
8. The eight mapped communities in the National Flood Insurance Program should investigate the costs and advantages of having Certified Floodplain Managers administer their programs.
9. All communities, but especially the ones subject to the most growth, should adopt the new Kankakee County model stormwater management ordinance.
10. A study should be conducted of the potential and realistic threat to area water supplies and appropriate measures that would prevent a drought from becoming a disaster.

5.10. References

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3. *Midwest Tornadoes of 1999, Observations, Recommendations and Technical Guidance*, FEMA, Building Performance Assessment Report, Preliminary Report, July 13, 1999
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10. *Living With Wetlands, A Handbook for Homeowners in Northeastern Illinois*, The Wetlands Initiative, 1998
11. *Stormwater Management – The Benefits of Alternative Approaches*, South Suburban Mayors and Managers Association, 2000.
12. *Model Stormwater Ordinance for Kankakee County, Illinois*, Stormwater Technical Advisory Committee (STAC) and Kankakee County Planning Department, 2005

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Chapter 6. Property Protection

Property protection measures are used to modify buildings or property subject to damage. This chapter covers the following approaches:

- Relocating the building out of harm's way,
- Erecting a barrier to keep the hazard from reaching the building,
- Modifying the building so it can withstand the impacts of the hazard,
- Modifying the sewer lines to prevent sewer backup,
- Taking care of nearby trees that may damage the building and utilities, and
- Insuring 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.

6.1. 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, ice floes, or other high hazard, relocation is often the only safe approach. Relocation is also preferred for large lots that include buildable space outside the floodplain or where the owner has a new flood-free lot available.

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.



Small, wood frame buildings are the easiest to relocate

Hollis Kennedy House Movers



This home in Lake County was not worth relocating, so it was acquired and demolished by the County. The site is now 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: In 2003, the Riggs Grove mobile home park and campground in Aroma Park's floodplain was purchased with State funds and cleared. The site has been redeveloped by the Village as open space and a campground. It will be vacant during ice jam season and can be evacuated following flood warnings in the summer.



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.

6.2. Barriers

Flood barriers: A flood protection barrier can be built of dirt or soil (übermö) or concrete or steel (floodwallö). 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.

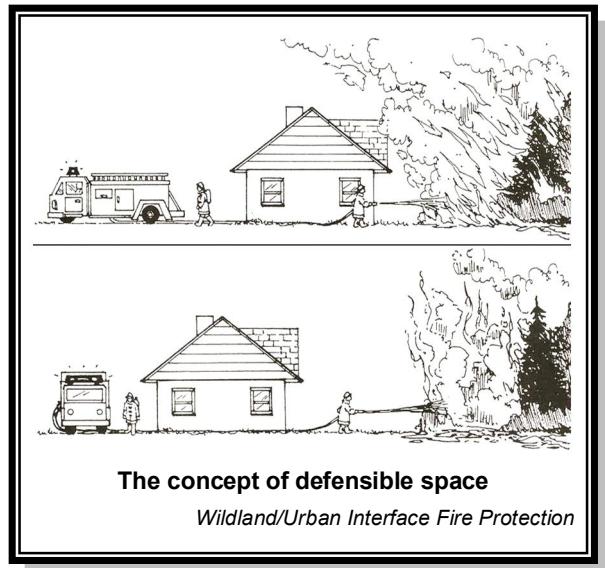
Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and maintained. A berm can settle over time, lowering its protection level. A floodwall can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



This barrier in Otto Township protects the home from flooding from the stream to the left.

Fire breaks: A fire break is another type of barrier – brush and other fuel are cleared away from the building so a fire may not reach it. This is called the concept of “defensible space.” Defensible space involves providing sufficient space between the structure and flammable vegetation.

Within this space, the fire service has room to battle the wildfire before it reaches the structure or to stop a structural fire before it ignites the wildland vegetation. With sufficient defensible space, the structure even has a chance to survive on its own when fire service personnel and equipment are not available, as often happens during a significant wildfire.



 **Local implementation:** There are no documented cases of flood barriers in the County. Local fire chiefs report that some roads act as fire breaks, but there need to be more fire breaks and clearance of flammable materials around homes.

 **CRS credit:** The Community Rating System credits barriers, such as floodwalls, that protect a single building. It also credits larger levees that protect entire neighborhoods, but not an individual floodwall. The credit is dependent on the number of buildings protected and the flood protection level.

6.3. Retrofitting

The previous property protection measures keep the hazard from reaching a building. 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.

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.

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 be a deterrence to trying this approach.

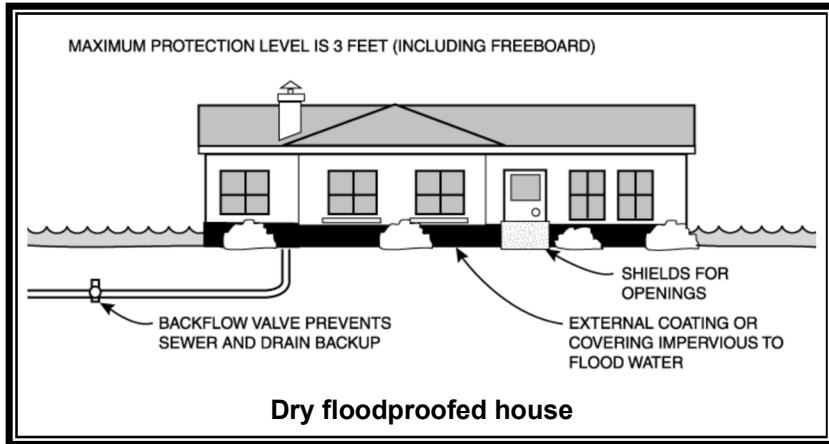
A third problem with elevation is that it may expose the structure to greater impacts from other hazards. If not braced and anchored properly, an elevated building may have less resistance to the shaking of an earthquake and the pressures of high winds. Given the low threat of earthquakes and low flood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

Flood-proofing: *Dry flood-proofing* is a retrofitting measure 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 flood-proofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under State and FEMA regulations.

Dry flood-proofing 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 flood-proofing techniques.



• **Elevated home on the Kankakee River**



Dry floodproofed house

The alternative to dry flood-proofing is *wet flood-proofing*: 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 flood-proofing 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.

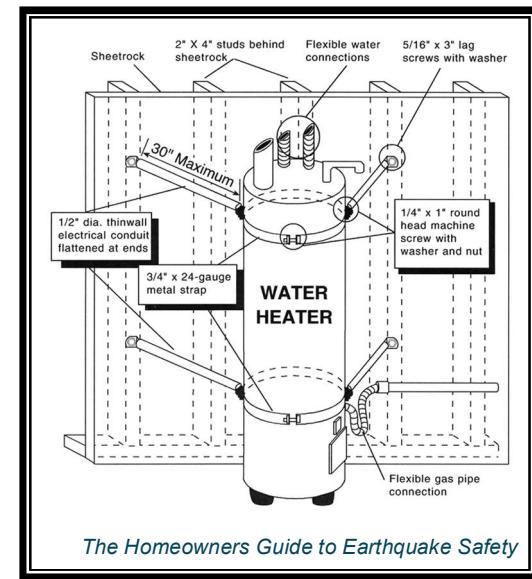
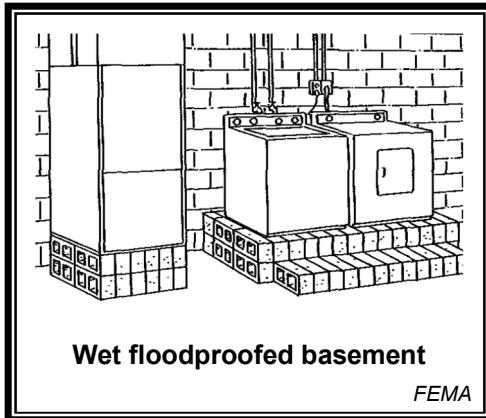
Tornadoes and high winds: These retrofitting measures include constructing an underground shelter or “safe room” to protect the lives of the occupants. Their worth has been proven by recent tornadoes in Oklahoma, as shown in the photo to the right. They can be installed for approximately \$3,000 for a single family home.

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. They also strengthen the structure’s ability to resist damage from shaking caused by an earthquake.

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

Earthquakes: Earthquake retrofitting measures include removing overhanging masonry features 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 Kankakee 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 (as illustrated).



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 protect vital contents and to continue operating during the shocks and aftershocks. They also need backup utilities in case their main service lines are damaged.

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.

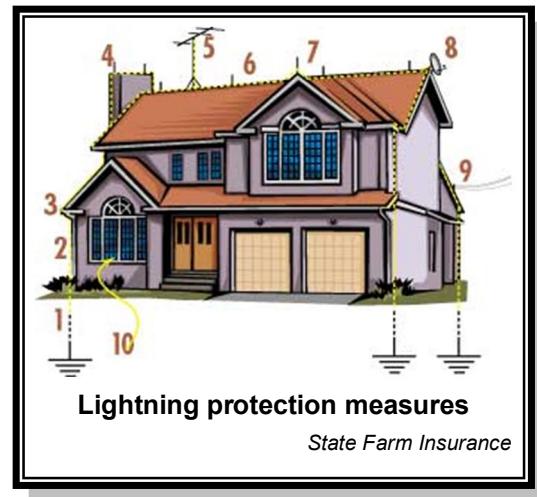
Thunderstorms: Retrofitting approaches to protect buildings from the effects of thunderstorms include storm shutters, lightning rods (illustrated to the right), and strengthening connections and tie-downs (similar to tornado retrofitting). Roofs could be replaced with materials less susceptible to damage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

Utility lines: Burying utility lines is a retrofitting measure that addresses the winds from tornadoes and thunderstorms and the ice that accompanies winter storms. Surge suppressors protect delicate appliances during thunderstorms. Generators and backup power batteries can provide electricity to essential appliances, such as sump pumps. *“Retrofitting”* the trees that hang over power lines is discussed under urban forestry later in this chapter.

Wildfire: Buildings can be made more resistant to fire damage and can be modified to reduce the potential for starting or fueling a fire. For example, there are fire resistant roofing and wall materials that won’t ignite when sparks land on them. A spark arrestor, or metal screen, can be placed over the chimney to prevent sparks from flying out. Firewood, downed limbs, fuel storage tanks and other flammables can be stored away from the structure.



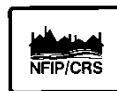
Local implementation: Aqua Illinois’ water treatment plant in Kankakee was saved from flood damage in 2002 by emergency sandbagging. As a permanent protection measure, the company covered the windows and walls of the lower part of the first floor with a waterproof stone wall. It is illustrated in the photo to the right.



Dry floodproofed Aqua Illinois plant

Kankakee County Planning Department

Since the adoption of the previous plan, Kankakee County has permitted the raising of seven floodplain dwellings. Of these dwellings, two were repetitive loss properties. In addition, one repetitive loss dwelling was demolished.



CRS credit: Credit for building elevation and flood-proofing is provided. Retrofitting to protect a building for hazards other than flooding is not credited under the CRS.

6.4. Sewer Backup Protection

In areas where sanitary and storm sewers are combined, basement flooding can be caused by stormwater overloading the system and backing up into the basement through the sewer line. In areas where sanitary and storm waters are carried in separate pipes, the same problem can be caused by cross connections between the storm and sanitary sewers or infiltration or inflow into the lines.

Houses which have downspouts, footing drain tile, and/or the sump pump connected to the sanitary sewer service may be inundated when heavy rains overload the system. These should be disconnected. Rain and ground water should be directed out onto the ground, away from the building.

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.



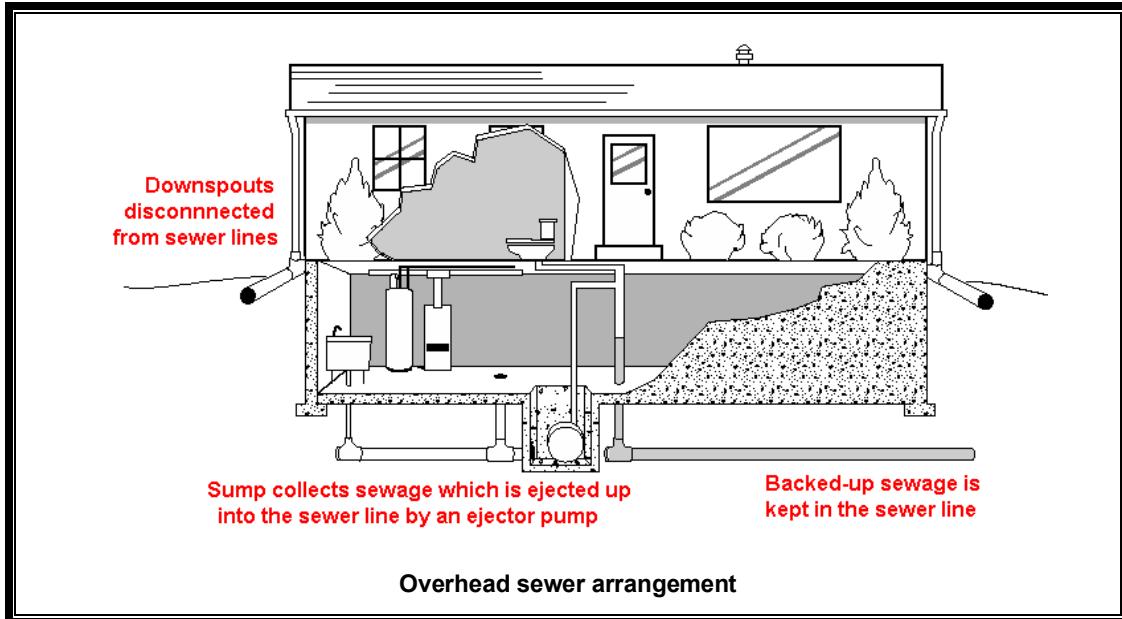
The other two measures, overhead sewers (illustrated on the next page) and backflow protection valves keep water in the sewer line during a backup. These are more secure, but more expensive (\$3,000-\$4,000).



Local implementation: Several of the smaller communities in Kankakee County do not have sewers or do not have a sewer backup problem. Some communities reported that check valves and standpipes have been used successfully by their residents. Manteno requires overhead sewers in all new buildings with basements. Aroma Park has a pressurized sewer system because bedrock prevented construction of a deeper gravity system. Every house has its own pump with shut off valves, similar to an overhead sewer.



CRS credit: Credit for sewer backup protection measures is provided under the retrofitting credit.



6.5. 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 caused by 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. 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.

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.



Trees are the first victims of ice storms

A tree and brush maintenance program will also reduce the community's exposure to damage from wildfires. By clearing dead wood, downed limbs, bushes and plants, property owners can create the "defensible space" around their buildings discussed on page 6-3. A community arborist or tree board can remind people of the need to do this and even give notices or tickets to properties with inadequate tree care or too many sources of fuel too close to the structure.



Local implementation: Kankakee and Momence are Tree City USA communities. Kankakee employs an arborist. Momence has a Tree Board with technical support from a tree trimming contractor. The City makes sure that every tree cut down is replaced by one that is appropriate for the site (e.g., not too tall near power lines).

Buckingham and Herscher's staff identifies trees that need to be cut and contract for trimming once a year. Bonfield relies on its Garden Club for guidance and Aroma Park gets help from the Kankakee Valley Forest Preserve District. Chebanse has applied for funds to support a forestry program.

ComEd responds to calls from customers concerned about trees near their power lines. Its Private Property Tree Replacement Program removes selected trees growing directly under overhead lines and gives the owner a voucher to replace those trees with low growing trees or plants.



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.



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

www.arborday.org/programs/treecityusa.html

6.6. 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. 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.

Homeowner's insurance: A standard homeowner's insurance policy will cover a property for the hazards of tornado, wind, hail, winter storms, and wildfire. Separate endorsements are usually needed for earth movement (e.g., earthquake) coverage. Farmers can purchase hail insurance for their crops.

Several insurance companies have sewer backup or sump pump failure 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.

Flood insurance: 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.

Crop insurance: Being exposed to the elements, crops in the field are subject to damage by natural hazards. Farmers can purchase multi-peril crop insurance which has coverage for losses caused by adverse weather, fire, irrigation failure during term of insurance, and unavoidable damage from insects or disease. Hail insurance is sold separately. Sometimes, hail storms are so localized; the deductible is greater than the crop losses.

Coverage on government properties: Larger local governments can self-insure and absorb the cost of damage to one facility, but if many properties are damaged, a self-insured local government will take a major hit to 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 Kankakee County communities since the 1970s. 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 3-3. On the average, only one in five floodplain properties in Kankakee County are covered by flood insurance.

Twelve municipalities are enrolled in the Illinois Municipal League Risk Management Association:

Aroma Park	Buckingham	Herscher
Bonfield	Chebanse	Manteno
Bourbonnais	Essex	Momence
Bradley	Grant Park	Saint Anne

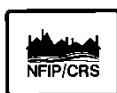
Flood Insurance Coverage			
	Floodplain Buildings	Floodplain Policies	Percent Coverage
Aroma Park	96	19	20%
Bourbonnais	299	34	11%
Bradley	289	96	33%
Kankakee	499	86	17%
Manteno	10	2	20%
Momence	53	25	47%
Sun River Terrace	15	0	0%
Uninc. County	1,963	364	19%
Total	3,224	626	19%

* Not in the National Flood Insurance Program
Figures do not include flood insurance policies rated on properties outside the floodplain.
FEMA. Data as of March 2005

This organization provides risk management advice and coverage for all of the hazards covered in this plan, including flood and earthquake. The other municipalities have either no insurance or commercial policies.

Kankakee County has a commercial insurance policy on all properties that covers wind and hail, much like a homeowner's policy. It has a separate flood insurance policy on the Highway Department office in the Kankakee River floodplain. It does not carry

earthquake insurance. Kankakee Community College& private insurance policies cover fire, wind, earthquake, and flood.



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.

6.7. 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.

Government facilities: One of the first duties of a local government is to protect its own facilities. Fire stations, wastewater 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 on page 6-10.

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. Rebates are explained on the next page. Loans and rebates 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 amounts of money act as a catalyst to pique the owner's interest to get a self-protection project moving.

Rebates

A rebate is a cost shared grant, usually given to a property owner after a project has been completed. It has the advantages of a low public cost share and simplicity. Many communities favor it because the owner handles all the design details, contracting, and payments before the community make a full commitment.

Community cost shares for retrofitting rebates have been as low as 20% and as high as 50%. Rebates leverage public funds. For example, for every public dollar spent in a program with a 25% rebate, the property owner pays three dollars toward the project.

The administrative simplicity is due to the typical operation: the owner ensures that the project meets the entire program's criteria, has the project constructed, and then goes to the community for the rebate after the completed project passes inspection.

Rebates are most successful where the cost of the project is relatively small, e.g., under \$5,000. The owner can afford to finance the bulk of the cost and the rebate acts more as an incentive than as needed financial support.

Operation: A typical rebate operation follows these steps:

1. The community publicizes the program and invites applications.
2. An applicant talks to community staff, making sure the project will qualify.
3. The applicant selects a contractor that is licensed or otherwise on a list of contractors approved by the community.
4. The applicant or the contractor takes out the building permit.
5. The project is constructed.
6. The community inspects the completed project, ensuring that it meets all code requirements.
7. If the project passes the inspection, the applicant applies for the rebate.

Examples: Mount Prospect, Illinois, contributes 20% of the cost of a sewer backup protection project, up to a maximum of \$1,000. It has funded 15 - 20 projects each year for an annual budget of only \$15,000.

South Holland, Illinois, 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 floodproofing 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.

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.



This floodwall in South Holland was installed after the owner attended a workshop on retrofitting. The community helped pay for the project with a rebate. It has kept floodwaters out of the house three times since it was built in 1991.

Pass through funding: Some measures, like acquisition and elevation, can be quite expensive for the property owner. Local governments can assist by sponsoring projects funded with state or federal funds. There are several sources of mitigation funding. The more common sources are listed below. Unfortunately the first five are only available after a flood or disaster, not before, when damage could be prevented.

Flood 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)

FEMA's disaster assistance (for public properties)

Small Business Administration disaster loans (for non-governmental properties)

FEMA's Hazard Mitigation Grant Program

FEMA's Pre-Disaster Mitigation Program

FEMA's Flood Mitigation Assistance Program

Community Development Block Grant

Environmental Protection Agency programs (for sewer backup problems)

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.

Insurance benefit: Sometimes only a little money is needed to motivate a property owner to implement a retrofitting project. A flood insurance premium reduction will result if a building is elevated above the flood level. This reduction is not enough to take much of a bite out of the cost of the project, but it reassures the owner that he or she is doing the right thing. Other forms of flood-proofing are not reflected in the flood insurance rates for residential properties, but they may help with the Community Rating System which provides a premium reduction for all policies in the community.

Mandates: Mandates are considered a last resort if information and incentives aren't enough to convince a property owner to take protective actions. One precedent for this is the program of mandatory inspections undertaken by most communities to assure disconnection of downspouts connected to sanitary sewer lines.

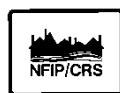
There is a mandate for improvements or repairs made to a building in the mapped floodplain. If the project is worth more than 50% of the value of the original building or increases the first floor area by more than 20%, it is considered a substantial improvement. The building (or the addition) must then be elevated or otherwise brought up to current flood protection codes.

Another possible mandate is to require less expensive flood 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 flood level or the installation of separate ground fault interrupter circuits in the basement.



Local implementation: There are no financial assistance programs for property protection administered by a Kankakee County local government. There are some property improvement programs, such as the housing rehabilitation programs administered by the Kankakee Community Development Agency. Other than providing aid to protect people from unsafe and unsanitary housing or lead paint, they do not have a hazard mitigation component.

Mandates in the form of floodplain development regulations are discussed in Chapter 5. Public information programs are covered in Chapter 9.



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.

6.8. Repetitive Loss Properties

Section 3.4 explains the criteria for designation of the County's 16 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 Illinois Emergency Management Agency mitigation funding programs.

A windshield survey of each area was conducted in May 2005. All of the properties are single-family homes or cottages. Data were recorded on the general conditions and foundation types of the majority of the buildings in the area. The summary data and tentative recommendations are shown in the table on the next page. Kankakee County's staff periodically surveys these properties when storm events occur and based on these surveys it has been determined that the same conditions exist that were in place in 2005.

The recommendations in the last column of the table are tentative and for planning purposes. Specific recommendations for any structure require an onsite and indoor

building inspection. Building elevations are needed to determine the benefits and costs of a project, a requirement for FEMA mitigation funding.

• Property Protection For Repetitive Loss Areas							
	No. of Bldgs	Condition ¹	Foundation ¹	Zone	Claim Dates ²	Last Claim	Recommendation
1	1	Good	Basement	X Zone	2	2/85	Barrier
2	6	Good	Slab	Floodway	2	6/81	Dry Flood-proof
3	31	Good	Slab	Floodway	4	1/05	Dry Flood-proof
4	4	Good	Slab/crawl	Floodway	5	1/05	Elevate
5	1	Good	Slab	Fringe/X	2	2/85	Dry Flood-proof
6	2	Good	Slab	Floodway	3	1/05	Dry Flood-proof
7	3	Good	Slab	Floodway	2	1/99	Dry Flood-proof
8	1	Good	Crawl	Floodway	2	2/85	Elevate
9	14	Good	Crawl	Floodway	12	1/05	Elevate
10	22	Good	Crawl	Fringe/FW	15	5/02	Elevate
11	1	Good	Crawl	X Zone	2	2/82	Elevate
12	3	Vacant	N/A	Fringe	2	6/81	Demolish
13	10	Good	Crawl	Floodway	2	6/81	Elevate
14	28	Good	Crawl	Floodway	5	2/85	Elevate
15	2	Dilapidated	N/A	Floodway	2	2/85	Demolish
16	13	Good	Crawl	Floodway	2	12/90	Elevate

Notes:

1. Information is for the general condition and foundation type of the majority of the buildings in the area
2. The Claim Dates column shows the number of different dates when claims have been filed. For example, in area 10, claims have been filed for one or more of the properties for 15 different flood incidents (see the table on page 3-9 for the actual dates).

FEMA claims data as of March 2005, field surveys by French & Associates

The following assumptions and criteria were used:

1. A building that has been vacant or dilapidated for some time should be demolished. If FEMA funds are used to acquire and clear the structure, the site must remain as publicly-owned open space. If FEMA funds are not used, a new building can be constructed on the site, provided it meets all flood protection codes. If there have only been two claims and the date of the last claim is more than 20 years ago, it is assumed that the owner is not interested in acquisition or relocation.
2. Short of moving it out of the floodplain, the best and most cost effective way to protect a building on a crawlspace is to elevate it above the flood level.
3. Buildings on slab and basement foundations are best protected from shallow flooding with a barrier. However, barriers are not permitted in the floodway as they will divert floodwaters onto other properties.
4. If a barrier is not feasible, the most cost effective protection measure for buildings on slab and basement foundations subject to shallow flooding is dry flood-proofing.

Acquisition is typically the most desired solution to mitigate repetitive losses. However, such an action requires government funding with the following concerns:

The County does not have a source of funding to acquire flooded properties.
State and Federal programs require a non-Federal cost share.
All of FEMA's mitigation programs require willing sellers
During the field data collection, it was noticed that several of the properties on FEMA's list were for sale. If the County were to apply for funds to acquire them, it cannot be assured that these properties will still be on the market when funding is provided 1-2 years from now.

Accordingly, acquisition is not favored. FEMA programs will not fund barriers or dry flood-proofing or residences. Besides, these approaches cost less and the owners may not need much financial assistance. If FEMA funds were applied for, it should be limited to:

Acquiring the vacant and dilapidated structures
Acquiring homes from willing sellers who are able to fund the cost-share
Elevating homes where the owners are able to fund the cost-share

6.9. 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. An urban forestry program can help prevent damage caused by high winds, winter storms, and wildfires, and can be implemented by the local governments at a relatively low cost.
4. Only 20% of the buildings in the County's floodplains are covered by flood insurance.
5. Local government agencies can promote and support property protection measures through several activities, ranging from public information to financial incentives to full funding.
6. It is unlikely that most government properties, including critical facilities, have any special measures to protect them from flooding, tornadoes, and other natural hazards.

7. The 16 municipalities in the risk management pools and Kankakee County should have adequate insurance coverage for the natural hazards. The other municipalities may or may not have sufficient insurance coverage.
8. Property protection measures can protect the most damage-prone buildings in the County: repetitive loss properties. General recommendations have been identified for each area, but some of the areas may not warrant much attention because they have not received a flood insurance claim for 20 years.

6.10. Recommendations

1. Property owners should be made aware of how they can retrofit, insure, or otherwise protect their properties from damage by natural hazards and should be advised of local examples of such measures. Recommended ways to convey these messages are covered in Chapter 9.
2. Each public entity should evaluate its own properties to determine if appropriate property protection measures would be physically and economically feasible. A storm shelter would benefit the Kankakee Community College west campus.
3. Because properties in floodplains will be damaged sometime and there are so many ways to protect flood-prone property, 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.
4. Each municipality should become or maintain its status as a Tree City USA.
5. Communities should establish cost sharing programs, such as rebates, to encourage low cost (under \$10,000) property protection measures on private property, such as:
 - Berms and regrading for shallow surface flooding,
 - Clearing defensible space and retrofitting buildings for wildfire protection
 - Sewer backup protection
 - Relocating furnaces and water heaters out of basements
 - Tornado safe rooms
 - Installing lightning rods
6. Priority repetitive loss areas for attention should be to those areas with dilapidated structures and those areas that have had the most floods, i.e., areas 9, 10, 12 and 15. All priority repetitive loss areas are in the unincorporated part of the County. The County should determine if owners in these areas are interested in implementing (and cost sharing on) a property protection project. If enough are interested, the County should pursue a mitigation project grant.

6.11. References

1. Firewise Communities website, www.firewise.org
2. *Flood Insurance Agent's Manual*, FEMA, 2000
3. *Guide to Flood Protection in Northeastern Illinois*, Illinois Association for Floodplain and Stormwater Management, 1997.
4. *The Homeowners Guide to Earthquake Safety*, California Seismic Safety Commission, 2000
5. *Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding*. Federal Emergency Management Agency, FEMA-312, 1998.
6. *Ice Storm Mitigation*, FEMA 6860-DR-Illinois, Illinois Emergency Management Agency, 1990.
7. Institute for Business and Home Safety website, www.ibhs.org
8. Discussions with municipal and county insurance offices, Spring 2005.
9. *Local Flood Proofing Programs*, U.S. Army Corps of Engineers, 2005.
10. Materials supplied by County offices and municipalities, Spring 2005.
11. State Farm Insurance website, www.statefarm.com/consumer/lightng.htm
12. *Taking Shelter from the Storm: Building a Safe Room Inside Your House*, Federal Emergency Management Agency, FEMA-320, 1998.
13. *Wildland/Urban Interface Fire Protection*, FEMA, 1989
14. Windshield surveys of repetitive loss areas conducted by French & Associates, Ltd., 2005.
15. *Windstorm Mitigation Manual for Light Frame Construction*, Illinois Emergency Management Agency, 1997.
16. Flood insurance data provided by FEMA, March 2005

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Chapter 7. Emergency Management

Emergency management 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). At the local level, programs are administered by the Kankakee County EMA (Emergency Management Agency), a unit of the County Sheriff's Police Department.

Kankakee County municipalities have emergency management contacts, usually the mayor, police chief, or fire chief. They generally leave emergency operations to the County. The exception to this is the Village of Manteno, which has its own detailed *Emergency Action Plan*, which was adopted in 2002.

This chapter reviews the County's emergency management 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 to being able to respond to a threat before it hits. 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.

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, 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 for 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 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. The Weather Service also posts current and forecasted gage levels on its website, (http://weather.gov/rivers_tab.php) so anyone with access to the Internet can monitor current and potential flooding.

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*.⁶ This means the amount of rain expected will cause ponding and other flooding on small streams and depressions. These events are so localized and so rapid that a *flash flood warning*⁶ may not be issued.

Ice jams: Ice jams happen so fast (and often at unpredicted locations) that they are too difficult to forecast. When ice jam conditions exist, as in late winter when frozen rivers break up, the Weather Service may issue advisories, but cannot predict the timing and height of an ice jam as it can predict a flood during free flowing conditions.

Therefore, for ice jams and ungaged 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 Police⁶ 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 formation of a tornado. For tornadoes and thunderstorms, local emergency managers can provide more site-specific and timely recognition by sending out 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.

Drought/Extreme Heat: As with other meteorological hazards, heat waves can be forecast by the Weather Service, giving people days or more to get ready to respond to the threat.

Wildfire: The Wildland Fire Assessment System is an internet-based information system administered by the U.S. Forest Service in Idaho. It monitors weather conditions, such as moisture and wind, and provides a national view of weather and fire potential, including national fire danger and weather maps.



Current conditions and predictions are available at www.fs.fed.us/land/wfas/map_list.htm. This system predicts conditions favorable for wildfires. There must be a local observation system to identify and report local fires.

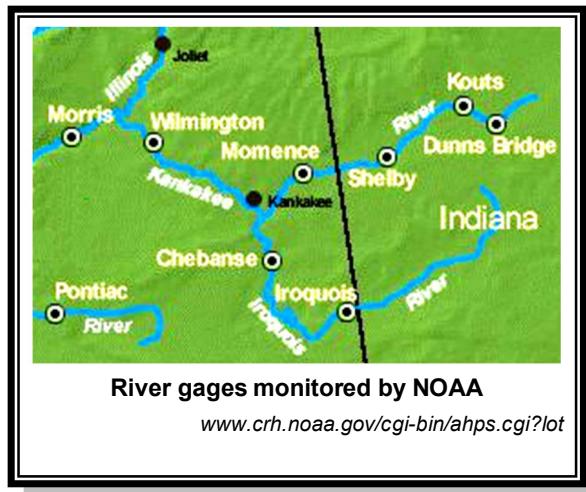
It was suggested that the County develop a trash disposal plan for areas not currently served by municipal contracts to help curb the burning of trash which is a major contributor to wildfires. In addition, the Regional Planning Commission feels the County should be more aggressive in the enforcement of county and state burning codes. One thought was to develop a red flag warning program utilizing National Weather Service notifications throughout the county which would include education, prevention, communication, and ordinance development.



Local implementation: The Kankakee County communications center (KANCOMM) provides 24-hour dispatch service for the Sheriff's office, 14 fire departments, 12 police departments, and 2 private ambulance services. Staff at KANCOMM monitor NOAA Weather Radio and LEADS. A policy and procedures manual provides guidance for what conditions warrant KANCOMM to contact the EMA Coordinator and other local officials on their pagers.

Bradley and Bourbonnais have their own dispatch services. Many critical facilities have NOAA Weather Radios and monitor them. For example, one is monitored by the Kankakee Community College Center receptionist desk. All schools and long term care facilities have been given NOAA Weather Radios by EMA.

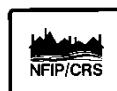
Floods: The NOAA/Weather Service gages that serve the Kankakee and Iroquois Rivers are shown in the map to the right. Real-time stream gage readings for the sites listed to the right can be accessed on the internet at the Weather Service's website, http://weather.gov/rivers_tab.php. This site tells the *current* stream conditions. It should be noted that the gage on the Iroquois River at Chebanse was disabled in May 2013 due to federal budget cuts.



The National Weather Service is able to issue a specific *prediction* of when and how high the river will crest at these gages. It does this for the Wilmington and Momence gages. NWS can also issue more general flood statements on smaller streams throughout the County.

One shortcoming of this system is that there is no gage close to where ice jams have caused the most problems – on the Kankakee River from the Aroma Park area and to Kankakee. The Momence gage is 12 miles upstream and the gage at Chebanse has been disabled. Ice jams can occur so quickly, that a real time reporting gage closer to the problem area would be useful. The US Geological Survey establishes such gages in cooperation with state or local sponsors. It costs \$15,000 to install such a gage and \$12,000 a year to maintain them. Sometimes, some of the costs can be picked up by USGS.

Other Weather Hazards: Weather conditions that contribute to ice jams, localized flash flooding, tornadoes, and severe storms are monitored by Sheriff, police and fire staff. EMA has over 80 trained volunteer spotters who have pagers and radios that can monitor conditions from their homes or be dispatched by the EMA Coordinator when conditions are appropriate.



CRS credit: Credit of up to 40 points can be received for having a formal flood threat recognition system that relates the flood heights at the river gages to areas of the community that would be affected. The actual points are based on how much of the community's floodplain is subject to flooding by the gauged stream.

7.2. Warning

After the threat recognition system tells the EMA Coordinator 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.

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
- Mass telephone notification (text alerts)
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Door-to-door contact
- Mobile public address systems
- E-mail notifications

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 Kankakee 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.

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. Kankakee County now uses a text alert system to warn residents.

Where a threat has a longer lead time (e.g., flooding along a large river), going door-to-door and radio can be effective.

IPAWS is a mass public notification warning system. Kankakee County has been approved by FEMA to utilize this system.

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. Kankakee County became a certified StormReady County in June 2007.



Local implementation: The Kankakee County EMA Coordinator and municipal governments are responsible for disseminating warning information to the public and notifying response personnel during an emergency. Once the threat is perceived, KANCOMM transmits the warnings to these offices (Bradley and Bourbonnais administer their own programs).

The general public is notified through the following systems:

Sirens in the affected areas can be triggered. An example of one in Kankakee is shown to the right.

EMA has given NOAA Weather Radios to all schools, nursing homes, and day care centers, courtesy of a state grant. Some companies have purchased their own. A program sponsored by a state legislator enabled many residents of Pembroke Township to receive NOAA Weather Radios.

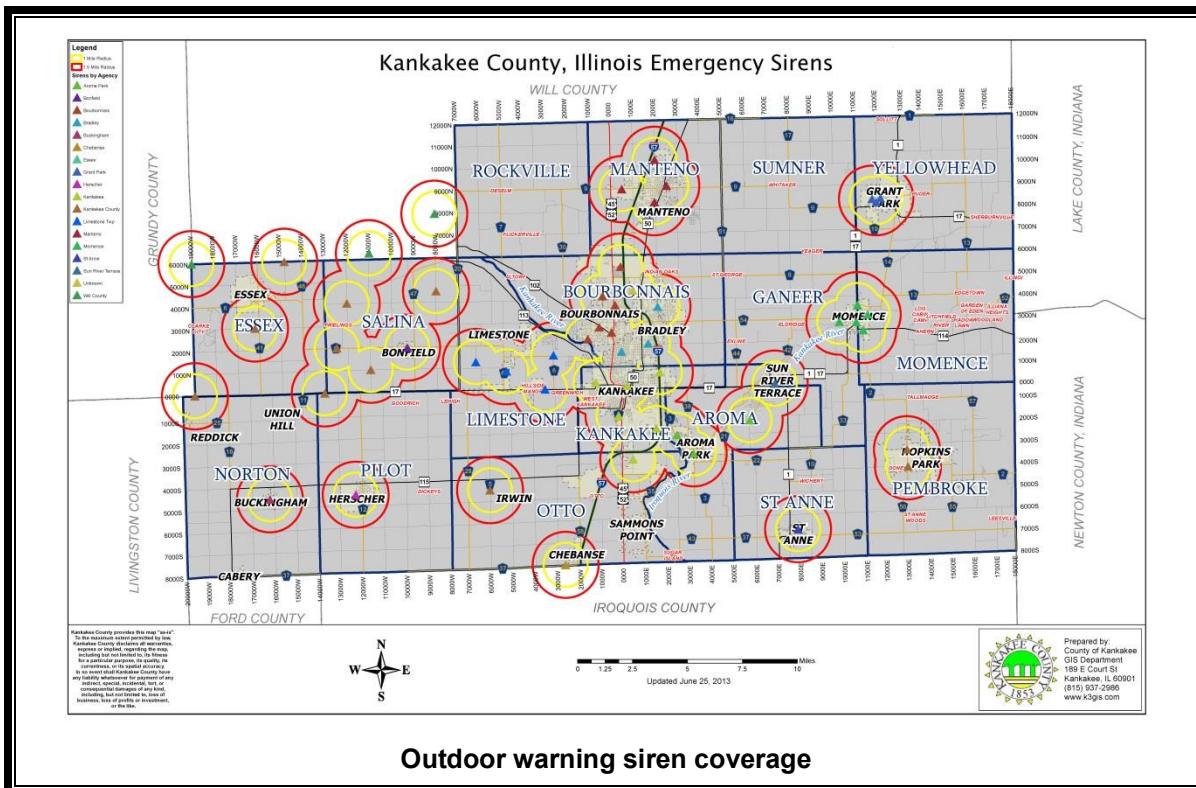
Siren coverage: Between the municipalities and the fire districts, there are 51 outdoor warning systems in the County. All of these were upgraded to the current standard, narrowband in 2012 and 2013.

For planning purposes, each siren is expected to reach people outdoors up to a mile away. Their locations and range are plotted on the map below. This map shows that there are many areas that are not reached by a siren. Most of these areas are unincorporated and sparsely populated.



Kankakee city siren

The siren coverage map shows that the Kankakee/Bradley/Bourbonnais/Aroma Park area and most of the smaller municipalities are well covered. So is the northwest corner of the County, the area closest to the Braidwood nuclear power plant.



Some populated areas could use better outdoor warning coverage, especially Cabery and Hopkins Park. The Pembroke Fire District, which covers Hopkins Park and the east part of the township, uses pagers to call its fire personnel, recently two sirens have been installed in the village.

Although Kankakee County has siren coverage not all areas are covered. One approach to remedy this problem that is being considered is to require subdividers and other large developers to contribute to a fund that will pay for a siren for the newly developed area.

StormReady: Kankakee County is a StormReady County but none of its municipalities are in StormReady. Nearby StormReady communities include Will and Kane Counties, Newton County, Indiana, and the cities of LaSalle, Marseilles, Plainfield and Bolingbrook.



CRS credit: Community Rating System points are based on the number and types of warning media that can reach the community's flood-prone population. Depending on the location, communities can receive 75 points for ing flood warnings to the public. Designation as a StormReady community can more points.

7.3. Response

Concurrent with issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. 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.

There are a lot of things that can be done and many different agencies and organizations can be involved. Therefore, a list of *typical* actions and responding parties could include:

- Responding to fires (fire department)
- Activating the emergency operations center (emergency manager)
- Ordering an evacuation (mayor/village president/county board chair)
- Holding children at school/releasing children from school (school district)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (see photo) (public works)
- Opening evacuation shelters (Red Cross)
- Monitoring water levels (engineering)
- Securing damaged or evacuated areas (police/sheriff)



Emergency response planning helps ensure that the many different offices and organizations work is coordinated.

Kane County Emergency Management Commission

Planning is best done with adequate data. One of the best tools for flood planning is a flood stage forecast map that shows what areas would be under water at various flood stages (see example, top of next page). 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. An example of this is seen at the bottom of the next page. If the flood stage forecast map is in a geographic information system (GIS) format, emergency responders can display current and predicted areas flooded in real time, which would be more useful during ice jams where advanced planning cannot be so site-specific.

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: Kankakee County's *Emergency Operations Center Plan* was updated in 2012. It is designed to present a common platform for coordination

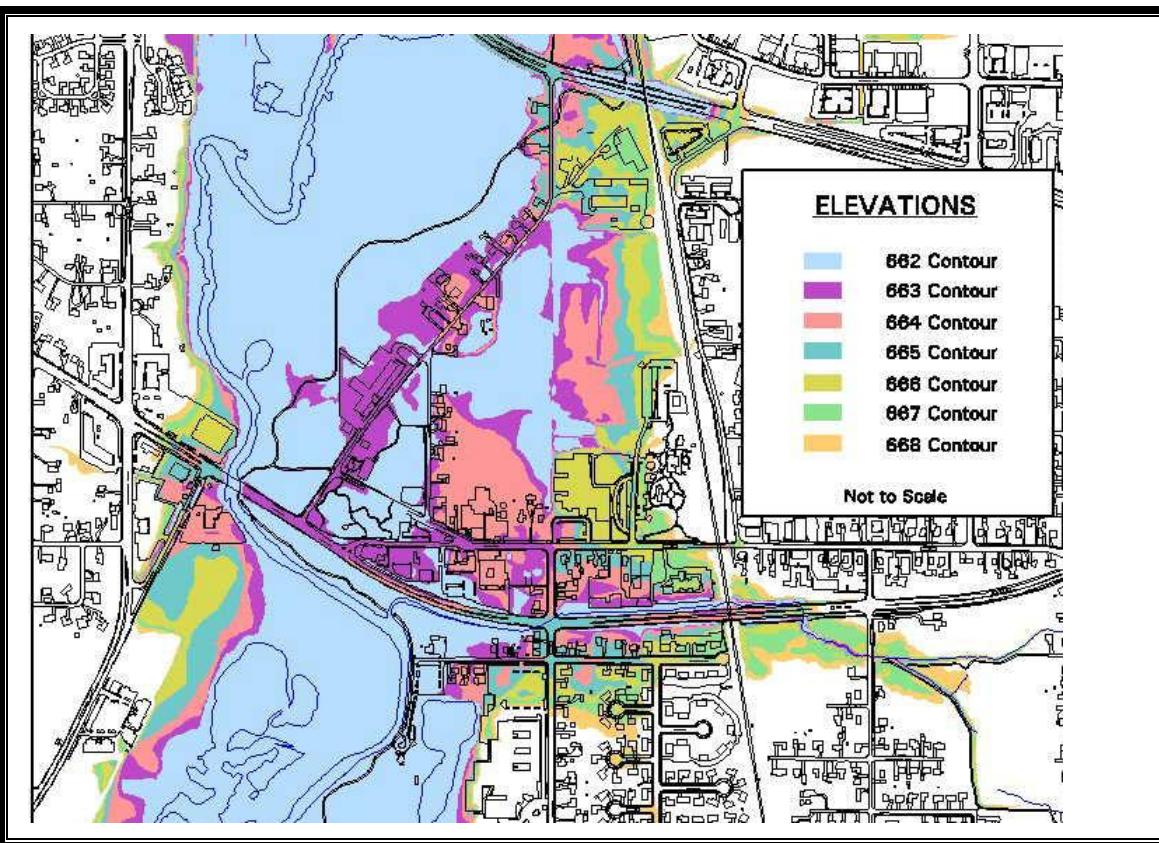
of major response activities for all types of natural and technological hazards. It establishes general procedures applicable to all types of emergencies and assigns responsibilities, such as for communications, evacuation and public health.

Actual emergency response operations and training exercises rely more on IPRA, because most participants are familiar and comfortable with it. IPRA is the *Illinois Plan for Radiological Accidents*. Having three nuclear power plants just west of Kankakee County has provided EMA with extra funds and many training opportunities that can pay off during other types of emergencies.

The *Emergency Operations Center Plan* has an introduction, the “Basic Plan” and 23 annexes that cover the details of various aspects of emergency response, such as communications, public information, evacuation, and mass care. The IPRA plan, in effect, acts as a hazard-specific annex to the overall Emergency Operations Center Plan. The earthquake annex only discusses assumptions, generic procedures, and general concerns about what may happen if an earthquake occurred.



Kankakee County EMA's Emergency Operations Center (EOC)



This Flood Stage Forecast Map was developed for the Des Plaines River. Different flood levels are shown as color coded areas, so the emergency manager can quickly see what will be affected at different forecasted elevations

Village of Gurnee, Illinois

Key Flood Activities That Need to be Monitored

12 Feet	Close off Edgewater Park
13 Feet	Close Grand Avenue between Alexandria Pike & Broadway
	Notify residents along Short Hazlett, 1 st & Madison, 2 nd & Sycamore, and Riverside Drive to prepare for sandbag operations and to make preparations for possible evacuation <i>(dependent on forecast and rate of rise)</i>
14 Feet	Manhole at Athletic Park behind pool starts to overflow
	Killbuck Creek begins to overflow into Aqua Gardens / Shadyside Lake – Close off walking paths around lakes

Flood response plan for Anderson, Indiana, showing specific actions to be implemented at specific flood stage predictions.

Even though there is much potential to prepare advanced plans for flooding, there is no annex or other written procedures on flood response. Staff relies on past experience and monitors known problem sites when the waters rise. Sandbagging and distribution of sandbags is a typical response (see photo), but one that would not provide much protection during a large flood or one with short warning time, such as an ice jam.

This approach has worked, in part because historically, the floodplain on the big rivers did not have a great deal of potential exposure to damage. Many of the properties were summer cabins and there was an attitude of acceptance of periodic flooding.

However, more and more of these properties have been converted to year-round residences and there are other risks in the floodplain, such as the Aqua Illinois water treatment plant in Kankakee. EMA staff report that when it was threatened by floodwaters in 2003, it was a ñscary 24 hours.ö

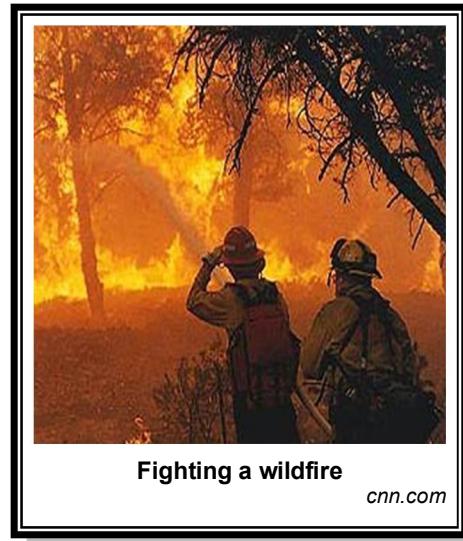
The County EMA office sponsors and trains Community Emergency Response Teams (CERT). These teams are volunteers who have been trained to recognize hazards in their homes, workplaces and neighborhoods. They have some basic equipment and are trained to give first aid to victims, to understand the Incident Command System, and to be able to operate under stressful conditions to help others. CERTS volunteers have participated in exercises and real disasters. There are over 160 CERT volunteers in Kankakee County. Kankakee and Bradley have also trained first responders at some industries.



Manteno's *Emergency Action Plan* is also designed as general procedures for responding to a variety of hazards. Most of the document assigns duties to Village officers and others, such as the Township Supervisor. This approach works because flooding is not a major problem and there is little warning or advanced preparation time for the major threats listed in the *Plan's* assumptions: tornadoes, hazardous materials incident, and mass casualty accident.

Fire response: One type of emergency response is for the fire department to extinguish fires. In the case of wildfires, a fast and the well managed response can contain and even eliminate the effects of the hazard.

The Insurance Services Office reviews fire departments for fire insurance ratings. Three general areas are scored: the alarm system (10% of the total score), the fire department (50%), and the water supply (40%). The classes and scores for the communities participating in the mitigation planning are shown on the next page. The actual insurance rates for a house are also based on distance from the fire station and from the nearest fire hydrant. When dealing with wildfires in areas beyond the reach of hydrants, the water supply score is not so important.



Fire Department Public Protection Scores					
Community	Fire Department/District	Alarm ¹	Fire ²	Water ³	Class
Aroma Park	Aroma FPD	7.34	28.86	20.92	5
Bonfield	Salina Township FPD	Note 4	Note 4	Note 4	9
Bourbonnais	Bourbonnais FPD	3.62	29.62	35.93	4
Bradley	Bradley Fire Dept.	6.77	27.77	35.39	4
Chebanse	Otto Township FPD	6.58	19.62	25.91	6
Essex	Essex FPD	Note 4	Note 4	Note 4	9
Grant Park	Grant Park Fire Dept.	7.52	29.22	32.32	4
Herscher	Pilot Township FPD	7.40	25.16	8.54	7
Hopkins Park	Pembroke FPD	Note 4	Note 4	Note 4	9
Kankakee	Kankakee Fire Dept.	8.5	38.28	37.33	2
Manteno	Manteno FPD	7.36	32.85	33.98	3
Momence	Momence FPD	6.83	18.22	22.04	6
Sun River Terrace	Momence FPD	6.83	18.22	22.04	6
Uninc. County	N/A	N/A	N/A	N/A	N/A
K. Com. College	Kankakee Fire Dept.	8.5	38.28	37.33	2

Notes:
 FPD = fire protection district
 1. Score for alarm system is out of a max of 10 points
 2. Score for fire department is out of a max of 50 points
 3. Score for water supply is out of a max of 40 points
 4. No details are provided for Class 9 departments

Insurance Services Office

The table shows that most fire departments and districts rated well. The rural areas of Essex, Salina, and Pembroke Townships only rated Class 9, one level up from a Class 10, which is given to areas that have no fire protection coverage. This is unfortunate for Hopkins Park and Pembroke Township, the area with the greatest wildfire threat.



CRS credit: In its current configuration, the *Emergency Operations Center Plan* and County flood response procedures would not receive CRS credit. Since the County has a flood-specific warning and response plan, it could receive up to 115 points.

7.4. Critical Facilities Protection

Critical facilities are discussed in section 1.4. 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.

Most critical facilities have full-time professional managers or staffs 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: EMA is continually compiling and updating its list of critical facilities during emergencies. It has worked closely with critical facilities, such as the 2003 flood threat to the water treatment plant. Many of these facilities have emergency response plans and are members of the LEPC.

Some facilities have their own general emergency response plans. The Chebanse Elementary School has an 8-page *Crisis Management Plan* which provides procedures for all types of emergencies. The *Plan* includes the following:

- The chain of command and each person's duties,
- Where to find utility shut offs,
- Telephone numbers for support offices, such as the ambulance service,
- Actions taken at different warning code levels, and
- Templates for signs.

All in all, this *Plan* is simple and straight forward and should be easy for teachers and others to follow during an emergency. It does not have specific instructions for natural hazards, such as tornadoes.

Kankakee Community College: The College has developed its own procedures for warning and response to emergencies. A lot of information is spelled out in a brochure, "Emergency and Safety Procedures," including monitoring weather alerts, snowstorm and evacuation procedures, and where to go for first aid. The College has also organized a Community Emergency Response Team (CERT) with County EMA.

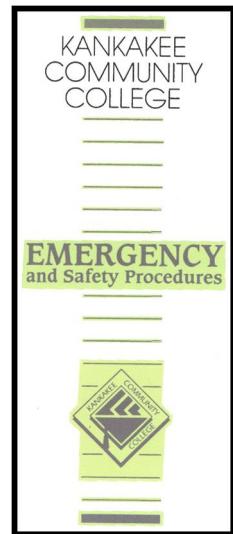


CRS credit: The Community Rating System gives 75 points for coordinating flood warning and response activities with operators of critical facilities.

CRS credit focuses on coordinating the community's efforts with the facilities' managers and helping them develop their own flood-specific emergency plans.



Two critical facilities in Chebanse



7.5. 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.

Typical recovery actions include:

- 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

Typical mitigation actions include:

- Conducting a public information effort to advise residents about property protection measures they can incorporate into their reconstruction work
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs
- Acquiring and clearing substantially damaged or repeatedly flooded buildings
- 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~~ and municipalities~~s~~ floodplain development ordinances require 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 to the National Flood Insurance Program.



This home was inspected before it was repaired after a flood. It was tagged as substantially damaged. The city applied for and received funds to purchase and clear the floodprone property.



Local implementation: The EMA Coordinator and Kankakee County Health Department conduct recovery operations, such as testing water supplies and food services that were affected. Annex E to the County's *Emergency Operations Center Plan* cover damage assessment. The Annex assigns duties to County Highways, the Assessor's Office, the Health Department, and the Red Cross. Their jobs are to report on damage in their areas of expertise (e.g., Highways collects and collates reports from township road commissioners).

Reconstruction is the job of the County and municipal building and code enforcement offices. There are no special procedures or public information handouts on post-disaster permit requirements or taking advantage of mitigation opportunities.

The Illinois Emergency Management Agency conducts a one day training course on damage assessment procedures. These courses can be taught on site and can involve full time and volunteer (e.g., CERT) emergency responders. Such a class would provide a good venue for the County and the municipalities to coordinate post-disaster recovery and mitigation procedures. Kankakee County has hosted several of these training courses.

7.6. Conclusions

1. There is a flood threat recognition system for clear water flooding on the Iroquois and Kankakee Rivers. The system does not cover smaller streams. In those areas, communities must use local river watchers.
2. The threat recognition system for severe weather hazards (tornadoes, winter storms, thunderstorms, and drought/heat) is as effective as the County can have for the cost.
3. There is no effective local threat recognition system for earthquakes and wildfires.

4. The County has not taken advantage of new technology to relate current and predicted river levels to the areas affected, such as using a GIS based flood stage forecast map.
5. The procedures and media used to disseminate warnings are adequate for most urbanized areas, but there are gaps in the areas covered by outdoor sirens and radio and television are not used to their fullest advantage.
6. The County's *Emergency Operations Center Plan* has overall guidance on responding to many different kinds of hazards.
7. The fire protection for most communities is good, based on the Insurance Services Office fire protection grading. Essex, Salina, and Pembroke Townships fire protection districts are only rated as Class 9.
8. Many critical facilities, such as Kankakee Community College, have their own emergency response plans.

7.7. Recommendations

1. The County should explore the costs and benefits of establishing a new real-time river gage on the Kankakee River near Aroma Park.
2. The County should explore options for re-enabling the gage on the Iroquois River near Chebanse.
3. Each community liaison should attend meetings, training, and participate in exercises.
4. County EMA should establish a program to install or upgrad outdoor warning systems.
5. Developers of properties in areas not covered by an outdoor warning system should contribute to a fund that will pay for a siren to cover the area.
6. The County should work with interested municipalities to develop local flood stage forecast maps and detailed flood response procedures.
7. The public should be educated on what the sirens and warnings mean and what steps they should take to protect themselves. The County should continue to educate the public in this regard.
8. Essex, Salina, and Pembroke Township fire protection districts should work to improve their fire protection insurance ratings.
9. Municipal leaders should encourage residents to volunteer for CERT teams so they will have the expertise within their community, should a disaster occur.

10. County and municipal emergency managers should review their emergency management operations and:
 - a. Identify where additional activities are needed to respond to natural hazards.
 - b. Ensure that all relevant offices and agencies are given clear and coordinated instructions. The Manteno *Emergency Action Plan* can be a model for this.
 - c. Ensure they have access to information on all critical facilities and update that information annually.
 - d. Attend training on damage assessment and post-disaster mitigation activities.
 - e. Develop post-disaster procedures for public information, reconstruction regulation and mitigation project identification.
 - f. Develop arrangements to provide and receive aid from other communities/permit departments to assist in post-disaster building inspection.
 - g. Conduct exercises in compliance with HSEEP.

7.8. References

1. *CRS Coordinator's Manual*, Community Rating System, FEMA, 2002
2. *CRS Credit for Flood Warning Programs*, FEMA, 2002
3. Emergency Management: Principles and Practice for Local Government, International City Management Association, 1991.
4. *Emergency Action Plan*, Manteno, 2002.
5. *Emergency Operations Center Plan*, Kankakee County EMA, 2004.
6. *Flood Fighting*, Illinois Department of Transportation, Division of Water Resources, 1985.
7. *Guide for All-Hazard Emergency Operations Planning*, FEMA SLG-101, 1996
8. *Guidelines on Community Local Flood Warning and Response Systems*, Federal Interagency Advisory Committee on Water Data, 1985
9. Information on fire protection scores from the Insurance Services Office, Chicago.
10. Information on StormReady communities can be found on the National Weather Service website, www.nws.noaa.gov/stormready/
11. Interviews and meetings with County staff
12. National Weather Service river gage website, http://weather.gov/rivers_tab.php
13. *Post-Flood Mitigation Procedures*, Village of South Holland, Illinois, 1997.
14. Wildland Fire Assessment System website, www.fs.fed.us/land/wfas/map_list.htm

Chapter 8. Flood Control

Flood control projects have traditionally been used by communities to control or manage floodwaters. They are also known as “structural” projects that keep floodwaters away from an area as opposed to “non-structural” projects, like retrofitting, that do not rely on structures to control flows. Flood control projects are usually designed by engineers and managed or maintained by public works staff.

Six issues related to managing floodwaters are reviewed in this chapter:

- Levees and floodwalls
- Dams and reservoirs
- Channel improvements
- Sedimentation
- Ice jam prevention
- Drainage system maintenance

These projects have some advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings.
- Many projects can be built without disrupting homes and businesses.
- They can be used to further other community objectives, such as water supply and recreation.
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, they also have shortcomings.

- They disturb the land and disrupt natural water flows, often destroying wildlife habitat.
- They require regular maintenance, which if neglected, can have disastrous consequences.
- They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage.
- They can create a false sense of security as people protected by a project often believe that no flood can ever reach them.
- They may promote more intensive land use and development in the floodplain.



Some channel improvements can be very damaging to the environment and may pass a flooding problem on to downstream properties

8.1. Flood Control Studies

Since structural flood control is generally the most expensive type of mitigation measure in terms of installation costs, maintenance requirements and environmental impacts. Larger projects have regional or watershed-wide implications. Therefore, a thorough assessment of alternatives needs to be conducted before choosing a project, a process that can be time consuming and expensive.

Because of these factors, flood control projects are often planned, funded and implemented at a regional level by state or federal agencies, such as the Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR), the U.S. Army Corps of Engineers, and the USDA Natural Resources Conservation Service.

Over the years, flood control studies have been conducted on the larger streams in Kankakee County. In most cases, these studies conclude that a flood control project would be too expensive for the benefits that would result. This was the case for IDNR studies on Bourbonnais and Gar Creeks and on the Iroquois River at Watseka.

A major òKankakee River Basin Feasibility Studyö was authorized by Congress in 1995. It was conducted by the Corps at a cost of \$3.5 million, with half the cost picked up by the States of Illinois and Indiana. It concluded

A basin-wide flood reduction program is not economically justifiable. Analyses of sediment transport and ecosystem restoration opportunities are ongoing. An Interim Report is being prepared that will provide recommendations for sediment reduction/removal and ecosystem restoration. (www.lrc.usace.army.mil/projects/Kankakee%20G1%20FY05.htm)

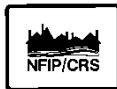
In fact, two restoration projects are being pursued, one channel project in Aroma Park and a wetland expansion at the state line. These may have some auxiliary flood protection benefits, but not enough to be measured as a flood control project.

The Corps and IDNR's predecessor agency, the Department of Transportation, Division of Water Resources, have prepared òreconnaissanceö reports. These review the level of a community's flood problem and conclude whether the problem is severe enough to warrant further study for a flood control project. One was published for Grant Park in 1981 that recommended against pursuing a study.

On the other hand, a Corps report for Soldier Creek in 1962 concluded

That periodic flooding of such severity as to warrant consideration of remedial measures does occur on Soldier Creek. (*Survey Report for Flood Control and Drainage Development, Soldier Creek, Kankakee County, Illinois, 1962*, p. 19)

It took more studies and 25 more years for a Department of Transportation, Division of Water Resources study to recommend the project that is shown on page 8-6.



CRS credit: 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 Community Rating System in order to not duplicate the larger premium reduction provided by removing properties from the mapped floodplain. The CRS does credit flood control projects that result in revisions to the 100-year floodplain map. It does credit 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 Ø 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 and address the concerns and shortcomings listed on page 8-1. If they meet the above criteria, levees, floodwalls, reservoirs and channel improvements 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.

8.2. 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.

Key considerations when evaluating use of a levee include:

- Compensating 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, and
- Creating a false sense of security.

This last item has been a major concern of state and federal agencies. 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. This was the vividly illustrated during the Great Flood of 1993.



Levee failure, 1993 Missouri River flood

US Army Corps of Engineers

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.



Local implementation: There are no formal levee or floodwall systems in Kankakee County. The elongated development pattern along the larger rivers is such that it would take a long levee system to protect a relatively small number of properties, so the benefits would not be worth the cost.



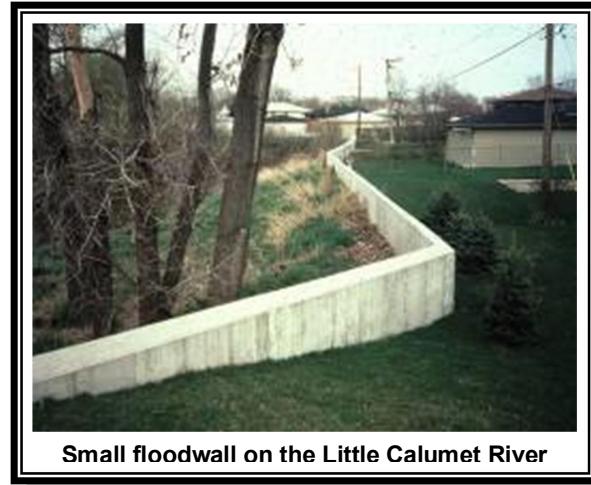
CRS credit: Up to 900 points are provided if a community has a levee system that does not provide 100-year flood protection, but is publicly maintained and subject to a special levee safety program. However, there are no such levees in Kankakee County.

8.3. Dams and Reservoirs

Reservoirs reduce flooding by temporarily storing floodwaters behind dams or in storage or detention basins. Reservoirs lower the flood height by holding back, or detaining, runoff before it can flow downstream. Floodwaters 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.

Off-stream 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).

Dams and 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.



Small floodwall on the Little Calumet River

In urban areas, some reservoirs are simply manmade holes, excavated to store floodwaters. 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 the use of dams and reservoirs:

- There is the threat of flooding the protected area should the 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.

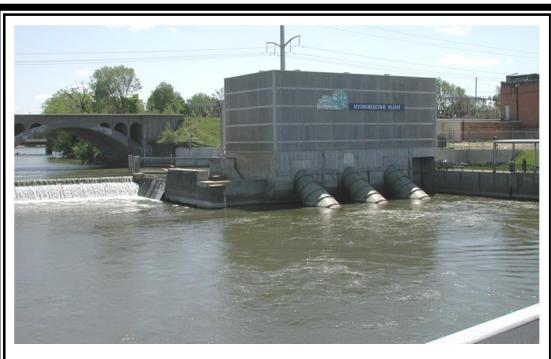


Local implementation: The City of Kankakee owns a dam in the Kankakee River at Washington Avenue. It was not built for flood control, but to provide hydroelectric power. As a side benefit, it keeps the water level up during low flow periods so boats can use the river upstream of the dam.

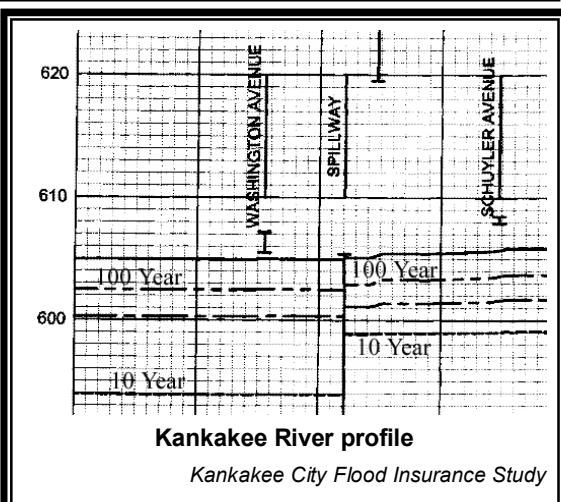
To the right is a profile which presents a side view of the Kankakee River. The River flows downhill from right to left. The dam is the vertical line in the middle. Upstream (to the right) of the dam, the 10 year flood is five feet higher, i.e., low flows are raised. However, higher flows, like the 100-year flood, flow over the dam with little impact on flood heights. This also means there is little threat of extra flooding if the dam failed during high flows.

There is another dam in the Kankakee River in Momence, on the channel on the north side of the island. It was built in the 1930s to raise the river level to create the island.

As with the Washington Avenue dam, it has no flood control benefit. There is enough capacity in the main channel to carry flood flows around the dam.



Kankakee River dam at Kankakee



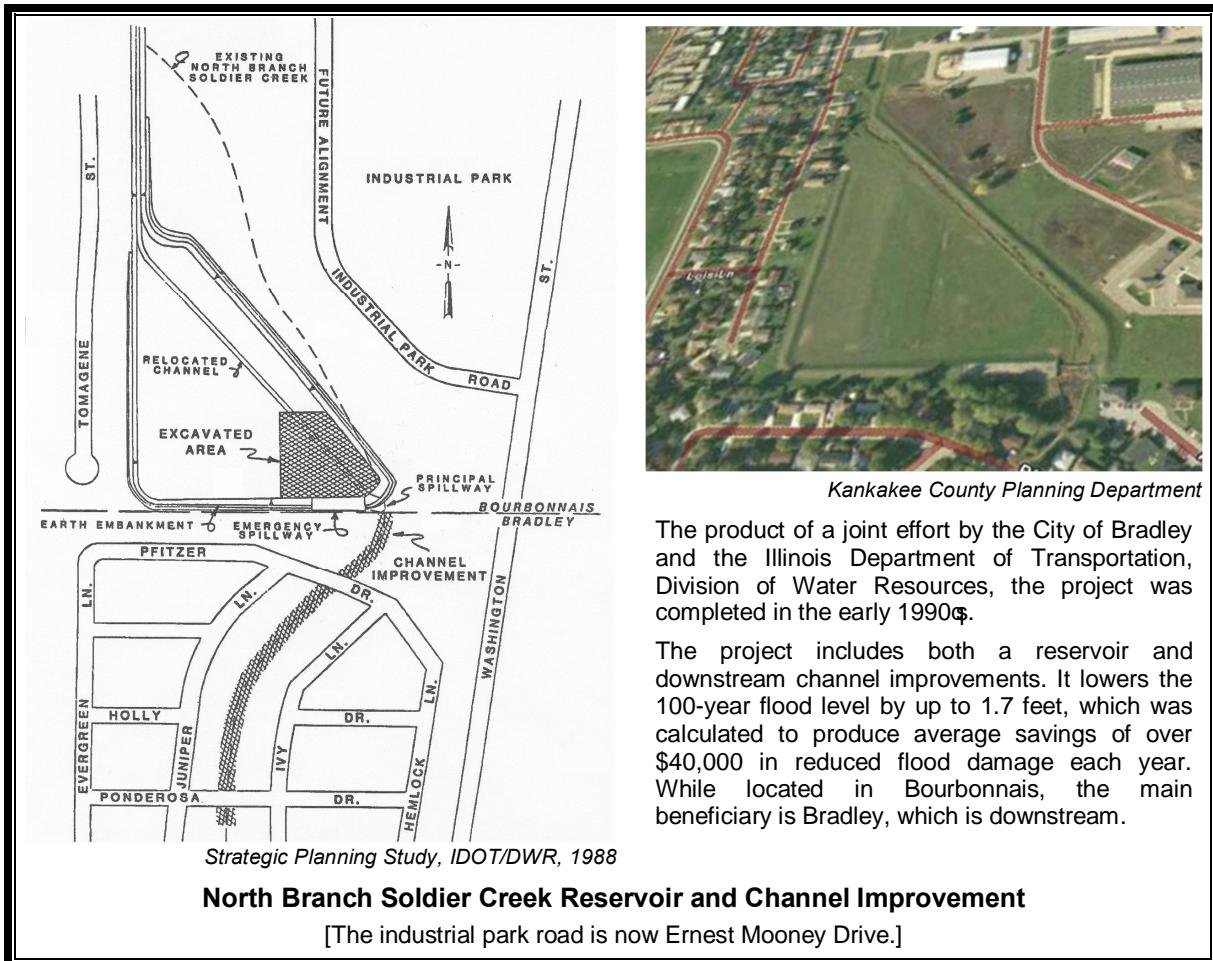
Kankakee River profile

Kankakee City Flood Insurance Study

The only major flood control reservoir in Kankakee County is the detention basin on the North Branch of Soldier Creek in Bourbonnais. It is illustrated below.



CRS credit: There are no flood control benefits from the Kankakee River dams. The North Branch Soldier Creek reservoir reduced the floodplain enough to warrant a new Flood Insurance Rate Map, so there is no credit for this project under the Community Rating System.



8.4. Channel Improvements

By improving a channel's conveyance, more water is carried away at a faster rate. Four types of channel improvements are reviewed here:

Channelization, i.e., making the channel wider, straighter or smoother,
Diversion of high flows to another channel or body of water, and
Improving crossings, bridges, and roadways.

Channelization: Straightening, deepening and/or widening a stream or river channel (illustrated on page 8-1), 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:

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 used to be, creating water quality and habitat problems.

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. A combination of vegetated swales, infiltration trenches and other best management practices will increase infiltration, reduce runoff and improve water quality. As shown in the photos below, these projects can have multiple benefits.



1. **Channel improvements do not have to result in concrete or rock banks. They can include measures to improve infiltration and water quality.**

Diversions: 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.

Channel crossings: In some areas, roads and bridges are flooded during heavy rains. While buildings may not be damaged, residents, customers, commuters, and emergency

vehicles may not be able to get through. A common safety hazard occurs when people try to drive through flooded streets or assume that a bridge that is underwater is still there. As noted on page 3-5, floods kill more people trapped in vehicles than anywhere else.

Another concern is when a small culvert or bridge opening constricts flows and causes localized backwater flooding. The common solution to these problems is to raise the roadbed and enlarge the culvert or bridge opening. However, designers need to consider the potential for a raised road acting as a dam, flooding people upstream and larger openings allowing more water downstream. Plans need to ensure that the projects do not worsen flooding on someone else.



Local implementation: The network of drainage ditches throughout the County is a product of channelization, but it was built in the first half of the 20th Century, without today's environmental protection restrictions. There was some channelization work as part of the North Branch Soldier Creek project (see page 8-6). There were no reports of diversion projects in the County.

In response to the municipal survey of mitigation measures, Herscher and Manteno identified bridges and other road crossings that impede or obstruct flows. Herscher's was fixed with the reconstruction of the state highway bridge over Horse Creek.

Manteno, the fastest growing municipality in the County, has several bridges and culverts that are now too small for the amount of water that is conveyed in the ditches. Two of them go under state highways. The Village also has a road that is covered by water when Rock Creek floods.

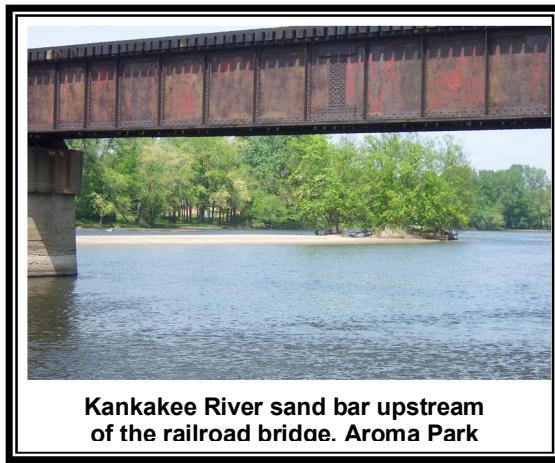
8.5. Sedimentation

Sedimentation is the deposit of sand and silt in the channel. The sand and silt come from two main sources: upstream riverbanks and farms and construction sites in the watershed. Sedimentation raises the channel bottom and forms sand bars and islands. As a result, there is less room in the channel to carry higher flows. There are two ways to deal with sedimentation: dredge the channel and control the erosion.

Dredging: Dredging is the most common way to remove sediment. However, it has the following problems:

Dredging is often cost prohibitive because the dredged material must be disposed of somewhere.

Given the large volume of overbank floodwaters, removing a foot or two from the bottom of the channel will have little effect on large floods.

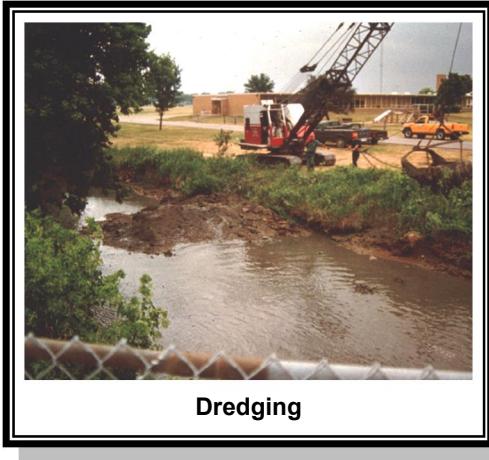


Kankakee River sand bar upstream of the railroad bridge. Aroma Park

Unless upstream erosion is stopped, 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.



Accordingly, dredging is usually not an effective or efficient flood control approach. It is usually limited to clearing channels needed for navigation and low flow drainage.

Erosion control: The sediment in the channel comes from upstream erosion of construction sites, farm land, and channel banks. Construction sites can be regulated and, as noted in section 5.6, the new model stormwater management ordinance has improved provisions.

Farm land is harder to regulate. Instead, the main approach is to show farmers soil conservation practices that can save them both their land and farming costs. This is one of the main goals of the Natural Resources Conservation Service and local soil and water conservation districts.

Eroding channel banks can be retrofitted with rock (rip rapo), concrete, steel, or appropriate planting. öStream conservation,ö öbioengineeringö or öriparian corridor restorationö are different terms for the same objective: return streams, streambanks and adjacent land to a more natural condition, including the natural meanders. A key component of these efforts is to use appropriate native plantings along the banks that resist erosion.



Local implementation: Sedimentation in the Kankakee and Iroquois Rivers has been a concern facing different groups, including boaters, fishers, farmers who use river water for irrigation, and emergency managers. It is estimated that in some areas, up to 30% of the channel has been filled in. A 2001 study by the Illinois State Water Survey found that the channel along the öSix-Mile Poolö between Aroma Park and the Kankakee dam has lost 13.4% of its capacity since 1980 due to sediment deposition.

The Flood Insurance Study for the City of Kankakee shows the channel bottom upstream of the dam to be over 20 feet higher than the channel bottom downstream of the dam. While a dam certainly catches sediment, most of the problem may be traced to upstream changes to the natural regime of the river. The Corps of Engineers reports

Originally, the Kankakee River meandered through some 2,000 bends over a 240-mile course. Limestone outcrops in the stream channel near Momence, Illinois, acted as a natural dam and created a vast marsh in Indiana. The Grand Marsh, or Kankakee Marsh, extended upstream of Momence to South Bend, Indiana, and covered some 500,000 acres, most of which was in Indiana.

The Indiana portion of the Kankakee River was channelized in the late 1800s to early 1900s. The limestone outcrop near Momence was lowered 2½ feet in 1893. The poorly defined tributaries were also channelized [by drainage districts working to drain soggy farmland]. These changes drained a significant portion of the marsh, allowed agricultural production, and resulted in significant hydrologic changes.

○ the reach between Aroma Park and Singleton Ditch [two miles upstream of Momence] experienced sediment deposition between 1966 and 1977, but has been fairly stable since 1977. The steep slope and rocky substrate are likely responsible for reduced sediment deposition in this reach. While absolute values of sediment deposition are small, some areas of the reach have been accumulating sediment. Some scour is evident in other parts.

The Six Mile Pool downstream of this reach has filled with trapped sand at a rate of about 0.67 percent per year since 1980. The upstream reach from Singleton Ditch to State Line Bridge is also losing capacity.

It is expected that sedimentation will continue in the Illinois portion of the Kankakee River. While studies and projects currently underway will begin to address sedimentation entering the Illinois reach of the Kankakee River, additional efforts are needed.

Sedimentation of key aquatic habitats is expected to continue. Side channel and pool areas are expected to continue to lose depth. The interstitial spaces between cobble and gravel substrates may become clogged with sediment. Overall, the high quality habitat of the Kankakee River is expected to decline due to sediment deposition. (Corps of Engineers Fact Sheet, pages 4 . 6)

Measurements of erosion loss show that relatively little of the sedimentation is being washed down from the flat terrain in Kankakee County. In fact, the County was one of the first to reach the 90% soil erosion goal of the US Department of Agriculture. It appears that a lot of the sediment comes from the rolling land in Iroquois County and from Indiana. The Water Survey report notes that a substantial sand bar forms at the State Line Bridge. It may also be that much of the sediment is from channel erosion and is simply moving from one place to another.

The Water Survey report lists three types of alternative measures to manage or reduce the sedimentation in the rivers:

Reduce bank erosion through measures such as constructing stabilization projects at the most severe sites, recreating meanders, and retrofitting bridge openings.

Capture or remove the sediment in the channel with traps and in-stream structures that increase velocity (allowing more sediment to be carried downstream). As for removing the sediment at locations such as the Six-Mile Pool and the State Line Bridge, the report notes,

If the deposited sediment is removed, this area will probably be filled up with sediment requiring removal at 5-, 10-, or 20-year intervals based on the severity of the problem. (page 61)

Keep erosion in the watershed from reaching the streams through buffer zones, detention ponds, created wetlands, and other best management practices (BMPs).

As noted on page 8-2, the Corps is proceeding with two restoration projects that will address sedimentation at Aroma Park and the State Line. Additionally, the Economic Alliance and Kankakee County has formed The River Roundtable, a local volunteer committee created in 2009, to explore the feasibility of extracting sand and sedimentation from the Kankakee River. Currently they are seeking funding for a pilot project near Aroma Park in the six mile pool.



CRS credit: There is no Community Rating System credit for sediment management programs or projects.

8.6. Ice Jam Prevention

As noted in Section 2.1, historically, the most common cause of the largest floods on the Kankakee River has been ice jams. Ice forms on top of the river during the coldest winter months. In late winter, it breaks up due to warmer temperatures and increased flows from rain. Ice jams form when the frozen ice blocks the river or when the broken up ice chunks (floes) collects at a shallow point or bridge.

Many agencies have tried a variety of measures to prevent or remove ice jams. These have included:

- Ice breaking boats or barges,
- Cutting up the ice with trenching machines,
- Removal by earth moving equipment,
- Breaking ice sheets with an air cushion vehicle,
- Weakening the ice sheet by drilling holes in it,
- Putting piers or booms in the channel to catch the ice upstream of developments,
- Warming the ice surface with black dust, and
- Blasting the jam with explosives.

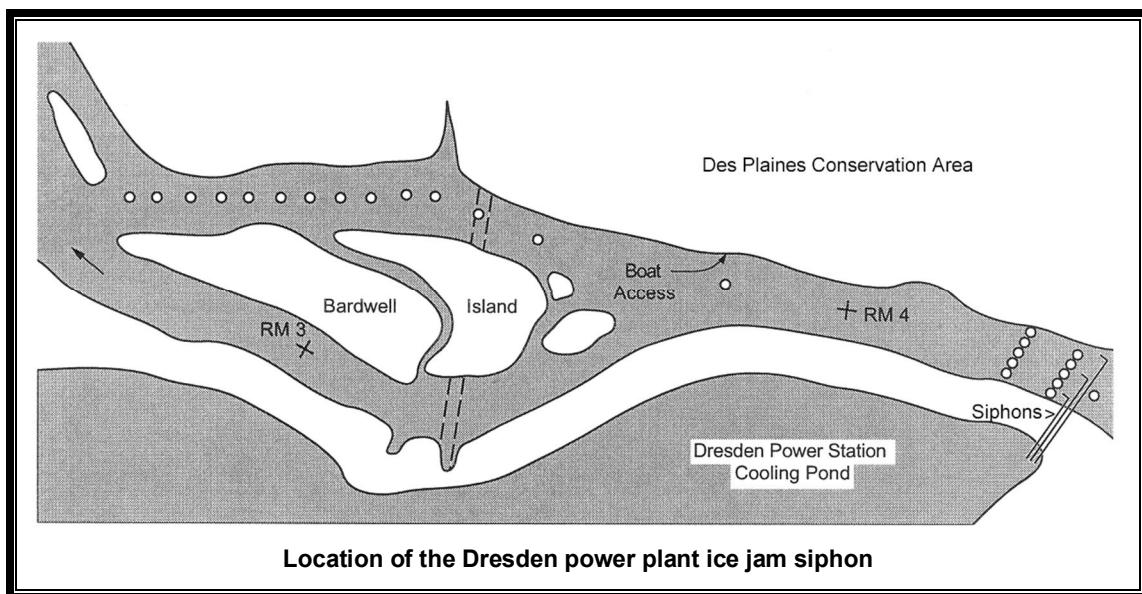
The Corps of Engineers® Cold Regions Research and Engineering Lab monitors ice jams and ice jam mitigation activities and experiments with different approaches. It concludes that each of these approaches has its pros and cons. For example, earth moving equipment can only be used in shallow areas or from bridges and ice breaking boats need deeper water. One can place explosives in sheet ice, but this is very difficult to do in a moving, building jam.



Local implementation: Several of the methods listed above have been tried on the Kankakee River. In the mid-1980s, IDOT-Water Resources hired a barge which helped break up a jam. The 1982 flood brought additional Corps interest because the ice had damaged the locks at Dresden Island.

In 1987, the Corps tried a demonstration project. A siphon system was installed to pipe water from the cooling pond of the Dresden nuclear power station to the river. The siphon is located four miles upstream of the confluence with the Illinois River, six miles downstream of Wilmington and one mile downstream of Interstate 55.

Three 30-inch pipes convey 68° water from the cooling pond to the river. In January 1988, the siphon raised the river's water temperature less than one degree in a week. This was enough to open 2.6 miles of the river. Within two weeks of operation, the channel was clear of ice from the siphon outlet to the confluence with the Illinois River.



The system has been used almost every year since and is no longer considered an experiment. For environmental protection reasons, it cannot be run for more than 14 days or more than two times a year. There is a fish barrier net around the siphon inlet. There have been no reported adverse environmental impacts.

The Will County emergency management office that operates the siphon reports:

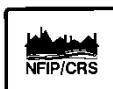
Its exact impact on flood reduction is hard to say. Because of its location, it provides a direct impact on a relatively small portion of the River. It does indirectly benefit ice jamming upstream by helping to eliminate the downstream ice that helps to hold the upstream ice in place. But, there are a lot of other factors that influence ice production and jamming that are not affected by the siphon. (*e-mail message from Harold Damron, Will County EMA*)

The following additional concerns should be kept in mind about the utility of this system:

The siphon system was designed to thin or melt the thick frazil ice that is hard to break up. This is only one kind of ice jam on the Kankakee, so warming may not work everywhere.

It is in a unique location, being next to a nuclear power plant& cooling ponds.

It is dependent on continued use of the power plant, something that is not guaranteed.



CRS credit: The siphon would not receive Community Rating System credit as a flood control project. Further, direct benefits to Kankakee County would need to be shown for the County to receive credit.

8.7. Drainage System Maintenance

A community&s drainage system includes its stream channels, ditches, swales, culverts, and detention ponds,. 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.

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 to the restrictor pipe, berm or overflow structure.



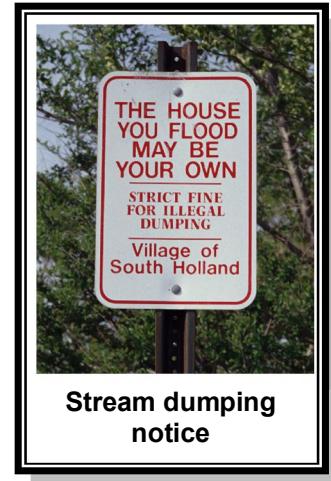
The ditch on the left, located in Kankakee County, has become clogged with growth and debris. The ditch on the right was maintained and can carry storm flows without flooding the road.

A drainage system maintenance program can be very effective at reducing the threat of local flooding from smaller storms, even if all it does is remove trash and debris. 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.

Cities and counties usually accept responsibility for maintaining facilities on public property and drainage districts have a duty over their own channels. However, in Illinois, the responsibility for drainageway maintenance on private property, where no easements have been granted, is with the individual private property owner. This often results in very little maintenance being accomplished.

Dumping regulations: One approach that can reduce drainage problems and the workload of the maintenance crews is an anti-dumping program. Many communities have nuisance ordinances that prohibit dumping garbage or other objectionable waste on public or private property. Drainageway 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 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, an anti-dumping program should include public information materials that explain the reasons for the rules as well as the penalties.



Local implementation: The Northern Illinois Anglers Association, which is headquartered in Kankakee, has sponsored an annual river clean up for 31 years. With help from the State's C2000 program, it also sponsors Illinois' first Adopt-a-River program. Participants keep their own reaches clean and help during the annual cleanup each September. All but ten miles of the Kankakee River is covered. Some tributaries are also cleaned. According to the Northern Illinois Anglers Associations chairman, over 45 tons of debris was removed from the Kankakee River during the 2013 event.

The program has received some state and county funding in some years. However, it is primarily a privately-run activity, more oriented toward clean up and habitat improvement than flood control. For example, the program would prefer to leave logs in the streams as habitat than remove them as potential dams. Further, it does include most small streams and urban ditches, waterways that could flood buildings if not kept cleared out.

The County's Highway Department inspects every county road bridge at least once every two years. If a problem is found or a complaint is received, the department will work to clear things that may affect the right-of-way. The program does not include inspecting other parts of the County's drainage system.

Most of the municipalities clear debris as it is found or in response to calls. Neither the county nor the municipalities have written procedures. However, some are developing procedures as part of the Environmental Protection Agency's NPDES program, which

requires communities in urbanized areas to begin programs of inspecting for illegal discharges into the drainage system. NPDES is discussed further in Section 5.6. IDNR has a model stream preservation program that has proved helpful, too.

Bourbonnais reported having a regular program that inspects everything at least once each year. The Village uses the results to identify priorities for maintenance and converting open ditches to enclosed storm sewers. It plans to have all ditches covered by 2010, doing a few projects each year. All new developments must enclose any ditches on their sites.

Kankakee County bi-annually inspects outfall locations in the unincorporated urbanized area as part of the requirements for its NPDES Permit. The County has implemented a policy and procedure for resolving issues with illicit discharges. This policy is available on the Planning Department's website at <http://planning.k3county.net/pdf/stormwater.htm>.

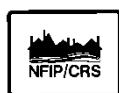
Manteno has a regulation that requires homeowner associations to maintain the facilities in their areas. If they are not maintained, the Village has the right to do the work and charge the association.

Hopkins Park and Sun River Terrace reported that their ditches had problems with debris, growth, and sedimentation. An example of one of these problem sites is on page 8-13. They have asked for assistance in cleaning out the problem ditches in their jurisdiction, something that should precede a routine maintenance program. Hopkins Park's staff have visited Springfield seeking help from state agencies to do this.

Dumping: A review of the local ordinances found regulations similar to a stream dumping ordinance, but they did not cover all sources of debris. Most focused on unhealthy items or littering in public places. For example, Momence's ordinance states:

No person shall throw, discharge or deposit or cause to be thrown, or deposited or discharged by any other person, any garbage, offal or refuse, or ashes, in the waters of any river, stream or creek or any tributary of the Kankakee River or on or along the banks of any of them. (6-3-15)

Such language would not make it unlawful to deposit grass clippings, branches, or stones in a ditch or along a creek.



CRS credit: 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. The programs must keep records of each inspection and follow up maintenance. Up to 570 points are possible, but communities that do not have formal written procedures and/or only respond on an as needed basis will not receive the credit.

The CRS also provides up to 30 points for enforcing and publicizing a regulation that prohibits dumping in the drainage system.

8.8. Conclusions

1. Structural projects can protect properties from flooding, but they can have adverse impacts on downstream properties and on the environment. They can also be very expensive. Therefore, a thorough study is needed before a larger project is constructed.
2. Most flood control studies in Kankakee County have concluded that a project would be either inappropriate or infeasible.
3. Two successful projects have been the reservoir on the North Branch of Soldier Creek and the Kankakee River ice jam siphon. Except for retrofitting or replacing undersized bridges and culverts, there do not appear to be more sites where flood control projects would be applicable.
4. Sedimentation of the Kankakee River will continue to be a problem, although there are Corps of Engineers restoration projects tackling two of the greatest problem areas, Six-Mile Pool (between Aroma Park and the Kankakee dam) and at the State line. The River Roundtable will begin a pilot project to remove sedimentation in the Six-Mile Pool area as soon as funding is available.
5. Most approaches to modifying stream channels and ditches have adverse impacts. However, removing obstructions, undersized culverts and cleaning out the channels could help reduce flooding that follows smaller storms. Hopkins Park and Sun River Terrace could use help in cleaning out their ditches.
6. Flooding and local drainage problems would be reduced by periodic drainage system inspections and maintenance and stream dumping regulations. There is an excellent, privately run program for the largest rivers, but most small streams and ditches are not covered by a formal maintenance program.

8.9. Recommendations

1. While there are no potential large-scale flood control projects, the County and the municipalities should pursue local projects, such as enlarging bridge openings, where there is a large enough concentration of damage-prone properties to make the projects worthwhile. The following guidelines should be followed:
 - a. Each project's study should look beyond the immediate project site to ensure that no other properties will be adversely impacted.
 - b. Each project's study should consider protecting and improving the natural functions of the stream and floodplain, in addition to flood protection.
 - c. The design and construction should be certified by a licensed professional engineer.
 - d. All relevant federal, state and local permits must be obtained.
 - e. Communities and property owners that may be affected by the project should be notified.

2. When bridges and culverts are repaired and replaced, County, township and municipal road and street departments should determine if the openings should be enlarged to reduce backwater flooding on upstream properties. They should also determine if the road bed should be raised to offer safe crossing during a flood.
3. The Corps restoration projects should proceed as removing or reducing sediment in the rivers will help reduce flood levels.
4. Each municipality and the County should implement a formal and regular drainage system maintenance program modeled on CRS and IDNR program guidance and coordinated with NPDES activities.
5. The County should assist Hopkins Park and Sun River Terrace identify sources of funding to clean out problem drainage ditches, provided they institute a formal and regular drainage system maintenance program to prevent the problems from recurring.

8.10. References

1. Cold Regions Research and Engineering Lab website, www.crrel.usace.army.mil/
2. *CRS Coordinator's Manual*, Community Rating System, FEMA, 2002
3. *CRS Credit for Drainage System Maintenance*, FEMA, 2002
4. *Fact Sheet, Kankakee Mainstem, Illinois River Ecosystem Restoration*, US Army Corps of Engineers, 2002
5. Flood Insurance Study, FEMA:
 - Village of Bourbonnais, March 29, 1978
 - Village of Bradley, May 5, 2003
 - City of Kankakee, May 5, 2003
 - Kankakee County (unincorporated areas), December 20, 2002
 - Village of Momence, November 20, 1996
 - Village of Sun River Terrace, April 16, 1997
6. *Ice Jam Flooding: Causes and Possible Solutions*, US Army Corps of Engineers, Engineer Pamphlet 1110-20-11, 1994
7. Interviews and correspondence with staff of the Illinois Department of Natural Resources, Office of Water Resources, Spring 2005.
8. Interviews and correspondence with staff of the US Army Corps of Engineers, Rock Island and Chicago Districts and Cold Regions Research and Engineering Lab, Spring 2005.
9. *Inventory and Analysis of Urban Water Damage Problems, Village of Grant Park*, US Army Corps of Engineers, 1981.

10. *River Geometry, Bank Erosion, and Sand Bars within the Main Stem of the Kankakee River in Illinois and Indiana*, Illinois State Water Survey, 2001
11. *Strategic Planning Study for Flood Control, North Branch Soldier Creek, Kankakee County, Illinois*, Department of Transportation, Division of Water Resources, 1988.
12. Survey of municipal and County offices, Spring, 2005.
13. *Survey Report for Flood Control and Drainage Development*, Illinois Department of Public Works and Buildings, Division of Waterways, 1962

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 steps to protect themselves and others.

Information can bring about voluntary mitigation activities at little or no cost to the government. Property owners mitigated their flooding problems long before there were government funding programs. A study of northeastern Illinois public information efforts found that people acted on information (see box). In fact, 60% of Illinois respondents who had retrofitted their homes, did so without outside financial assistance.

The usual approach to delivering information involves two levels of activity. The first is to broadcast a short and simple version of the message to everyone potentially affected. The second level provides more detailed information to those who want to learn more.

This chapter starts with activities that reach out to people and tell them to be advised of the hazards and some of the things they can do. It then covers additional sources of information for those who want to learn more. It ends with an overall public information strategy.

9.1. Outreach Projects

Outreach projects are the first step in the process of orienting people to the hazards they face. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Research has proven that outreach projects work (see box). 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.

Information Brings Results

Dr. Shirley Laska of the University of New Orleans has studied various programs that encourage floodprone homeowner self-protective behavior.⁺ In her book she notes

The research reported herein demonstrates considerable interest among and effort by flooded homeowners to retrofit their homes to protect them from future flood damage. Several measures were undertaken by those who retrofitted. Moreover, they spent their own money . often considerable sums . to implement the measures^o .

Having some source of retrofitting information appeared to encourage retrofitting, and the measures implemented by flooded homeowners who did consult an information source were evaluated by those owners as more protective than the measures implemented by homeowners who did not rely on a source [of information].⁺

Floodproof Retrofitting . Homeowner Self-Protective Behavior, University of Colorado, 1991, pages 221 and 223.

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.

Local newspapers can be strong allies in efforts to inform the public, but they don't reach as many people as a community newsletter. 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.

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),
- Videos for cable TV or to loan to organizations or individuals,
- Brochures available in municipal buildings and libraries (see examples, below),
- School programs, activities, and handouts, and
- Special meetings, such as flood-proofing open houses.





Local implementation: The table below identifies the major public information activities currently being implemented by communities in Kankakee County. It can be seen that only three communities have their own newsletter, although three more plan to start one. Eight communities and the Community College have their own websites.

Public Information Activities					
	Newsletter	Website	Hazard Info	Read FIRMs	Technical assistance
Aroma Park	No	Yes	N/A	Yes	Yes
Bourbonnais	No	Yes	No	Yes	No
Bradley	No	Yes	No	Yes	Yes
Kankakee	No	Yes	Yes	Yes	No
Manteno	Yes	Yes	No	Yes	No
Momence	Yes	Yes	No	No	Yes
Sun River Terrace	No	No	N/A	No	No
Uninc. County	No	Yes	Yes	Yes	No
K. Com. College	Yes	Yes	No	N/A	N/A

The “Hazard Info” column identifies whether the newsletters or websites have included hazard related information. As seen by the following examples, some emergency preparedness information is provided, but most do not include many details about natural hazards or information on how to protect oneself from them.

Chebanse’s March 2005 newsletter and Kankakee’s website provide information about their outdoor warning siren system.

The May 2004 issue of Bonfield’s Village newsletter included an article on West Nile virus, the January 2004 issue called for volunteers to serve in the County’s Community Emergency Response Team (CERT), and the March 2005 edition announced this hazard mitigation plan and the opportunity for public input.

Several communities place brochures in public places, such as where people pay utility bills. These have include insurance company flyers on tornado safety.

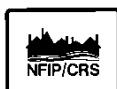
The Village of Herscher has a two page handout that covers all the important information a resident should know, such as Village phone numbers, Village Board members, permit requirements, the website, and a reminder to not blow grass clippings into the streets as it will clog the drainage system.

The Community College’s “Emergency and Safety Procedures” brochure, (see page 7-12), is given to all staff and is available for anyone else to pick up.

The County Planning Department setup a satellite office at the Momence City Hall immediately after the 2008 flood to help residents obtain information about recovery, building permits, and mitigating damage.

The River Roundtable has hosted informational events open to the public to disseminate information about the Kankakee River and the Roundtable’s activities.

Staff from the County Planning Department regularly attends the Kankakee County Home Builders Association's annual spring home builder's show. At this event information, brochures, and other documents are distributed to the public. The Manteno Fire Department participates in Burning and Red Flag Warning Days to alert its citizens when open burning would be at a hazardous or dangerous level.



CRS credit: The Community Rating System provides up to 350 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 9.5).

Repetitive loss outreach project: The Community Rating System requires communities with one or more repetitive loss property to send out an outreach project at least once each year. This would affect Kankakee, Aroma Park and the County.

The project goes to all properties in the repetitive loss *areas*. Such projects are typically 2 ó 6 page letters mailed before the local flood season. They must cover

That the property is in or near an area subject to flooding,
Property protection measures appropriate for the flood situation,
Sources of financial assistance for property protection measures, and
Basic facts about flood insurance.

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 regulations, one federal and two state, require that potential buyers of a parcel be told of their exposure to a hazard.

Flood Disaster Protection Act: 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 A Zone if the mortgage or loan is federally insured. However, there is no legal requirement as to how far in advance of closing the disclosure must occur. Sometimes, local officials are called on the day of closing by a distressed home buyer. Often, the bank's information is provided after the loan applicant is already committed to purchasing the property.

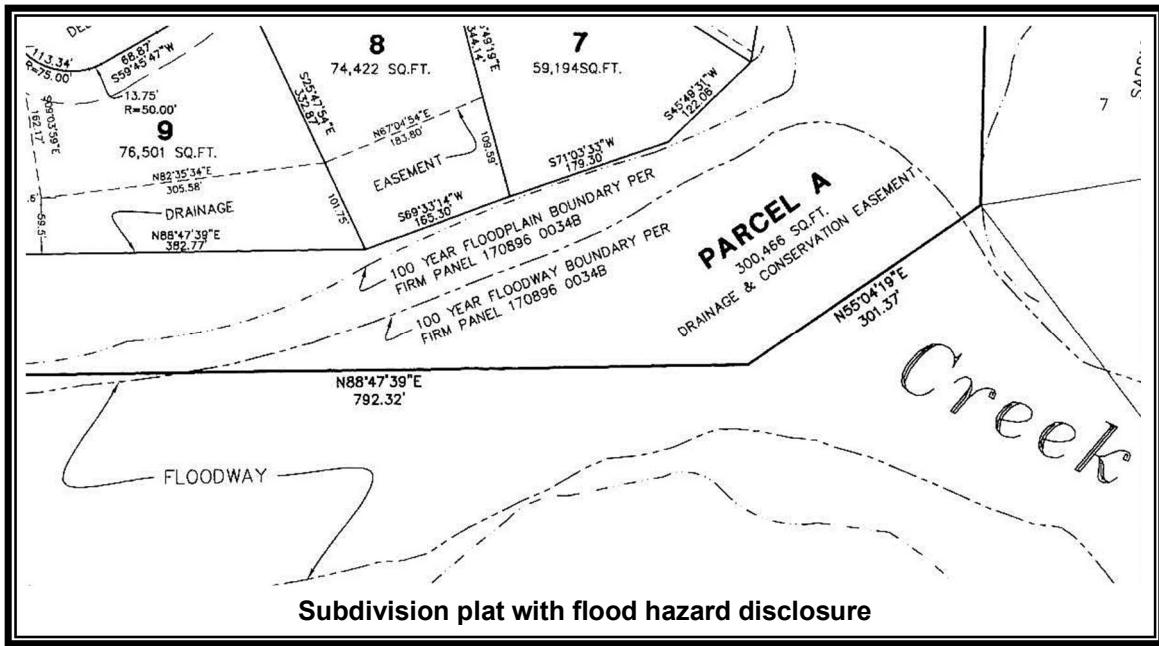
Illinois Residential Real Property Disclosure Act: This law requires a seller to tell a potential buyer:



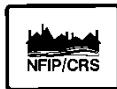
- If the seller is aware of any flooding or basement leakage problem,
- If the property is located in a floodplain or if the seller has flood insurance,
- If the seller is aware of a radon problem,
- If the seller is aware of any mine subsidence or earth stability defects on the premises, and
- If the 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 when a property is being sold. 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.

Subdivision plats: *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 below).



Local implementation: The Kankakee County Association of Realtors® administers the Multiple Listing Service used by real estate offices in the County. It does not list potential hazards, such as whether a property is in a floodplain. A sample of real estate agencies' website postings of available properties did not reveal any disclosure, either, although listings state "waterfront property" or "riverview charmer" (with basement). However, the Association stated that it would be glad to meet with County or municipal staff to discuss possible activities.



CRS credit: Communities would receive 10 points for the two state laws. Up to 41 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. Technical Information

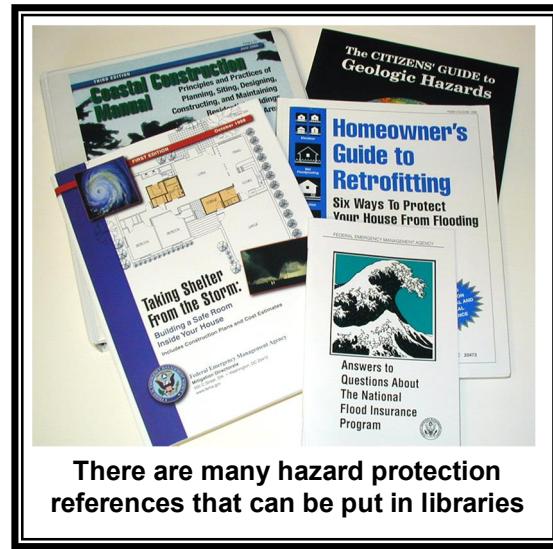
After an outreach project or real estate disclosure makes a person aware that a property is subject to a hazard, that person should look further into the hazard and ways to mitigate its effects. The community can help by providing technical information and assistance. The community library and local web sites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Library: 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.

Handbook: Research has shown that a publication tailored to local conditions, especially one that is seen as written for the reader's situation, is more effective than a general reference. The reader can identify with the situation and may have personally seen some of the examples. As a result, readers of such localized books are more likely to implement a property protection project.

Website: Today, websites 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 (www.fema.gov/kids/). This website teaches children how to protect their home and what to have in a family disaster kit.



Local implementation: Library: Kankakee County libraries are members of the multi-county Heritage Area Library System, giving each access to the publications in

any of the system libraries. However, a search of the word “flood” in Kankakee area libraries found only five references, three of them histories of floods elsewhere (in Venice and Johnstown, Pennsylvania) and two of them technical references. “Tornado” found 25 documents, but many of them were stories (including *The Wizard of Oz*). A search of the Community College’s on line library catalog found more references, but none of them guides for property owners or how to mitigate the effects of the hazards.

Handbook: The County EMA office provides a 25 page booklet entitled “Family Emergency and Disaster Plan.” It has information on protection measures for the hazards of fire, flood, tornado, and terrorism along with checklists, website resources, and a place to write a family’s emergency phone numbers. There are state and northeastern Illinois guides to flood protection that could be copied by any community for distribution to its floodplain residents.

Website: The table on page 9-3 identifies the eight communities that have their own websites. Only Kankakee and the County’s sites have emergency or hazard information. The City’s relates to its siren system.

The County’s code enforcement website has a page on floodplain management, including photos from recent floods and a discussion about why floodplain regulations are needed. A link provides access to scanned versions of all Flood Insurance Rate Maps in the County.



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

Map reading: Many benefits stem from providing hazard information to inquirers. Residents and business owners who are aware of the potential hazards can take steps to avoid problems and/or reduce their exposure. Real estate agents and house hunters can find out if a property is floodprone and whether flood insurance may be required.

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.

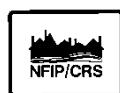
Property protection assistance: While information provided by outreach projects, the library or a website helps, most property owners do not feel ready to regrade their yards,

install a tornado shelter, or retrofit their homes 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 last two columns in the table on page 9-3 identify which communities help inquirers read their Flood Insurance Rate Maps (six of the eight mapped communities) and provide technical advice on property protection (four communities). None of the communities advertise these services.



CRS credit: The Community Rating System provides 90 points for providing map information to inquirers.

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 chapter 5.
- 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 4.
- 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 21, 2013, meeting, the Mitigation Advisory Task Force 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 Mitigation Task Force, at its August 23, 2018 meeting, reviewed the results from 2013 and felt that they were still valid. A new survey was not conducted.

Each Task Force member was given the handout that appears on page 9-11. The handout lists 53 possible topics that would be useful for residents and businesses to know. The members were asked to check the 10 topics they felt were most important to convey. They could also add other topics not listed.

The handout on page 9-11 shows the actual scores for each topic. After a review of the results, the higher scoring topics were organized and combined. It was concluded that the following topics deserved the most attention:

- Family preparedness.
- Protecting water quality.
- Flood safety precautions.
- Winter storm and thunder storm safety precautions.
- Warning signals.
- Beautify the riverfront.
- Safety in vehicles.

A second exercise was conducted to identify the most effective ways to convey the various messages to residents and businesses. A handout with 32 different ways to communicate was given to each Task Force member. They were asked to identify the five most important ways.

The handout on page 9-12 shows the actual “votes” for each approach. After a review of the results, the higher scoring media were organized and combined. It was concluded that the following media are preferred for explaining hazard mitigation topics to the public. They are listed in order of preference.

- Newspaper articles.
- County-wide newsletter.
- Website with links to other sources.
- Radio public service announcements

Public Information Topics

There are a variety of messages that can be delivered to property owners, businesses, school children and other members of the öpublic.ö 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.

4	Beautifying the riverfront	1	Safety in buildings
0	Benefits of open space	4	Safety in vehicles
0	Dealing with contractors	3	Sewer backup protection measures
0	Earthquake safety precautions	3	Sources of assistance
2	Economic impact of natural hazards	0	Status of flood control projects
6	Emergency protection measures	0	Status of implementing the mitigation plan
8	Family preparedness	5	Storm safety precautions
2	Flood Insurance Rate Maps	2	Substantial damage regulations
5	Flood safety precautions	7	Tornado safety precautions
1	Floodproofing a business	5	Warning signals
0	Floodproofing a house	0	Ways to protect a building from hail
3	Health hazards	0	What a flood insurance policy covers
3	How to evacuate during a storm/flood	1	What state and federal agencies are doing
1	How to get out of buying flood insurance	4	What the community is doing
1	Local drainage protection	0	What to do during an ice jam
2	Making sure your yard drains	0	When flood insurance must be purchased
3	Materials on the website	2	Whether a building is in a floodplain
1	Past disasters in the County	1	Who is responsible for flooding
1	Preparing a building for a winter storm	1	Why channel maintenance is important
0	Preserving and protecting wetlands	0	Why it floods
2	Protecting a manufactured home from wind	0	Wildfire property protection measures
5	Protecting water quality	2	Wildfire safety precautions
0	References in the local library	0	Wind protection measures
1	Reporting construction violations	5	Winter storm safety precautions
1	Reporting dumping violations	0	Other: _____
0	Retrofitting a building for tornado protection	0	Other: _____
0	Retrofitting for earthquake protection	Other: _____	Other: _____
1	Rules against dumping in streams		
3	Rules on building in the floodplain		

Handout used to determine the most important topics for a public information program to explain to residents and businesses.

Public Information Media

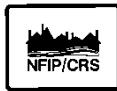
There are many different ways to convey the messages about hazards, safety precautions, and ways to protect one's property. The following are listed in alphabetical order.

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.

- 3 Cable TV notices
- 0 Displays in home improvement stores
- 2 Educational programs in grade schools
- 2 Educational programs in high schools
- 1 Educational programs in junior high
- 2 Handouts/flyers at public places
- 2 Homeowner's flood protection handbook
- 2 Mass mailing to all floodplain residents/businesses
- 2 Mass mailing to all residents/businesses
- 7 Newspaper articles
- 2 Newspaper supplements
- 1 News releases
- 0 Open houses/contractors' shows
- 6 County-wide newsletter
- 2 Municipal newsletter
- 0 Park/recreation department educational programs
- 0 Presentations at neighborhood meeting
- 0 Presentations to banks and lenders
- 0 Presentations to contractors
- 0 Presentations to insurance agents
- 1 Presentations to organizations or clubs
- 0 Presentations to real estate agents
- 0 References available in the library
- 1 Shopping mall displays
- 1 Special events (e.g., ~~T~~ornado Awareness Week+)
- 0 Technical advice from community staff
- 0 Telephone book/~~Y~~ellow Book+
- 2 Utility bill stuffers
- 1 Videos/Cable TV programs
- 0 Visits to a home by community staff
- 6 Web site with links to other sources
- 6 Other: Radio public service announcements

Other: _____

Handout used to determine the best ways for a public information program to convey messages to residents and businesses.



CRS credit: The Community Rating System provides 200 points for a public information program strategy. The CRS provides the most credit for direct mailings to floodplain residents. Credit also favors newsletters, websites, libraries, and providing map information and technical assistance. 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.
2. Outreach projects, newsletters, libraries and websites can reach a lot of people, but most communities are not including much hazard or mitigation information in their current activities.
3. Current practices that disclose hazards to buyers of property are either dependent on the seller or provide the information late in the process.
4. The most important topics to cover in public information activities are:

Family preparedness.

Protecting water quality.

Flood safety precautions.

Winter storm and thunder storm safety precautions.

Warning signals.

Beautify the riverfront.

Safety in vehicles.

5. The preferred ways to get the messages out are:

- Newspaper articles.
- County-wide newsletter.
- Website with links to other sources.
- Radio public service announcements

9.7. Recommendations

1. Public information activities should advise people about ways to protect themselves and their properties from natural hazards. They should also cover ways to protect natural features, such as streams and water quality. Special attention should be given to floodplain management issues.

2. County and municipal offices should use their newsletters, cable TV resources, and websites to distribute information. They should also get the mitigation messages out via handouts, brochures, news releases, mass mailings, and presentations to organizations.
3. Each County office and municipality should review their current public information activities and incorporate the messages in them, where appropriate.
4. County and interested municipal staff should initiate discussions with the Association of Realtors to review ways to better inform people of the natural hazards that properties are exposed to.
5. The County should provide an order form for municipalities and local and college libraries to order free state and federal hazard mitigation publications.
6. The County should develop a master list of website links and include it on a county hazards awareness page. Community websites should include local information and link to the County's site.

9.8. References

1. Brochures, flyers, websites, and other Kankakee County public informational materials.
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. *Guide to Flood Protection in Northeastern Illinois (Homeowner's booklet)*, Illinois Association for Floodplain and Stormwater Management, 1997
6. Municipal and library websites, questionnaires and interviews, Spring 2005.
7. Survey and interviews on local public information programs, Spring, 2005.
8. *Stormwater Management Public Information Resource Guide*, South Suburban Mayors and Managers Association, 1999

A complete list of references recommended for local libraries is found in Section 354 in the *CRS Coordinator's Manual*.

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Chapter 10. Action Plan

10.1. Background

The culmination of the Kankakee County *Natural Hazards Mitigation Plan* is the series of action items presented in this chapter. The goals and priorities of the overall program are outlined here. Specific activities pursuant to the goals and priorities are detailed in Sections 10.2 – 10.4. These sections assign recommended projects and deadlines to the appropriate offices.

Note: *A table listing all Action Items, their descriptions, anticipated project resources, their contribution to the mitigation strategy, and each actions current status and accomplishments since the previous plan is in Appendix C – Action Plan Table of this document.*

Goals: The overall directions can be summarized under the five goals established by the Community Development Subcommittee and listed at the end of Chapter 4:

1. Protect the lives, health, safety, and welfare of the people of Kankakee County from the dangers of natural hazards.
2. Place a priority on protecting public services, including critical facilities, utilities, roads, and schools.
3. Educate people about the hazards they face and the ways they can protect themselves, their homes, and their businesses from those hazards.
4. Manage future development to minimize the potential for damage from natural hazards and adverse impacts on other properties.
5. Preserve and protect the rivers and floodplains of the County.

General recommendations appear at the end of Chapters 5 – 9 for each of the five general mitigation strategies. This chapter converts those general recommendations to specific action items, for the most part following the same order as Chapters 5 – 9.

Priorities: The Task Force reviewed and discussed many things that can be done to protect people and property from the natural hazards introduced in Chapter 2. It was recognized that priorities must be set so the County’s and municipalities’ resources can focus on those activities that will do the most good. Accordingly, five factors were used to prioritize what should be pursued:

1. **The greatest threats:** Efforts should focus on those hazards that present the greatest threats to the County. Chapter 3 reviewed the County’s vulnerability to the eight hazards and summarized in section 3.13.
 - a. The natural hazard that causes the most property damage is overbank flooding. Overbank flooding affects the County, Kankakee, Bradley and Bourbonnais the most. Affected to a lesser extent are Aroma Park, Manteno,

Momence, and Sun River Terrace. Repetitive flood losses are almost all along the Kankakee River, in the unincorporated areas of the County. Other municipalities may have an overbank flood hazard, but current floodplain maps do not provide complete coverage of the County.

- b. Local drainage and thunderstorms come in second in causing property damage. The expected average annual property damage from tornadoes, earthquakes, winter storms and drought/heat is relatively minor. Wildfires deserve attention in Pembroke and St. Anne townships.
- c. Tornadoes potentially cause the most economic disruption. However, on a regular basis, winter storms are more disruptive and more costly to local governments more than the other hazards due to plowing and power losses.
- d. Tornadoes and drought/heat kill more people, but from overall life, safety, and health concerns, more attention should be given to winter storms and thunderstorms.

2. **Appropriate measures:** The recommended action items need to be appropriate for the type of threat presented. For example, Chapter 3's analysis notes that the major threat presented by floods and local drainage problems is property damage, so property protection and preventive measures, such as retrofitting and code enforcement should be directed toward those hazards.

On the other hand, the threat presented by winter storms and thunderstorms is primarily a life safety one. Appropriate measures for life safety threats are emergency warning and public information activities.

3. **Costs and benefits:** The Task Force considered the costs and relative benefits of alternative measures. These factors are listed in the description of each action item. It is desirable to list costs in terms of dollars, but most of the recommendations involve staff time rather than the purchase of equipment or services that can be readily measured in dollars.

In many cases, benefits, such as lives saved or future damage prevented, are hard to measure in dollars, so narrative discussions are provided. In all cases, the Task Force concluded that the benefits (in terms of reduced property damage, economic harm prevented, lives saved, and/or health problems averted) outweighed the costs for the recommended action items.

4. **Affordability:** Not only must the benefits exceed the costs, the projects must be affordable given the County's and municipalities' available resources and staffing. In some cases, the total cost was not clear, so an action item recommends pursuing more information. Action item 13, for example, calls for more research on the installation and annual maintenance costs of another river gauge.

5. **Environmental impact:** The impact of a project on both the natural and human environment was considered. Projects such as acquiring and clearing large floodprone

areas were discarded because of the disruption they would cause to existing communities and neighborhoods. Action item 18 is primarily a list of measures to follow to prevent adverse environmental impacts from flood control projects.

Based on these factors, the Task Force prioritized the possible activities that could be pursued. Some possible projects, such as dredging the length of the Kankakee River, were not pursued because they did not meet the above criteria. The result is 26 action items that address the major hazards, are appropriate for those hazards, are cost-effective, are affordable, and have minimal impact on the human and natural environment.

Action items: Twenty-four action items are recommended in the following pages. Each action item starts with a short description, followed by five subheadings that identify

Earlier sections of this *Plan* that discuss the topic and make recommendations
The agency or office responsible for implementing the action item,
The deadline for accomplishing the action item,
The cost of implementation, and
The benefits of implementing the action item.

All of the action items can be tied to the above listed goals and the recommendations in Chapters 5 ó 9. These relationships are shown in the table on page 10-19. These recommendations and the discussions in the earlier chapters provide more background and direction on each action item.

Section 10.2 identifies administrative tasks needed to administer and support *Plan* implementation. Section 10.3 includes the 18 programmatic action items that are recommended. Section 10.4 lists four public information action items that form the public information program strategy credited separately by the Community Rating System. Sections 10.5 and 10.6 provide proposed resolutions for the County Board and City Councils/Village Boards to pass to put the Action Plan in effect within their jurisdiction.

10.2. Administrative Action Items

This section identifies three action items that are needed to administer and support the recommendations of the rest of this chapter: adopting the *Plan*, charging the Community Development Subcommittee with monitoring its implementation, and applying to the Community Rating System to receive recognition and provide an additional incentive for implementation of the action items.

1. Plan Adoption: The County, each municipality, and Kankakee Community College will adopt this *Natural Hazards Mitigation Plan* by passing the resolution in Section 10.5 or 10.6, as appropriate. The County's resolution charges the Planning Department with the tasks described in the next action item. The municipal resolutions adopt the action items that are pertinent to the community and assigns a person responsible for them.

Responsible office: County Board, Village Boards and City Councils, Kankakee Community College Board of Trustees.

Deadline: September 1, 2013

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.

2. Monitoring and Reporting: A plan is worthless if there is no instrument for ensuring that it is carried out. Accordingly, the Kankakee County Regional Planning Commission is proposed to monitor the implementation of this *Plan*, report to the County Board and municipalities on its progress, and recommend revisions to this *Plan* as needed. The Commission would:

- Act as a forum for hazard mitigation issues,
- Disseminate hazard mitigation ideas and activities to all participants,
- Monitor implementation of this Action Plan,
- Report on progress and recommended changes each year to the County Board and each municipality, and
- Draft the five-year update mandated for continued FEMA recognition of the *Plan*.

The Commission would not have any powers over County or municipal staff. It would be purely an advisory body. Its primary mitigation duty is to collect information and report to the County Board, the municipalities, and the public on how well this *Plan* is being implemented.

The Commission would be, in effect, Kankakee County's hazard mitigation conscience, reminding the 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.

The resolution in Section 10.6 calls for each municipality to appoint a mitigation liaison who is to attend the meetings of the Commission when it reviews mitigation issues. The liaison is to report on his or her community's activities and provide input for the annual plan implementation progress reports.

Responsible office: Chair, Kankakee County Regional Planning Commission and each municipality. Staff support for the Commission and drafting the reports will be provided by the County Planning Department.

Deadline: The annual progress report would be due by September 30 of each year, the same deadline that other progress reports are due to 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* will be evaluated in light of progress, changed conditions, and new opportunities.

3. Community Rating System: With help from the Insurance Services Office, the Planning Department will develop an abbreviated application to the Community Rating System that includes those activities undertaken by communities in Kankakee County and/or are recommended by this *Plan*. The Department will host a workshop to review the application. Participants will determine whether to apply for a Community Rating System flood insurance premium rate discount. If so, they would submit an application.

Background information: Section 1.5.

Responsible office: Kankakee County Planning Department. 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, 2014.

Cost: Staff time.

Benefits: There are many benefits to CRS participation, as explained in Section 1.4. In addition to saving residents money, the CRS has been shown to provide an effective incentive to implement and maintain floodplain management activities, even during times of drought.

10.3. Program Action Items

4. Development Regulations: As comprehensive plans, zoning ordinances, and subdivision ordinances are being revised by the County and the municipalities, the following provisions should be incorporated into them:

- Setting aside floodplains and wetlands as open space,
- Requiring utility lines to be buried,
- Requiring drainageways to have maintenance easements or otherwise be set aside from development,
- Identifying who is responsible for maintenance activities in easements,
- Requiring new manufactured housing communities to have storm shelters, and
- Requiring developers to contribute to a fund that will pay for appropriate hazard protection measures, such as rain gauges and outdoor warning systems.

Background information: Sections 5.1 – 5.6, 5.9 (recommendations 1 and 2), 7.2, and 7.7 (recommendation 4).

Responsible office: County Planning Department, municipal planners or engineers.

Deadline: The County Planning Department will provide model ordinance language to the Spring 2014 mitigation review meeting of the Regional Planning Commission. Communities will review the language and incorporate it as appropriate when their 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.

5. Building Code Improvements:

Aroma Park, Grant Park, and Hopkins Park should adopt the latest International series of codes (I-Codes), the new national standard that is being adopted throughout the country.

Bradley and Herscher should request a Building Code Effectiveness Grading Schedule (BCEGS) survey. The other communities should request one after they have adopted the I-Codes.

Kankakee Community College should require that all construction projects receive a building permit from the City of Kankakee, thereby assuring that the latest I-Code standards will be met.

Every community should update its building code at least every five years.

Background information: Sections 5.3, 5.9 (recommendations 3, 4 and 5).

Responsible office: County Planning Department, municipal building or code enforcement offices, Kankakee Community College Physical Plant.

Deadline: The first three actions should be completed by January 1, 2014.

Cost: Staff time.

Benefits: Adoption of the I-Codes 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. A new BCEGS rating will better convey the community's code administration program and identify if there are any weaknesses that should be addressed.

6. Regulation Administration: While current regulatory programs appear to be well administered, the following improvements would help:

- Code administrators need to ensure that newly installed manufactured homes, especially those in manufactured housing communities, are being properly installed to

protect them from wind damage and that all provisions of their floodplain management regulations are being enforced.

- This is particularly important for the County, Essex, Hopkins Park, Kankakee, and Manteno, which have large numbers of manufactured homes.
 - Aroma Park, and Kankakee should ensure that at least one regulatory staff member becomes a Certified Floodplain Manager (CFM®).
 - Bourbonnais, Bradley, and Manteno should ensure that their CFMs obtain the training needed to keep their certification.

Background information: Sections 5.4 – 5.5, 5.9 (recommendations 7 and 9).

Responsible office: County Planning Department, municipal building or code enforcement offices.

Deadlines: Ongoing. The CFM exam is given several times each year.

Cost: Staff time. The CFM exam is \$100 per person plus Association dues (\$20/year). There could also be a cost for the required continuing education, depending on how the credits are earned.

Benefits: Closer scrutiny of manufactured housing installation will help ensure that they are securely connected to the foundation and protected from flooding. Certification will ensure that staff understands their responsibilities under the National Flood Insurance Program.

7. Floodplain Mapping: This item has been completed.

8. Stormwater Management: This item has been completed.

9. Property Evaluations: Each entity should assess its critical facilities and publicly owned buildings and their insurance policies for exposure to damage from:

- Flooding,
- High winds,
- Lightning,
- Hail,
- Power losses from downed lines, and
- Other natural and technological hazards, as appropriate.

Nearby Kane County is developing a checklist for a similar project. FEMA's new National Mitigation Data Collection Tool provides software to help record and analyze information related to flooding. These two activities should be reviewed to determine the appropriate evaluation tools and approach for Kankakee County. 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 IDNR, IEMA, or FEMA.

Background information: Sections 6.1 – 6.7 and 6.10 (recommendation 2).

Responsible office: County Planning Department and municipal engineers

Deadline:

Establish evaluation procedures by June 2014

Do at least 25% of the facilities within each jurisdiction each following year

Cost: Staff time.

Benefits: Keeping critical facilities and other public buildings operational during and after a natural disaster, hazardous materials spill, or other type of emergency is vital to public health and safety. This action item would provide a summary for each facility of its exposure to damage by natural hazards and other known 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 critical facility could exceed \$100,000 in repair costs and the ripple effect on other people and property.

10. Repetitive Loss Evaluations: The County will apply for funds to support an evaluation of all 124 properties in the 16 repetitive loss areas. If funded, the County will conduct a field survey to collect more data on each property. The data will be recorded in FEMA's new software for mitigation of repetitive loss properties, which will provide more detailed mitigation recommendations than those in Chapter 6. The owners will be contacted before this work.

Each owner will receive a report itemizing what could be done to reduce the building's exposure to repetitive flooding. If the recommendations are for acquisition or elevation of the structure, and it can be shown that the project would be cost-effective, funding assistance could be applied for from IDNR, IEMA, or FEMA.

Background information: Sections 3.4, 6.1 – 6.8 and 6.10 (recommendation 6).

Responsible office: County Planning Department, with support from Kankakee and Aroma Park for the properties in their jurisdiction.

Deadline: Apply for funding by the deadlines for the Flood Mitigation Assistance, Pre-Disaster Mitigation, and Hazard Mitigation Grant Programs, as appropriate.

Cost: Based on a similar project underway in Kane County, it is expected that this project would cost \$30,000. It would be dependent on funding support from one of FEMA's mitigation programs.

Benefits: Repetitive flooding takes its toll on people and property and leads to deterioration of neighborhoods over time. Reducing the damage caused by repetitive flooding will address the number one reason why the National Flood Insurance Program has to raise premium rates. Lower cost projects can be funded by the owners, resulting in no cost to

the County or municipality. If an acquisition or elevation project is recommended, a favorable benefit/cost ratio is a prerequisite for financial assistance.

11. Property Protection Assistance: The findings in action item 10, Repetitive Loss Evaluations, will provide more detailed information on appropriate property protection measures for typical floodprone buildings in the County. Some of these will necessitate state or federal funding support, while others could be accomplished at relatively low cost, such as:

- Berms and regrading for shallow surface flooding,
- Local drainage improvements,
- Clearing defensible space and retrofitting buildings for wildfire protection,
- Sewer backup protection,
- Relocating furnaces and water heaters out of basements,
- Tornado safe rooms, and
- Installing lightning rods.

Implementing such projects would be greatly supported if there was technical and financial assistance. The funding sought for action item 10 will be used to help design a program of technical assistance and financial incentives (such as rebates or cost sharing) to encourage low cost property protection measures on private property. Alternatives will be explored and explained to the municipalities. Each community can opt for a level of involvement appropriate for its hazards and financial situation.

Background information: Sections 6.1 – 6.7, 6.10 (recommendation 5), 9.3, 9.5, and 9.7 (recommendation 1).

Responsible office: County Planning Department

Deadline: Present a proposed program, with funding alternatives, to the Spring 2015 meeting of the Regional Planning Commission, after completion of action item 10.

Cost: Staff time to review and develop appropriate alternatives would be supported by the funding sought for action item 10. The level of financial support depends upon the community's resources. It should be noted that road-related drainage improvement projects can be funded by Motor Fuel Tax budgets.

Benefits: In some cases, staff time to provide technical information is all that is needed to guide and motivate a property owner to construct or install a property protection measure. Using a 25% rebate level, for every dollar spent by the community, \$4 will be spent to protect a property from damage. Many Chicago area communities have found these approaches 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.

12. Tree City USA: Each municipality will implement an urban forestry program that qualifies it 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 6-9:

- A tree board or department,
- A tree care ordinance,
- A forestry program with an annual budget of at least \$2 per capita, and
- An Arbor Day observance and proclamation.

Kankakee and Momence are already Tree City USA, designees, so this action item is for them to maintain their eligibility.

Background information: Sections 6.5 and 6.10 (recommendation 4).

Responsible office: To be designated by the municipality& adopting resolution.

Deadline: Incorporate the program into the fiscal year 2015 budget cycle.

Cost: \$2 per capita, staff time. It should be noted that some communities already spend this much or more on tree trimming contracts or related work.

Benefits: In addition to improving a community& appearance, an active urban forestry program will address the major problems caused by winter storms and high winds ó loss of power, telephone and cable services and damage to vehicles and buildings due to falling trees or limbs.

13. Flood Warning and Response: EMA will review what is needed to install new gauges or otherwise improve the County& flood threat recognition system. It will also explore preparing a flood stage forecast map for one or more stretches of the County& major rivers. The map will show areas that will be inundated at various flood levels and will identify properties and roads that will be affected. The map will be reviewed with affected agencies and ócalibratedö to historical floods.

Background information: Sections 7.1 – 7.4 and 7.7 (recommendations 1 and 6).

Responsible office: County EMA will take the lead with support from the Planning Department& GIS staff, the County Highway Department, and each affected municipality and township.

Deadline: Report on findings at the Spring 2014 meeting of the Regional Planning Commission.

Cost: Staff time.

Benefits: Early recognition of an impending flood can save lives and prevent property damage. A flood stage forecast map can quickly show the impact of a predicted flood and help EMA, municipal, and township officials take appropriate actions before an area is

flooded. For example, ten minutes of warning would give local authorities time to close a road or evacuate a parking lot before they are flooded. The data collected from a new gauge would also help in evaluating watershed plans and models.

14. Outdoor Warning Systems: The County will establish a program to continue to install or upgrade outdoor warning systems. Priority funding should go to Hopkins Park, Cabery, and Irwin, the only municipalities that have no outdoor warning sirens or in the case of Hopkins Park, minimal warning sirens.

Background information: Sections 7.2 and 7.7 (recommendations 3 and 4).

Responsible office: County EMA

Deadline: Begin disbursement within two months of securing the funds.

Cost: An annual budget of \$24,000 is recommended.

Each municipality or fire district will need to provide an equal share to match the County's contribution.

Benefits: Outdoor warning systems are the most effective way to protect people who are outdoors and exposed to an impending hazard, such as a tornado or severe thunderstorm. By making such systems affordable for the smaller communities, many lives will be protected from such hazards. A cost-sharing approach will also ensure that new sirens will be consistent with EMA's standards.

15. Emergency Response Operations: To improve the County's and each municipality's abilities to respond to hazards, the following actions will be pursued:

The coordinator/liaison will attend EMA training and participate in exercises.

Municipal leaders will encourage residents to volunteer for CERT teams so they will have the expertise within their community, should a disaster occur.

The County EMA and the Planning Department will jointly develop post-disaster procedures for public information, reconstruction regulation and mitigation project identification.

The municipal coordinator/liaison will review their emergency management operations and:

- Identify where additional activities are needed to respond to natural hazards,
- Ensure that all relevant offices and agencies are given clear and coordinated instructions,
- Ensure they have access to information on all critical facilities and update that information annually,
- Develop arrangements to provide and receive aid from other communities' permit departments to assist in post-disaster damage assessment and building inspection, and
- Attend training on damage assessment and post-disaster mitigation activities,

County EMA will invite the municipal coordinator/liaisons to an exercise at least once a year.

Background information: Sections 7.1 – 7.5 and 7.7 (recommendations 2, 9, and 10).

Responsible office: County EMA, municipal coordinator/liaisons

Deadline:

Each municipality will identify its emergency management coordinator/liaison when it passes its resolution to adopt this *Plan* [see Section 10.4].

County EMA will host a county-wide meeting of emergency personnel and review procedures, mutual aid arrangements, and training needs by February 28, 2015.

Cost: Staff time.

Benefits: Emergency response plans that have been carefully prepared, that utilize the latest planning and management tools, that are coordinated with the affected municipalities, and that are regularly exercised will greatly improve local disaster response capabilities. Better disaster response means less loss of life, injury to people and damage to property.

16. Fire Protection Operations: The Essex, Salina, and Pembroke Fire Protection Districts will review the criteria for the Insurance Services Officesøfire department classification system. They will determine whether they have been accurately scored and, if so, they will identify steps to take that will improve both their operations and their insurance classification.

Background information: Sections 7.3 – 7.4 and 7.7 (recommendation 8).

Responsible office: Essex, Salina, and Pembroke Fire Protection Districts, with support from the Kankakee Valley Fire Chiefs Association.

Deadline: Conduct the review by February 28, 2014.

Cost: Staff time.

Benefits: The review will identify any shortcomings and needs of the districts.

If they are corrected, their constituents will be better protected from urban and wild fires and will benefit from reduced insurance premiums.

17. Small Flood Control Projects: When drainage improvement, flood control, or bridge and culvert repair projects are pursued, the following guidelines will be used:

- Wherever possible, flood and drainage protection measures will be incorporated into road, street, bridge and culvert improvement projects.
- Each project& study should look beyond the immediate project site to ensure that no other properties will be adversely impacted.
- Each project& study should consider protecting and improving the natural functions of the stream and floodplain, in addition to flood protection.
- The design and construction should be certified by a licensed professional engineer.
- All relevant federal, state and local permits must be obtained.
- Communities and property owners that may be affected by the project should be notified.

Background information: Sections 8.1 – 8.4 and 8.9 (recommendations 1 and 2).

Responsible office: County Engineer, municipal engineers and public works directors

Deadline: Ongoing

Cost: The cost of each project will vary and may well be part of operational or street maintenance budgets.

Benefits: The benefits of each project will vary, but this approach ensures that the projects selected will provide the most protection for the cost. Several of the listed criteria assure that adverse impacts will not be transferred on to neighboring or downstream properties.

18. River Restoration Projects: The Corps of Engineers should implement its planned projects to remove sediment and restore habitat at Six-Mile Pool and the State line.

Background information: Sections 8.5 and 8.9 (recommendation 3).

Responsible office: The Planning Department, Kankakee River Basin Commission, and the US Army Corps of Engineers, Rock Island District

Deadline: The Planning Department and the Commission will provide a report on the Corps& progress by the Spring 2014 meeting of the Regional Planning Commission.

Cost: Staff time.

Benefits: The primary benefit will be improved habitat, but there will be secondary flood protection benefits from the removal of sediment and the provision of some upstream flood storage.

19. Drainage System Maintenance: Each municipality, in coordination with appropriate active drainage districts, will implement a formal and regular drainage system maintenance program. This would involve mapping the local drainage system, determin-

ing which areas can be accessed for inspection and maintenance, preparing procedures modeled on Community Rating System and IDNR 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.

Background information: Sections 8.7 and 8.9 (recommendations 4 and 5).

Responsible office: Municipal public works departments, Kankakee Community College Physical Plant, active drainage districts. Model procedures will be developed by the Planning Department based on CRS and IDNR guidance.

Deadline: Develop the model procedures by March 31, 2015, in conjunction with the CRS workshop (action item 3).

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 a great deal of flood damage, closed streets, and threats to people.

20. Water Use Management: The Regional Planning Department, the Kankakee River Basin Commission, and Aqua-Illinois Water Company will review the long term potential for a shortage in water supplies and diversion of water to other areas. A report will be prepared that summarizes the potential problems, analyzes alternative solutions, and makes recommendations to the County Board, city councils, and village boards.

Background information: Sections 2.7, 3.10, 5.7, and 5.9 (recommendation 11).

Responsible office: The Planning Department, the Kankakee River Basin Commission, and Aqua Illinois Water Company, with support from municipal water departments.

Deadline: Draft the study for presentation to the Regional Planning Commission by August 2015.

Cost: Staff time.

Benefits: The study will shed light on the problem and the possible solutions. It will help inform the public and elected officials provide a factual basis for action by the local governments and water suppliers. Such actions may prevent or reduce the adverse impacts of a drought on people, property, and habitat.

10.4. Public Information Program Strategy

21. Messages and Templates: The County Planning Department and EMA, with help from members of the Community Development Subcommittee, will prepare background information, articles, templates and other materials that can be used by anyone to communicate hazard mitigation topics, including:

The natural hazards that threaten Kankakee County,
What the sirens and warnings mean,
Safety and health precautions for all types of hazards,
Emergency and permanent property protection measures,
Floodplain management and flood insurance information,
The benefits of preventive measures and the need for all projects to get permits,
What government agencies are doing and how they can help, and
Protecting streams, water quality, wetlands and open spaces.

These materials are to be provided to County, municipal, school, Red Cross, and private offices for use in presentations, newsletter articles, webpages, brochures and other outreach projects.

Background information: Sections 5.9 (recommendation 6), 6.7, 6.10 (recommendation 1), 7.1 – 7.3, 7.7 (recommendation 7), 9.5, and 9.7 (recommendation 1).

Responsible office: County Planning Department and EMA

Deadline: Ongoing.

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 the likelihood that the messages will get out. The messages will also be technically correct and consistent throughout the County.

22. County-Wide Activities: The following public information activities will be implemented on a county-wide basis:

Brochures or handouts on the hazards, safety precautions, and simple property protection measures,
Playing videos and short programs on the public access cable channel,
Putting more information on the County's website and adding links to other sites with relevant materials, and
An order form for free references that can be put in municipal offices and local and school libraries.

Background information: Sections 5.9 (recommendation 6), 6.7, 6.10, (recommendation 3), 9.1 – 9.5, and 9.7 (recommendations 2, 5 and 6).

Responsible office: County Planning Department and EMA

Deadline: Ongoing.

Cost: Staff time to prepare the materials. Some funding may be needed for reproduction of items like the brochures. Sponsorship could be sought from utilities or companies interested in hazard mitigation or public safety.

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.

23. Municipal Activities: Each municipality will review its needs, resources, and interest in CRS credits and will determine what public information activities it will implement. Municipalities will be supported with materials and templates provided by the County Planning Department that will help with the following:

- Articles in their newsletters,
- An annual mailing on flood protection to all residents of the floodplain,
- Appropriate handouts at permit offices for applicants and other interested parties,
- References in the local public library,
- Information and links on their website,
- Helping people obtain information from the Flood Insurance Rate Map,
- Providing technical advice to people interested in property protection,
- Making site visits to review drainage and other problems facing a property, and
- Annual Arbor Day celebrations pursuant to being a Tree City USA community.

Background information: Sections 6.5, 6.7, 6.9 (recommendations 1, 3 and 4), 9.1 – 9.5, and 9.7 (recommendations 2, 3 and 6).

Responsible office: Determined by each municipality.

Deadline: Ongoing

Cost: Staff time. There may be printing and mailing costs, depending on the extent of the project.

Benefits: Same as the previous action item.

24. Real Estate Disclosure: The County Planning Department will meet with the Association of Realtors to review ways to inform people of the natural hazards that

properties are exposed to. A special effort will be made to advise people to check out a site's flood hazard before they are committed to a purchase.

Background information: Sections 9.2 and 9.7 (recommendation 4).

Responsible office: County Planning Department

Deadline: The first meeting will be held by March 31, 2014.

Cost: Staff time.

Benefits: This action item has both a consumer protection benefit and a flood protection benefit. House hunters will be more aware of what they are purchasing and can ensure that they can afford flood insurance. They may even plan to retrofit or otherwise protect the property before they move in.

Action Items, Goals and Recommendations						
Action Item	Goal 1. Protect health and safety	Goal 2. Protect public services	Goal 3. Educate people	Goal 4. Manage future development	Goal 5. Protect rivers & floodplains	Chapter . Recommendation
10.2. Administrative Action Items						
1. Plan Adoption	X	X	X	X	X	All
2. Monitoring and Reporting	X	X	X	X	X	All
3. Community Rating System	X	X	X	X	X	All
10.3. Program Action Items						
4. Development Regulations	X	X		X	X	5-1, 5-2, 7-4
5. Building Code Improvements	X	X		X		5-3, 5-4, 5-5
6. Regulation Administration	X	X		X	X	5-7, 5-9
7. Floodplain Mapping	X		X	X	X	5-8
8. Stormwater Management	X			X	X	5-10
9. Property Evaluations	X	X				6-2
10. Repetitive Loss Evaluations	X	X	X		X	6-6
11. Property Protection Assistance	X	X	X		X	6-5, 9-1
12. Tree City USA	X	X	X	X		6-4
13. Flood Warning and Response	X	X				7-1, 7-6
14. Outdoor Warning Systems	X	X	X			7-3, 7-4
15. Emergency Response Operations	X	X	X			7-2, 7-9, 7-10
16. Fire Protection Operations	X	X				7-8
17. Small Flood Control Projects	X	X			X	8-1, 8-2
18. River Restoration Projects					X	8-3
19. Drainage System Maintenance	X	X	X		X	8-4, 8-5
20. Water Use Management	X	X	X	X	X	5-11
10.4. Public Information Strategy						
21. Messages and Templates	X	X	X	X	X	5-6, 6-1, 7-7, 9-1
22. County-Wide Activities	X	X	X	X	X	5-6, 6-3, 9-2, 9-5, 9-6
23. Municipal Activities	X	X	X	X	X	6-1, 6-3, 6-4, 9-2, 9-3, 9-6
24. Real Estate Disclosure	X		X	X	X	9-4
This table relates the 26 action items to the 5 goals of this <i>Plan</i> . The goals are stated in full on pages 4-6 and 10-1. The table also shows the relation between the action items and the recommendations at the end of chapters 5 . 9. For example action item 6, Regulation Administration, is drawn from recommendations 7 and 9 at the end of chapter 5.						

Appendix A. Public Involvement Activities

As noted in Chapter 1, many of the mitigation activities that were reviewed, and some that were recommended, require the cooperation of residents, businesses, and property owners to be effective. Because the public is important to the solution, it was involved in the mitigation planning effort. The public was kept abreast of developments through newspaper articles and the County's website. These efforts continually asked for input via the Mitigation Advisory Task Force and the website.

A.1. Mitigation Advisory Task Force

The Regional Planning Commission and its advisory task force included many non-government representatives. The Commission itself is composed of fifteen plan commissioners, thirteen of whom are not governmental employees or elected officials.

The Task Force was composed primarily of County staff and representatives from municipalities and fire protection districts (who represent the residents of their communities).

During the Spring and Summer of 2018 the Advisory Task Force and the Regional Planning Commission held meetings to discuss issues and review draft chapters of the *Plan*. Each meeting was publicized in accordance with County public meeting rules and posted on the County's website and Facebook Page (see page A-11). The public was always invited to attend.

<u>Date</u>	<u>Topics</u>
January 18	Organize
February 22	Involve the Public, Surveys
March 15	Assess the Hazards
April 19	Assess the Hazards, Evaluate the Problem
May 17	Evaluate the Problem
June 21	Set Goals
July 19	Review Mitigation Strategies
August 16	Draft the Plan

A.2. Newspaper Coverage

A news release was issued at the beginning of the planning process and was covered by local newspapers.

that typically serves 150 people six days a week and daily food giveaway for the needy along with many others. Current locations of The Salvation Army drop boxes throughout Kankakee County.

County seeks public input

Kankakee County is in the process of updating the existing Kankakee County Natural Hazards Mitigation Plan. With re-adoption of the plan, Kankakee County and its municipalities will maintain their eligibility to apply for federal funding towards natural hazard mitigation projects. This local planning process includes a wide range of representatives from city and county government and emergency management personnel.

A natural hazards mitigation plan provides communities with a set of goals, action items and resources designed to reduce risk from future natural disaster events.

Engaging in mitigation activities provides jurisdictions with a number of benefits, including reduced loss of life, property, essential services, critical facilities and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within the community through the planning process; and increased potential for state and federal funding for recovery and reconstruction projects.

To comment on hazard mitigation planning, visit <http://k3countymitigation.k3countynet>.

A survey is available on the website for citizens to provide information about their natural hazard experiences in Kankakee County. This information will be utilized in updating the plan. The survey will be available until July 5, 2013.

A draft version of the Kankakee County Natural Hazards Mitigation Plan will be available for formal public comment in July. Copies of the plan will be available on the planning department's websites.

For more information regarding the Kankakee County Natural Hazards Mitigation Plan or the update process, contact Delbert Skimerhorn, planner, at 1-815-937-2940 or email Delbert.Skimerhorn@k3countynet.

KCC South Extension Center

Kankakee Community College's new South Extension Center opened its June 3, 2013 at 1488 E. Walnut St. in Wauseka, adjacent to Riverside Medical Center. A grand opening celebration will be held Wednesday, June 26 from 4:30 to 7 p.m., with remarks at 5:45 p.m. The public is invited and refreshments will be served.

KCC's former Iroquois County Satellite Center moved from 1001 E. Grant St., Wauseka to the new location and was re-

Submitted photo with Ashlyn Roggenbuck and Kynden McKay during camp last year (above). River Valley still has openings for camp. For more information call the SRA office at 1-815-933-7336. The camp is funded partly by a grant the SRA received from the Community Foundation of the Kankakee River Valley.

Win a tractor and more added to Tractors for a Cure

Submitted photo Win a 1963 Allis Chalmers D-17 Series 3 tractor at the third annual Tractors for a Cure event, Saturday, July 13, 2013 from 9 a.m. until midnight at Freeman's Park, Beecher. Raffle tickets for the tractor are \$10 each. All proceeds from the TFAC event and raffle go to the American Cancer Society to help find a cure for cancer. This year's event is once again family oriented. Lunch and dinner are included in the ticket price. Tickets/wrist bands are \$25 for ages 13 and over and \$15 for children ages 5-12. Kids 5 and under enter free with a paying parent. There will be a silent and live auction, tractor poker run, a cancer ribbon of tractors in a local farm field and parade at 1 p.m. Entertainment will be provided by DJ Misty Maves beginning at 9 a.m. Added to the schedule of events is Bernie Glim and the County Roads Band from 4-7 p.m. The Greg Schneider Band will perform at 8 p.m. and the candlelight event and tribute video with the Stockyard Kitty Band begins at 9 p.m. New this year will be a bean bag tournament at 1 p.m. with registration at 11 a.m. The Color Guard with Amvets Post 67, National Anthem and Tribute to Troops will begin at 6 p.m. Several residents will be open from 4 p.m. to midnight. For more information, contact Dean Betterhausen at 1-708-243-8877, visit www.tractorsforacure.com or like them on Facebook.

Mosquito spraying

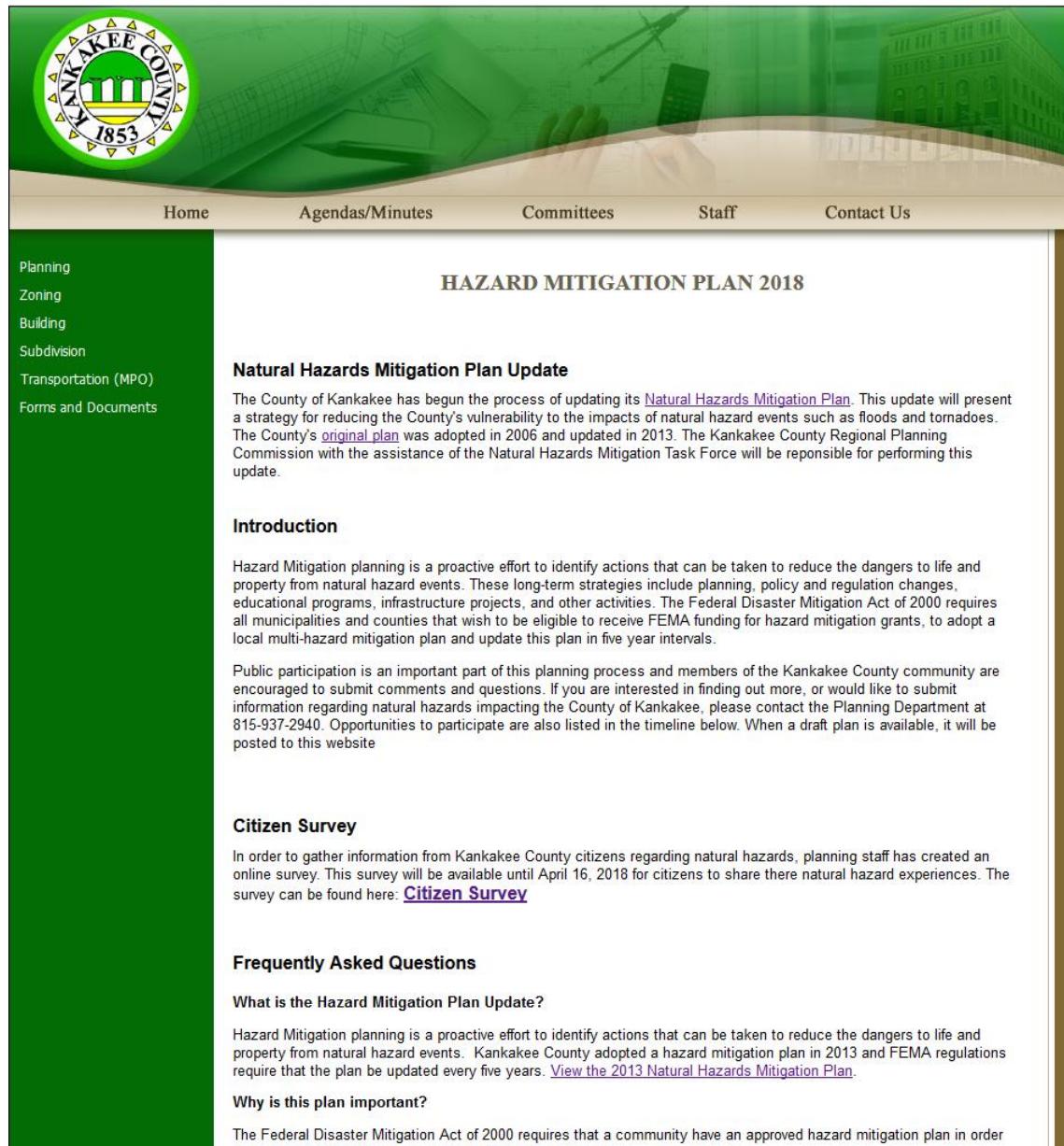
KCC is offering college credit, continuing education, GED and adult education classes at the site. In addition to classes, students can register, meet KCC's main campus at 1-815-802-8500.



A.3. Website

The Planning Department established a mitigation planning page on the County's website (<http://planning.k3county.net/hmplan2018.html>). It included an overview of the process, the members of the Mitigation Advisory Task Force, the schedule of Task Force meetings, and (after it had been reviewed by the Task Force) the draft plan.

The website also had a survey whereby people could submit information on their experiences with natural hazards and could offer suggestions for mitigation activities. Even though this was publicized, few took advantage of it. Excerpts from the website are included here.



The screenshot shows the Kankakee County website with a green header featuring the county seal. The main content area is titled "HAZARD MITIGATION PLAN 2018". It includes sections for "Natural Hazards Mitigation Plan Update", "Introduction", "Citizen Survey", and "Frequently Asked Questions". The "Natural Hazards Mitigation Plan Update" section contains text about the update process and the original plan adopted in 2006. The "Introduction" section provides an overview of hazard mitigation planning. The "Citizen Survey" section links to an online survey. The "Frequently Asked Questions" section includes a question about the hazard mitigation plan update.

HAZARD MITIGATION PLAN 2018

Natural Hazards Mitigation Plan Update

The County of Kankakee has begun the process of updating its [Natural Hazards Mitigation Plan](#). This update will present a strategy for reducing the County's vulnerability to the impacts of natural hazard events such as floods and tornadoes. The County's [original plan](#) was adopted in 2006 and updated in 2013. The Kankakee County Regional Planning Commission with the assistance of the Natural Hazards Mitigation Task Force will be responsible for performing this update.

Introduction

Hazard Mitigation planning is a proactive effort to identify actions that can be taken to reduce the dangers to life and property from natural hazard events. These long-term strategies include planning, policy and regulation changes, educational programs, infrastructure projects, and other activities. The Federal Disaster Mitigation Act of 2000 requires all municipalities and counties that wish to be eligible to receive FEMA funding for hazard mitigation grants, to adopt a local multi-hazard mitigation plan and update this plan in five year intervals.

Public participation is an important part of this planning process and members of the Kankakee County community are encouraged to submit comments and questions. If you are interested in finding out more, or would like to submit information regarding natural hazards impacting the County of Kankakee, please contact the Planning Department at 815-937-2940. Opportunities to participate are also listed in the timeline below. When a draft plan is available, it will be posted to this website

Citizen Survey

In order to gather information from Kankakee County citizens regarding natural hazards, planning staff has created an online survey. This survey will be available until April 16, 2018 for citizens to share their natural hazard experiences. The survey can be found here: [Citizen Survey](#)

Frequently Asked Questions

What is the Hazard Mitigation Plan Update?

Hazard Mitigation planning is a proactive effort to identify actions that can be taken to reduce the dangers to life and property from natural hazard events. Kankakee County adopted a hazard mitigation plan in 2013 and FEMA regulations require that the plan be updated every five years. [View the 2013 Natural Hazards Mitigation Plan](#).

Why is this plan important?

The Federal Disaster Mitigation Act of 2000 requires that a community have an approved hazard mitigation plan in order to qualify for federal funding from the following grant programs:

A.4. Public Meeting

On July 23, 2013, the Task Force held a public meeting to hear comments on the draft Natural Hazards Mitigation Plan.

A.5. Survey Results

To gather public input on hazard mitigation activities, the Planning Department created an online survey for citizens to complete. The survey was available for over five months and 13 responses were received. Below is a synopsis of those responses.

Question 1: Please indicate your age. ó 7.7% were 18 to 30, 23.1% were 31 to 40, 7.7% were 41 to 50, 30.8% were 51 to 60, and 30.8% were 60 and over.

Question 2: Gender. ó 53.8% were male, and 46.2% were female.

Question 3: Please indicate what area of Kankakee County you live in. - The largest number of respondents were from the Village of Aroma Park (30.8%) and Unincorporated Kankakee County (23.1%) had the next highest. In third was the City of Kankakee and the Village of Manteno each with 15.4%. The rest were scattered throughout the County.

Question 4: If you answered unincorporated Kankakee County for question 3, which township do you live in? - The respondents were equally dispersed between Kankakee, Yellowhead, Limestone, Manteno, and Bourbonnais.

Question 5: How long have you lived in the County? ó The majority of respondents have lived in the county more than 20 years (61.5%).

Question 6: Have you been impacted by a natural hazard in the last 5 years while living or working in Kankakee County? Most respondents indicated that they had been impact by natural hazards in the last 5 years in some fashion.

Question 7: Please rank how prepared you feel you and your household are for the probable impacts of natural hazard events. ó Most respondents felt they are prepared (53.8%).

Question 8: Why do you think you are prepared for the probable impacts from natural hazards? ó The majority of respondents indicated that locally provided news and media information made them prepared for natural hazards (61.5%).

Question 9: In the past 10 years, which of the following natural hazard events have you or someone in your household experienced within Kankakee County? ó Property flooding and Drought topped the lists.

Question 10: Information on the impacts of and how to prepare for a natural disaster can be disseminated to the public in various ways. Of the methods, please identify the top 3

ways which would be most effective. ó Social Media and Text Messaging topped the list followed by television and radio.

Question 11: Are you currently signed up for Kankakee County's text alert system. ó 53.8% of the respondents indicated that they are not subscribers of the system.

Question 12: Do you currently have any of the following disaster and emergency plans and procedures in place. ó 58.3% said their home has an emergency plan, 41.7% said their workplace had an emergency plan. 25% have a disaster supply kit in their home and 17% have a disaster supply kit in their workplace. 83.3% stated they know how to shelter in-place in their home and 38% know how to shelter in-place at their workplace. 50% know evacuation routes from their homes and 33.3% know evacuation routes from their workplace.

Question 13: Is your property located in a designated floodplain? ó 84.6% stated ñnoö and 7.7% were not sure.

Question 14: Do you have flood insurance? ó 76.9% said ñnoö.

Question 15: If you do not have flood insurance, what is the primary reason? ó ñMy home is not in the floodplainö was the main answer (50%).

Question 16: Did you consider the impact a natural disaster could have on your home before you purchased / moved into your home? ó 76.9% stated they did consider natural disaster when purchasing their homes.

Question 17: Would the disclosure of this type of information influence your decision to purchase / move into a home? ó 92.3% stated that it would.

Question 18: If your property were located in a designated ñhigh hazardö area, or had received repeated damage from a natural hazard event, would you consider a ñbuy outö, elevation of the structure, or relocation offered by a public agency? ó 66.7% indicated yes for this question.

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Appendix B. Summary of Plan Changes

B.1. Summary of Plan Changes

The following is a brief summary of changes made in the 2013 Natural Hazards Mitigation Plan, Kankakee County, Illinois, from the 2006 version of the Plan:

Executive Summary: Updated with the new information from the plan.

Chapter 1 ó Introduction: New Task Force membership was provided and demographics from the 2010 census were added. A new county map and critical facilities information was added.

Chapter 2 ó Hazard Profile: Historical hazard data was updated to reflect conditions since 2006 including new maps and tables.

Chapter 3 - Vulnerability: New building values, insurance claims, and information on repetitive loss properties were added. Vulnerability to various hazards was reviewed and updated as needed.

Chapter 4 ó Goals: County and municipal plans and ordinances were reviewed and the Chapter was updated accordingly. A new goal setting exercise was performed and the plans goals were updated as needed.

Chapter 5 ó Preventative Measures: The Chapter was reviewed and local implementation sections were updated to reflect projects that have occurred since 2006.

Chapter 6 ó Property Protection: Insurance and repetitive loss information was updated.

Chapter 7 ó Emergency Management: Procedures were reviewed and updated as needed. New information concerning warning sirens was added, as well as, a new map showing their locations.

Chapter 8 ó Flood Control: Local implementation sections were updated to reflect changes since the 2006 plan.

Chapter 9 ó Public Information: Updated to reflect public information activities that were conducted as part of the update.

Chapter 10- Action Plan: The action Plan was reviewed and revised. Items that were completed since the previous plan have been noted.

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Appendix C. Action Plan Table

C.1 Action Plan Table

Actions	Projected Resources	Rational for Action	How Action Contributes to Mitigation Strategy	Update Status (2013)
10.2 Administrative Action Items				
Action 10.2.1 ó Plan Adoption	Staff Time ó General Revenue Funds	The County, each municipality, and Kankakee Community College will adopt this <i>Natural Hazards Mitigation Plan</i> by passing the resolution in Section 10.5 or 10.6, as appropriate. The County's resolution charges the Planning Department with the tasks described in the next action item. The municipal resolution adopts the action items that are pertinent to the community and assigns a person responsible for them.	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.	In progress, to be completed after FEMA, IEMA review.
Action 10.2.2 ó Monitoring and Reporting	Staff Time ó General Revenue Funds	A plan is worthless if there is no instrument for ensuring that it is carried out. Accordingly, the Kankakee County Regional Planning Commission is proposed to monitor the implementation of this <i>Plan</i> , report to the County Board and municipalities on its progress, and recommend revisions to this <i>Plan</i> as needed	The Commission would be, in effect, Kankakee County's hazard mitigation conscience, reminding the agencies and municipalities that they are all stakeholders in the <i>Plan</i> 's success. The resolution charges it with seeing the <i>Plan</i> 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.	On-going process throughout life of the plan.
Action 10.2.3 ó Community Rating System	Staff Time ó General Revenue Funds	With help from the Insurance Services Office, the Planning Department will develop an abbreviated application to the Community Rating System that includes those activities undertaken by communities in Kankakee County and/or are recommended by this <i>Plan</i> . The Department will host a workshop to review the application. Participants will determine whether to apply for a Community Rating System flood insurance	There are many benefits to CRS participation, as explained in Section 1.4. In addition to saving residents money, the CRS has been shown to provide an effective incentive to implement and maintain floodplain management activities, even during times of drought.	In progress. A workshop will be held in Spring 2014.

		premium rate discount.		
Actions	Projected Resources	Rational for Action	How Action Contributes to Mitigation Strategy	Update Status (2013)
10.3 Program Action Items				
Action 10.3.4 ó Development Regulations	Staff Time ó General Revenue Funds	County and municipal plans and ordinances provide the impetus for the implementation of many of the Hazard Mitigation Plans goals and actions.	The County Planning Department will provide model ordinance language to the Spring 2014 mitigation review meeting of the Regional Planning Commission. Communities will review the language and incorporate it as appropriate when their relevant plans and ordinances are up for review.	In progress. The model ordinance will be distributed in Spring 2014.
Action 10.3.5 ó Building Code Improvements	Staff Time ó General Revenue Funds	Updated building codes can help to mitigate potential hazards before they develop.	The County Planning Department will provide assistance to local municipalities wishing to update their codes.	In progress.
Action 10.3.6 ó Regulation Administration	Staff Time ó General Revenue Funds	Code administrators need to ensure that newly installed manufactured homes, especially those in manufactured housing communities, are being properly installed to protect them from wind damage and that all provisions of their floodplain management regulations are being enforced. Also, Aroma Park and Kankakee should ensure that at least one staff member is a Certified Floodplain Manager.	Closer scrutiny of manufactured housing installation will help ensure that they are securely connected to the foundation and protected from flooding. Certification will ensure that staff understands their responsibilities under the National Flood Insurance Program.	On-going.
Action 10.3.7 ó Floodplain Mapping	Staff Time ó General Revenue Funds	The County will work with FEMA, the Illinois Department of Natural Resources (IDNR), and the other communities in the National Flood Insurance Program to obtain a revised Kankakee County Flood Insurance Rate Map (FIRM).	An accurate, up to date FIRM is a prerequisite for managing new development, setting accurate insurance rates, and flood response planning.	Completed.
Action 10.3.8 ó Stormwater Management	Staff Time ó General Revenue Funds	The County Board and all municipalities should adopt and implement the new model stormwater management ordinance and appropriate best management practices.	Adoption of the new model and implementing its requirements as well as best management practices for government activities will reduce the adverse impacts	Completed.

			of runoff, prevent local drainage problems, protect natural areas, & ensure a consistent set of standards.	
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Actions	Projected Resources	Rational for Action	How Action Contributes to Mitigation Strategy	Update Status (2013)
Action 10.3.8 ó Property Evaluations	Staff Time ó General Revenue Funds	Each entity should assess its critical facilities and publicly owned buildings and their insurance policies for exposure to damage.	Keeping critical facilities and other public buildings operational during and after a natural disaster, hazardous materials spill, or other type of emergency is vital to public health and safety. This action item would provide a summary for each facility of its exposure to damage by natural hazards and other known 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 critical facility could exceed \$100,000 in repair costs and the ripple effect on other people and property.	On-going.
Action 10.3.10 ó Repetitive Loss Evaluations	Apply for funding for the Flood Mitigation Assistance, Pre-Disaster Mitigation, and Hazard Mitigation Grant Programs, as	The County will apply for funds to support an evaluation of all 124 properties in the 16 repetitive loss areas. If funded, the County will conduct a field survey to collect more data on each property. The data will be recorded in FEMA's new software for mitigation of repetitive loss properties, which will provide more detailed mitigation recommendations than those in Chapter 6. The owners will be contacted before this work.	Repetitive flooding takes its toll on people and property and leads to deterioration of neighborhoods over time. Reducing the damage caused by repetitive flooding will address the number one reason why the National Flood Insurance Program has to raise premium rates. Lower cost projects can be funded by the owners, resulting in no cost to the County or municipality. If an acquisition or elevation project is recommended, a favorable benefit/cost ratio is a prerequisite for financial assistance.	Apply for grant funding in 2014.

	appropriate .			
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Actions	Projected Resources	Rational for Action	How Action Contributes to Mitigation Strategy	Update Status (2013)
Action 10.3.11 ó Property Protection Assistance	Present a proposed program, with funding alternatives , to the Spring 2015 meeting of the Regional Planning Commission, after completion of action item 10.	The findings in action item 10, Repetitive Loss Evaluations, will provide more detailed information on appropriate property protection measures for typical floodprone buildings in the County. Some of these will necessitate state or federal funding support, while others could be accomplished at relatively low cost.	In some cases, staff time to provide technical information is all that is needed to guide and motivate a property owner to construct or install a property protection measure. Using a 25% rebate level, for every dollar spent by the community, \$4 will be spent to protect a property from damage. Many Chicago area communities have found these approaches 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.	In progress. To be presented to RPC in Spring 2015.
Action 10.3.12 ó Tree City USA	Staff Time ó General Revenue Funds	Each municipality will implement an urban forestry program that qualifies it 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 6-9	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 ó loss of power, telephone and cable services and damage to vehicles and buildings due to falling trees or limbs.	Incorporate program into fiscal 2015 budget.

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Actions	Projected Resources	Rational for Action	How Action Contributes to Mitigation Strategy	Update Status (2013)
Action 10.3.13 ó Flood Warning & Response	Staff Time ó General Revenue Funds	EMA will review what is needed to install new gauges or otherwise improve the County's flood threat recognition system. It will also explore preparing a flood stage forecast map for one or more stretches of the County's major rivers. The map will show areas that will be inundated at various flood levels and will identify properties and roads that will be affected. The map will be reviewed with affected agencies and ócalibratedö to historical floods.	Early recognition of an impending flood can save lives and prevent property damage. A flood stage forecast map can quickly show the impact of a predicted flood and help EMA, municipal, and township officials take appropriate actions before an area is flooded. For example, ten minutes of warning would give local authorities time to close a road or evacuate a parking lot before they are flooded. The data collected from a new gauge would also help in evaluating watershed plans and models.	To be completed by Spring 2014.
Action 10.3.14 ó Outdoor Warning System	General Revenue Funds	The County will establish a program to continue to install or upgrade outdoor warning systems. Priority funding should go to Hopkins Park, Cabery, and Irwin, the only municipalities that have no outdoor warning sirens or in the case of Hopkins Park, minimal warning sirens.	Outdoor warning systems are the most effective way to protect people who are outdoors and exposed to an impending hazard, such as a tornado or severe thunderstorm. By making such systems affordable for the smaller communities, many lives will be protected from such hazards. A cost-sharing approach will also ensure that new sirens will be consistent with EMA's standards	In progress.

Actions	Projected Resources	Rational for Action	How Action Contributes to Mitigation Strategy	Update Status (2013)
Action 10.3.15 0 StormReady	Staff Time 6 General Revenue Funds	The County will review the requirements for becoming a StormReady community. If the standards appear feasible, it will apply for the designation and will commit to maintaining the designation	As with the Community Rating System, StormReady can be used as a yardstick to ensure the County's programs meet national standards. By meeting the StormReady standards the County will be better able to detect impending weather hazards and disseminate warnings as quickly as possible. It is difficult to measure the resulting benefits of saving lives and preventing injuries and property damage.	Completed.
Action 10.3.16 6 Emergency Response Operations	Staff Time 6 General Revenue Funds	To improve the County's and each municipalities ability to respond to hazards, the county will develop post disaster procedures, review emergency management operations, and participate in training exercises.	Emergency response plans that have been carefully prepared, that utilize the latest planning and management tools, that are coordinated with the affected municipalities, and that are regularly exercised will greatly improve local disaster response capabilities. Better disaster response means less loss of life, injury to people and damage to property.	To be completed by February 2015.
Action 10.3.17 6 Fire Protection Operations	Staff Time 6 General	The Essex, Salina, and Pembroke Fire Protection Districts will review the criteria for the Insurance	The review will identify any shortcomings and needs of the districts.	To be completed

	Revenue Funds	Services Officesøfire department classification system. They will determine whether they have been accurately scored and, if so, they will identify steps to take that will improve both their operations and their insurance classification.		by February 2014.
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Actions	Projected Resources	Rational for Action	How Action Contributes to Mitigation Strategy	Update Status (2013)
Action 10.3.18 ó Small Flood Control Projects	General Revenue Funds	Ensure that certain criteria are met when local government pursue small flood control projects.	The benefits of each project will vary, but this approach ensures that the projects selected will provide the most protection for the cost. Several of the listed criteria assure that adverse impacts will not be transferred on to neighboring or downstream properties.	On-going.
Action 10.3.19 ó River Restoration Projects	Staff Time ó General Revenue Funds	The Corps of Engineers should implement its planned projects to remove sediment and restore habitat at Six-Mile Pool and the State line	The primary benefit will be improved habitat, but there will be secondary flood protection benefits from the removal of sediment and the provision of some upstream flood storage.	Progress report due Spring 2014.
Action 10.3.20	Staff Time ó General Revenue Funds	Each municipality, in coordination with appropriate active drainage districts, will 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 Community Rating System and IDNR program guidance, conducting an annual inspection, and removing	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 a great deal of flood damage, closed streets, and threats to	Develop model procedures by March 2015.

		debris as needed. It would include educating and working with homeowner associations and other non-governmental entities responsible for maintenance on their own properties.	people.	
Action 10.3.21	Staff Time 6 General Revenue Funds	The Regional Planning Department, the Kankakee River Basin Commission, and Aqua-Illinois Water Company will review the long term potential for a shortage in water supplies and diversion of water to other areas. A report will be prepared that summarizes the potential problems, analyzes alternative solutions, and makes recommendations.	The study will shed light on the problem and the possible solutions. It will help inform the public and elected officials provide a factual basis for action by the local governments and water suppliers. Such actions may prevent or reduce the adverse impacts of a drought on people, property, and habitat.	Draft study to be presented August 2015.

Actions	Projected Resources	Rational for Action	How Action Contributes to Mitigation Strategy	Update Status (2013)
10.4 Public Information Program Strategy				
Action 10.4.22 6 Messages and Templates	Staff Time 6 General Revenue Funds	The County Planning Department and EMA, with help from members of the Community Development Subcommittee, will prepare background information, articles, templates and other materials that can be used by anyone to communicate hazard mitigation topics.	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 the likelihood that the messages will get out.	On-going.
Action 10.4.23 6 County-Wide Activities	Staff Time 6 General Revenue Funds & Donations	The county will partner with municipalities and utility companies to develop and distribute brochures and handouts pertaining to hazards that affect Kankakee County including ways to mitigate these hazards.	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.	On-going.

Action 10.4.24 ó Municipal Activities	Staff Time ó General Revenue Funds	Each municipality will review its needs, resources, and interest in CRS credits and will determine what public information activities it will implement. Municipalities will be supported with materials and templates provided by the County Planning Department.	Same as the previous action item.	On-going.
Action 10.4.25 ó Real Estate Disclosure	Staff Time ó General Revenue Funds	The County Planning Department will meet with the Association of Realtors to review ways to inform people of the natural hazards that properties are exposed to. A special effort will be made to advise people to check out a site's flood hazard before they are committed to a purchase	This action item has both a consumer protection benefit and a flood protection benefit. House hunters will be more aware of what they are purchasing and can ensure that they can afford flood insurance. They may even plan to retrofit or otherwise protect the property before they move in.	First meeting to be held by March 2014.