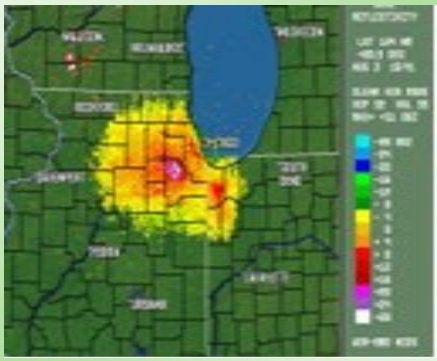


CITY OF DES PLAINES

HAZARD MITIGATION PLAN

1420 MINER STREET

DES PLAINES,

ILLINOIS

847-391-5390

UPDATED- NOVEMBER 2013

Executive Summary

1. Introduction

Des Plaines is subject to natural hazards that threaten life and health and cause extensive property damage. To better understand these hazards and their impacts on people and property, and to identify ways to reduce those impacts, the City of Des Plaines undertook this *Hazard Mitigation Plan.*

This *Plan* was developed under the guidance of a Mitigation Planning Committee, authorized by a resolution of the City Council. The Planning Committee's members included representatives of key City departments, neighborhood associations, academia, and organizations involved in mitigation activities. The Mitigation Planning Committee followed a standard 10-step process, based on FEMA's guidance and requirements.

> *"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

This *Plan* fulfills the Federal mitigation planning requirements, qualifies for Community Rating System credit and provides the City with a blueprint for reducing the impacts of these natural hazards on people and property. This *Plan* was first developed and adopted in 2007 by the City of Des Plaines. FEMA requires an update of the mitigation plans and the re-adoption by the community every 5 years.

2. Hazard Profile

This *Plan* addresses natural hazards that face Des Plaines:

- Floods
- Severe Summer Storms (including sewer backup)
- Wind Events (tornadoes and microbursts)
- Severe Winter Storms
- Earthquakes

Flooding of repetitive loss area #6, Big Bend Drive, 1986

Chapter 2 reviews these hazards, where they occur, historical events, and the frequency or likelihood of future occurrences. Overbank

flooding affects floodplains, but the others can hit any area of the City.

3. Vulnerability Assessment

This chapter reviews how vulnerable Des Plaines is to property damage, adverse impact on the local economy, and threats to public health and safety. There are over 27,000 buildings in the City subject to some level of damage from the eight natural hazards. There are over 2,600 structures in the floodplain and 16 repetitively flooded areas within the City.

Chapter 3 provides tables that show the estimated damage to these buildings from an occurrence of each hazard. Similar reviews are given for the impact of the eight hazards on the local economy, on safety, and on health. This assessment concluded:

1. The natural hazards that cause the most property damage are floods and tornadoes. The expected average annual property damage from other hazards is relatively small.

2. Tornadoes and flooding cause the most economic disruption in a single occurrence. However, on a regular basis, winter storms and thunderstorms are more disruptive and cost local governments more than the other hazards.

3. Extreme heat and thunderstorms are the greatest threats to people, although repetitive flooding also stands out.

4. In most cases, the relative amount of property damage, economic disruption and safety and health threat is the same throughout the city. The exceptions are:

Chapter 3 reviews typical property damage caused by natural hazards

   - Most overbank and repetitive flooding occurs in the mapped floodplains, especially in the floodplain of the Des Plaines River.
   - Sewer backup affects older buildings with basements.
   - Tornadoes and earthquakes present higher hazards to larger and older buildings.
   - Winter storms, extreme heat, and diseases have a greater impact on the elderly.

4. Goals

After reviewing the goals of existing City plans and conducting a goal setting exercise, the Mitigation Planning Committee adopted five goals statements:

1. **Education:** Educate the citizens of Des Plaines on the hazards they are exposed to and how they can protect their lives, health, and property.

2. **Regulation:** Manage new development so that it will not increase threats to existing properties or adversely affect open and natural areas.

3. **Public services:** Place a priority on measures that protect public services, critical facilities and utilities.

4. **Flooding:** Devote special attention to flooding problems, including the Des Plaines River, areas that are repetitively flooded, local drainage, and sewer backup.

5. **Other Natural Hazards:** Identify mitigation strategies that protect lives, health and property from the impacts of severe summer storms, wind events, including tornadoes and microbursts, severe winter storms and earthquakes.

6. **Financing:** Maximize the use of State and Federal funds.

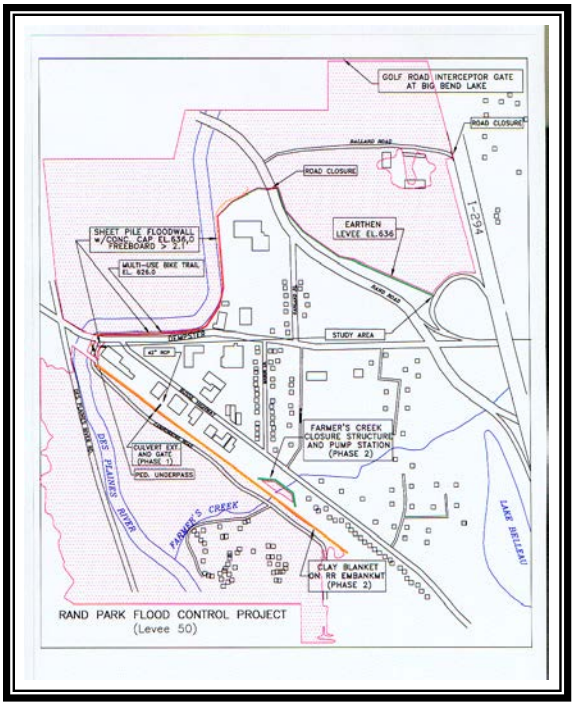
5. Preventive Measures

Preventive measures, in the form of planning and regulations, focus on the future. These measures are designed to keep the problem from getting worse by ensuring that future development does not increase flood damage. Seven types of preventive measures are reviewed in Chapter 5:

5.1 Planning and zoning
5.2 Open space preservation
5.3 Subdivision regulations
5.4 Building code
5.5 Manufactured housing regulations
5.6 Floodplain regulations
5.7 Stormwater management

The review of how these measures could be used and how they are currently being implemented concluded:

- The City's comprehensive plan, zoning ordinance and subdivision ordinance do not fully address the need to preserve hazardous areas from development or set protection standards for future development.
- The City has the latest building code provisions for protection from earthquakes, tornadoes, high winds, and snow storms and its administration of these provisions has been rated very highly.
- The City's floodplain and stormwater management programs exceed national



and regional standards, but some training is needed and some procedures should be revised to ensure continued compliance with State and Federal rules.

6. Property Protection

Property protection measures are used to modify buildings or property subject to damage. Chapter 6 covers the following approaches:

6.1 Relocating the building out of harm's way,
6.2 Erecting a barrier to keep the hazard from reaching the building,
6.3 Modifying the building so it can withstand the impacts of the hazard,
6.4 Modifying the sewer lines to prevent sewer backup,
6.5 Taking care of nearby trees that may damage the building and utilities, and
6.6 Insuring the property to provide financial relief after the damage occurs.

Chapter 6 concludes:

- Property owners can implement a variety of property protection measures at little cost, especially for sites with low damage potential (e.g., shallow flooding, sewer backup, earthquakes, thunderstorms and winter storms).
- The City's urban forestry program can help prevent damage to utility lines and roofs caused by high winds, ice storms, snow storms.
- While City-owned properties are adequately insured against damage by natural hazards, less than 50% of the privately owned buildings in the City's floodplains and 1% of the buildings in the rest of the City are covered by flood insurance.
- Property protection measures are normally implemented by the property owner, but the City can help with technical and financial assistance. Its rebate program has been particularly successful and has gained national recognition.
- Property protection measures can protect the most damage-prone buildings in the City: repetitive loss properties. Specific recommendations are provided for each area.

Elevated cottages in the Campground

7. Emergency Management

Emergency management measures protect people during and after a disaster. Chapter 7 reviews these measures, from identifying an oncoming problem (threat recognition), through warning, response procedures, and post-disaster activities. Chapter 7 concludes:

- The City has good measures to obtain early threat recognition of weather-related hazards and can warn most residents.

- City staff has experience with emergency operations and each department has instructions based on past experience.
- There are no storm or tornado shelters in the City's three mobile home parks, areas that are particularly susceptible to wind damage.
- The City Response Plan has been approved by Illinois Emergency Management Agency in June 2012.

8. Flood Control

Five areas related to controlling floodwaters are reviewed in this chapter:

8.1 Des Plaines River projects
8.2 Farmers Creek projects
8.3 Channel improvements
8.4 Drainage and sewer improvements
8.5 Drainage system maintenance

Chapter 8's review found:

- Much has been done to control flooding in Des Plaines. The City and other agencies are implementing flood control alternatives for both major stream flooding and local drainage and sewer problems.
- Opportunities for channel, drainage, and sewer improvements have been studied. Those that are cost effective will be constructed by the City over the years as annual funding allows.
- The City has a drainage maintenance program, with supportive stream dumping regulations, that meets the national model program.

9. Public Information

Hazard protection brochures prepared and distributed by private organizations.

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.

Chapter 9 reviews 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. At the end of this review, it concludes:

- 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.
- More hazard and mitigation information could be included in the City's activities.
- Current practices that disclose hazards to buyers of property are either dependent on the seller or provide the information late in the process.
- The most important topics to cover in Des Plaines and the most effective media to convey those topics were identified by the Mitigation Planning Committee.

10. Action Plan

Chapter 10 contains the 2013 *Des Plaines Hazard Mitigation Plan* implementation action plan. The action items contained in this chapter are from the 2007 *Plan*'s action items and the hazard mitigation recommendations made at the end of Chapters 5-9. In 2013, the Mitigation Planning Committee updated the 2007 *Plan*'s action items based completed action and the needs of the City to reduce the potential impact of hazards on residents and businesses in Des Plaines.

1. ***Plan* Adoption:** The City Council will adopt the *Plan* by resolution.

2. **Monitoring and Reporting:** The Mitigation Planning Committee will monitor the implementation of this *Plan* at least annually, and report progress to the City Council and the public.

3. **Public Information Efforts:** Current projects should be continued and messages on natural hazard mitigation and ways to disseminate the messages, should be examined each year.

4. **Continued Participation in the Community Rating System (CRS):** The City will continue participation in the CRS and work to improve its CRS rating.

5. **Continued Implementation NFIP Requirements:** The City will continue to implement its floodplain ordinance to ensure that development within the regulatory floodplain meets the NFIP minimum standards. The City will also look for way to improve the regulatory program administration.

6. **Seek Mitigation Grant Funding for Cost Beneficial Projects:** The City should continue to apply for mitigation grant funding through available IEMA and FEMA for floodplain mitigation and other types of hazards (e.g., severe storms and tornadoes) where project are cost beneficial.

7. **Continued Participation in StormReady:** The City will continue its participation in the National Weather Service's StormReady program.

8. **Improve Emergency Response:** As an IEMA Accredited Emergency Management Program, the City is required to have an IEMA Multi-Year Training and Exercise Planning Plan and follow the FEMA Homeland Security Exercise and Evaluation Program (HSEEP).

   HSEEP is applicable for exercises across all mission areas—prevention, mitigation, response, and recovery. HSEEP supports the Des Plaines Response Plan by providing a consistent approach to exercises and measuring progress toward building, delivering, and sustaining core capabilities. The City has met all the requirements for the past three years beginning in 2011 and will continue to meet the requirements.

9. **Regional Storm water Management:** The City will actively participate in regional stormwater, flooding, and watershed activities.

10. **Urban Forestry:** The City will continue its policies and programs to maintain trees that threaten utility lines and buildings.

11. **Rebates:** The City will continue the rebate program to provide a financial incentive for low cost flood and sewer backup projects. If there are general funds available, the rebate program will be expanded to include measures for other hazards.

12. **Drainage System Maintenance:** The City will continue to maintain the ditch and drainage culverts and revise its procedures to maximize CRS credit.

13. **Flood Control Projects:** The City will work with State and Federal agencies to create new flood control projects on the Des Plaines River.

14. **Incorporate the *Hazard Mitigation Plan* into Other City Plans:** The findings and recommendations of this *Plan* should be incorporated into other plans and regulations of the City, such as the comprehensive plan and development regulations.

The Mitigation Planning Committee, which serves as an advisory body to the City, will meet annually to review progress on the implementation of the action items. An annual report will be prepared for the City Council and the public on this *Plan*. The Mitigation Planning Committee includes members of the public, but additional public participation and comments will be welcome annually and at during the update planning process. FEMA requires that this *Plan* be updated and re-adopted every five years.

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Chapter 1. Introduction

1.1. Background

Des Plaines is subject to natural hazards that threaten life and health and cause extensive property damage. While flooding has historically been the natural hazard of greatest interest in the City, the area is subject to the danger and damage caused by other hazards. As seen in Table 1-1, Des Plaines has had 13 Mayoral State of Emergency or Disaster Declarations in the last 8 years due to natural hazards.

Table 1-1. Des Plaines State of Emergency or Disaster Declarations

Declaration Date	Type of Disaster
May 25, 2004	Rain and flood*
August 23, 2007	Rain and flood*
September 13, 2008	Rain and flood*
March 8, 2009	Rain and flood
March 23, 2009	Rain and flood
December 26, 2009	Rain, snow and flood
May 24, 2010	Rain and flood*
June 19, 2010	Thunderstorms and high winds
June 25, 2010	Flood
January 31, 2011	Blizzard*
June 22, 2011	Severe storm, flood
July 21, 2011	Rain and flood
April 18, 2013	Severe storm, flood

Des Plaines EMA
**Disaster Declarations*

To better understand these hazards and their impacts on people and property, and to identify ways to reduce those impacts, the City of Des Plaines undertook this *Hazard Mitigation Plan.* "Hazard mitigation" does not mean that all hazards are stopped or prevented. It does not suggest complete elimination of the damage or disruption caused by such incidents. Natural forces are powerful and most natural hazards are well beyond our ability to control. Mitigation does not mean quick fixes. It is a long-term approach to reduce hazard vulnerability.

Purpose of this plan: An adopted mitigation plan is a requirement for Federal mitigation funds under Section 104 of the Disaster Mitigation Act of 2000 (DMA) (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 (CRS), a program that reduces flood insurance premiums, which is discussed in Section 1.5.

This *Hazard Mitigation 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 Des Plaines:

- Overbank flooding
- Local drainage and sewer backup
- Tornadoes
- Earthquakes
- Winter storms
- Thunderstorms
- Drought/extreme heat
- Illness/disease

This *Plan* fulfills the Federal mitigation planning requirements, qualifies for Community Rating System credit and provides the City with a blueprint for reducing the impacts of these natural hazards on people and property.

1.2. Planning Approach

The *City of Des Plaines Hazard Mitigation Plan* was first developed in 2006 utilized the "10-Sept Process" shown in Figure 1-1. This process is recommended by FEMA through the CRS program and was used in the update. The 2013 update ensured that the FEMA planning phases or steps for DMA hazard mitigation planning as recommended by FEMA in the "State and Local Mitigation Planning How-To Guides" (FEMA 386-1 to 4) were also met. The "How To" process is also shown in Figure 1-1

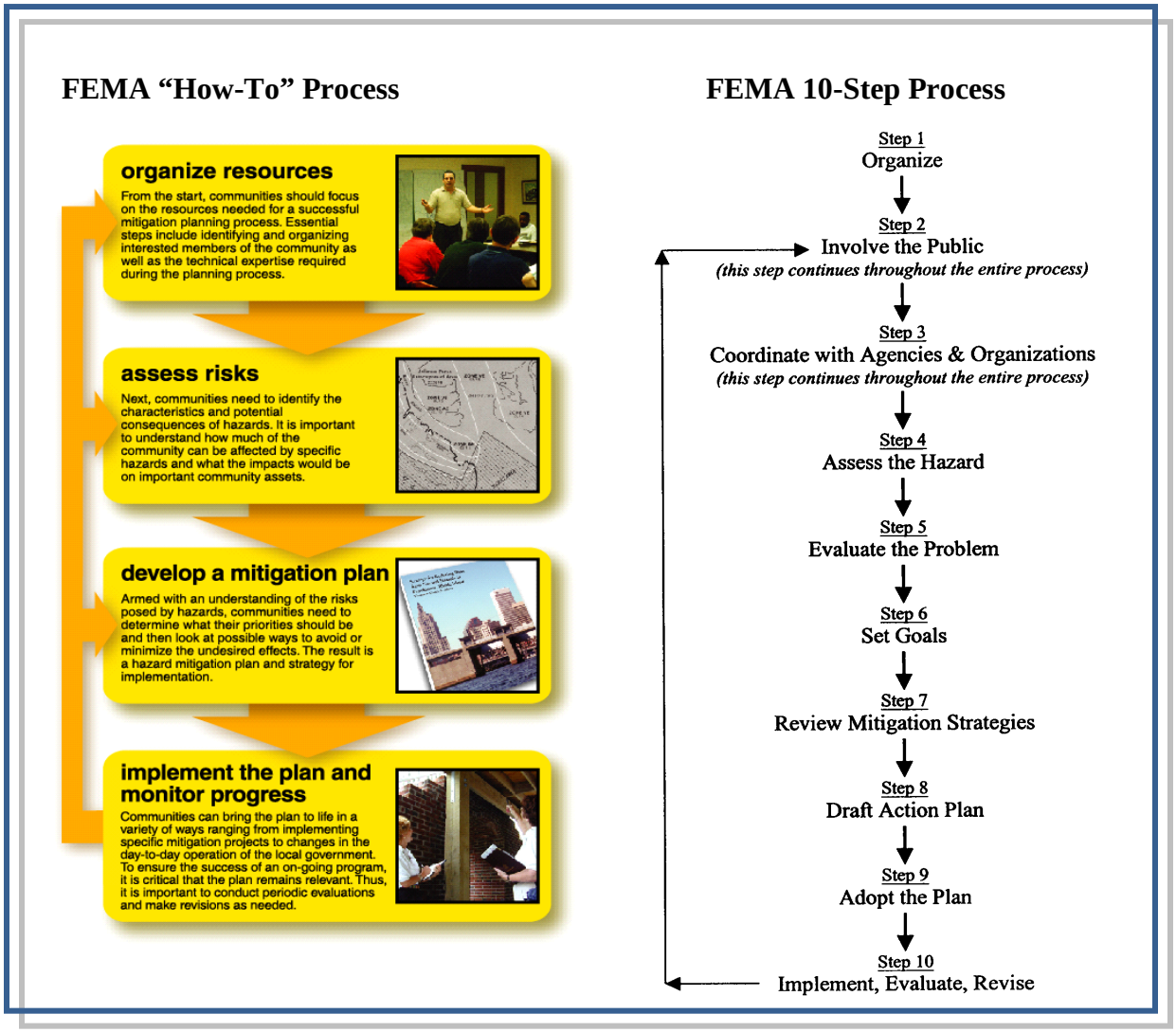

Figure 1-1 Planning Steps

The Planning Committee: The original *Hazard Mitigation Plan* was developed under the guidance of a Mitigation Planning Committee, authorized by a resolution of the City Council on November 6, 2006. The Planning Committee's members included representatives of key City departments, neighborhood associations, academia, and organizations involved in mitigation activities. The Planning Committee has been in place since the development of the 2007 *Plan*, has been meeting annually, and met in August 2012 and September 2013 to update the *Plan*. The current members of the Mitigation Planning Committee are shown below.

Mitigation Planning Committee Members

John LaBerg	City of Des Plaines, Public Works and Engineering
John Pluta	City of Des Plaines, Homeland Security & Emergency Management Agency
Ray Hund	Historic Methodist Campground
Scott Mangum	City of Des Plaines, Community & Economic Development
Marilyn Sauerberg	Des Plaines Resident
Linda Caruth	Des Plaines Resident
Jon Duddles	City of Des Plaines, Public Works and Engineering
Butch Ehrke	City of Des Plaines, Community & Economic Development

Technical support for the 2007 *Plan* was provided by French & Associates, Ltd., and support for the update was provided by Molly O'Toole & Associates, Ltd. (MO&A).

1.3. Update Process

Organization: Organization (Step 1) began with bringing the members of the Planning Committee together in August 2012 (see sample meeting announcement on the following page). Input from Planning Committee members was collected throughout the *Plan* update

The Planning Committee used available City, regional and State plans and available data for the 2013 update of this *Plan*, including:

- Des Plaines Repetitive Loss Plan, 2002
- Des Plaines Comprehensive and Land Use Plans, 2006
- 2010 State of Illinois Natural Hazard Mitigation Plan
- Des Plaines Emergency Operation Plan
- Cook County Flood Insurance Study and Flood Insurance Rate Maps
- Lower Des Plaines River Detailed Watershed Plan, MWRD

Public Works and Engineering Department
1420 Miner Street
Des Plaines, IL 60016
Tel: 847-391-5390
Fax: 847-391-5619

August 7, 2012 REF # 012141

Pat Beauvais
547 Webford Ave
Des Plaines, IL 60016

RE: Update to Floodplain Management Planning for the City of Des Plaines CRS Rating (Activity 510)

Dear Ms. Beauvais:

We are cordially inviting you to attend a meeting on August 15, 2012 at 9:00am in Room 101 of Des Plaines City Hall. The purpose for this meeting is to update the plan for Floodplain management in the City of Des Plaines. You were previously involved in the planning for the Hazard Mitigation Plan for the City of Des Plaines 5 years ago and this meeting is just for the floodplain management component of this Hazard Mitigation Plan. We will be discussing flood issues that have occurred over the past 5 years, set goals to minimize these flood issues, and adopt an action plan for the next 5 years.

Please RSVP by August 13, 2012.

If you have any further questions, please contact the undersigned at 391-5385.

Yours truly,

Jon Duddles, P.E., CFM
Assistant Director of Public Works and Engineering

John LaBerg, P.E., CFM
Civil Engineer

CC: Scott Cofoid, CRS/ISO Specialist

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

- Contact with Planning Committee members
- All Planning Committee meetings open to the public
- Property owner survey
- Press releases
- Website
- Public meeting

The Planning Committee meetings were publicized through media and the City's website. Examples of public involvement efforts are provided in Appendix A.

City of Des Plaines residents were invited to provide public input to the planning process through "Survey Monkey," an online survey tool. The web link was included in news releases and promoted by Planning Committee members. Printed copies of the survey were also made available at City Hall. Ten questions were presented and results were used to evaluate the prioritization of natural hazards and to develop a sense of citizens' understanding of their mitigation needs.

Respondents ranked floods, high wind/microbursts, sewer backup and tornadoes as hazard events of the greatest concern. Over 60% of respondents felt "somewhat prepared" for hazard events and about 30% felt "adequately" or "well" prepared. Other survey results were incorporated into other *Plan* updates, and a summary in included in Appendix A.

The draft updated *Plan* was available to be viewed on the City's website. The public comment period remained open through the process. A public meeting was held on September 19, 2013 at City Hall.

Agency Coordination: The City took a number of steps to coordinate with agencies (Step 3) on the update effort. The City coordinated with the Illinois Emergency Management Agency (IEMA), FEMA, the Metropolitan Water Reclamation District of Greater Chicago, and the Cook County Department of Homeland Security and Emergency Management Agency (DHSEM) on the update effort.

Letters were sent to neighboring communities, townships, and state and federal agencies that could have data or information pertinent to the *Plan* update. A sample letter is included in Appendix A.

Note that as the 2013 update to this *Plan* was being developed, the DHSEM was coordinating the development of the Cook County hazard mitigation plan and the City coordinated their current effort with DHSEM and participated in the Cook County effort.

Hazard Assessment and Problem Evaluation: Chapter 2 of this *Plan* addresses Step 4 of the 10-step planning process and Chapter 3 addresses Step 5. These two chapters make up the risk assessment required for the DMA plan. The potential hazards reviewed were based on (1) the natural hazard identified in the 2007 plan, (2) hazard events that occurred within Des Plaines and Cook County between 2007 and 2012, and (3) based on Planning Committee input. Hazards were reviewed at the August 2012 meeting of the Committee, and due other severe events that happened in 2013, the hazards were re-assessed at the September 2013 meeting.

Chapter 2 examines the hazards, including a hazard assessment (what causes the hazard and the likelihood of occurrence) and Chapter 3 provides a vulnerability assessment (which estimates the impact of the hazard on life, health, and property). The tasks involved with conducting the risk assessment for this plan included; hazard identification, inventory of community assets vulnerable to the hazards, hazard events profile, magnitude, history, probability, impacts, flood insurance claims, future development trends, and mapping these components. Repetitive flood loss properties were also re-examined for this update. New repetitive loss areas were identified by the Planning Committee, based on available data, at the September 2013 meeting.

Developing Goals: Mitigation planning goals presented in Chapter 4 of the *Plan* were reviewed and one new goal was added by the Planning Committee for this update. The Planning Committee also discussed efforts that have been made and should be made to incorporate goals and recommendations of this *Plan* into other City plans.

Mitigation Strategies: The Mitigation Planning Committee considered everything that could affect the impact of the hazards and reviewed a wide range of alternatives. The Planning Committee'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 – e.g., zoning, building codes, and other development regulations
- Property protection – e.g., relocation out of harm's way, retrofitting buildings
- Emergency services – e.g., warning, sandbagging, evacuation
- Flood control – e.g., levees, reservoirs, channel improvements
- Public information – e.g., outreach projects, technical assistance

Chapters 5 through nine were updated to reflect the mitigation efforts undertaken by the City or other agencies since 2007.

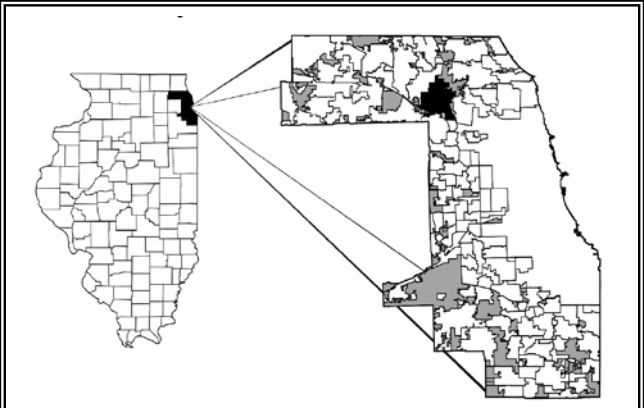
Action plan: For the 2007 *Plan*, many alternatives were reviewed, the Planning Committee drafted an "action plan" that specifies recommended projects, who is responsible for implementing them, and when they are to be done. The action plan is included in Chapter 10 of this *Hazard Mitigation Plan*. For the 2013 update of the *Plan*, the Planning Committee reconsidered each action item. A number of action items were

deleted, others renamed, and new action items were added. A record of the original 2007 *Plan* action items and changes made in this update are included in Appendix B.

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 Des Plaines City Council. It also depends on the cooperation and support of the offices designated as responsible for each action item.

1.4. Community Profile

History: The City of Des Plaines is located in Cook County, northeastern Illinois, just to the northwest of the City of Chicago (see map). The Des Plaines area was occupied by Potawatomi, Ottawa, and Chippewa Indians until the Treaty of Chicago in 1833. It was then settled by farmers from New England, New York and Germany.



Map 1-1. Des Plaines–Cook County Location

The settlers found a very flat area that had been leveled by several glaciers in eons past. The main topographical features were flat, wet, prairie and the Des Plaines River. Because of the flat terrain and water loving prairie grasses, much of the rain that fell on the area stayed there. The river was more of a wide grassy swale, not the deeper cut channel seen today. To farm the ground and build houses, the land had to be drained artificially with man made ditches.

The present site of Des Plaines was determined by early settler Socrates Rand who developed a grist mill on the Des Plaines River. In the 1850's, the railroad came through, connecting Chicago to central Wisconsin. Trains would stop near the mill to take on water. The Chicago and North Western Railroad, named its station "Des Plaines."

In 1869, the Village of Des Plaines was incorporated. In 1870, the federal census noted that the village had 800 residents. The town grew as a farming and railroad community until the mid 20th Century when it became more and more tied to Chicago as a suburb. In 1925, a referendum passed to adopt the city form of government. In the 50 years from 1940 to 1990, the population increased from 9,000 to over 50,000. Industry and business grew, too, giving the City a diversified economy.

City of Des Plaines website

Map 1-2. City of Des Plaines
Legend
Major Streets
Streets
RailRoad
Coperate Boundary
Stream
Lake or River
N
W
E
S
Des Plaines River
Big Bend Lake
Lake Opeka
1 inch equals 0.58 miles
0
1,900
3,800
1:37,000
7,600 Feet
GIS consortium.org
State Plane NAD 83 Illinois East
October 12, 2006 JRG FandAMap1v10

While the railroad is still central to Des Plaines, the City is served by two Interstate highways and is adjacent to O'Hare Airport.

Current development: In 2010, the population is 58,364. The City has 27,000 buildings, of which 93% are residential (most of them single family homes). The current land use is shown in Table 1-2.

Table 1-2 Land Use

Land Use	Acreage	Percent
Single Family	3,172	42%
Mobile homes	42	1%
2−4 family	53	1%
Multi-family	279	4%
Commercial	882	12%
Industrial	1,352	18%
Public/churches	1,008	13%
Parks/open/vacant	879	11%
Total	7,667	

Draft Comprehensive Plan, 2006

Table 1-3. Forecast for Des Plaines

	2010 Census	2040 CMAP Forecast
Population	58,364 *	60,343
Households	27,178	29,394
Employment	44,124	47,004

Source: CMAP "Go To 2040"
** U.S. Census 2010 figure - http://quickfacts.*

Future development: Des Plaines and the surrounding area are growing. The best available predictors of future development trends are the forecasts for changes in population and households made by the Chicago Metropolitan Agency for Planning (CMAP). In 2013, CMAP issued the "Go To 2040 Comprehensive Regional Plan." The CMAP number from the 2010 U.S. Census and the forecast figures are listed in Table 1-3.

While there will be only a forecasted 3% increase in population; however there is a predicted 8% increase in the number of households. CMAP also estimates there will also be a 6.5% increase in the number of jobs. These numbers mean more buildings in the City. The future of the City's hazard problems depends in part on where these new structures will go and how well they are constructed.

Most of Des Plaines is built up and there are few vacant areas open for development. Current building codes and stormwater management regulations include protection measures for new construction and redevelopment, especially measures to protect buildings from damage by wind, water, cold, and heat.

City government: The City of Des Plaines is a home rule municipality with a managerial form of government. Flood and other natural hazard issues are addressed by the City's Community and Economic Development, and Public Works and Engineering Departments. The City's Homeland Security and Emergency Management Agency in one of five accredited emergency management agencies in Cook County.

Des Plaines participates in the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program and the Community Rating System (CRS). The City regulates all development within the Special Flood Hazard Area (SFHA). The City is within the corporate limits of the Metropolitan Water Reclamation District of Greater Chicago (MWRD). The MWRD is responsible for wastewater treatment, and they also have the authority to regulate development that impacts stormwater within Cook County.

1.5. Critical Facilities

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

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

1. Buildings or locations vital to public safety and the disaster response and recovery effort, such as emergency management centers and hospitals.

2. Buildings or locations that, if damaged, would create secondary disasters, such as nursing homes and hazardous materials storage yards.

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

1. Emergency management sites, such as fire stations and radio towers
2. Facilities vital to public health, such as water treatment plants
3. Facilities that if they are damaged, they would create secondary problems, such as nursing homes.

These facilities are identified in the City's Threat Assessment Plan. They are not listed in this mitigation plan for security reasons. The Committee took them into account during the planning process, but their locations are not included in this public document. The full list is available for those authorized from the Emergency Management Coordinator.

1.6. The Community Rating System

As discussed in Chapters 2 and 3, flooding problems have a great impact on Des Plaines. 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 1-5). 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.

Over 20,000 communities are in the NFIP and about 1,250 participate in the CRS. Over 50 communities in Illinois participate in CRS, including Des Plaines and the nearby municipalities of Mount Prospect, Northbrook, Prospect Heights, and Wheeling. Des Plaines is currently a Class 7.

Table 1-5. CRS Premium Reductions

Class	Points	Premium Reduction In Floodplain	Premium Reduction 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

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. They 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. The public information activities build a knowledgeable constituency interested in supporting and improving flood protection measures.

5. 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.

6. Every time residents pay their insurance premiums, they are reminded that the community is working to protect them from flood losses, even during dry years.

More information on the Community Rating System can be found at www.fema.gov

1.7. References

- City of Des Plaines web site, www.desplaines.org/
- CRS Coordinator's Manual, FEMA, 2013
- Example Plans, FEMA/Community Rating System, 2007
- Getting Started – Building Support for Mitigation Planning, FEMA, FEMA-386-1, 2002
- Multi-hazard Mitigation Planning Guidance Under the Disaster Mitigation Act of 2000, FEMA, 2004
- Chicago Metropolitan Agency for Planning (CMAP) "Go To 2040 Comprehensive Regional Plan," October 2012
- U.S. Census 2010 - http://quickfacts.census.gov/qfd/states/17/1719642.html

Chapter 2. Hazard Profile

This chapter provides basic data on the natural/weather hazards that face the City of Des Plaines. Of the fourteen natural hazards experienced in Des Plaines, eight natural hazards were selected for this assessment. The following (14) natural/weather hazards are listed in the Basic Plan of the City's Response Plan as mandated by the Illinois Administrative Code 301.220. Floods (Overbank flooding, local drainage and sewer backup)

1. Severe and Excessive Heat (drought/extreme heat)
2. Severe and Excessive Cold (winter storms)
3. Severe Thunderstorm (thunderstorms)
4. High Winds (thunderstorms)
5. Microburst (thunderstorms)
6. Lightning (thunderstorms)
7. Hail (thunderstorms)
8. Tornadoes (tornadoes)
9. Winter Storms (winter storms)
10. Blizzard (winter storms)
11. Snow (winter storms)
12. Ice (winter storms)
13. Earthquakes (earthquakes)
14. Forest Preserve Fires (drought/extreme heat)

This chapter has eight sections; Overbank Flooding, Local Drainage and Sewer Backup, Tornadoes and Micro-bursts, Earthquakes, Winter Storms, Thunderstorms, Drought/Extreme Heat, and Illness/Disease which address each hazard.

Each section begins with a description of the hazard, followed by a summary of where they occur, historical occurrences in Northern Cook County, and the likelihood of future occurrences. Chapter 3, Vulnerability Assessment, reviews the impacts of the hazards on property, the economy, and people.

This chapter was developed with the 2007 *Plan* and updated with available information from natural hazards that occurred between 2007 and 2013. This includes floods, microbursts, snow storms, thunderstorms, extreme heat and drought events..

2.1. Overbank Flooding

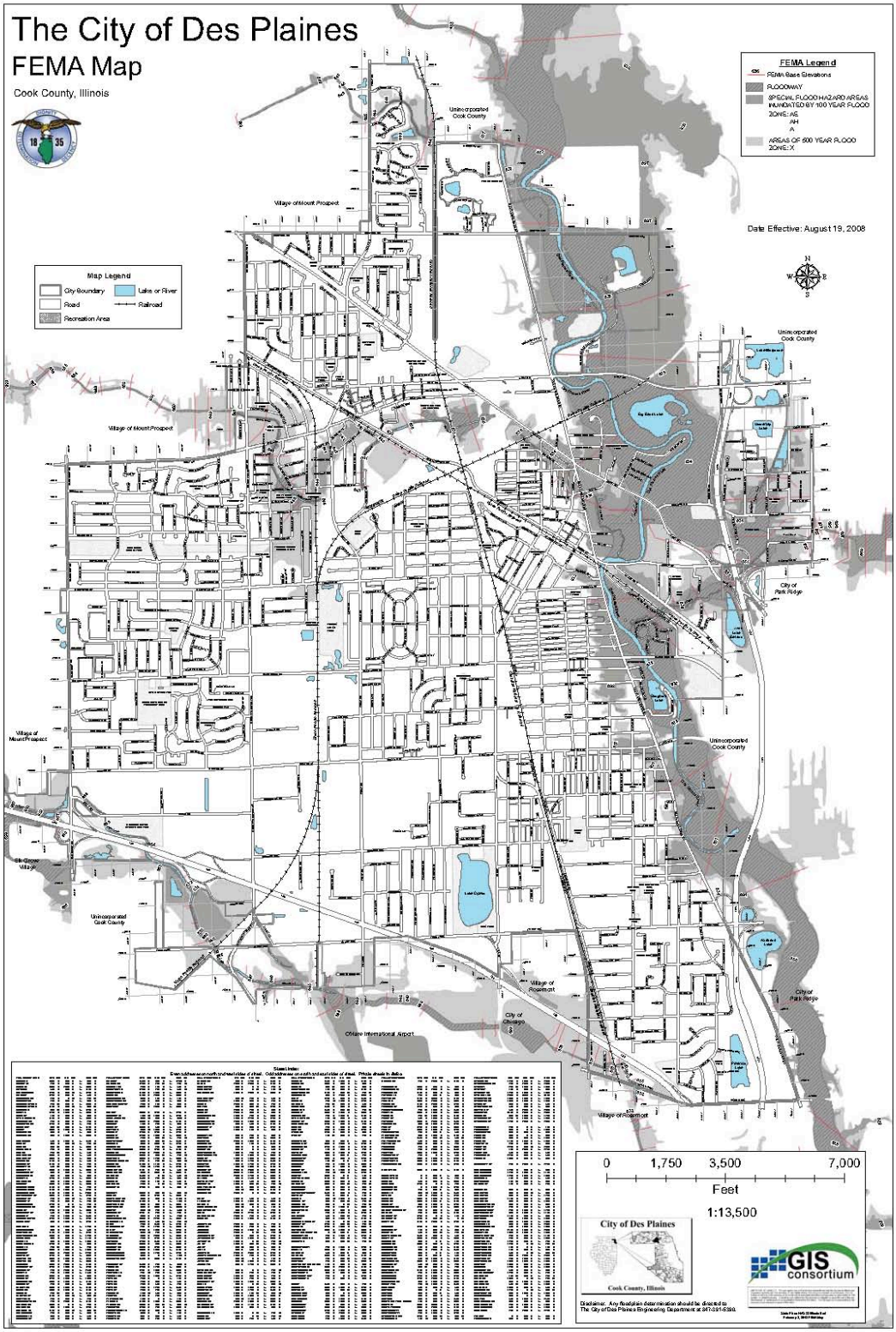
Des Plaines has had several different flood studies. The official floodplain study for insurance and regulatory purposes is the *Flood Insurance Study* for Cook County by the Federal Emergency Management Agency (FEMA), August 19, 2008.

The City is subject to overbank flooding from five streams, the Des Plaines River and four of its tributaries. These are shown on the Map 2-1. Floodplains and Floodways and are listed from north to south:

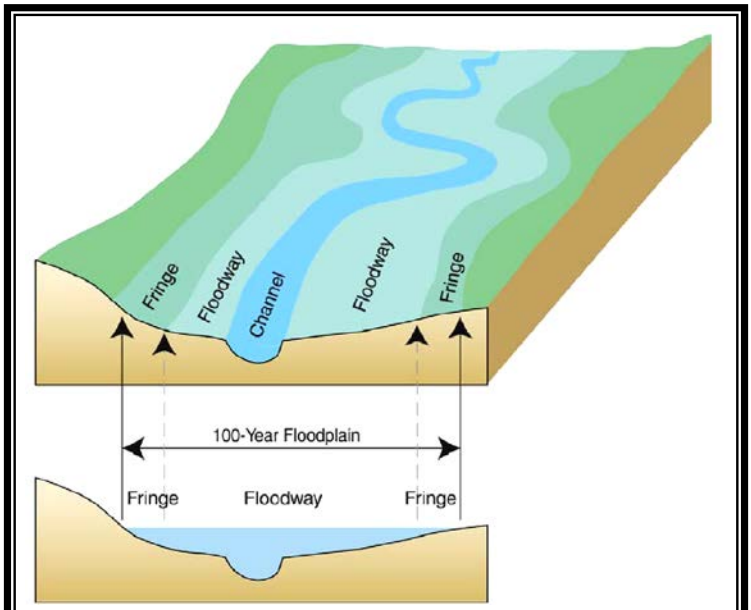
- Des Plaines River, which flows from Wisconsin, south to join the Kankakee River, forming the Illinois River. The drainage area at Golf Road is 360 square miles.
- Feehanville Ditch, a small stream that crosses the City at the north end. The drainage area at Wolf Road is 1.2 square miles
- Weller Creek, which flows from west to east through the middle of the City. The drainage area is 16.2 square miles.
- Higgins Creek, which flows from west to east along the southwestern edge of the City. The drainage area is 6.8 square miles at Touhy. Higgins Creek flows out of the City, but joins Willow Creek to become Willow Higgins Creek at the southeastern corner of the City.
- Farmers Creek, which flows from the northeast. The drainage area is 5.0 square miles where it joins the Des Plaines River.

Areas Affected: The areas affected by the base or 100-year flood have been mapped on the Cook County Flood Insurance Rate Map (FIRM). These areas are shown approximately as the A, AE and AH Zones on Map 2-1. The areas affected by the 500-year flood are shown as the darker X Zone. It should be noted that a recent flood study on Farmers Creek (see Section 8.2) may result in a new map for that area in the next few years.

Map 2-1. Floodplains and Floodways



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.



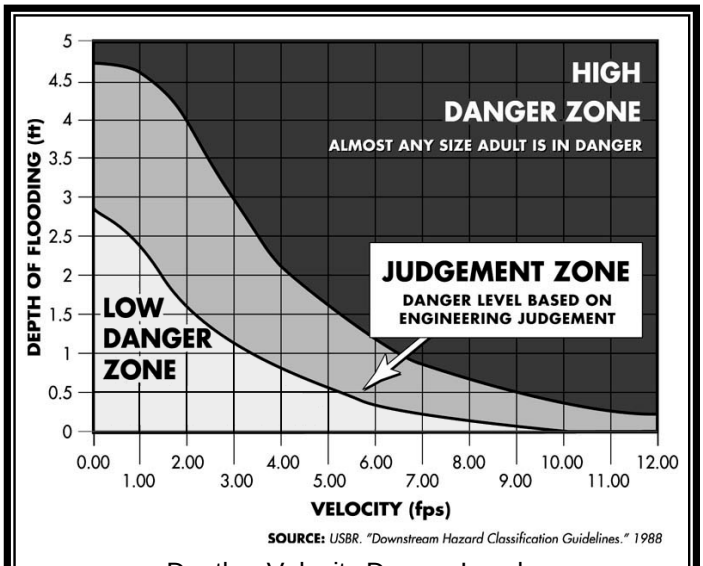
Floodplain/Floodway Delineation

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. Floodwater moving faster than five feet per second is generally considered high velocity flooding, requiring special design considerations for buildings, roads, bridges, and other manmade structures in its path.

The FEMA Flood Insurance Study includes the "average floodway velocity" for the Des Plaines River and its tributaries. 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 Des Plaines River and the smaller streams drop only 1 – 2 feet per mile. These streams have low average floodway velocities, ranging from 0.2 to 3.0 feet per second, with most cross sections having less than 1.0. Therefore, flood velocity is a relatively low hazard in the City.

Although velocity is one factor that contributes to the potential harm of a flood, the total impact of moving water is related to the depth of the flooding. Studies have shown that deep water and low velocities is as dangerous as shallow water and high velocities (see graph).



Depth – Velocity Danger Levels

Warning time: An important flood mitigation concern is how fast floodwaters rise. Fast rising floods are known as flash floods. Flash floods occur in hilly areas and in urban areas where large parts of the watershed are covered with pavement and other impervious surfaces. In these areas, stormwater runs off quickly and can cause a stream to go overbank in a few hours.

The tributary creeks are in small urban watersheds and can reach flood stage quickly during or soon after a storm. For the purposes of this plan, a conservative figure of less than one hour warning time is used.

In contrast, the Des Plaines River has a relatively slow rate of rise. In 1986, it took three days for the river to reach its flood crest. Even with the heavy local storm of 1987, the River took two days from normal flow to flood crest. Therefore, there is at least 24 hours of warning time for the Des Plaines River at the Des Plaines gage.

Duration: Another concern is how long floodwaters remain up. The longer the duration, the more damage will be done to property and the longer businesses and roads will stay closed. Floods can take several days to rise and fall on the Des Plaines River. Flooding of the tributary streams typically lasts only a few hours.

First McDonald's on the Des Plaines River Road and Lee Street, 2008

Historical occurrences: The relative heights of the historic and predicted floods are shown for the Des Plaines River gage at Des Plaines in the chart on the next page. This gage is located upstream of the Cook County Forest Preserve District's Dam No. 2, downstream from Euclid Avenue. It is operated and maintained by the U.S. Geological Survey (USGS).

The gage measures water levels starting from an arbitrary "stage" of zero. Records are in stage, but they can be converted to elevation above sea level. The stage of zero equates to an elevation of 621.9 feet above sea level. For example, water that reaches a stage of 8.0 feet at the gage is 629.9 feet above sea level.

The 1986 flood exceeded the 100-year flood elevation in effect at the time. However, a more recent study of the Des Plaines River concluded that the earlier Flood Insurance Study under-estimated the true risk. There were several reasons why the new study showed a higher flood risk:

– The newer study included more years of gage records. The later years have been wetter than the earlier ones. The 100-year discharge (the amount of water coming downstream during a base flood) increased by about 35%.

– Development in the watershed converted open land to impervious surfaces at many sites. The resulting increased runoff contributed to the higher discharge.

– The newer hydraulic model (the computer model used to predict where the base flood will go) is more thorough and accurate than models used in the 1970's. It was "calibrated" so that it matched the flood flows of more recent floods.

Des Plaines River Gage
Flood Stages and Elevations

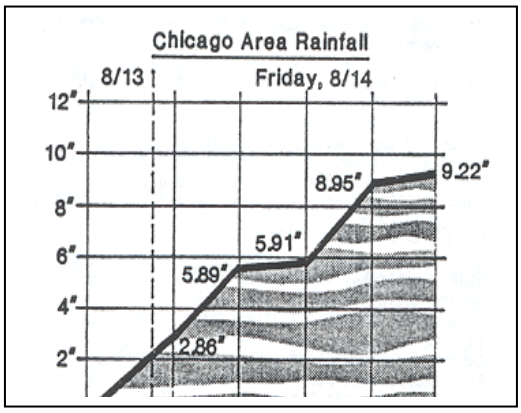
Stage	Elevation	
	635.5	-500 year flood
	634.0	-100 year flood
12.0	633.9	
	633.5	-50 year flood
	633.1	- Oct. 1, 1986
11.0	632.9	
10.0	631.9	
	631.8	-10 year flood
9.0	630.9	
8.0	629.9	
7.0	628.9	
6.0	627.9	

This chart relates historic flood levels to the risk of recurrence. While many people felt the 1986 flood was a 100-year flood, the 2000 Flood Insurance Study shows it to be less than a 50-year flood.

1986: Northeastern Illinois received almost one inch of rain daily from September 21 through October 4, 1986. On some days, there was as much as three inches. Over this two week period, the watershed received up to 12.9 inches of rain. This is a lot when compared to the normal monthly amount of 3 inches. The flood damaged 2,200 homes and 150 businesses.

According to the 2000 Flood Insurance Study for Cook County, the 1986 flood is now considered between the 10-year and 50-year flood, based on elevation and discharge. The amount of water moving downstream at the peak of the 1986 flood was 4,900 cubic feet per second (cfs). In 1938, the discharge was approximately 5,000 cfs.

The gage graphic shows that while the 1986 flood carried slightly less water, it was nearly two feet higher. This is attributed to the loss of floodplain storage and encroachments into the floodplain between 1938 and 1986.



1987: For the second time in less than a year, the River and its tributaries overflowed their banks and wreaked havoc for thousands of homeowners in August. Nearly 13 inches of rain fell in a four day period from August 13-16 flooding many of the same areas that were just recovering from last fall's flood. Damages from the two floods in three counties (Lake, Cook and DuPage) are estimated at more than $140 million." – *Illinois Floodlines*, Winter 1987.

Unlike the 1986 flood, which was primarily a riverine flood problem, the heaviest rainfall occurred in a short period of time over the northwest suburbs (see graph). This produced the second highest flood on the Des Plaines River at Des Plaines since flood insurance became available. However, the storm did not cause much flooding of the Des Plaines River upstream in Lake County.

On the other hand, there were extensive areas with small stream and stormwater flooding. This is reflected in the flood insurance claims data reported for the City.

August 24, 2007: The Des Plaines River in Des Plaines peaked at 8.62 feet on August 24th. The weather service had predicted the river to reach a flood stage of 10.9 feet. The City began placing over 250 jersey concrete barriers at numerous locations. The County, SWAT and U.S. Coast Guard teams assisted residents with sandbags and EMA provided 24 hour phone coverage. The 911 Call Center had received over 1,000 calls on power outages, flooded basements and power lines on fire. Police closed roads and placed barricades at the flooded locations throughout the City.

President Stroger declared Cook County a disaster area. On August 26th, the City started damage assessments including trees on homes, vehicles stuck in flood water and downed power lines. The Red Cross provided over 200 clean-up kits and debris clean-up began.

September 13, 2008: The National Weather Service reported the Des Plaines River in Des Plaines was at 6.2 feet and was expected to crest at 11.3 feet on September 14th. The City's Incident Management Team (IMT) started preparations for potential flooding. Sandbags were made available at various locations; shelters were opened, flood safety

instructions were issued, roads were closed and barrier walls erected to contain the water. The Mayor declared a State of Emergency.

Based on the continued rainfall and the increased rising of the river, the Mayor signed a Declaration of Disaster. The City asked for a voluntary evacuation of approximately 2000 residents in areas prone to flooding. The Park District and the American Red Cross opened an emergency shelter and relocation center at Prairie Lakes. The Salvation Army served approximately 5,000 meals over a seven day period to first responders, volunteers and residents. Over 100 homes in the Big Bend area were evacuated and there were more than 2,500 reports of residential damage.

The Big Bend area (Hawthorne Ln. to the Des Plaines River), Shagbark area (Des Plaines River Rd. to the Des Plaines river, north of Algonquin), Willow Av. (Graceland to Lee St.), and Fargo Av. (Fargo east to the Des Plaines river) amongst other areas had houses that received a considerable amount of first floor damage, along with basements filled with water. Homes went without power for several days since circuit breakers are located in the basements. The basements had to be pumped out slowly so that the basement walls did not collapse due to the excessive hydrostatic pressure. Furnaces, water heaters, and washer and dryers were the major appliances damaged. Since these houses received first floor flooding, the entire floors from the joists up to the finished surface were warped. Up to three feet of drywall all along the perimeter of the first floor (wicking action of flooded water) was mold covered. All doors in the basement and first floor were non functional. Lower cabinets in the kitchens were destroyed.

The City began its recovery efforts on September 15, 2008 after the river had crested at 10.01 feet as reflected on Map 2-2. Flood Stage 10. Because of the massive amount of debris, Public Works crews, ARC Disposal and Cook County SWAP assisted in removing debris as well as sandbags. The Salvation Army distributed over 3,000 clean up kits to residents and businesses.

The City did its final damage assessments, assisted FEMA, and IEMA as they did there damage assessments of the City. The Governor along with FEMA declared Des Plaines as well as the State a Federal Disaster. FEMA has set up a Disaster Recovery Center in Des Plaines which allowed residents and small businesses to apply for grants and low interest loans.

The duration of this flooding event and its aftermath lasted well over nine (9) days not including the lasting affect it had on people's lives.

The After-Action Report recommended that the City of Des Plaines follow FEMA's recommendations to mitigate flooding along the Des Plaines River basin in Des Plaines. Two FEMA mitigation grants have been awards since the 2008 flood. These grants, while not completed, granted the City of Des Plaines $10.9 million, applied for under a 2009 HMGP, for the buyout of 31 repetitive loss homes, along with an additional $55 million to buy out an additional 220 homes that experience severe damage. When the Big Bend Subdivision was built it was not in the flood plain. This area was mapped in the

floodplain in 2000. The only feasible mitigation for these homes is buyout since the raising of these homes is not an option as:

1. They still are in a flood area with the near certain loss of their ground level garages.

2. They would lose their basements which would lower their market value considerably.

3. Rescuing residents in raised homes presents hazards for our fire and police departments when evacuation is necessary.

4. The NFIP- Increased Cost of Compliance is not sufficient to raise the properties since these homes have basements and estimated structural elevating would be $150,000 or more.

The only issue with the FEMA buyout program is the value of the homes exceed $400,000 which result in more federal money needed to buyout the over 100 homes affected. Estimated costs to mitigate the entire subdivision would exceed $60,000,000.

December 26, 2008: Melting snow, heavy fog, raising temperatures, and then some sleet and rain brought water into the Des Plaines River and the fear of flooding. The National Weather Service issued a flood warning for the Des Plaines River near Des Plaines. The Des Plaines River was expected to peak at 8.6 feet. It crested reaching 7.43 feet. (See Map 2-3.Flood Stage 7)

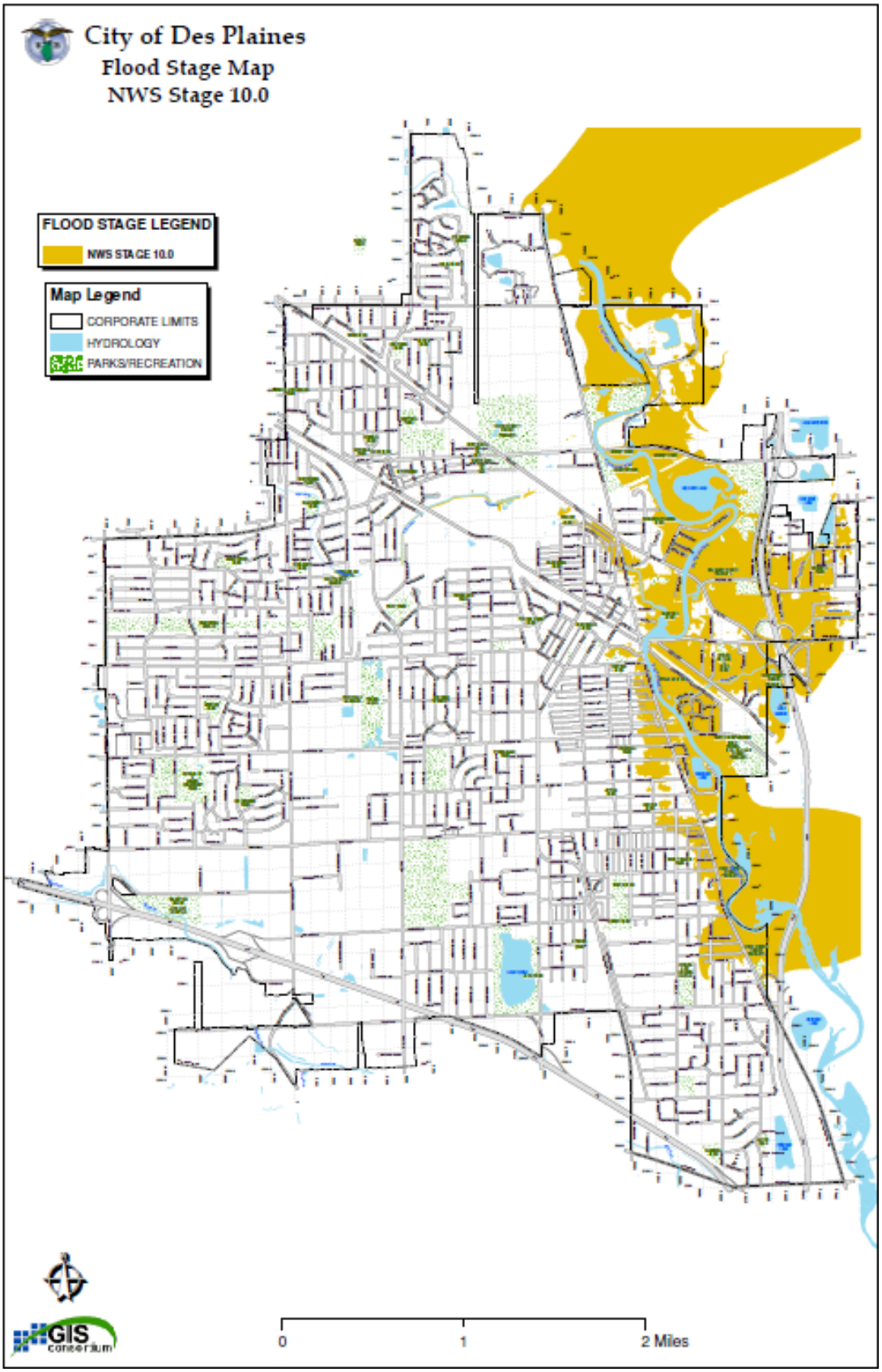
The Mayor declared a State of Emergency on December 27. Des Plaines Public Works and Engineering Department and Emergency Management Agency (EMA) crews are working throughout the community cleaning catch basins allowing water to run off and alleviate street flooding. Public Works provided sand and sandbags to residents.

No overland flooding of houses occurred along the river during this December flood, however, areas such as Marshall Drive and Pennsylvania Avenue near the west boundary of the City experienced overland flooding. Studying these locations was imperative since it is not common to have overland flooding in areas that are not located in the floodplain.

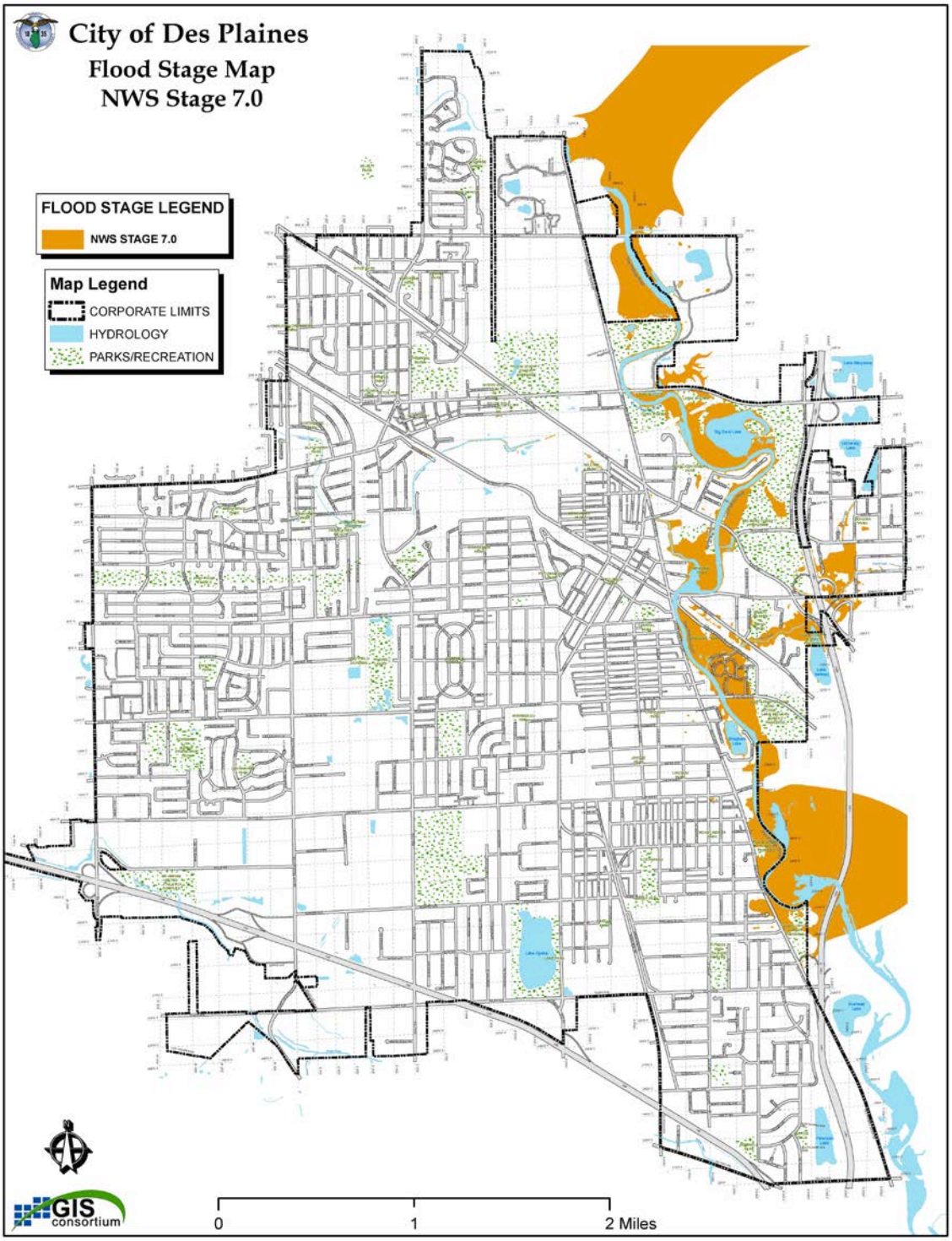
July 22, 2011: The National Weather Service reported that 6.8 inches of rain fell in the City of Des Plaines within a three-hour period during the night of Friday, July 22, 2011. According to the National Weather Service on July 23, 2011, the Des Plaines River near Des Plaines crested at 7.55 feet.

The Emergency Operation Center (EOC) on Saturday, July 23, 2011, at approximately 4 p.m. is at Level 2 activation. One roof collapse was reported. About 1,400 calls were made to the City EOC about flooding, particularly basement backup outside of the 100 year floodplain. Flooded basements and streets have been reported in numerous areas throughout the City. Sand and sandbags have been placed at three locations throughout Des Plaines and at least eight (8) intersections are currently closed.

Map 2-2. Flood Stage 10



Map 2-3. Flood Stage 7



Commonwealth Edison reported that 2,043 residents were without power and a Local State of Emergency was signed by Mayor Martin J. Moylan at 10 a.m. Saturday morning.

The recovery plan which was instituted by the Incident Management Team (IMT) for the June 21 severe storms was implemented. The IMT was able to continue with it, and modify as necessary, to recover from the events listed above while maintaining City services.

As a result of this storm the City hired a consultant to study four areas outside of the 100 year floodplain for overland flooding issues. Some of the solutions recommended included adding storm sewer pipe for overland flooding, raising window wells, and enlarging existing detention basins. These projects are currently being analyzed for cost effectiveness.

The City's Public Works and Engineering Department also visited over 30 homes and provided written mitigation advice on flooding. Most recently FEMA allowed cities to apply for public assistance, which allowed the City to recuperate some of the monies expended on flood efforts.

April 18, 2013: April 2013 record rainfalls now mark it as the Chicago Area's wettest on record in the 143 years history of Chicago observational data. April 22's .61" of rain was enough to put the April rain tally at 8.45", breaking the previous record of 8.33" set in 1947. On April 17, the National Weather Service was still predicting flood stage at Des Plaines of 6.2 feet.

These are the facts that set the stage for a late night conference call (approximately 10:00 p.m.) between the National Weather Service, Cook County DHS&EM and other County EMA Coordinators and the Des Plaines Emergency Management Coordinator. Additionally, weather spotters were activated to monitor the River levels at this time.

The City's Emergency Operations Center (EOC) was activated at a Level 3 at approximately 11:30 p.m. Sand bagging operations at began at 2300 hours and a call-back of Public Works personnel was initiated at that time.

At approximately 3:00 a.m. hours on the morning of April 18, 2013, the river gauge at Miner Street and the Des Plaines River was up 1.5 feet. The EOC was activated at a Level 2 at this time. All incident management team members were notified to report to the EOC. A Declaration of Local State of Emergency was signed at 0400 hours.

At 8:00 a.m., the first briefing of the Incident Management Team was conducted, with all following operations conducted utilizing NIMS principals. The EOC was manned and two command posts were established; one to coordinator flood operations and the other to coordinate evacuation operations.

The Incident Management Team continued with their response to this flood while monitoring and conducting day-to-day operations within their functional areas.

At 3:00 p.m. hours on April 18, 2013, a Declaration of State of Disaster was signed on the advice of the Incident Management Team. During the next 6-10 weeks, the Incident Management Team utilized the necessary mutual aid resources from County/State/Federal resources, NGOs resources and other stakeholders, then demobilizing them as appropriate. A President's Declaration of State of Disaster was declared. FEMA recovery teams visited 1,566 homes and businesses in Des Plaines that were affected by the flooding.

June 2013: Due to continuing heavy rainfall and thunderstorms moving through the area, weather spotting staff was deployed in Des Plaines at approximately 2:00 a.m., June 26, 2013. At approximately 3:00 a.m., surface streets were flooded severely enough to warrant numerous street closures. The National Weather Service issued a flash flood warning on June 26, at 5:26 a.m. All available response department personnel and EMA volunteers were called in. By 7:00 a.m., the EOC was activated at a Level 3. Fast moving thunderstorms with very heavy rainfall continued to move across the entire area. The NWS estimated three inches of rain or more had already fallen, and ongoing thunderstorms predicted throughout the day, producing even more heavy rainfall. Driving was difficult as excessive runoff from heavy rainfall caused flooding of small creeks and streams, highways, viaducts and underpasses in Des Plaines. At 9:30 a.m., a State of Emergency was signed.

For the next 72 hours, the EOC was activated at a Level 2 to deal with the flooding and recovery issues, as was done in the earlier April flooding.

Likelihood of future occurrences: Flood studies and mitigation plans are based on the risk of future flooding. Flood studies extrapolate from historical records to determine the potential that 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 wrong. 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.

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

What are the odds of a flood?

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

Chance of Flooding over a Period of Years

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

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

percent chance flood has also been called the 100-year flood. The base floodplain is shown as the "A" zones on Map 2-1.

Another term used is the "500-year flood." This has a 0.2% chance of occurring in any given year. While the odds are more remote, it is the national standard used for protecting critical facilities, such as hospitals. It is shown as the darker shaded "X Zone" on Map 2-1.

2.2. Local Drainage and Sewer Backup

Flood problems are not limited to the mapped floodplains. They can occur in yards and streets throughout the City. Runoff from storms overloads the storm sewers and drainageways and flows into the streets and low-lying areas. Sanitary sewers are infiltrated or subject to direct inflow of rainwater and become overloaded. Streets, yards, homes and businesses are flooded, especially basements and the lower part of first floors.

Heavy rains can overwhelm the drainage system

Linda Caruth

Local drainage flooding poses most of the same problems caused by larger floods, but because it typically affects smaller areas and fewer people, it tends to get less government attention. However, flooding of this type also tends to recur. If nothing is done, small problems accumulated over time can become major problems.

It is very difficult to separate local drainage from sewer backup problems. They are both caused by heavy local rains and when a basement is flooded, the owner usually cannot tell where the water came from. Therefore, they are treated together in this *Plan*.

In both cases, the drainage system receives more water than it can handle. As in most urban areas, Des Plaines' original natural drainage system has been modified to handle the larger flows. Roadside ditches and storm sewers collect the runoff and convey it to the creeks and the Des Plaines River. When the drainageways and creeks become overloaded, water flows overland.

When the sewers are overloaded, they back up. There are three types of sewers in Des Plaines:

1. Storm sewers that collect surface drainage and direct it to the creeks and rivers. When storm sewers work, the streets and yards are drained quickly. Storm sewers won't work if they are overloaded, underdesigned or blocked. Blockages can be caused by a broken pipe, debris or sediment in the pipe, or an outlet or outfall that is underwater.

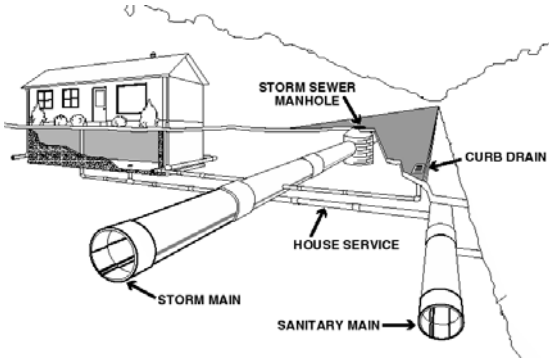
2. Sanitary sewers that collect sewage from buildings and carry it to wastewater treatment plants. They should not be affected by stormwater because they are separate from the storm sewers. However, there are sometimes cross connections and leaks in sanitary

sewer pipes that receive inflows and infiltration which can overload a sanitary line during wet weather. The City's sanitary sewer is connected to the MWRD interceptor which carries combined sewage and surcharges into City sanitary sewer.

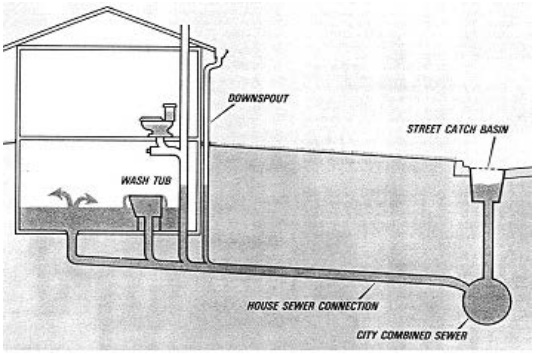
3. Combined sewers that collect both stormwater and sewage and carry it in the same pipe to a treatment plant.

When overloaded with stormwater or snowmelt, sewers back up and flow into the lowest opening in the sewer line. The figure below shows that sanitary sewers back up into basements and storm sewers back up into yards and streets. Because combined sewers take both stormwater and sewage, combined sewer overflow creates both flooding and water pollution problems and is usually the biggest problem of the three types of sewer backup.

Street flooding with sewer backup
(Note bubbling from manhole in the street)



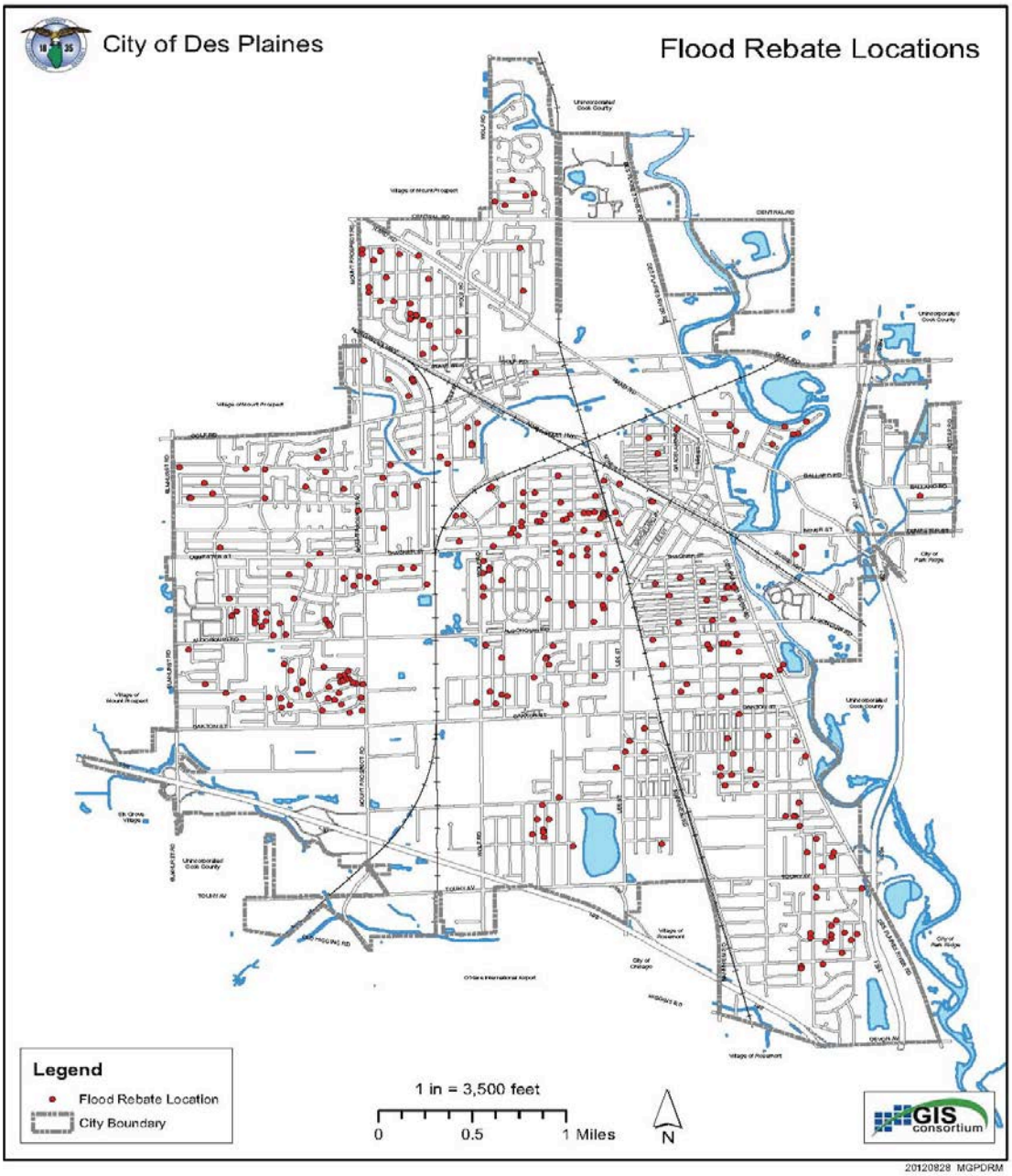
Storm and sanitary sewer schematic



Combined sewer backup schematic

Areas Affected: Local drainage problems have occurred everywhere in the City. Because of the extent of the problem and the fact that some protection measures can be expensive, the City established flood and sewer lateral rebate programs, which are explained in more detail in Section 6.7. Map 2-3 shows where the rebates have been used over the several years. This map demonstrates that the problem is very site-specific and occurs city-wide (most blank areas are not in residential land use and the rebates are limited to residential properties).

Map 2-3. Rebate Sites



Historical occurrences: Drainage problems and sewer backups have occurred many times over the years following heavy local storms. Often they cause no damage, just the nuisance of having to drive around a flooded area. Often problems are not even reported to the City, so there are no good records of historical occurrences.

Telephone calls following the October 13, 2001, storm were analyzed as part of the City's 2003 Stormwater Master Plan. Eighty seven people reported basement flooding/sewer backup after that event.

As part of the 2002 repetitive loss plan, the City sent out questionnaires to an area not subject to overbank flooding. Questionnaires were returned for 13 properties in this general area. Two reported no problem; the other 11 reported shallow basement flooding (less than 15") due to flooded streets when the storm sewers are overloaded.

In 2003, the City sent a questionnaire to all homeowners. It received 697 responses. The results are summarized in Table 2-2. It should be noted that 155 people stated they had no flooding, leaving 542 respondents with problems. These 542 listed 830 causes of flooding, showing that local drainage and sewer backup problems cannot be separated.

Table 2-2 Questionnaire Summary

Location of Flooding	Number of Responses
Basement	452
Crawlspace	107
First floor	29
Yard	120
No flooding	155
Cause of Flooding	
Storm sewer backup	311
Sanitary sewer backup	180
Sump pump/power failure	86
Basement wall seepage	180
Surface flooding	73

Stormwater Master Plan, p. 2.

On Mary 8, 2009, the Des Plaines River was forecasted to crest at 7 feet which is Flood stage. Des Plaines Public Works and Engineering Department and Emergency Management Agency (EMA) crews worked throughout the community cleaning catch basins allowing water to run off and alleviate street flooding. Public Works crews provided sandbags to residents.

Although the aforementioned areas in 2008 were not affected by this flood, the fear of another major flood made resident very anxious.

Likelihood of future occurrences: It is difficult to base the frequency of future drainage and sewer backup problems on historical experiences since the City's sanitary and combined sewers were connected to the Metropolitan Water Reclamation District's Deep Tunnel. The frequency of backups has diminished.

While nuisance drainage problems occur several times a year, it takes a severe storm to create local drainage and sewer backup problems large enough to damage property and endanger people. Section 2.6 on Thunderstorms describes the rationale behind a frequency of every other year or 0.5 for such a storm.

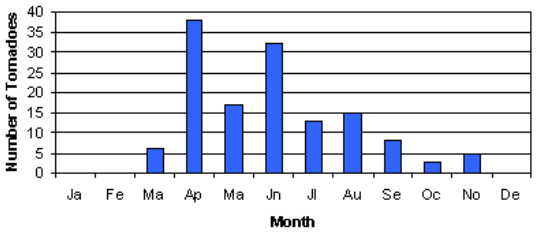
2.3. Tornadoes and Microbursts

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. Tornadoes are classified as F0 through F5, based on wind speed and damage levels using the Fujita Tornado Scale (see box, below).

National Weather Service

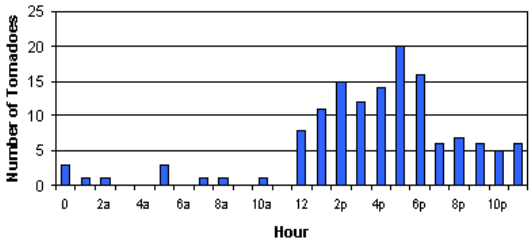
Tornadoes can move forward at up to 70 miles per hour, pause, slow down and change directions. Most have a narrow path, less than 100 yards wide and a couple of miles long. However, damage paths can be more than 1 mile wide and 50 miles long. For this *Plan*, an average impact area of 300 yards times 2 miles is used, an area of 1/3 square mile.

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



Chicago Area Tornadoes by Month

Illinois State Water Survey



Chicago Area Tornadoes by Hour

Illinois State Water Survey

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

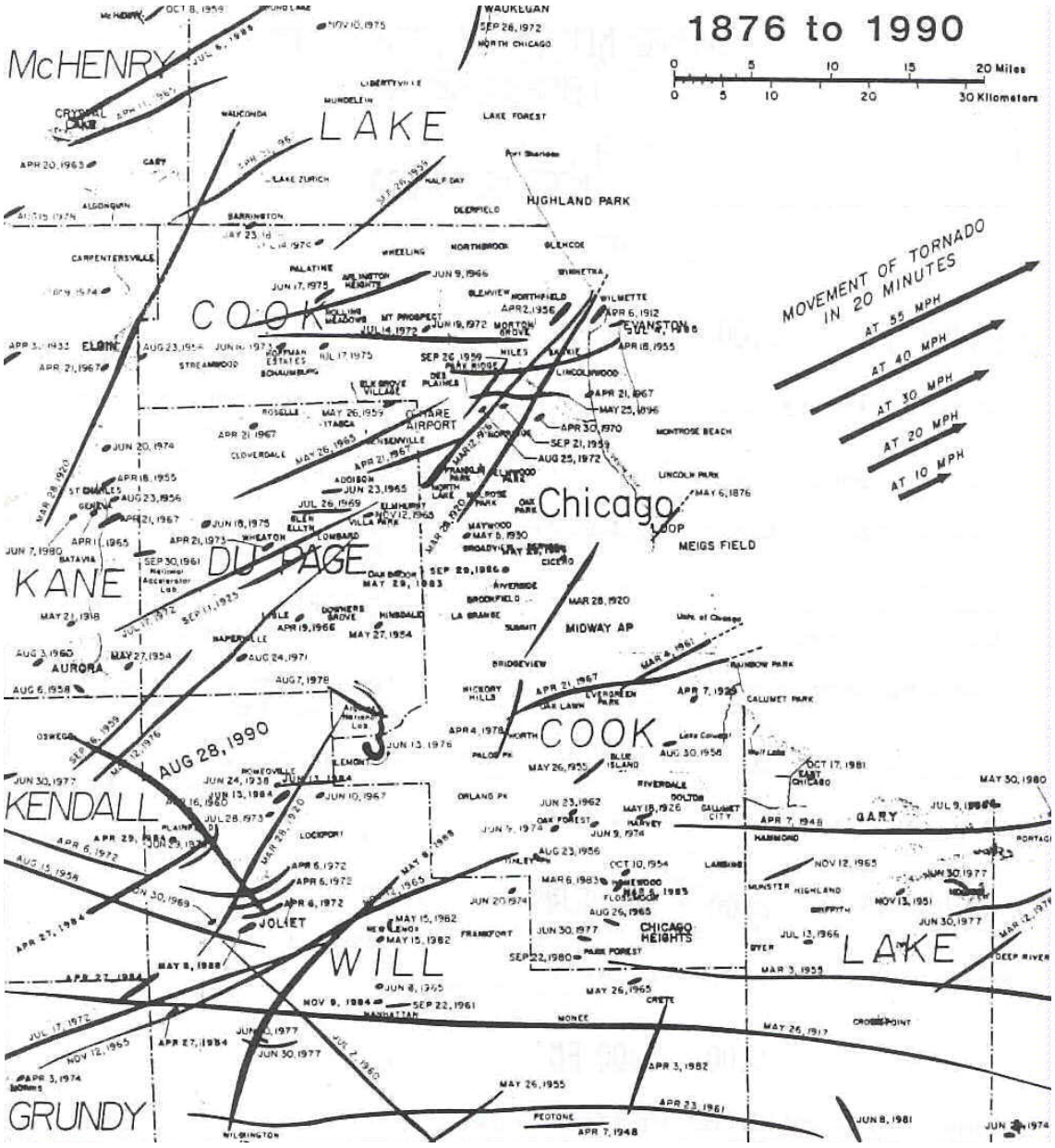
F3 Severe tornado 158-206 mph, roofs and walls torn down, trains overturned, cars thrown around

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

Area affected: In the past fifty years, Cook County has had 44 tornadoes. These are listed in Table 2-3 on page 2-22. A detailed study of Chicago area tornadoes was conducted by the University of Chicago. The historical events are shown on Map 2-4. It shows that no area is safe from a twister and that the Des Plaines area had near misses in 1955 and 1972.

Map 2-4. Chicago Area Tornadoes



Prof. Ted Fujita, University of Chicago

Historical Events: The best known recent tornado in the Chicago area was the one that hit northwestern Will County on August 28, 1990. At 3:30 the twister hit Plainfield and the Joliet area. The tornado had winds up to 300 miles per hour, giving it a Fujita rating of F-5 (see box, page 2-20). 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 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.

If the August 1990 tornado had struck 30 miles to the northeast, it would have hit the Des Plaines area where the higher concentration of development would probably have meant more deaths and destruction than what occurred in the Plainfield area.

In April, 2004, a tornado hit the small town of Utica, 75 miles southwest of Des Plaines. Older buildings in the downtown were destroyed and eight people were killed (most of them taking shelter in the older buildings). Reconstruction was complicated by the fact that much of the damaged area is in the regulatory flood-plain, where substantially damaged houses must be elevated to be protected from flooding.

Table 2-3. Cook County Tornadoes

Date	Deaths	Injuries	Fujita
Oct. 10, 1954	0	0	F1
May 26, 1955	0	2	F1
April 2, 1956	0	0	F1
Aug. 23, 1956	0	3	F2
Aug. 30, 1958	0	0	F1
May 26, 1959	0	0	F1
Sept. 21, 1959	0	0	F1
Sept. 26, 1959	0	0	F2
Sept. 26, 1959	0	14	F1
March 4, 1961	1	115	F2
June 23, 1962	0	10	F2
May 26, 1965	0	0	F2
May 26, 1965	0	0	F2
Aug. 26, 1965	0	0	F1
Nov. 12, 1965	0	0	F2
June 9, 1966	0	0	F0
June 9, 1966	0	0	F2
June 9, 1966	1	30	F2
April 21, 1967	0	0	F1
April 21, 1967	33	500	F4
April 21, 1967	0	0	F1
April 30, 1970	0	9	F2
June 19, 1972	0	2	F1
July 14, 1972	0	0	F1
Aug. 25, 1972	0	1	F2
April 21, 1973	0	0	F2
April 21, 1973	0	0	F1
June 16, 1973	0	0	F0
June 20, 1974	0	0	F1
July 14, 1974	0	0	F0
June 17, 1975	0	0	F2
March 12, 1976	2	41	F2
June 13, 1976	2	23	F4
June 30, 1977	0	0	F1
Sept. 7, 1977	0	0	F1
April 18, 1978	0	0	F1
Sept. 22, 1980	0	0	F0
May 29, 1983	0	1	F1
May 29, 1983	0	2	F0
July 4, 1985	0	0	F1
Sept. 29, 1986	0	10	F1
March 27, 1991	0	7	F3
May 5, 1991	0	0	F0
May 30, 2003	0	0	F0
Sept. 22, 2006	0	0	F0
May 16, 2007	0	0	F0
June 7, 2008	0	6	F2
June 7, 2008	0	0	F1
August 4, 2008	0	0	F0
June 23, 2012	0	0	F0
June 15, 2011	0	0	F0
June 22, 2011	0	0	F1
Total	39	776	

www.tornadoproject.com

Investigators with the National Weather Service determined Wednesday that a tornado with winds as high as 90 to 100 mph touchdown in in Mount Prospect

On June 22, 2011, a strong line of storms blew through Des Plaines unleashing heavy rain, thunder and lighting. The winds were as high as 90 to 100 mph strong enough to produce a small tornado. It traveled a path about 200 yards wide over two miles long, snapping trees at

their trunks, uprooting trees, breaking branches and damaging roofs in Des Plaines and Mount Prospect.

Damage to Des Plaines included numerous downed trees and debris littering our streets, with wide-spread power outages effecting approximately 16,000 customers. Twenty-one intersections (21) were without power and 83 structures damaged; 56 structures with minor damage, 14 moderate damage and 13 heavy damage. The City was fortunate not to have experienced any storm related injuries. Many residents worked together by providing generator power thru orange extension cords to those residents without power. This power sharing is dangerous since these extension cords were sitting on damp or wet pavement.

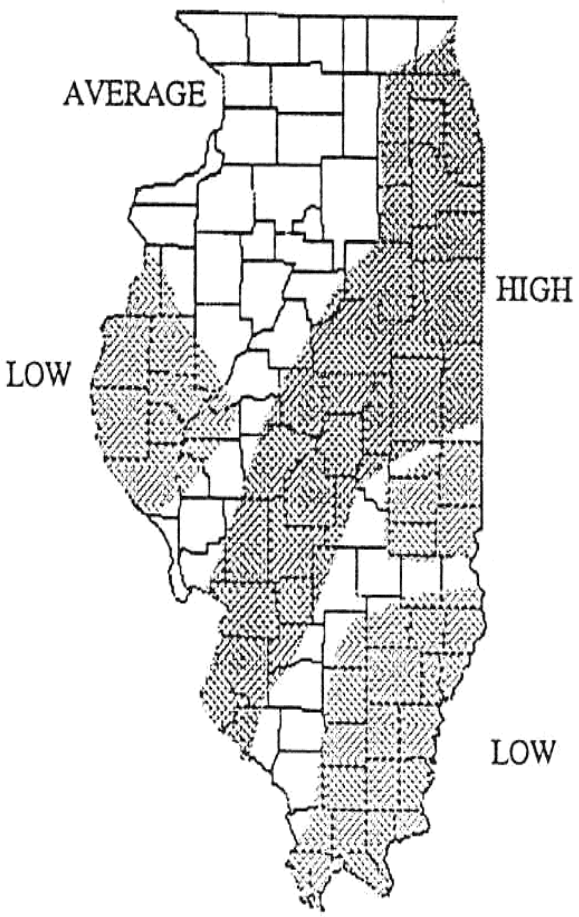
On June 22 at 1400 hours, the Mayor signed a Declaration of Local State of Emergency.

Likelihood of future occurrences: Approximately 1,000 tornadoes occur each year in the United States. Illinois is tied for 7th in the United States with an average of 26 tornadoes per year. There are no official recurrence intervals calculated for tornadoes.

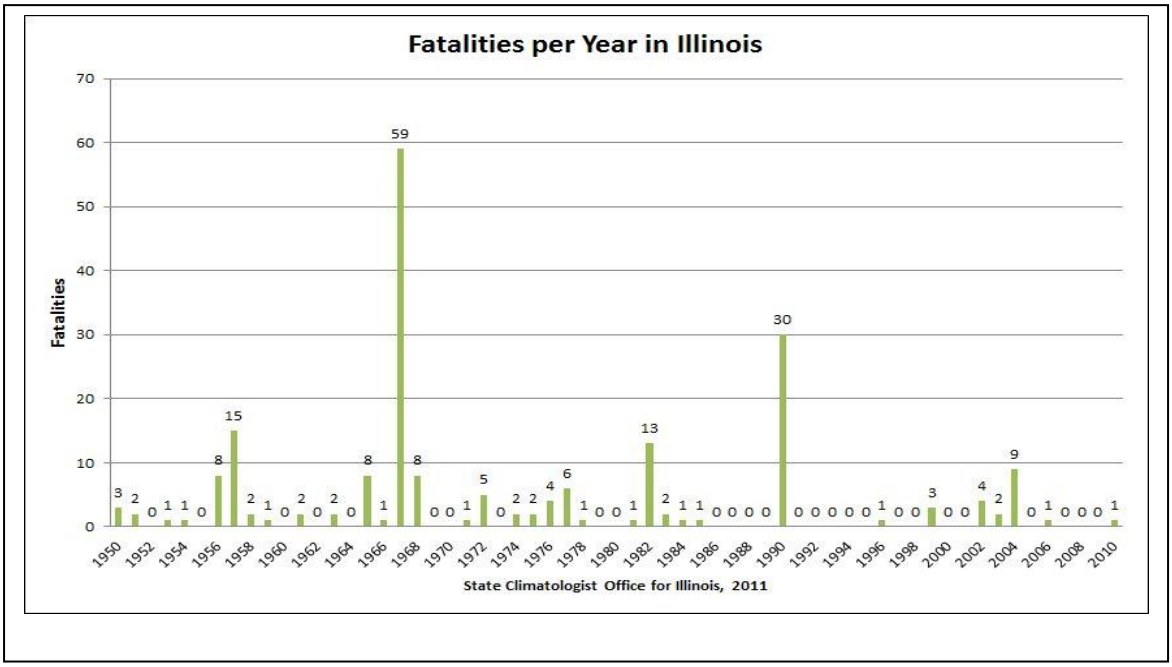
Cook County has had 44 of the 1,472 tornadoes recorded in Illinois between 1950 and 1999. There has been one tornado fatality in Cook County since 2007. Cook County is classified as having a "High" tornado risk by the Illinois *Natural Hazard Mitigation Plan*.

With 44 occurrences over 50 years, the likelihood of a tornado hitting somewhere in the county is 88% in any given year (44/50 = 0.88). There are 946 square miles in Cook County and 12 square miles in Des Plaines. The odds of a tornado hitting in Des Plaines in any year is just over 1% (0.88 x 12/946=0.011).

Tornado Frequency in Illinois



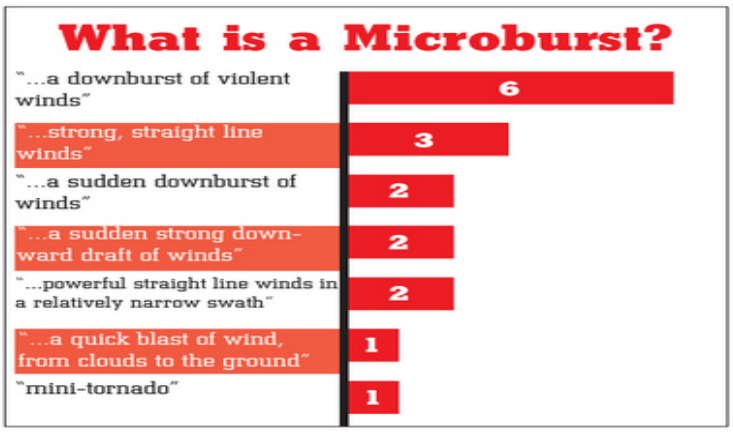
Illinois Emergency Management Agency



In the near future, Cook County will have a Hazard Mitigation Plan. In the interim the City of Des Plaines will query schools, mobile home parks, and nursing homes to see how they would respond to tornadoes. We will encourage semi- annual drills and safe rooms.

Microburst: A small downburst with its outburst, damaging winds. An intense microburst could produce damaging winds as high as 168 mph lasting a couple of seconds to several minutes. The high winds can knock over fully grown trees.

On September 22, 2010, a neighborhood on the far southeast side of Chicago had a wet microburst hit causing severe localized damage and power outages, including fallen-tree impacts into at least four homes. No fatalities were reported.



2.4. Earthquakes

Earthquakes are one of nature's most damaging hazards. 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 the fault. 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 an earthquake can be localized near its epicenter or felt significant distances away. For example, a 6.8-magnitude earthquake in the New Madrid Fault in Missouri would have a much wider impact than a comparable event on the California Coast.

The old flat-lying, intact bedrock of the central United States behaves as good "transmitters" 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 last situation, shaking can mix groundwater and soil, liquefying and weakening the ground that supports buildings and severing utility lines. This is a special problem in floodplains where the water table is relatively high and the soils are more susceptible to liquefaction. The Modified Mercalli and Richter Scales are compared in Table 2-4 below, but it is important to note that the Mercalli Intensity varies based on the observer's proximity to the epicenter. Using the example of a 6.8-magnitude earthquake event at the New Madrid Fault, the Intensity in St. Louis may be "IX", but in Des Plaines the Intensity may be observed as a "VI."

Area affected: If an earthquake occurred in the area, the entire City of Des Plaines would be affected.

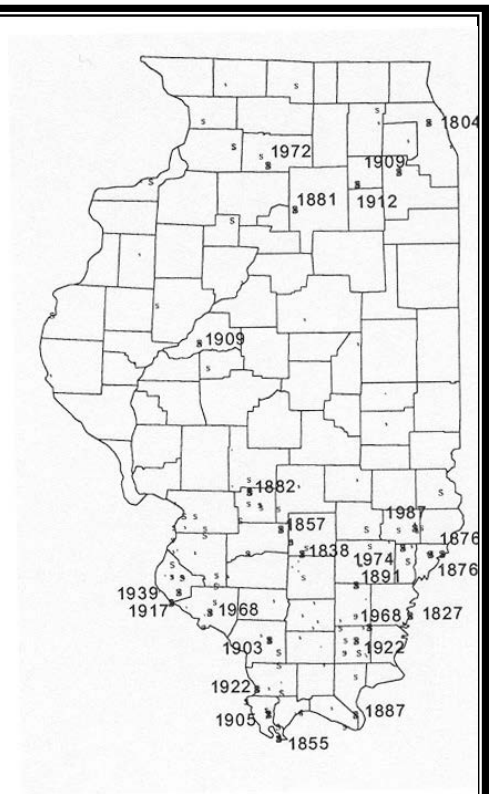
Historical events: In the United States, the most frequent reports of earthquakes come from the West coast, but the largest earthquakes in the lower 48 states occurred in Missouri in 1811 and 1812 along the New Madrid Faults. The Great New Madrid Earthquakes are the benchmarks from which all earthquakes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

Table 2-4. 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		

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



Map 2-5. Earthquakes in Illinois 1800–2000

Illinois Natural Hazard Mitigation Plan

About 200 earthquakes happen each year in the New Madrid seismic zone, but most are too small to be felt by people. The larger earthquakes felt in Northeastern Illinois are listed in Table 2-5. While the magnitudes and locations of events before the 1970s are estimates based historical accounts and not by seismograph readings, none of these earthquakes caused much damage.

Table 2-5. Earthquakes Felt in Northeastern Illinois

Date	County	Richter
8/20/1804	Cook	4.5
5/26/1909	Will	5.1
7/29/1911	Cook	3.3
1/2/1912	Kendall	4.7
3/3/1925	Cook	2.7
3/16/1944	Kane	2.7
3/16/1947	Kane	3.1
9/9/1985	DuPage	3.0

Illinois State Geological Survey

Table 2-6. Recent Earthquakes Closest to Des Plaines

Date	Distance from Des Plaines	Richter
11/25/1974	130 miles	2.4
9/9/1985	20 miles	3.0
9/2/1999	75 miles	3.5
6/28/2004	70 miles	4.2

USGS Earthquake Data Base

The most significant earthquake to affect Des Plaines in the last century was the May 26, 1909 quake described above. Table 2-6 shows the four earthquakes in the area over the last 25 years that have been large enough to record in the USGS Earthquake Data Base. Note how they are all at or below 4.2 on the Richter scale.

Likelihood of future occurrences: According to the Central U.S. Earthquake Consortium, Des Plaines is in an earthquake Intensity zone of VI (MMI Scale) for a 7.6-magnitude earthquake along the New Madrid Seismic Zone. There is a 19% – 29% chance that Des Plaines will be hit with an earthquake with a MMI of VI over the next 35 years. As noted in Table 2-4 on page 2-26, this level of quake would be felt by everyone, but would cause minor structural damage.

It is important to note that the level of damage is dependent on the location of the earthquake. As seen on Map 2-5, earthquakes can be much closer to Des Plaines than ones associated with the New Madrid Seismic Zone. A smaller earthquake event closer to Des Plaines may cause as much damage as a large event in the New Madrid Seismic Zone. On the whole, the probability of a damaging quake hitting Des Plaines in any given year is considered at 1% 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.

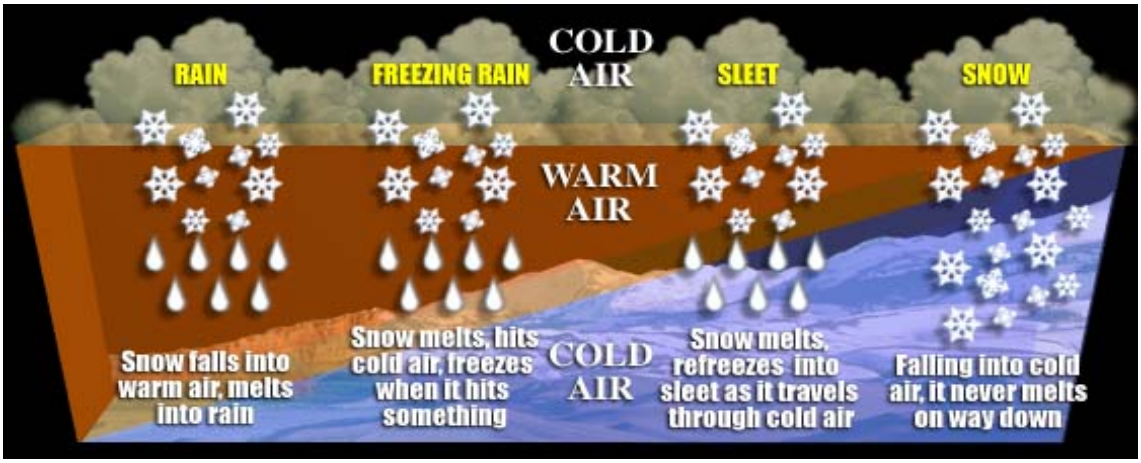
Winter storms in the Midwest are caused by Canadian and Arctic cold fronts that push snow and ice deep into the interior region of the United States. Winter storms can occur as heavy snowfalls, ice storms or extreme cold temperatures. Winter storms can occur as a single event or they can occur in combination 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.

National Weather Service

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 Table 2-7. In addition to the problems caused by the snow storm is the subsequent melting and possible flooding.

Table 2-7. Snow Classifications	
Blizzard	Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less that 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, as illustrated below.



University of Nebraska website, http://hpccsun.unl.edu/nebraska/icestorms.html

Area affected: Winter storms affect the entire City of Des Plaines.

Historical Events: One of the worst winter storms to impact the State was on January 26-27, 1967, when as much as 23 inches of snow fell on the Chicago area. Travel throughout northern Illinois was curtailed and areas to the south experienced a glaze of ice which made travel virtually impossible until January 29. Fifty deaths were directly attributed to this storm. In February 2011, there was a large snow storm event and over 20” of snow fell over a 24-hour period.

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, up to 20 inches, was recorded in the northeast quarter of the State, where traffic was paralyzed and transportation corridors closed.

The 1999 New Year's Day storm which intensified over the next two days (January 1-3, 1999) resulted in record snowfall across the northern half of the State. High winds and frigid temperatures caused blizzard conditions behind the snowfall which left 21.6 inches in Chicago, second only to the 1967 January storm.

From December 10 - 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.

The January 31 – February 2, 2011 winter storm called the 2011 Groundhog Day Blizzard had a reported total snowfall of 21.2 inches at Chicago-O'Hare International Airport, making this the third largest total snowfall in Chicago history after the infamous Chicago Blizzard of 1967, and the Blizzard of 1999.

Table 2-8 Cook County Winter Storms

Date	Type	Deaths
January 26, 1994	Ice Storm	0
December 6, 1994	Winter Storm	0
January 18, 1995	Heavy Snow	0
December 8, 1995	Winter Storm	0
January 9, 1997	Winter Storm	0
January 15, 1997	Winter Storm	5
December 9, 1997	Heavy Snow	0
January 8, 1998	Heavy Snow	0
March 9, 1998	Heavy Snow	0
January 1, 1999	Heavy Snow	1
March 5, 1999	Heavy Snow	0
March 8, 1999	Heavy Snow	0
February 18, 2000	Heavy Snow	0
December 10-31, 2000	Heavy Snow	0
January 30, 2002	Winter Storm	0
March 2, 2002	Winter Storm	0
March 4, 2003	Winter Storm	0
January 4, 2004	Heavy Snow	0
January 4, 2005	Heavy Snow	0
January 21, 2005	Heavy Snow	0
December 8, 2005	Winter Storm	0
January 20, 2006	Winter Storm	0
February 2, 2011	Winter Storm	0

NCDC

The National Weather Service (Chicago) issued a severe snow storm and blizzard warning for northern Illinois. The snow was expected to accumulate at approximately 3 inches per hour, and by Wednesday afternoon (February 2), rise to a height of two feet. Between Tuesday, February 1st and Wednesday, February 2nd at approximately 20.2 inches of snow fell on the Chicago area, making this storm northern Illinois' third-largest snowfall on record.

On Tuesday, February 1, 2011, Mayor Martin J. Moylan signed a Proclamation of Local State of Emergency Declaration under the Des Plaines EMA Ordinance and Illinois Emergency Management Act.

This was a severe storm and the accumulation of drifting snow dangerous enough that public schools were closed for several days as did the business community. Area roads, expressways, toll-ways were completely shut down due to the volume of blowing and drifting show. The City of Des Plaines worked out details to use vacated land for snow storage, and traveled thru the neighborhoods to shovel out blocked fire hydrants.

Cook County received Presidential Emergency Declarations for the winter storms of 1979, 1999, 2000, and 2011.

The City of Des Plaines plows the major arterial routes thru the City so emergency vehicles can access. The plows then move to collector and neighborhood streets. After the plowing has ended, salt mixed with calcium chloride is applies to the pavement to minimize the ice buildup.

Likelihood of future occurrences: During the 20th century, there were at least two severe winter storms in Illinois each year. As shown in Table 2-8, there have been 1 – 2 winter storms in Cook County severe enough to record in the National Climate Data Center's database. Therefore, the odds of a winter storm hitting Des Plaines in any given year are a 100% chance or 1.0. However, the odds of a storm severe enough to warrant a declaration by FEMA are once every 10 years or 0.1.

2.6. Thunderstorms

Severe thunderstorms and high winds 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. Severe storms 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 are covered under the earlier sections on flooding, local drainage, and sewer backup.

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.

Tornadoes are also 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 (200 km/h).

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.

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.

Area affected: Thunderstorms affect the entire City of Des Plaines.

Historical events: Generally, thunderstorms and their accompanying hazards do not warrant a disaster declaration or a lot of documentation. Storms in July 1993 caused numerous flash flood events. Three to six inches fell over portions of Cook counties on July 18-19. Some 500 residents below an earthen dam were evacuated in McHenry County after officials expressed concerns the dam might break. Fortunately the dam held.

The National Weather Services reported that 244 hail events, 385 severe storms, and 23 lightning events were reported in Cook County between January 1950 and April 2010. Several of the recent storms were listed for Des Plaines with winds of 50 knots.

The records show nine hailstorm events for Des Plaines since 2000. These are shown in Table 2-9. It should be noted that two of these had hailstones larger than 1.5 inches in diameter, the threshold where the stones will cause property damage.

Table 2-9. Des Plaines Hail Events

Date	Time	Hailstone
05/18/2000	11:05 AM	0.75 inch
07/17/2003	04:25 PM	1.75 inches
07/20/2003	09:52 PM	0.75 inch
08/01/2003	02:38 PM	0.75 inch
08/01/2003	12:40 PM	0.88 inch
05/21/2004	09:05 AM	0.75 inch
05/17/2006	04:04 PM	1.75 inches
06/28/2006	05:06 AM	0.75 inch
04/05/2010	09:35 PM	1.00 inch

NCDC

On May 14, 2010, the National Weather Service has issued a flash flood warning for the Des Plaines River near the city of Des Plaines. Doppler radar indicated thunderstorms produced heavy rainfall over the northern and western suburbs and will continue to move across the area this morning, with rainfall rates of up to one to two inches per hour.

Parts of the Des Plaines River Trail flooded and some of the underpasses and roads were closed. This was a minor incident, but it still kept the residents in flood prone areas acutely aware of their precarious situation.

Again on June 19, 2010, a severe thunderstorm blew through the Des Plaines and surrounding area unleashing heavy rain and winds that knockdown twenty-nine power poles were along Lee and Oakton. 2,700 businesses and homes were affected by the power outage in the area east of Mannheim Road, south of Prospect Avenue and north of Pratt Avenue to Des Plaines River Rd. It would take Commonwealth Edison nine days to replace the poles and restore power.

Flood waters in Des Plaines residents' basements and roads were receding Sunday, as damages surfaced and we began the clean-up process. No flooding in the four major flood areas, but the loss of power for an extended period of time was difficult to endure. Many residents worked together by providing generator power thru orange extension cords to those residents without power

Likelihood of future occurrences: The Cook County is 946 square miles. It averages 6 – 7 thunderstorm events each year worthy of recording in the National Weather Service's severe storms database. Assuming the average severe storm affects 75 square miles, the odds of a severe thunderstorm hitting Des Plaines are 50% or 0.5 (6.5 x 75/946).

2.7. Drought/Extreme Heat

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.

Drought is a period of scarce water supplies and primarily affects agriculture. As Des Plaines has an ample supply of Lake Michigan water, drought is not considered a hazard to the City.

Extreme heat for a region is temperatures that hover 10 degrees or more above the average

high temperature for several weeks.

Area affected: Cook County and most other northeastern Illinois areas have an "elevated" hazard rating for extreme heat in the 2010 Illinois Natural Hazard Mitigation Plan. Heat waves occur throughout the City of Des Plaines.

Historical events: A recent example of extreme heat was the summer of 1995. The combination of record or near record high temperatures and high dew point temperatures led to heat indices routinely above the 120 degree mark on July 12 – 17. The heat index peaked at 125 degrees on July 14 when the air temperature was 98 degrees and the dew point was 83 degrees. Scattered power outages compounded the problem when Commonwealth Edison and other electric utilities could not keep up with the record demand.

At the time there was a perception that the number of people killed was inflated, but later studies indicated the opposite was true and the heat victims were significantly undercounted. Local officials believed that many of the elderly were scared to come out of their apartments because of crime in their neighborhoods. Many were found in their rooms with air temperatures in excess of 120 degrees.

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. (2010 Illinois Natural Hazard Mitigation Plan, page III-88)

The U.S. Department of Agriculture declared on July 11, 2012 that more than 1,000 counties in 26 states are natural-disaster areas due to record high temperatures making it the worst drought in decades. The average temperature for July 4-6 was 102 degrees.

Likelihood of future occurrences: "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." (2010 Illinois Natural Hazard Mitigation Plan, page III-88) As evidenced in Table 2-10, there have been cases in six of the last twelve years when extreme heat has killed more than 10 people in Cook County. Therefore the odds of it occurring in any future year are 0.5.

Table 2-10. Cook County Extreme Heat Deaths

Year	Deaths
1995	622
1996	7
1997	22
1998	15
1999	21
2000	0
2001	35
2002	40
2003	3
2004	0
2005	1
2006	1
2012	18

NCDC

2.8. Illness/Disease

When a new disease or a new strain spreads around the world, causing serious illness and possibly death, it becomes a natural hazard warranting government, and sometimes, emergency management, attention. Such a hazard spreads easily from one person to another, and can infect an entire community in a matter of days. As a new threat, it is unlikely that health departments will have antidotes or vaccines that will prevent or quickly stop the spread of the disease.

Types of viral illnesses that have the potential to be pandemic include influenza (flu), measles, SARS, West Nile Virus, and an intentional release of smallpox. Types of bacterial illness that may be considered health emergencies include bacterial meningitis, botulism (caused by a bacterial toxin), and anthrax. Bacterial illness is less of a hazard because they usually can be successfully treated with antibiotics.

The threat from any illness depends in part on how the disease is spread and how easily it can be prevented and controlled. In the modern world, international travel and shipping allow pathogens to travel from region to region and country to country. An example of a disease being spread by travel is the recent outbreak of SARS in East Asia and Toronto. Epidemics can also be caused by pathogens transmitted as insects and animals migrate. An example of this type of transmission can be found in the recent outbreak of the West Nile Virus and avian flu.

Area Affected: All residents of Des Plaines are exposed to contagious diseases, although the elderly are more vulnerable to serious consequences.

Historical Occurrences: In the past 100 years, there have been three flu pandemics—in 1918 (Spanish flu), 1957 (Asian flu) and 1968 (Hong Kong flu). While the 1918 Spanish Flu pandemic was by far the most deadly of the three, killing more than 40-50 million people worldwide, the 1957 and 1968 outbreaks resulted in approximately 2 million and 1 million deaths, respectively, and each caused tens of thousands of deaths in the United States.

In Illinois, West Nile virus was first identified in September 2001 when laboratory tests confirmed its presence in two dead crows found in the Chicago area. The following year, the state's first human cases and deaths from West Nile disease were recorded and all but two of the state's 102 counties eventually reported an infection of a human, bird, mosquito or horse.

By the end of 2002, Illinois had counted more human cases (884) and deaths (67) than any other state in the United States. In 2003, the epicenter of West Nile disease moved westward. The number of West Nile human cases in Illinois fell dramatically with just 54 reported and only one death. Illinois' caseload in 2004 was slightly higher than the previous year with 60 reported cases and four deaths. In 2005, Illinois recorded 252 cases and 12 deaths, both totals are the second highest in the nation, after California's 880 cases and 19 deaths. Illinois first human case in 2006 was not reported until August 1.

In 2011, the Department of Public Health reported 2,526 cases and 10 deaths in Illinois from the H1N1 influenza virus.

Likelihood of future occurrences: A frequency of a severe pandemic of once in 50 years (0.02) is used for this plan.

2.9. References

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- University of Nebraska website, www.hprcc.unl.edu/nebraska/U_S_SEVERE.html
- US Geological Survey website, "Earthquake History of Illinois," http://neic.usgs.gov/neis/states/illinois/illinois_history.html
- US Geological Survey website, for gage number 05529000 Des Plaines River near Des Plaines
- US Geological Survey website, for gage number 05530000 Weller Creek at Des Plaines

Chapter 3. Vulnerability Assessment

Chapter 2 reviewed the hazards that face the City of Des Plaines. If they struck vacant land, there would not be much cause for concern. Because the City has over 58,000 residents and thousands of homes, businesses and critical facilities, the potential for damage and deaths can be high.

This chapter reviews how vulnerable Des Plaines 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. The impact of the other factors is measured subjectively. A four step process was followed to calculate the cost to Des Plaines of the hazards reviewed in Chapter 2:

Step 1: Inventory appropriate categories of property subject to damage
Step 2: Determine the cost of damage to the properties from one event
Step 3: Determine the threat of the hazard to the economic base and to people
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 – 3.11 cover steps 2 – 3, the impacts of each hazard on people and property. Section 3.12 calculates values for all the factors and Section 3.13 summarizes the findings.

3.1. Properties

This chapter is based on the assumption that natural hazards do not damage land, only manmade structures. Therefore, nine categories of buildings were reviewed to assess the City's vulnerability to property damage. Their dollar values from 2007 are shown in Table 3-1. Dollar values were not adjusted for the 2013 update of this *Plan* due to the limited growth of the region's economy. Other data, where available, was updated in 2013.

Table 3-1. Building Numbers and Values

Type of Building	Number of Buildings	Rounded Building Value	Total Building Value	Contents Multiplier	Total Property Value
Single family	23,431	$255,000	$5,974,905,000	1.5	$8,962,357,500
Campground	129	$50,000	$6,450,000	1.5	$9,675,000
Mobile homes	582	$40,000	$23,280,000	1.5	$34,920,000
2−4 family	1,347	$500,000	$673,500,000	1.5	$1,010,250,000
Multi-family	322	$500,000	$161,000,000	1.5	$241,500,000
Commercial	967	$875,000	$846,125,000	2.0	$1,692,250,000
Industrial	373	$3,900,000	$1,454,700,000	2.0	$2,909,400,000
Public/churches	320	$875,000	$280,000,000	2.0	$560,000,000
Oakton/Maine West	2	$82,000,000	$164,000,000	1.5	$246,000,000
Total	27,473		$9,583,960,000		$15,666,352,500

While these categories may appear to be general, they are sufficient for planning purposes: to assess the relative vulnerability of properties to the hazards facing Des Plaines. The building counts came from the City of Des Plaines Geographic Information System (GIS) office.

Building values for most of the properties are based on tax assessed values, adjusted by factors provided by the Cook County Tax Assessors office to represent their market value. These figures were found to be too low when compared to recent sales, so an additional multiplier was used to approximate recent market value records (minus land value) and the results were rounded off to produce the values in Table 3-1. Building values for several categories were calculated differently:

- There are no tax assessment figures for the Campground because it is on church property, so an estimated value is used.
- There are no tax assessment figures for public buildings or churches because they aren't taxed, so the average value of commercial buildings is used.
- There are no assessed values for mobile homes because they are all located in three parks, which pay property tax on the entire property. The value came from another mitigation project that had mobile home values.
- Averages of the reported values were used for Oakton Community College and Maine West High School, each of which has one very large building. Smaller buildings on the campuses are counted under the public/churches category.

Critical facilities are included under the public properties in order to simplify the dollar calculations of property damage. The impact of a critical facility being damaged is considered in the discussions on the impact on safety.

Contents: 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 tables in the following sections when calculating contents damage.

3.2. Other Impacts

One cannot put dollar figures on the impact of a hazard on the community and on individual people. Therefore, four subjective measures of nil, low, moderate, and high are used in this chapter for:

- Overall economic impact on businesses, transportation and the tax base
- Safety hazard, including threat to critical facilities
- Health hazard

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 City.

3.3. Overbank Flooding

Buildings: Damage to buildings, especially residences, is usually a city's largest single flood problem. In a few situations, deep or fast moving waters will push a building off its foundation, but this is rare. More often, structural damage is caused by the weight of standing water, known as "hydrostatic pressure."

Building flooding in the Methodist Campground

This basement floor broke due to hydrostatic pressure

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

Due to the relatively shallow flood depths in the City's floodplains, the most common type of damage inflicted by a flood is caused by soaking. When soaked, many materials change their composition or shape. Wet wood will swell and, if dried too quickly, will crack, split or warp. Plywood can come apart. Gypsum wallboard will fall apart if it is bumped before it dries out.

Soaking delaminates plywood and the wicking effect means that damage will be higher than the flood level.

Effects of soaking on walls, floors and cabinets.

The longer these materials are wet, the more moisture, sediment and pollutants they will absorb. Walls present a special problem: a "wicking" effect pulls water up through wood and wallboard, soaking materials several feet above the actual high-water line.

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

Mason Lane, Des Plaines, after 2004 flood

Linda Caruth

In short, while a building may look sound and unharmed after a flood, the waters can cause a lot of damage. To properly clean a flooded building, the walls and floors should be stripped, cleaned, and allowed to dry before being recovered. This can take weeks and is expensive. Most of the contents, especially clothing, carpeting and furniture, are usually thrown out.

Flood insurance payments: A readily available source of building damage data is flood insurance claim payments. FEMA has paid 971 insurance claims for flood damage to Des Plaines properties since 1978 for a total of $18,727,442. Almost all of these claims have been for single family homes.

Table 3-2 shows the highest average payments were from the 2008 flood, the highest flood in recent history. Even though the 1986 flood affected more properties than the 1987 flood, there were more insurance claims in 1987. This can be attributed to the fact the 1986 flood made more people aware of both their exposure to flooding and the availability of insurance. Federal aid also required 1986 flood disaster assistance recipients to purchase a flood insurance policy.

Table 3-2. Flood Insurance Claim Payments

Year	Number	Total Paid	Average
1978 – 1981	29	$56,364	$1,944
July 1982	19	$63,948	$3,366
1982 – 1985	15	$47,173	$3,145
October 1986	61	$1,292,514	$21,189
August 1987	139	$2,267,906	$16,316
1989 – 1984	12	$50,283	$4,190
May 1996	23	$236,273	$10,273
February 1997	35	$208,004	$5,943
April 1999	8	$69,977	$8,747
October 2001	16	$50,653	$3,408
April, June 2002	2	$2,217	$1,108
August 2002	8	$48,283	$6,035
May 2004	7	$56,739	$8,105
September 2008	387	$13,300,000	$34,367
Total	971	$17,750,604	$18,280

Table 3-3 shows the average values of the buildings in the mapped floodplain. The numbers in the second column, number of buildings in the floodplain, are from the City's GIS office. The building values and contents multipliers are explained in Section 3.1. They are different values than for the City as a whole (houses are worth slightly more, non-residential buildings less). Columns 2 – 4 are multiplied times each other to produce the total value of property (building and contents) located in the City's floodplain.

The average single-family home building in the floodplain, with contents value is $260,000 x 1.5 = $390,000. $25,000 in average flood damage (structure and contents) equals approximately 6.5% of the value of the building and its contents. 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* damage percentage based on past experiences of 10 to 50-year floods. Buildings close to the Des Plaines River will receive much more damage while buildings at the edge of the smaller streams' floodplain will suffer less. A 100-year flood would cause more damage.

The last column is 6.5% of the total values, i.e., the value of property damage from floods that average 6.5% damage to property.

Table 3-3. Property Damage from a Flood

Type of Building	Number of Buildings	Rounded Building Value	Contents Value Multiplier	Total Property Value	Damage Percentage	Estimated Property Damage
Single family	2,108	$260,000	1.5	$822,120,000	6.5%	$53,437,800
Campground	127	$50,000	1.5	$9,525,000	6.5%	$619,125
Mobile homes	0	$0	1.5	$0	6.5%	$0
2−4 family	100	$303,000	1.5	$45,450,000	6.5%	$2,954,250
Multi-family	24	$460,000	1.5	$16,560,000	6.5%	$1,076,400
Commercial	151	$650,000	2.0	$196,300,000	6.5%	$12,759,500
Industrial	47	$495,000	2.0	$46,530,000	6.5%	$3,024,450
Public/churches	45	$650,000	2.0	$58,500,000	6.5%	$3,802,500
Oakton College	1	$650,000	1.5	$975,000	6.5%	$63,375
Estimated total damage from one event						$77,737,400

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.

Roads and bridges are closed for a while due to flooding. The Corps of Engineers studied the cost of lost travel time due to the closing of the bridges over the Des Plaines River in northern Lake County. Based on the distance people had to drive at $0.28 per mile and

the median income for the area, the Corps calculated the value at $383,000 per day. The figure would be higher at today's prices and in Des Plaines, where there is more traffic.

There is a cost of flood fighting and recovery that is borne by the City. Public expenditures include search and rescue, shelters, and emergency protection measures. The largest expenses are for clean up and disposal of debris. Repetitively flooded areas tend to deteriorate over time and property values go down, resulting in a social cost.

Overall economic impact: High.

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 3-4). 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.

Floods kill more people trapped in vehicles

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.

Table 3-4. Flood Related Deaths

	Total	
	IL	US
1959-2005	51	4513

These figures do not include Hurricane Katrina.

Data in this format not available since 2005

NIU.EDU

Two people have been killed in floods in Cook County in the last 10 years. In February 1997, a woman died when she drove her car into a barricaded, flooded viaduct under railroad tracks in a south suburb. In August 1998, a 6 year old boy was swept into a storm drain while playing in flood waters in a southwest suburb. He was carried over 1/4 mile through a drain pipe to a retention pond where he was pinned against a grate for 25 minutes until a rescue squad found him.

Warning and evacuation: The threat to life posed by a flood can be avoided if people can evacuate before the waters reach their buildings or close their evacuation routes. This requires advance notice that a flood is coming and a system to disseminate flood warnings. Flood warning programs are discussed in Chapter 7. With the gages and National Weather Service river level predictions, there can be lead time on the Des Plaines River 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.

With adequate warning, people and possessions can be evacuated before the flood instead of rescued during it.

Critical facilities: One critical facility is in the 100-year floodplain of the Des Plaines River. The management is aware of the hazard and has constructed some flood protection measures. However, access to the site is still threatened when the water rises. There is also the main fire station located in the 100-year floodplain that needs to be evacuated during high rainfall events.

Two critical facilities are adjacent to the 100-year floodplain, Holy Family Hospital and City Hall. Both of these are expected to be high and dry during a 500-year flood, but access to the other side of the Des Plaines River will be cut off.

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

Post-flood silt, mold and mildew

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 will be flooded again someday. 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.

3.4. Repetitive Losses

There are several different definitions of a "repetitive loss property." This *Plan* uses the Community Rating System's definition, in part because data are readily available: a repetitive loss property is one which has received two flood insurance claim payments for at least $1,000 each since 1978. These properties are important to the National Flood Insurance Program (NFIP) and the Community Rating System (CRS) because even though they comprise 2% of the policy base, they account for 33% of the country's flood insurance claim payments. There are currently 268 buildings included on the City of Des Plaines' repetitive flood loss list. A number of the homes on the list have been mitigation or are included in mitigation projects being implemented by the City.

In 2002, the City prepared its Repetitive Loss Plan. This *Hazard Mitigation Plan* meets FEMA's repetitive loss planning criteria and supersedes the 2002 plan. In the 2002 plan, there were 46 repetitive loss properties. In 2007 the number rose to 87 repetitive loss properties. With flooding between 2008 and 2013, the number has increased to 268 properties. With The addresses and their flood insurance claim history are protected by the Privacy Act and are not listed in this public document.

The 46 addresses were plotted on a map and visited. Properties subject to the same flood hazard were grouped into repetitive loss areas. The grouping includes properties not on FEMA's list that are at the same elevation or otherwise exposed to the same flooding that damaged the ones on FEMA's list. It is assumed that had they been insured under the same policy at the time of the floods, they, too, would be on FEMA's list. Further, they would benefit from the mitigation actions recommended in this plan.

This grouping process resulted in 11 repetitive loss areas in the City of Des Plaines. This plan focuses on the areas rather than individual properties (except for the two areas that have only one property).

Map 3-1 shows the location of all repetitive loss areas. Map 3-2 shows the location of repetitive loss areas 1 – 9 that were closely examined in the 2002 Repetitive Loss Plan.

Areas 12 through 15 have been added for the 2013 update of the *Plan* and capture all properties on the FEMA repetitive loss list plus additional properties in those areas. Table 3-5 identifies a total of 334 residential and non-residential buildings.

Repetitive loss area #6, Big Bend Drive underwater, 1986

Area 16 is does not have properties on the FEMA repetitive loss list, but is an area identified by the Planning Committee as an area of flood concern. Areas 10 and 11 are in "X Zones" in the western portion of the City. They are subject to local drainage and sewer backup problems rather than overbank flooding.

Table 3-5 Repetitive Loss Area Summary

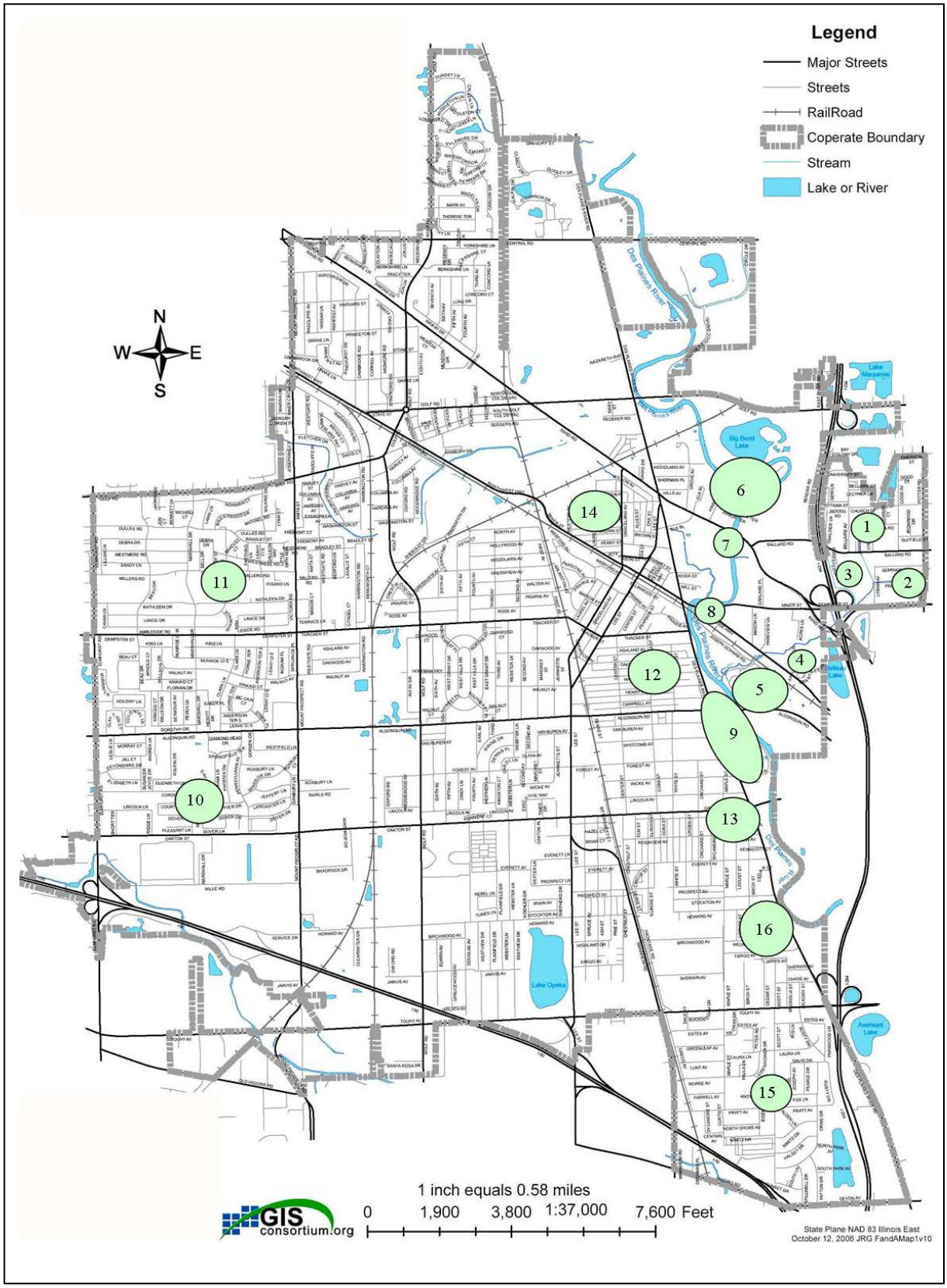
Area	Flood source	Years flooded	Flood Data				Number of Bldgs	
			FIRM Zone	Floodway	Velocity (fps)	Warning time	Homes	Other
1. Bellaire	FC/DPRBW	86, 87, 08	AE	Yes	0.5	< 1 hour	10	
2. Seminary	FC/DPRBW	79, 86, 87, 08	AE	Part	0.2	< 1 hour	11	2
3. Forest Edge	FC/DPRBW	86, 87, 97, 08	X	N/A	0.7	< 1 hour	1	
4. Apple Creek	FC/DPRBW	86, 87, 94, 96, 97, 99, 02, 04, 08	AE	No	N/A	< 1 hour	5	
5. Campground	DPR	79, 82, 83, 85, 86, 87, 94, 96, 97, 99, 02, 08	AE	Yes	1.0	1+ day	110	17
6. Big Bend	DPR	79, 82, 83, 86, 87, 96, 01, 04, 08	AE	Yes	0.4	1+ day	95	
7. Scott Nolan	DPR	86, 87, 08	AE	Yes	1.0	1+ day		2
8. 1723-53 Busse	DPR	86, 87, 08	AE	No	1.0	1+ day		1
9. Campbell-River	DPR	86, 87	AE	Yes	1.0	1+ day	5	
10. Windsor	Drainage	82, 87, 01	X	N/A	N/A	< 1 hour	7	
11. Westmere	Drainage	78, 79, 87, 97, 99, 00, 01	X	N/A	N/A	< 1 hour	13	
12. Algonquin	Drainage		X	N/A	N/A	< 1 hour	15	
13. Oakton	DPR		AE	Yes	1.0	1+ day	20	
14. Willow	Drainage		X	N/A	N/A	< 1 hour	10	
15.South	Drainage		X	N/A	N/A	< 1 hour	12	
16. Birchwood-Cedar	DPR		AE	Yes	1.0	< 1 hour	20	
Total							334	23

FC/DPRBW = Farmers Creek plus Des Plaines River backwater flooding DPR = Des Plaines River

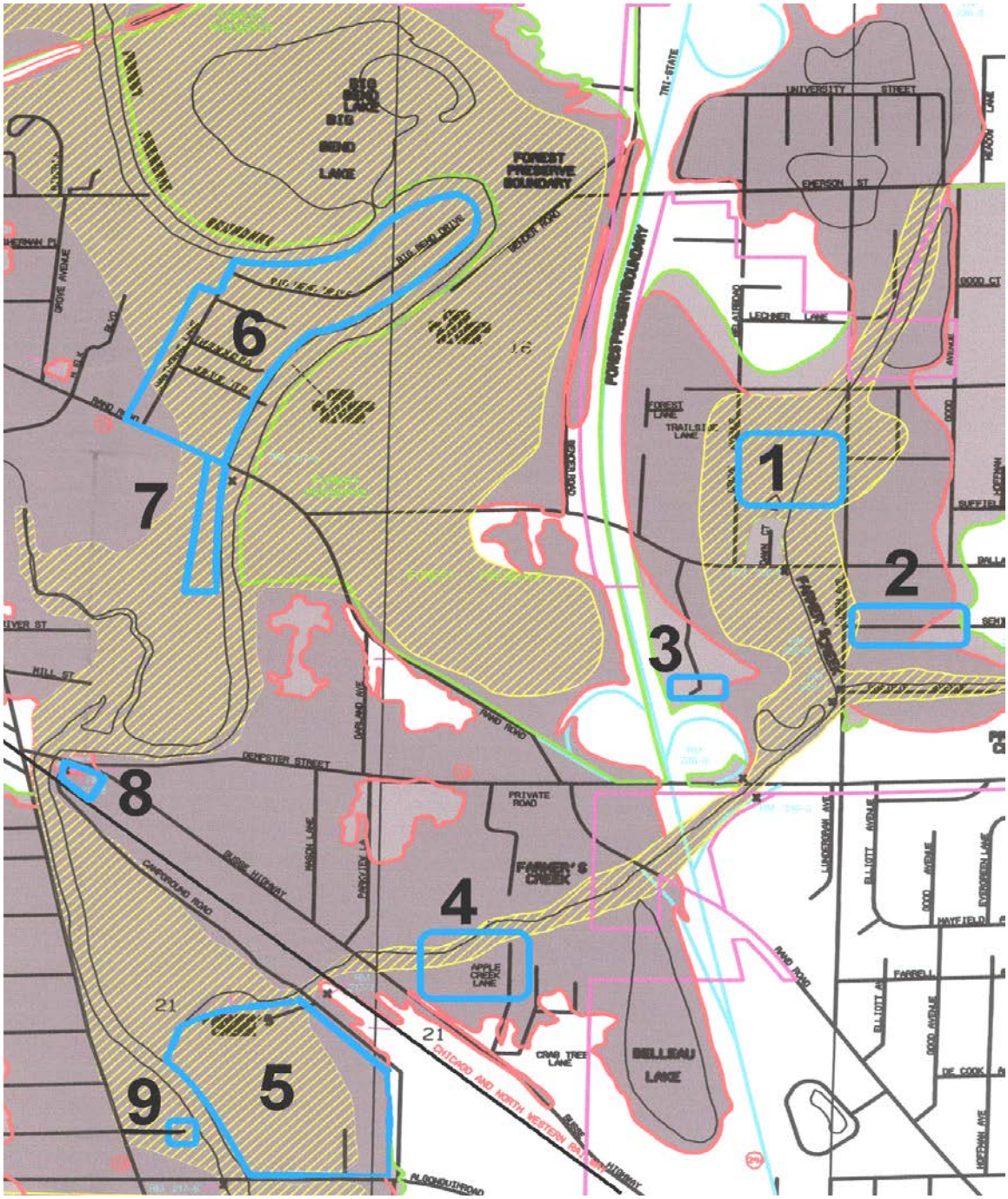
Years flooded data are from both insurance claims and resident responses to a 2002 survey

fps = feet per second

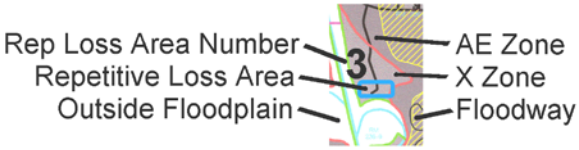
Table 3-5 lists the 16 areas and provides summary data. Four properties received six claims and three have received five claims. All areas were affected by the record rainfall and river flooding of August 1987. Additional properties were added to the Des Plaines list since the 2007 *Plan* due to the 2008 rainfall related to Hurricane Ike and 2011 and 2013 flooding on the Des Plaines River.



Map 3-1 City of Des Plaines Repetitive Flood Loss Areas



Map 3-2 City of Des Plaines Repetitive Flood Loss Areas 1 – 9



Properties can be shown as "mitigated" on the FEMA repetitive loss list if it can be shown that there has been a flood control project or the building has been removed or retrofitted. There has been work on Farmers Prairie Creek, as discussed in Chapter 8, but this only reduces backwater flooding from the Des Plaines River and does not stop flooding of Farmers Creek following local rainstorms. Some of the properties in area 5, the Methodist Campground, have been elevated, but not all of those on FEMA's list, so the Campground is still a repetitive loss area. Homes in the Big Bend Lake area are also being addressed. Property protection measures for the repetitive loss areas area discusses in Chapter 6 of this *Plan*.

Building damage: Building damage from repetitive flooding is the same as from overbank flooding. Table 3-6 uses the same factor or 6.5% of the value of the buildings and their contents. This table is from the original 2002 *Repetitive Loss Plan*.

Economic impacts: The impact of repetitive flooding on the City's economy and government operations is less than from overbank flooding because relatively few commercial and no government facilities are in the repetitive loss areas.

Overall economic impact: Low

Safety and health: The safety and health impacts of repetitive flooding are the same for overbank flooding, discussed in the previous section. The one critical facility directly affected by overbank flooding is also in a repetitive loss area.

Overall safety hazard: Moderate

Overall health hazard: Moderate

Table 3-6. Property Damage from Repetitive Loss Flooding						
Type of Building	**Number of Buildings**	**Rounded Building Value**	**Contents Value Multiplier**	**Total Property Value**	**Damage Percentage**	**Estimated Property Damage**
Single family	128	$260,000	1.5	$56,550,000	6.5%	$3,675,750
Campground	127	$50,000	1.5	$9,525,000	6.5%	$619,125
Commercial	23	$650,000	2.0	$29,900,000	6.5%	$1,943,500
Estimated total damage from one event						$6,238,375

3.5. Local Drainage and Sewer Backup

Drainage problems can present an unappreciated safety hazard.

Village of Gurnee, Illinois

Buildings: The damage posed to buildings from surface drainage problems is the same as for surface flooding. Some areas are subject to overland flooding from severe rains causing below grade flooding. However, most structures are elevated enough above grade to be above the water from drainage problems. This is not the case for basements and other below grade flood levels.

Sewer backup is different. By getting items wet with dirty water, a sewer backup flood can effectively destroy many basement contents. Finished basements, with carpeting and furniture, are especially susceptible to damage. Even in unfinished basements, water damages washing machines, dryers, furnaces, water heaters, and utilities.

Because flood insurance provides limited coverage to basements and other floors below ground level, there are no insurance figures to base the cost of property damage. However, it is not expected that either shallow drainage or sewer backup causes much damage to a building's structure.

Des Plaines basement after a sewer backup

Linda Caruth

A round number of $5,000 per building is used to estimate property damage to contents from local drainage and sewer backup. Each occurrence is estimated to affect 100 buildings for a cost per occurrence of $500,000.

Economic impacts: Disrupted traffic and businesses with flooded basements may result in a business being closed for a day or two. Street ponding is usually not severe enough to close a street to traffic, at least not to emergency vehicles.

Overall economic impact: Nil.

Safety: Surface drainage poses similar safety hazards as surface flooding does. In fact, because it is shallow water, it can be seen as safe or even as an "attractive nuisance." Adults and children have been killed driving or walking through shallow flooded areas.

The primary safety hazard from sewer backup is electrocution that may occur if the power to the basement is not turned off and a person walks in electrified water.

Critical facilities: Two of the critical facilities have basements that would be affected by a sewer backup flood. The managers of both were interviewed. One has no history of sewer backup, but has no vital items stored in the basement. The other has had surface flooding in the basement and has evacuated everything of value, including the controls and machinery for the building's elevators.

Overall safety hazard: Moderate.

Health: The health hazards of surface flooding are discussed earlier. Backed up sewers create a significant health problem, even in empty basements. Clean up must be careful and thorough to ensure there are no lingering hazards. The health, mental health, and noneconomic impacts are similar to those described for overbank flooding.

Overall health hazard: Moderate.

3.6. Tornadoes

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

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

Structures within the direct path of a tornado vortex are often reduced to rubble. However structures adjacent to the tornado's 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.

Also, wind shear plays an important role in the formation of tornadoes and hail. It is a rapid change in winds over a short horizontal distance and some amount of wind shear is always present in the atmosphere.

Damage from the April 2004 Kankakee tornado

Damage from the April 2004 Kankakee tornado
WGFA Radio

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 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 and industrial buildings, are more susceptible to damage. All *areas* of Des Plaines are equally exposed to the tornado threat, but only 1/3 square mile would be affected by a single occurrence (see discussion on page 2-11). The City of Des Plaines is approximately 12 square miles, so one tornado would affect 3% of the City (0.33/12 = 0.03).

Tornado damage to a mobile home
Marvin Nauman/FEMA News Photo

It is estimated that an *average* tornado in the City would cause destruction and damage to 3% of the buildings and their contents at an average of 50% damage. 3% of the mobile homes would be 100% damaged and 3% of the industrial buildings would be 75% damaged. Again, these are average figures. While, a tornado that hit a shopping center would cause more damage, one that hit a park or farm fields would cause less.

Table 3-7. Property Damage from a Tornado				
Type of Building	**Total Building Value**	**Percent affected**	**Damage Percentage**	**Estimated Damage**
Single family	$8,962,357,500	3%	50%	$134,435,363
Campground	$9,675,000	3%	50%	$145,125
Mobile homes	$34,920,000	3%	100%	$1,047,600
2−4 family	$1,010,250,000	3%	50%	$15,153,750
Multi-family	$241,500,000	3%	50%	$3,622,500
Commercial	$1,692,250,000	3%	50%	$25,383,750
Industrial	$2,909,400,000	3%	75%	$65,461,500
Public/churches	$560,000,000	3%	50%	$8,400,000
Oakton/Maine West	$246,000,000	3%	50%	$3,690,000
Estimated total damage from one event				$257,339,588

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 buildings are insured, so the economic impact on the local treasury may well be small.

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

Overall economic impact: High

Safety: The tornado section in Chapter 2 notes that 39 people have been killed and 776 injured by tornadoes in Cook County since 1950. The 1990 Plainfield twister caused 28 deaths and the 2004 Utica tornado killed eight people.

Table 3-8 shows recent tornado related fatalities in the United States and where they occurred. 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.

Table 3-8. Tornado Fatalities

Year	U.S.	Illinois
2003	54	2
2004	35	8
2005	30	0
2006	66	1
2007	81	0
2008	126	0
2009	21	0
2010	45	1
2011	553	0

NOAA

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

The number of people who live in mobile homes is far smaller than the numbers who live in permanent homes, however Table 3-8 shows that they have practically the same number of deaths. It is common knowledge that residents in mobile homes are at the greatest risk.

Critical facilities: Several critical facilities, such as fire stations, may be particularly susceptible to damage because of their long roof spans.

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

Memorial to the 8 people killed
by the 2004 Utica tornado

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 Des Plaines would be limited to large, older, and unreinforced masonry structures. These are found in older areas, especially in the downtown.

The dollar damage estimate is 2% of the value of 25% of the City's commercial, multi-family, and public buildings. The damage to contents would be negligible, so none is calculated. The results are shown in Table 3-9.

The most likely type of earthquake damage in Des Plaines would be to masonry buildings and structural overhangs.

FEMA

Table 3-9. Property Damage from an Earthquake

Type of Building	Total Building Value	Percent Affected	Damage Percentage	Estimated Damage
Multi-family	$241,500,000	25%	2%	$1,207,500
Commercial	$1,692,250,000	25%	2%	$8,461,250
Public/churches	$560,000,000	25%	2%	$2,800,000
Estimated total damage from one event				$12,468,750

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.

Overall economic impact: 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 Mercali Intensity of VII, the likelihood of such damage is low.

Critical facilities: Some of the City's critical facilities are older masonry buildings. However, the amount of damage expected is not considered severe enough to curtail operations in them.

Overall safety hazard: Low

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

3.8. Winter Storms / Ice Storms

The highest snowfall on record in Chicago was in January 1967, with 23 inches, followed by January 1999 with 21.6 inches. The 2011 blizzard's total was 20.2 inches at O'Hare Airport, according to the National Weather Service. The blizzard was followed by bitter cold, with wind chill temperatures plunging to 20 to 30 below zero.

Buildings: Historically, roofs would collapse due to heavy snow loads, but most buildings in Des Plaines 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 but ice storms can cause massive damage to trees and electrical infrastructure leading to widespread long-term power outages affecting streets and 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. Table 3-10 calculates the dollar damage to buildings from a single storm using $1,000 in damage to 1% of the City's buildings.

Table 3-10. Property Damage from a Winter Storm

Type of Building	Number of Buildings	Percent Affected	Dollar Damage	Estimated Damage
Single family	23,431	0.010	$1,000	$234,310
Campground	129	0.010	$1,000	$1,290
Mobile homes	582	0.010	$1,000	$5,820
2−4 family	1,347	0.010	$1,000	$13,470
Multi-family	322	0.010	$1,000	$3,220
Commercial	967	0.010	$1,000	$9,670
Industrial	373	0.010	$1,000	$3,730
Public/churches	320	0.010	$1,000	$3,200
Oakton/Maine West	2	0.010	$1,000	$20
Estimated total damage from one event				$274,730

Economic impact: Being in a Northern climate, businesses in Des Plaines 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. Loss of access due to snow or ice covered roads has a similar effect. However, the Public Works and Engineering Department, General Services Division, calculates that it costs $40,000 per day to keep the streets open during a snow storm.

Cook County received Presidential emergency declarations for the winter storms of 1979, 1999 and 2000. It should be noted that these were not disaster declarations to help with recovery from damage caused by the event. An emergency declaration assists communities with the costs of dealing with the hazard, so the major impact is on the City's budget.

Overall economic impact: Moderate

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

Matthew Masek, University of Nebraska

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.

Winter storms bring extreme cold, due to low temperatures and loss of heat during power outages. Extreme cold can result in people and animals suffering from frostbite and hypothermia. Frostbite is damage to tissue caused by the effects of ice crystals in frozen tissue. Extremities (hands, feet, ears, and nose) with more circulation difficulties are most frequently affected.

Injuries Related to Cold

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

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.

Winter Weather Deaths

	IL	US
2002	0	11
2003	4	20
2004	17	27
2005	8	24
2006	1	2
2007	15	47
2008	26	44
2009	15	33
2010	18	34
2011	8	29

National Weather Service

The Table 2-7 in Chapter 2's section on winter storms shows that six people have been killed by winter storms that have affected Cook County over the last ten years. Table 3-11 shows that winter storms have led to more deaths in Illinois that any other natural hazard except extreme heat.

Critical facilities: No critical facilities are considered particularly exposed to damage or disruption by winter storms.

Overall safety hazard: Moderate

Health: Certain populations are especially vulnerable to the cold, including the elderly, the homeless, and lower income families with heating problems. Because the onset of danger is quick, winter storms are considered more of a safety threat than a health hazard.

Overall health hazard: Low

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.

Straight line winds and microbursts 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 in the last 53 years in Illinois (*Illinois Hazard Mitigation Plan*, page III-25). 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.

Building damaged by microburst, July 7, 1994 storm in Aurora

Aurora Emergency Management

Windows and cars are especially vulnerable to hail damage

University of Nebraska website

While a large area may be rained on, damage from thunderstorms is more concentrated. For this *Plan's* purposes, thunderstorms are estimated to affect ¼ of the City at any one occurrence. Such an event is estimated to cause $5,000 in damage to 1% of the buildings affected by wind, hail and lightning. This means that on an average ¼ of 1% of the City's building would be affected. No damage is expected to contents. The damage estimates are in Table 3-12.

Table 3-12. Property Damage from a Thunderstorm

Type of Building	Number of Buildings	Percent Affected	Dollar Damage	Estimated Damage
Single family	23,431	0.25%	$5,000	$292,888
Campground	129	0.25%	$5,000	$1,613
Mobile homes	582	0.25%	$5,000	$7,275
2−4 family	1,347	0.25%	$5,000	$16,838
Multi-family	322	0.25%	$5,000	$4,025
Commercial	967	0.25%	$5,000	$12,088
Industrial	373	0.25%	$5,000	$4,663
Public/churches	320	0.25%	$5,000	$4,000
Oakton/Maine West	2	0.25%	$5,000	$25
Estimated total damage from one event				$343,413

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 2001, the National Weather Service reported 20 people in Illinois were killed by flash floods, wind and lightning brought by thunderstorms (see Table 3-13).

Lighting 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).

Most of these deaths can be prevented through safe practices. Much information has come out over the last 25 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.

Table 3-13. Lighting Deaths

Year	IL	US
1995	1	85
1996	2	52
1997	1	42
1998	0	44
1999	2	46
2000	0	51
2001	5	44
2002	1	51
2003	0	43
2004	0	32
2005	1	38
2006	1	47
2007	1	45
2008	0	27
2009	0	34
2010	1	29
2011	0	26
Total	16	736

National Weather Service

Critical facilities: Critical facilities with antennas, such as the fire and police stations, are subject to damage from high winds and lightning. While the buildings would not likely be damaged, loss of radio communication or public warning sirens would severely affect fire and police operations during an emergency.

Overall safety hazard: Moderate

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 high temperatures or drought.

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 by the City with no economic disruption, although rationing or lawn watering bans may be needed. There may be buckling of street pavements, but these can also be fixed relatively quickly.

Overall economic impact: Nil

Safety: Table 2-9 notes that 622 people died in Cook County during the heat wave of 1995 and an average of 22 people have died each year since then. However, the impact of heat on the human body is considered a health hazard, as it has a slow onset and can be prevented when appropriate precautions are taken.

In 2012, July 4-6 averaged 102 degrees.

Critical facilities: As with other buildings, no critical facilities are considered subject to damage or disruption from drought or extreme heat.

Overall safety hazard: Nil

Health: 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 (see Table 3-14).

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.

Table 3-14. Heat Index/Heat Disorders

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

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.

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: High

3.11. Illness/Disease

Buildings: Illnesses and diseases are not considered to cause property damage.

American Public Health Association

Economic impact: Hospitals and medical staff will be heavily taxed. Depending on the type of disease, ambulance service may be overworked, too.

Unhealthy individuals do not go to work and many people may remain home to care for sick family members or to avoid contamination. Some buildings may have to be quarantined and disinfected, which could result in temporary closure of some businesses, schools, and government facilities.

Overall economic impact: Moderate

Safety: Illnesses and diseases are not considered safety hazards.

Critical facilities: As with other buildings, no critical facilities are considered subject to damage or disruption from illness or disease.

Overall safety hazard: Nil

Health: By definition illnesses and disease are health hazards and a pandemic is a health hazard on a large scale.

Overall health hazard: High

3.12. Summary of Hazard Risk Assessment

Buildings: There are over 27,000 buildings in the City of Des Plaines subject to some level of damage from natural hazards. In Table 3-15 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 "frequency" sections in Chapter 2. The frequency for overbank flooding is 0.02 or once every 50 years and the frequency for repetitive loss flooding is 0.2, or once every five years. The result is the expected average annual damage.

Table 3-15. Property Damage Summary

Hazard	Damage from Single Occurrence	Annual Chance	Average Annual Damage
Overbank flooding	$77,737,400	0.020	$1,554,748
Repetitive flooding	$6,238,375	0.200	$1,247,675
Drainage/sewers	$500,000	0.500	$250,000
Tornadoes	$257,339,588	0.011	$2,830,735
Earthquakes	$12,468,750	0.010	$124,688
Winter storms	$274,730	0.100	$27,473
Thunderstorms	$343,413	0.500	$171,706
Drought/heat	$0	0.500	$0
Illness/disease	$0	0.020	$0
Total			$6,207,025

Table 3-15 shows that flooding and tornadoes are the greatest threats to the City of Des Plaines in terms of property damage. A single tornado will cause much more damage than a flood, but over the long run floods and repetitive floods have the potential to cause roughly the same amount of property damage. The other hazards are less of a threat to buildings, even though most occur more frequently than floods or tornadoes.

Economic impact: The subjective measures for overall economic impact of "nil," "low," "moderate," and "high" were converted to numerical values of 1, 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.

Table 3-16 displays an "economic score." This is a number that is only useful for comparing the various hazards with each other. The scores have no other value. The table shows that the hazards with the greatest economic impact are winter storms and thunderstorms. Severe winter storms have a moderate impact, but occur only once in ten years. While the impact of thunderstorms is rated as "low," they occur every year. Flooding comes in third.

Table 3-16. Overall Economic Impact				
Hazard	**Overall Impact**		**Annual Chance**	**Economic Score**
Overbank flooding	High	100	0.020	2.00
Repetitive flooding	Low	10	0.200	2.00
Drainage/sewers	Nil	1	0.500	0.50
Tornadoes	High	100	0.011	1.10
Earthquakes	Low	50	0.010	0.50
Winter storms	Mod	50	0.100	5.00
Thunderstorms	Low	10	0.500	5.00
Drought/heat	Nil	1	0.500	0.50
Illness/disease	Mod	50	0.020	1.00

Impact on safety and health: In Table 3-17, the subjective measures for overall safety and health impacts of "nil," "low," "moderate," and "high" are converted to numerical values of 1, 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 safety and health. The safety and health scores are added together to get a "combined score" that represents the impact of the hazard on people.

Table 3-17. Overall Safety and Health Impact									
Hazard	**Safety Impact**		**Annual Chance**	**Safety Score**	**Health Impact**		**Annual Chance**	**Health Score**	**Comb. Score**
Overbank flooding	Mod	50	0.020	1.00	Mod	50	0.020	1.00	2.00
Repetitive flooding	Mod	50	0.200	10.00	Mod	50	0.200	10.00	20.00
Drainage/sewers	Low	10	0.500	5.00	Mod	50	0.500	25.00	30.00
Tornadoes	High	100	0.011	1.10	Low	10	0.011	0.11	1.21
Earthquakes	Low	10	0.010	0.10	Low	10	0.010	0.10	0.20
Winter storms	Mod	50	0.100	5.00	Low	10	0.100	1.00	6.00
Thunderstorms	Mod	50	0.500	25.00	Low	10	0.500	5.00	30.00
Drought/heat	Nil	1	0.500	0.50	High	100	0.500	50.00	50.50
Illness/disease	Nil	1	0.020	0.02	High	100	0.020	2.00	2.02

The scores in Table 3-17 show that thunderstorms present the greatest safety threat, primarily because they occur so frequently. Extreme heat is the greatest health threat. Using the "combined score," extreme heat is also the greatest threat overall to people, with thunderstorms being second.

Tornadoes are rated as having a high safety score and illness/diseases have a high health score, but because their frequency of occurrence is relatively low, they do not rate high on the overall impact scores. While having moderate safety and health scores, repetitive flooding ranks high as an overall threat to people because it occurs roughly every five years.

3.13. Conclusions

1. The natural hazards that cause the most property damage are floods and tornadoes. The expected average annual property damage from other hazards is relatively small.

2. Tornadoes and flooding cause the most economic disruption in a single occurrence. However, on a regular basis, winter storms and thunderstorms are more disruptive and cost local governments more than the other hazards.

3. Extreme heat, sewer backup, and thunderstorms are the greatest threats to people, although repetitive flooding also stands out.

4. In most cases, the relative amount of property damage, economic disruption and safety and health threat is the same throughout the city. The exceptions are:

   - Most overbank and repetitive flooding occurs in the mapped floodplains, especially in the floodplain of the Des Plaines River.
   - Sewer backup affects older buildings with basements.
   - Tornadoes and earthquakes present higher hazards to larger and older buildings.
   - Winter storms, extreme heat, and illness/diseases have a greater impact on the elderly.

Based on the above information, the Planning Committee concluded that **natural hazard priorities in the City of Des Plaines for the 2013 *Plan* update are:**

1. **Floods**
2. **Severe Summer Storms**
3. **Wind Events**
4. **Severe Winter Storms**
5. **Earthquakes**

Sewer back-up in included in severe summer storms, and both tornadoes and microbursts are included in wind events.

These conclusions were compared to the 2010 Illinois Natural Hazard Mitigation Plan, prepared by the Illinois Emergency Management Agency (IEMA) The 2010 Illinois Natural Hazard Mitigation Plan hazard rating system has five levels: low, guarded, elevated, high and severe. Cook County's hazard ratings for identified natural hazards are in the 2010 Plan are shown in Table 3-18.

Table 3-18 IEMA Hazard Ratings for Cook County

Hazard	IEMA Rating
Floods	High
Tornado	High
Severe Summer Storms	Severe
Severe Winter Storms	Severe
Drought	Guarded
Earthquake	Guarded
Extreme Heat	High

The conclusions and summary of natural hazards for the City of Des Plaines are fairly consistent with the ratings made by IEMA. The Planning Committee ranked flood higher than IEMA and severe winter storms lower.

3.14. References

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- Multi-Hazard Identification and Risk Assessment, Federal Emergency Management Agency, 1997.
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Chapter 4. Goals

Goals are needed for this planning effort to guide the review of the possible mitigation measures. This *Hazard Mitigation Plan* needs to make sure that the goals and recommended actions are consistent with what is appropriate for City of Des Plaines. Mitigation goals need to reflect community priorities and be consistent with other plans for the City. Two other plans have relevant goals, the City's Comprehensive Plan and its Repetitive Loss Plan.

4.1. Comprehensive Plan Goals

The Comprehensive Plan includes 20 goals for the City under six categories: land use and development, transportation, community facilities and resources, urban design, economic development, and administration and implementation. Each goal has one or more detailed objectives.

Many of these goals and objectives can support the mitigation goals of protecting people and property from hazards. The relevant ones are listed on the next page. It can be seen that many different types of goals and objectives can support hazard mitigation activities.

For example, "Protect the integrity and high quality of single-family residential neighborhoods throughout Des Plaines" is an objective under the goal of providing high quality and diverse housing options. However, such housing should also be protected from damage by wind, water, and other natural hazards, so housing programs should be aware of these hazards and ways to protect homes from them.

4.2. Repetitive Loss Plan Goals

The 2002 Repetitive Losses Plan set four goals to determine the appropriate flood mitigation actions for the City:

1. Protect existing properties. Use the most cost-effective approaches to protect buildings from flooding, including structural projects and floodproofing.

2. Keep the problem from getting worse. Enact and enforce regulatory measures that ensure that new development will not increase flood threats to existing properties. Make sure that structural flood control projects have minimal impact on the environment.

3. Use City funds most efficiently. Prioritize mitigation projects, starting with those sites facing the greatest threat to life, health and property. Maximize the use of outside resources, including State, Federal and property owner funds.

4. Maximize property owner participation. Inform owners on how they can protect themselves and encourage them to implement self-protection measures.

City of Des Plaines Comprehensive Plan Goals (Excerpts)

A. Land Use and Development

GOAL: *Seek to provide high quality and diverse housing options for City residents.*

Objective b. Protect the integrity and high quality of single-family residential neighborhoods throughout Des Plaines.

Objective e. Publicize Community Development Block Grant (CDBG) and other federal funds to support single-family and multi-family residential rehabilitation.

GOAL: Strengthen the City's existing commercial areas.

Objective c. Encourage the upgrading and/or replacement of obsolete retail and office space where possible.

GOAL: *Revitalize the City's industrial base.*

Objective c. Encourage redevelopment of obsolete and/or physically deteriorated industrial buildings.

GOAL: *Maintain and expand open space and recreational opportunities within the City.*

Objective f. Utilize areas within the Des Plaines River floodplain for recreational opportunities.

B. Transportation

GOAL: *Improve traffic flow and safety throughout the City.*

Objective h. Widen and improve residential streets that don't meet current design standards.

C. Community Facilities and Resources

GOAL: *Protect and enhance existing historic and natural resources.*

Objective b. Implement appropriate regulations and practices to ensure the protection of existing trees and other natural resources during redevelopment within the City.

Objective d. Promote the use of the proposed riverwalk by providing wayfinding signage and pedestrian friendly access.

D. Urban Design

GOAL: *Enhance the appearance of neighborhood commercial areas and key community entry points and traffic routes.*

Objective e. Bury overhead utility lines, where feasible, as upgrades are undertaken at key traffic routes.

E. Economic Development

GOAL: *Continue and enhance economic development efforts within the City.*

Objective e. Fund continual maintenance of the City's infrastructure, so that current and future business may rely upon adequate water, sewer, stormwater, utility, and telecommunication systems.

F. Administration and Implementation

GOAL: *Amend and enforce City codes, as appropriate, to support the purposes of the Plan.*

Objective a. Revise the City's zoning ordinance, so as to plan for and implement redevelopment in neighborhoods, commercial corridors and the industrial sector.

Objective b. Establish appropriate allowable use, bulk and density requirements in areas likely to experience redevelopment pressure, to ensure redevelopment is consistent with the City's expectations.

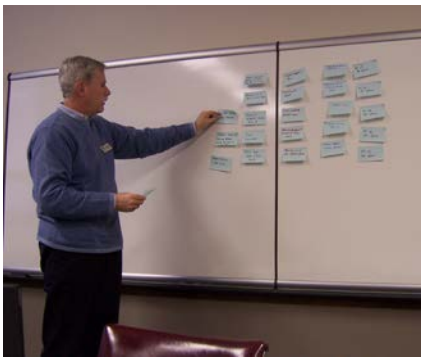
Objective c. Provide the fiscal resources to ensure adequate building code enforcement throughout Des Plaines.

GOAL: *Continue to provide high quality municipal services and facilities.*

Objective a. Continue an aggressive program of City infrastructure improvements including adequate stormwater, sewer, and water systems through strategic planning and the capital improvement program (CIP).

4.3. Goal Setting

In December 2006, the Mitigation Planning Committee reviewed the drafts of Chapters 2 and 3 in detail, i.e., the hazards facing the City of Des Plaines and their impact on people and property. The Committee then discussed the goals in the Comprehensive Plan and the Repetitive Loss Plan. This was followed by an exercise to outline goals for this multi-hazard mitigation plan. Each member was given the handout that appears on the next page, asking "What would you most like to see in Des Plaines' future?" It was designed to help set the stage for mitigation planning.



Goal setting exercise

Committee members wrote down their top five choices on a Post-it card. Each member then posted them on the wall and explained their choices. The cards were then organized by similar topics. There was a good amount of consistency in the members' topics. The handout has 24 possible statements, but the members' nominations included fewer than half of them. Several of the nominations were not listed in the handout.

The main things Committee members want to see in Des Plaines' future are listed below. The first three were considered the most important.

- More knowledgeable/educated residents and children
- Fewer problems with trains and less traffic congestion
- Having the City distinguished from other communities
    - Special attention given to the Des Plaines River as a community asset
    - Historical and cultural sites are preserved
- More or improved businesses and job opportunities
- More development is allowed, but precautions are taken to ensure they don't aggravate problems (e.g., by keeping them out of floodprone areas)
- More or improved open space and recreation opportunities
- Provide safe houses with shelter for mobile home parks or other large communities
- Fewer flood, drainage, and sewer problems
- Young people staying in/moving into the community

A second exercise was then conducted. Each member was given the handout that appears on page 4-5, asking "What should be the goals of our mitigation program?" Again, Committee members wrote down their top five choices on a Post-it card. Each member then posted them on the wall and explained their choices. The cards were then organized by similar topics. Once again, the first three topics were felt to be the most important.

- Make sure development does not make things worse
- Help/educate people to protect themselves
- Maximize use of state/federal funds/minimize property owner expenses
- Protect lives and health
- Protect public services and utilities

- Protect critical facilities
- Special attention to flooding, sewers, and repetitive losses
- Protect open space, parks and forest preserves
- Protect homes and businesses

The exercise revealed important information to guide the planning effort, both in what was selected from the handouts and what was not selected. For example, there is a special emphasis on people becoming more knowledgeable and taking care of themselves and there is a good deal of attention about future development.

4.4. Goals

Based on the goals previously set in the Comprehensive and Repetitive Losses Plans and the goal setting exercise, the following goals statements were adopted by the Mitigation Planning Committee:

1. **Education:** Educate the citizens of Des Plaines on the hazards they are exposed to and how they can protect their lives, health, and property.

2. **Regulation:** Manage new development so that it will not increase threats to existing properties or adversely affect open and natural areas.

3. **Public services:** Place a priority on measures that protect public services, critical facilities and utilities.

4. **Flooding:** Devote special attention to flooding problems, including the Des Plaines River, areas that are repetitively flooded, local drainage, and sewer backup.

5. **Other natural hazards:** Identify mitigation strategies that protect lives, health and property from the impacts of severe summer storms, wind events, including tornadoes and microbursts, severe winter storms and earthquakes.

6. **Financing:** Maximize the use of State and Federal funds.

For the 2013 update of this *Plan*, the Mitigation Planning Committee reviewed the five goals established in 2007 *Plan* and reaffirmed Goals 1 though 4 and Goal 6 for the 2013 update. At the September 2013 meeting, the Planning Committee decided to add a new goal number 5 to address other hazards.

The Planning Committee also discussed the other plans adopted by the City and their relationship to this *Plan*. This discussion led to the recommendation of an action item in Chapter 10 specifically directed to incorporating the City's *Hazard Mitigation Plan* into other City plans and vice versa. Chapters 5 through 9 describe efforts that have been undertaken by the City to foster and further these goals. Chapter 10 presents efforts still needed to achieve these goals.

Chapter 5. Preventive Measures

Preventive measures, in the form of planning and regulations, focus on the future. These measures are designed to keep the problem from getting worse by ensuring that future development does not increase flood damage. Seven types of preventive measures are reviewed:

5.1 Planning and zoning
5.2 Open space preservation
5.3 Subdivision regulations
5.4 Building code
5.5 Manufactured housing regulations
5.6 Floodplain regulations
5.7 Stormwater management

CRS credit: Preventive measures can receive credit within Community Rating System (CRS). CRS Activities 420 (Open Space Preservation), 430 (Higher Regulatory Standards) and 450 (Stormwater Management) can credit the measures discussed in this Chapter.

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 property damage.

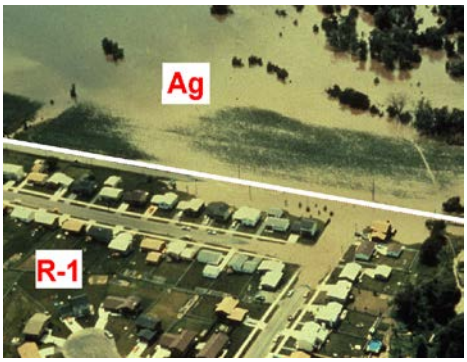
Comprehensive Plans: Comprehensive and land use plans are the primary tools used by communities to address future development. They can reduce future damage by indicating open space or low density development within floodplains and other hazardous areas. Unfortunately, natural hazards are not always 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. The zones should be based on the future land uses proposed by the comprehensive or land use plan. Zoning codes are considered the primary tool to implement a comprehensive plan's guidelines for how land should be developed.

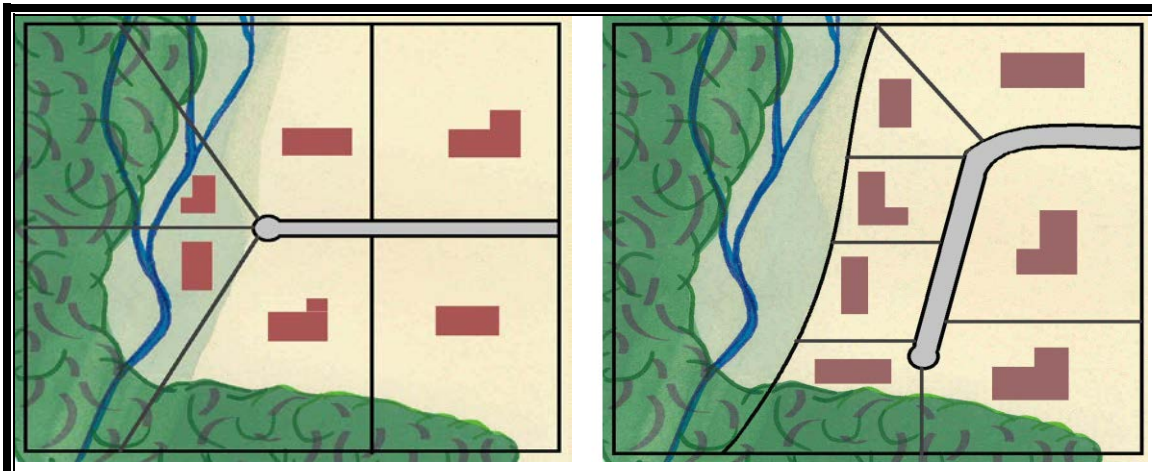
For example, appropriate zoning districts for a floodplain include public use, conservation, agriculture, and (for shallow, slow moving floodprone areas) low-density development. It should be noted that public use and conservation generally require public ownership of the land to avoid a legal challenge that the restrictions are so severe they amount to a "taking" of the land.

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. From a hazard mitigation perspective, the ordinance and the community should allow flexibility in lot sizes and location so developers can avoid hazardous areas.



A zoning ordinance should designate floodprone lands for 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 design standards and land use densities can be adjusted, as in the example below.



In the standard zoning approach (left), the developer considers six equally-sized lots without regard for the flood hazard. Two properties are subject to flooding and the natural stream is disrupted. An alternative, flexible, PUD approach is shown on the right. The floodplain is dedicated as public open space. There are seven smaller lots, but those abutting the floodplain have the advantage of a larger open area. Four lots have riverfront views instead of two. These amenities compensate for the smaller lot sizes, so the parcels are valued the same. The developer makes the same or more income, the future residents are safer, and the natural area is preserved.

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 for public parks and recreation areas.

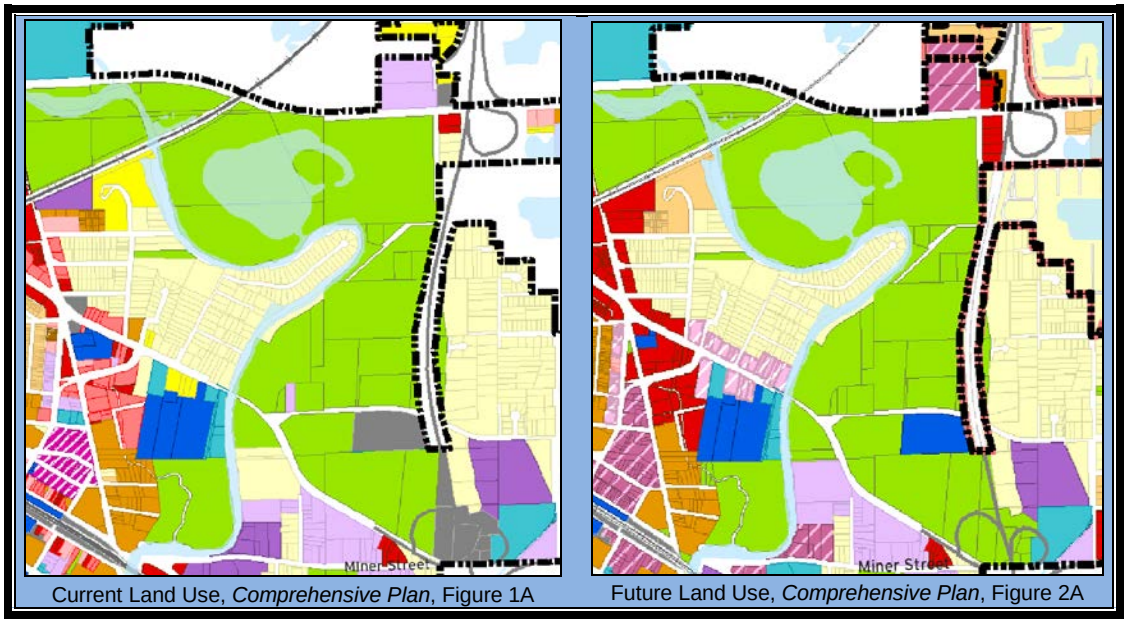
Implementation in Des Plaines: The City's comprehensive plan does not directly address natural hazards. It does break the City into subareas. The only subarea that can be related to natural hazards is the Des Plaines River Subarea. The Des Plaines River subarea plan does not deal with flooding or propose activities to provide flood protection. It does recommend channel maintenance, but primarily as a tool to improve appearances.

The objectives of the Des Plaines River subarea plan are to:

- Inform homeowners/renters on updating insurance
- Public education on flooding – channel 17
- Elevation of the Methodist Campground cottages
- Update codes for high winds
- Disaster plan for homeowners
- Mitigate flooding
- Remove Ash Borers
- Reduce power outages
- Protect the legacy of the Des Plaines River as a long term resource for the city.
- Improve pedestrian, vehicular and water access to the Des Plaines River and adjacent amenities that are open to public enjoyment.
- Upgrade the visual quality of riverfront areas as a means of creating public pride and awareness of Des Plaines' riverfront.
- Strive to take full advantage of the natural amenities along the riverfront while promoting conservation of these natural resources.

The subarea plan notes that most of the area is already built up and that floodplain regulations restrict future development. It proposes a variety of activities to redevelop the riverfront, including a greenway and other trails and paths for pedestrians and bicycles, river access for boats and canoes, and improving the appearance of the area, including on Forest Preserve District land.

As seen below, the future land use map for the Des Plaines River area does not vary much from the current land use. Again, it should be noted that most of the area is already developed or in forest preserve (green).



Current Land Use, *Comprehensive Plan*, Figure 1A | Future Land Use, *Comprehensive Plan*, Figure 2A

Des Plaines' zoning ordinance identifies existing public lands, but does not have special zones for lands that are currently vacant. These lands can be developed as residential, commercial, etc. as they are zoned, providing the construction projects meet the City's floodplain management regulations (discussed in section 5.6). Most of the floodprone areas are zoned residential or institutional. Unlike the comprehensive plan, there is no open space or park zoning district.

The zoning ordinance does allow planned unit developments (PUD), which would facilitate the flexible development approach illustrated on page 5-2. One purpose of having the provision is to permit a "pattern of development to preserve natural vegetation, topographic and geologic features." (Section 3.5-1.C).

The Engineering Division of the Public Works and Engineering Department prepares the City's Capital Improvement Program for infrastructure improvement. The 2012 budget called for $8.4 million for pervious alley improvements ($286,000), street improvements ($1.4 million), water system improvements ($230,175), sewer system improvements ($450,000), drainage improvements ($1.2 million) and miscellaneous improvements ($4.7 million). Because it is substantially built up, there are no major improvements that will encourage new development in the floodplain. On the other hand, funds have been budgeted to contribute to the flood control projects discussed in Chapter 8.

5.2. Open Space Preservation

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

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

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

This golf course on the Des Plaines River in Lincolnshire illustrates the benefit of preserving open space in the floodplain.

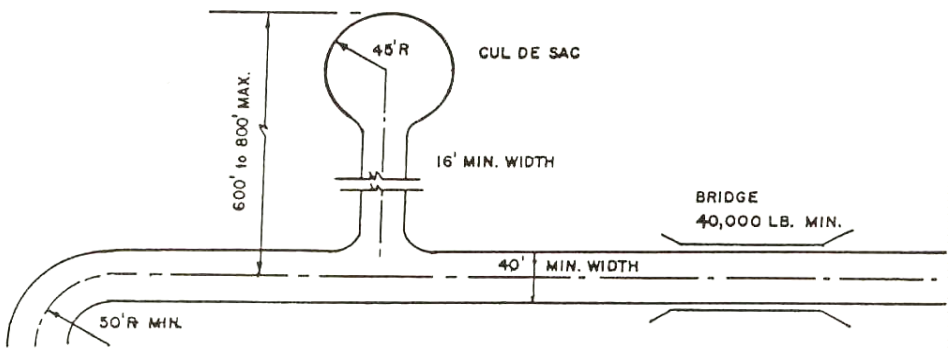
Implementation in Des Plaines: Approximately 25% of the floodplains on the Des Plaines River and is tributaries is owned by public agencies and kept as open space. The largest single owner of floodplain property is the Cook County Forest Preserve District, which now owns 7,200 acres of land adjacent to the Des Plaines River in the north half of the County alone (between the Lake County line and the Eisenhower Expressway, I-290).

The Forest Preserve District has undertaken a conscientious effort since the 1920's to acquire and set aside land along the Des Plaines River. This has been recognized as having a major impact on preventing flood damage in Cook County. The Lake County Forest Preserve District has a similar program. The City of Des Plaines is a major beneficiary of these efforts which have kept damage-prone development out of the City's floodplain and preserved flood storage areas upstream.

Other lands are owned by the Des Plaines Park District, Oakton College, and the school districts. These public lands account for almost all of the undeveloped parcels in the Des Plaines River and Farmers Creek floodplains.

5.3. 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 should ensure that streets can handle emergency vehicles.

Wildland/Urban Interface Fire Protection

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 fire fighting equipment and snow plows,
- Requiring power or phone lines to be buried,
- No basements,
- Establishing minimum water pressures needed for fire fighting,

– Requiring that each lot be provided with a building 1.0' above the flood level, and
– Requiring that all roadways be no more than one foot below the flood elevation.

Implementation in Des Plaines: Title 13 of the City's code of ordinances is the subdivision ordinance. Most of the provisions were adopted in 1978. Title 13 has the recommended street and cul-de-sac design standards (Section 13-3-1), requirements for the location and spacing of fire hydrants (Section 13-3-2-F), and requirements for underground utility lines in subdivisions of five or more lots (Section 13-2-5-W).

5.4. Building Code

Building codes provide one of the best methods of addressing the hazards facing Des Plaines. They are the prime property protection measure to protect new buildings from damage by water, earthquakes, tornadoes, high winds, snow storms, and extreme heat. 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.

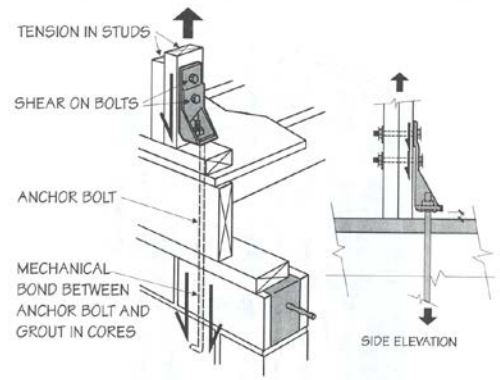


Fig. 14 - TYPICAL TIE-DOWN DETAIL TO FOUNDATION

Both builders and inspectors need to know the details of proper anchoring to protect new buildings from high winds.

Windstorm Mitigation Manual for Light Frame Construction, page 95.

Model Building Codes: Most communities in Illinois have adopted the International Code series of model code provisions. The I-Codes are considered "state of the art" when it comes to addressing natural hazards. The International Codes have a section on flood protection that communities must adopt separately. However, these standards are not as stringent as the minimum floodplain management requirements of the State.

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 the 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 Community Rating System and the 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.

Implementation in Des Plaines: The City has adopted the 2006 International Building Code.

5.5. 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 of 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.

Tornado damage to a manufactured housing community

FEMA

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

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

Following the installation of a manufactured home, installers must send the state a certification that they have complied with the State's tiedown code. The Department of Public Health conducts inspections only if complaints are made regarding an installation. As the Department's website notes "Although installers of tiedown equipment must comply with these standards, the home owner is ultimately responsible for properly securing the home."

The State sets minimum standards for installation of manufactured homes

The Illinois Department of Public Health also regulates mobile home parks, but not in home rule communities. Because of limitations on the Department's authority, it does not inspect or enforce its mobile home park regulations in home rule communities.

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

Implementation in Des Plaines: As noted in Table 3-1, there are 582 manufactured homes in Des Plaines. These are concentrated in three mobile home parks. The parks are located in the zoning ordinance's MH-1 Mobile Home Park District. None of them have shelters built to protect residents from tornadoes or high winds.

Manufactured housing community in Des Plaines

Because it is a home rule community, the State does not inspect mobile home parks in Des Plaines. The City's zoning ordinance does not have any special hazard-related provisions in the Mobile Home Park District. However, the City does conduct inspections in the parks to check installation and tie downs.

5.6. Floodplain Regulations

Most communities with a flood problem participate in the National Flood Insurance Program (NFIP). The NFIP sets minimum requirements for the participating communities' subdivision regulations and building codes. These are usually spelled out in a separate ordinance. Additional requirements are set by State law. These minimum requirements are summarized in the box on the next page.

As with building codes, administration of the regulations is as important as the regulatory standards. The Illinois Association for Floodplain and Stormwater Management administers the 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.

Implementation in Des Plaines: Des Plaines is in the NFIP. The City's floodplain management regulations are in Chapter 14 of the City Code. They comply with all State and FEMA requirements summarized on the next page. The City has enacted some regulatory standards that exceed these minimum FEMA and state requirements. These include:

- Freeboard of 1 foot (Sections 14-1-2, 14-1-9.C). All new buildings and substantial improvements must be protected to the base flood elevation plus one foot. This is a highly encouraged standard and because it protects new buildings better than the minimum standard, it results in lower flood insurance premiums.
- Compensatory storage (Sections 14-1-6.B, 14-1-7.B.2.b, and 14-1-8.B.2). For each cubic foot of fill that is placed in the floodplain, the developer must remove 1.5 times that amount of fill (2 times the amount in the floodway). This compensates for the floodplain's flood storage capacity that would be reduced by the development. It is especially important in flat areas with slower moving floodwaters, like along the Des Plaines River and Farmers Creek.
- Counting building alterations cumulatively (Section 14-1-9.C). When the value of an improvement is worth more than 50% of the value of the structure, the structure must meet the flood protection requirements for new buildings. This provision prevents property owners from avoiding the substantial improvement rule by constructing a series of small improvement projects over several years.
- Prohibition of hazardous materials (Section 14-1-9.A). Certain dangerous, flammable, and otherwise hazardous materials must be kept out of the floodplain.
- Compaction and dimension requirements for filling (Section 14-1-9.C.1.b). These additional standards protect buildings built on fill from being undermined by erosion and scour during a flood.
- Prohibiting additional uses in the floodway, including detached garages, storage sheds and accessory structures (Section 14-1-7.B.1).

The Des Plaines Civic Association's 1999 survey of floodplain residents found very strong resident support for higher regulatory standards. Two-thirds of the floodplain residents responding stated that they "strongly agree" with the statement "I believe that the city should refuse to allow any future building in the floodway/floodplain."

Because so much of the vacant areas in the floodplain are in the floodway or otherwise preserved as open space, the greatest impact of floodplain regulations will be on redevelopment and improvements to existing buildings.

Minimum Floodplain Regulatory Requirements

The National Flood Insurance Program (NFIP) is administered by the 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. State laws set additional requirements. Here are the basic requirements:

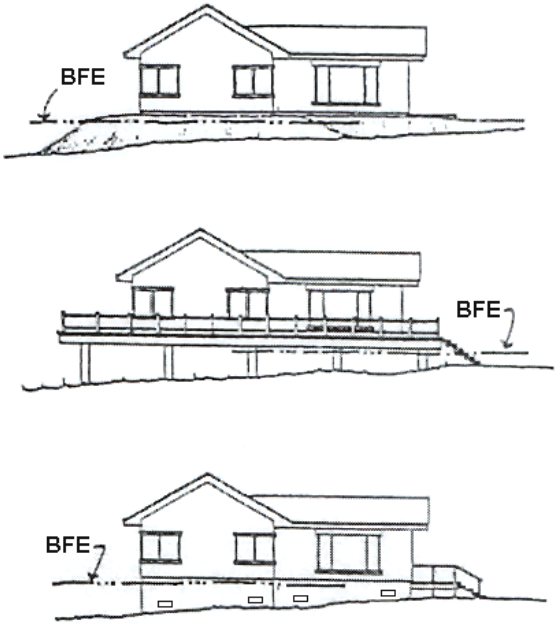
1. The regulatory floodplain is the floodplain mapped on the August 19, 2008, Cook County Flood Insurance Rate Map. This is the floodplain shown on Map 2-1.

2. All development in the regulatory floodplain 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 materials.

3. Only "appropriate uses" are allowed in the floodway. The floodway is the channel of a river or other watercourse and the adjacent land areas that are needed to convey the base flood (see page 2-3). Appropriate uses include flood control structures, recreational facilities, detached garages and accessory structures, floodproofing activities, and other minor alterations. They do not include buildings, building additions, fences, or storage of materials. Such larger projects in the floodway require a permit from the State in addition to the City permit. The result of this requirement is that vacant floodways will essentially remain as open space, free of insurable buildings or other obstructions.

4. 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 above the base flood elevation (BFE). Nonresidential buildings must be either elevated or floodproofed.

5. 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.



Communities are encouraged to enact more restrictive regulations that better reflect local flooding conditions and better meet local needs.

The ordinance could be important after a flood or other disaster, when the City must review all damaged buildings to determine if they are substantially damaged. If they are, they must comply with the requirements for new construction. A substantially damaged home will have to be elevated so the lowest floor and utilities are at least one foot above the base flood elevation.

However, a review of past flood insurance claims shows that few, if any, buildings were likely to have suffered substantial damage during past floods. This is because of the relatively shallow flooding and the high property values.

Except for a flood that greatly exceeds past flood levels, the likelihood of using the substantial damage requirement to mandate protection of a building after a flood is very slim. Therefore, the key property protection factor in floodplain regulations is the requirement that all new substantial improvements be protected to the base flood elevation plus one foot.

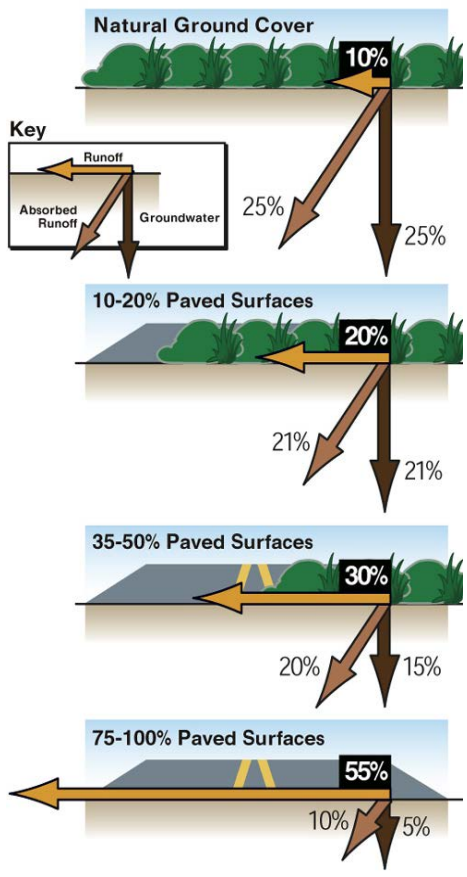
John LaBerg, Timothy Oakley, and Jon Duddles are all Professional Engineers and Certified Floodplain Managers in the Public Works and Engineering Department.

5.7. Stormwater Management

Development in floodplains is development in harm's way. 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 overload the community's drainage system and aggravate downstream flooding.

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, shopping centers, and



Increases in impervious surfaces increase stormwater runoff

NAI Toolkit, page 20

larger development projects. Many developments utilize wet or dry basins as landscaping amenities. Larger detention basins are more effective than smaller ones, which drain relatively quickly. Advance community planning can identify the most effective location for a basin and require developers to contribute funds for it in lieu of constructing less efficient and harder to maintain on-site detention.

Implementation in Des Plaines: The City's stormwater management ordinance (Section 890, Appendix A), follows the recommendations of the Northeastern Illinois Planning Commission. All developments greater than five acres must restrict the release of stormwater runoff to a three-year storm's flows with a runoff rate coefficient of 0.15.

Prairie Lakes Park is an example of a stormwater basin that is an attractive community amenity

Because so much of the repetitive loss flooding comes from areas outside the City limits, the City's ordinance is not as important as the standards enforced by other communities in the watershed. The Cook County communities in the Farmers Creek watershed are in the Metropolitan Water Reclamation District, which sets stormwater management standards that are not as restrictive as the City's. There is a Cook County Stormwater Management Committee, but it has no regulatory authority.

In 2005 the Illinois General Assembly gave the Metropolitan Water Reclamation District new authority to set stormwater management standards throughout Cook County. The District is preparing a master stormwater management plan that is expected to recommend higher standards for retention and detention.

However, neighboring communities and developments have implemented good stormwater management practices. An example of this is the recent addition to the Advocate Lutheran General Hospital in Park Ridge. The hospital is providing roughly twice the amount of detention required for the size of the project and it includes special provisions for water quality and environmental protection such as rain gardens, a green living roof, and native plantings. As a result, the run off from the parking lot and site will be cleaner than the water in the receiving stream.

5.8. Conclusions

1. Only a few of the comprehensive plan and zoning ordinance provisions address the need to preserve hazardous areas from development or set protection standards for future development.

2. As much as 25% of the City's floodplain is kept free from damage-prone development by being preserved as open space.

3. The City has most of the recommended hazard protection provisions in its subdivision regulations.

4. The City has the latest building code provisions for protection from earthquakes, tornadoes, high winds, and snow storms and its administration of these provisions has been rated very highly. The one area that could use improvement is staff training.

5. The City fills the gap left by the absence of State administration of installation of manufactured homes. However, the City's mobile home parks do not have shelters to protect residents from tornadoes and high winds

6. The City's floodplain and stormwater management programs exceed national and regional standards. Because most of the floodplains have been built up, planning, zoning, and floodplain management regulations will not have a great impact on preventing or reducing flood losses.

7. More Community Rating System credit could be obtained for the City's programs with a few ordinance amendments and some additional documentation.

5.9. Recommendations

The following recommendations are for preventive measures. The recommendations are made in light of the five goals set for this *Plan*
(see box and page 4-6.)

Mitigation Plan Goals

1. Educate citizens
2. Manage new development
3. Protect public services
4. Address flooding
5. Maximize use of State and Federal funds

5-1. A review of all development regulations should be conducted to determine if additional standards would be appropriate. This would include the zoning, subdivision, floodplain management, and stormwater management ordinances.

5-2. Existing open spaces and natural areas should be preserved. Efforts to educate the public about the values of these areas, such as the riverwalk, should be pursued.

5-3. The City should increase attention to training of its regulatory staff.

5-4. The City should continue to make sure that manufactured homes are being properly installed to protect them from wind damage. It should review the current provision for storm shelters in the three parks and discuss possible options with the owners.

5-5. The City should continue to participate in the Metropolitan Water Reclamation District's stormwater management efforts to ensure that the City's needs are reflected in the District's programs and regulatory standards.

5-6. The City should stay in full compliance with the National Flood Insurance Program and ensure that all of its current and new preventive measures are fully recognized by the Community Rating System.

5-7. The public, developers, builders, and decision makers should be informed about the hazard mitigation benefits of these preventive measures and the procedures that should be followed to ensure that new developments do not create new problems.

5.10. References

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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:

6.1 Relocating the building out of harm's way,
6.2 Erecting a barrier to keep the hazard from reaching the building,
6.3 Modifying the building so it can withstand the impacts of the hazard,
6.4 Modifying the sewer lines to prevent sewer backup,
6.5 Taking care of nearby trees that may damage the building and utilities, and
6.6 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.

CRS credit: Property protection measures can receive credit within Community Rating System (CRS). CRS Activities 520 (Acquisition and Relocation) and 530 (Flood Protection) can credit the measures discussed 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.

Small wood frame buildings are the easiest to relocate

Hollis Kennedy House Movers

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.

This home in Lake County was not worth relocating, so it was acquired and demolished by the County. The site is now open space.

Lake County Stormwater Management Commission

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.

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.

1265 River Drive
Elevated home in Des Plaines, IL

One problem that sometimes results from an acquisition and demolition project is a "checkerboard" pattern in which non-adjacent properties are acquired (see photo). 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.

Implementation in Des Plaines: The City of Des Plaines has acquired floodprone properties in the past. Two lots on River Road were acquired and their buildings were cleared in 1989 and 1990. The sites are used for a two acre stormwater detention pond. In 2005, the City purchased the Beverly Foundation property for the Forest Preserve District to maintain as floodplain open space in return for right of way for Levee 50 (Section 8.1). Currently, IEMA reviewing the City's grant application to buyouts properties on Big Bend Drive (Repetitive Loss Area 6).

6.2. Barriers

Flood barriers: A flood protection barrier can be built of dirt or soil ("berm") or concrete or steel ("floodwall"). Careful design is needed so as not to create flooding or drainage problems on neighboring properties.

A flood barrier wall will protect the home from flooding

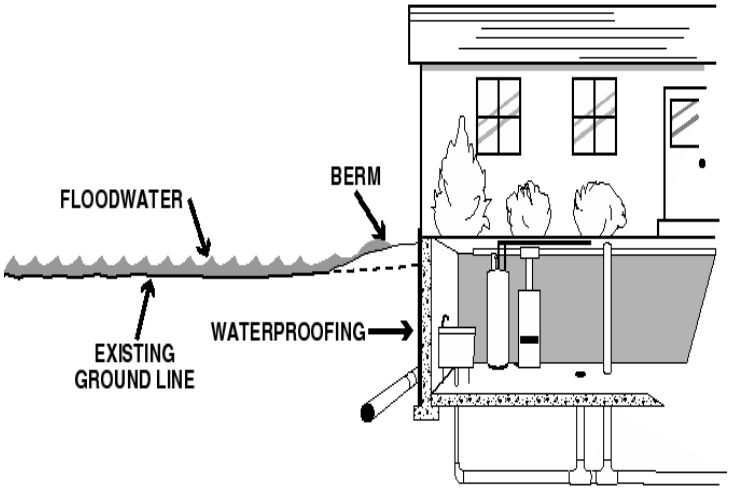
Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that falls inside the perimeter. This is usually done with a sump and/or drain to collect the internal groundwater and surface 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. Barriers typically have openings for access that need to be closed before the water arrives. Because of these factors, barriers need careful design and maintenance (and insurance on the building, in case of failure).

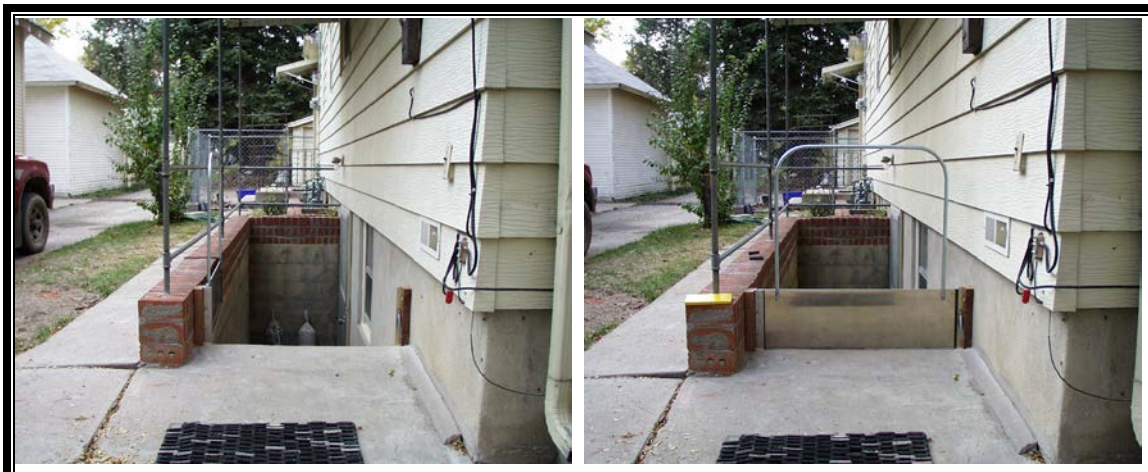
The barrier walls are hidden within the brick fence until needed at 2000 Berry Lane.

Human Intervention: the need for one or more people to be present to take actions needed to make a property protection measure work. Measures that need human intervention are considered less dependable, especially if there is little advance warning.

Basements: A variation on the barrier approach is the basement protection berm (for overland flooding only). Basements and the lower floors of split levels can be protected from surface water by construction of low walls around stairwells or using backfill. Walls are built up vertically around the window wells and basement stairwells (without blocking basement windows that are needed for emergency exits). They are also built under the roof soffits so not to hold water. An earthen berm is placed against the side of the house. Downspouts and sump pump discharges shall be extended away from the house.



Basement protection berm guards against overland flooding and seepage.



This house was faced with basement flooding. The stairwell's retaining wall was raised and a removable closure fits in grooves in the floodwall. This project relies on human intervention – if someone does not slide the board in place, the building will not be protected.

Implementation in Des Plaines: The 2003 stormwater management questionnaire to Des Plaines residents asked "Have you installed any flood protection measures on your property?" While berm or floodwall was not a listed response, 85 people (12%) responded that they had regraded their yards, which is a similar way to direct surface waters away from the building.

6.3. Retrofitting

The previous property protection measures keep the hazard from reaching a building. An alternative is to modify or "retrofit" the building to minimize or even prevent damage. There are a variety of techniques to do this. Some are more dependable than others and some require human intervention to be effective.

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.

This Des Plaines house was elevated 7 feet above the base flood elevation of the Des Plaines River.

Elevating a building will change its appearance. 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 including the HVAC 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.

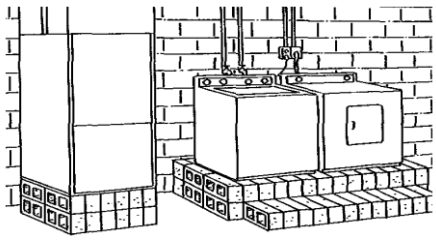
A third problem with elevation is that it may expose the structure to greater impacts from other hazards. If not braced and anchored properly, an elevated building may have less resistance to the shaking of an earthquake and the pressures of high winds. Given the low threat of earthquakes and low flood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

Floodproofing: *Dry floodproofing* is a retrofitting measure where all areas below the flood protection level are made watertight. Foundation walls are protected by berms or flood walls with enclosures similar to a flood barrier or plastic sheeting. Openings (doors, windows, and vents) are closed, either permanently, with removable shields, or with sandbags.

A Des Plaines home that eliminated a below grade garage to prevent flooding

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

The alternative to dry floodproofing is *wet floodproofing:* water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater, and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.



Wet flood proofed basement

FEMA

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

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.

Interior rooms can be reinforced and retrofitted to be tornado "safe rooms" for trailer parks /campgrounds and schools.

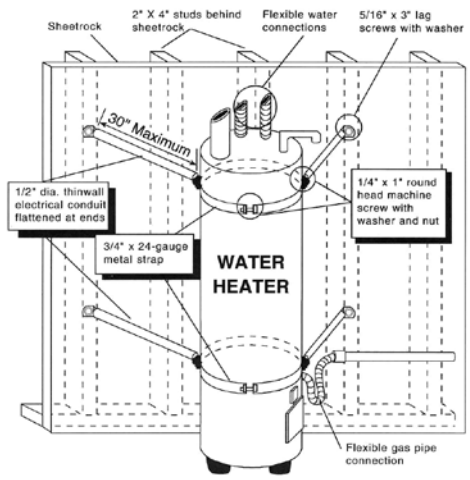
FEMA

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 Des Plaines 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).



Earthquake retrofitting of utilities

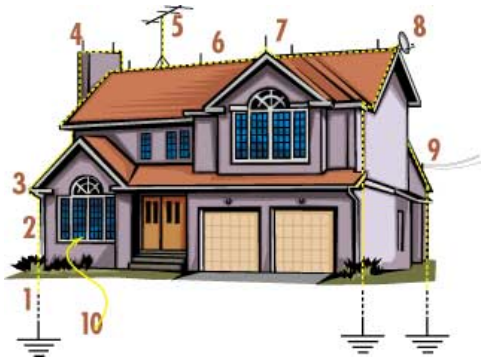
The Homeowners Guide to Earthquake Safety

While these simple and inexpensive measures may be cost effective for a home or business, they may not be sufficient for protection of critical facilities. Fire stations need to be sure that they can open their doors and hospitals must be strong enough to 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),
- Strengthening connections and tie-downs (similar to tornado retrofitting),
- Replacing roofs with materials less susceptible to damage by hail,
- Surge suppressors to protect delicate appliances during electrical storms, and
- Generators and backup power batteries to provide electricity to essential appliances, such as sump pumps.



Lightning protection measures

State Farm Insurance

The City adopted a Resolution on September 6, 2011 authorizing a Home Generator Reimbursement Program for the residents of the City of Des Plaines. Any resident of the City that purchased a home generator (portable or permanent) from June 22, 2011 through January 31, 2012 was eligible for partial reimbursement.

Utility lines: Burying utility lines is a retrofitting measure that addresses the winds from tornadoes and thunderstorms and the ice that accompanies winter storms. Removing tree branches that hang over power lines is discussed under urban forestry later in this chapter.

Implementation in Des Plaines: The Campground (repetitive loss area #5) has a FMA grant to elevate 9 cottages; six have been completed. Some previous projects were not done carefully and one had to be stopped by the Building Division. There is interest in elevating more cottages, but, due to the unique nature of these historic structures, there are no good examples to guide owners and contractors.

1265 River Drive - Elevated home

The 2002 newsletter flood protection questionnaire asked "Have you installed any flood protection measures on your property?" Twelve percent of the 697 respondents (83 properties) reported that they had waterproofed their walls,

i.e., they dry floodproofed. 126 respondents (18%) reported that they have moved items out of their basements, a simple and inexpensive wet floodproofing measure.

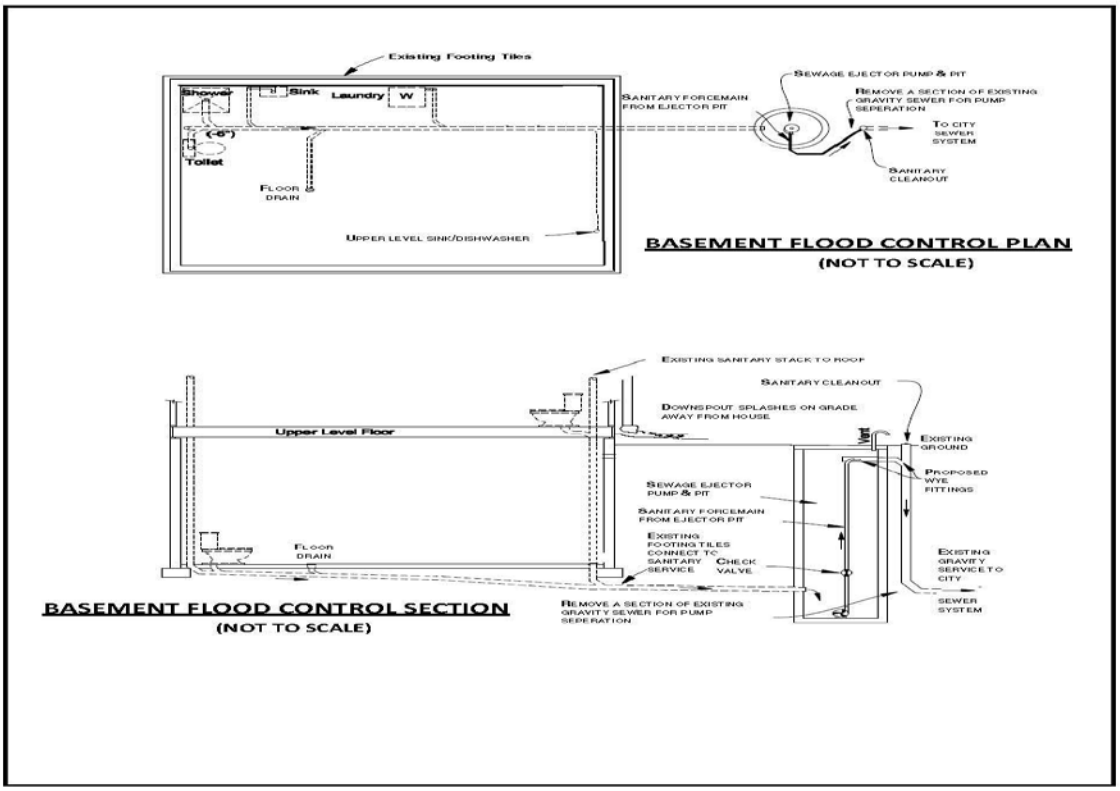
6.4. Sewer Backup Protection

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.

Two approaches may be used to protect a structure against sewer backup:

Overhead Sewers - They are more expensive ($6,000-$7,500). An overhead sewer keeps water in the sewer line during a backup.

Backflow Protection Valves - The alternative is a backflow protection valve located in the sewer line between the building and the sewer main under the street (illustrated below).



Implementation in Des Plaines: The 2002 flood protection questionnaire asked "Have you installed any flood protection measures on your property?" Many respondents have done a variety of things for sewer backup problems:

- 12% Use a sewer plug
- 16% Have or installed an overhead sewer
- 5% Installed a backup valve
- 1% Took other steps (e.g., cleaned out sewer lines)

6.5. Urban Forestry

Trees are the first victims of ice storms

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.

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. In 2006, the Emerald Ash Borer insect invaded Illinois communities including Des Plaines. The City actively removed all ash trees in poor or worse condition.

A properly written and enforced urban forestry plan can reduce liability, alleviate the extent of fallen trees and limbs caused by disease, wind and ice build-up, and provide guidance on repairs and pruning after a storm. Such a plan helps a community qualify to be a Tree City USA.

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

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

- 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.
- 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.
- 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.
- An Arbor Day observance and proclamation

Tree Cities in the Des Plaines area include Arlington Heights, Bensenville, Chicago, Elk Grove Village, Mount Prospect, Morton Grove, Park Ridge, and Prospect Heights.

Source: www.arborday.org/programs/treecityusa.html

Implementation in Des Plaines: The City of Des Plaines has been a Tree City USA for many years. The Public Works and Engineering Department has a Streets/Grounds Division which is responsible for the care and maintenance of the City's trees. The tree care program includes the trimming and shaping of the public trees, hazard tree removal, and clean up and repair following major storms. Trees removed are replaced with a 50/50 cost sharing program with the homeowners each spring.

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 property protection 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, and winter storms. It is recommended that renters also obtain renter's insurance. Separate endorsements are usually needed for earth movement (e.g., earthquake) coverage.

Several insurance companies have sewer backup or sump pump failure coverage riders that can be added to a homeowner's insurance policy. Each company has different amounts of coverage, exclusions, deductibles, and arrangements. Most of these riders cost extra and usually only 2 claims can be made before riders are terminated. 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 only 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.

Increased Cost of Compliance

There is a special funding provision in the NFIP for insured buildings that have been substantially damaged by a flood, "Increased Cost of Compliance." ICC coverage pays for the cost to comply with floodplain management regulations after a flood if the building has been declared substantially damaged. ICC will pay up to $30,000 to help cover elevation, relocation, demolition, and (for nonresidential buildings) floodproofing. It can also be used to help pay the 25% owner's share of a FEMA funded mitigation project. Flood insurance must be maintained.

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 pay for building damage after a flood. 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.

In other words, the law expects public agencies to be fully insured as a condition of receiving Federal disaster assistance. Generally, the maximum amount of coverage for a non-residential property is $500,000.

Implementation in Des Plaines: Data on private insurance policies are not available. Flood insurance has been available in Des Plaines since the 1970's. There are 2,124 flood insurance policies in the City as of November 2013. There 2,100 single family homes and nearly 500 other types of buildings in the floodplain. In 2007 it was estimated that roughly half of the floodplain properties in Des Plaines were covered by flood insurance. However, nearly half of the polices shown in FEMA's database in 2007 were on condominium *units*, not individual buildings. Therefore, potential half of the buildings in the mapped floodplain are estimated to have flood insurance.

In 2007 there were 326 flood insurance policies for properties outside the mapped floodplain. It can be assumed that this number has risen significantly since 2007.

The City is a member of the Municipal Insurance Cooperative Association. Through this association, it has insurance on all City-owned structures for the hazards of wind, snow, water, and earthquake. There are also flood insurance policies on several City-owned buildings in the mapped floodplain.

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 a community 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. Insurance is even more important as a mitigation measure because of the Stafford Act provisions discussed above.

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

Demonstration projects: Because most property protection measures are implemented by the property owner on a voluntary basis, it often helps for the owners to see actual examples of good projects. It has long been known that when one property owner tries something that works, neighbors are likely to copy it. Dr. Shirley Laska's research into what makes people protect themselves (see page 9-1) found that homeowners reported that the top two sources of information on how to retrofit a house were someone who had already retrofitted and contractors (*Floodproofing Retrofitting*, pages 97 – 99).

Therefore, it is important that these sources correctly explain how to do a project. One way to do this is to construct demonstration projects in hazard-prone neighborhoods. Residents can see how a retrofitting project is constructed and how it works. With close government supervision, the project can be assured to work as designed. If the area is hit by a flood or other natural hazard, neighbors can see the benefit of mitigation.

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.

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 makes a full commitment. For example, 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 was constructed in Des Plaines to keep floodwaters out of the house.

The City of Des Plaines rebate program pays 30% up to $2,000 for an approved flood control device.

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

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
- (see box, page 6-10)
- 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
- FEMA's Repetitive Flood Claims
- FEMA's Severe Repetitive Loss
- Community Development Block Grant

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 City could process the funding application, work with the owners, and ask the IDNR/OWR for 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 floodproofing 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.

Implementation in Des Plaines: Since 1990, the City's Flood Rebate Program has improved to provide up to 30% of the cost (up to $2,000) for installation of flood protection measures, such as overhead sewers, backwater valves in basements or yards, glass block basement windows, drain tile with sump pumps, basement waterproofing, and backup battery sump pumps.

From 2000 to 2003, the program funded 209 projects at an average cost to the City of $755. The recent figures for flood and sewer projects are shown in Table 6-1. The locations for these projects are shown in Map 2-2.

Table 6-1.
Rebate Program Projects

Year	Number
2004	21
2005	24
2006	22
2010	144
2011	57

This innovative rebate program has received awards for its public-private partnership approach to protect buildings from sewer backup and flooding (because the funds come from sewer revenues, the rebates are limited to sewer and flooding problems). The 1999 Des Plaines Civic Association survey asked if residents were familiar with the rebate program. Only 26% of the respondents knew of it and of those, only 16% had taken advantage of it.

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

6.8. Repetitive Loss Properties

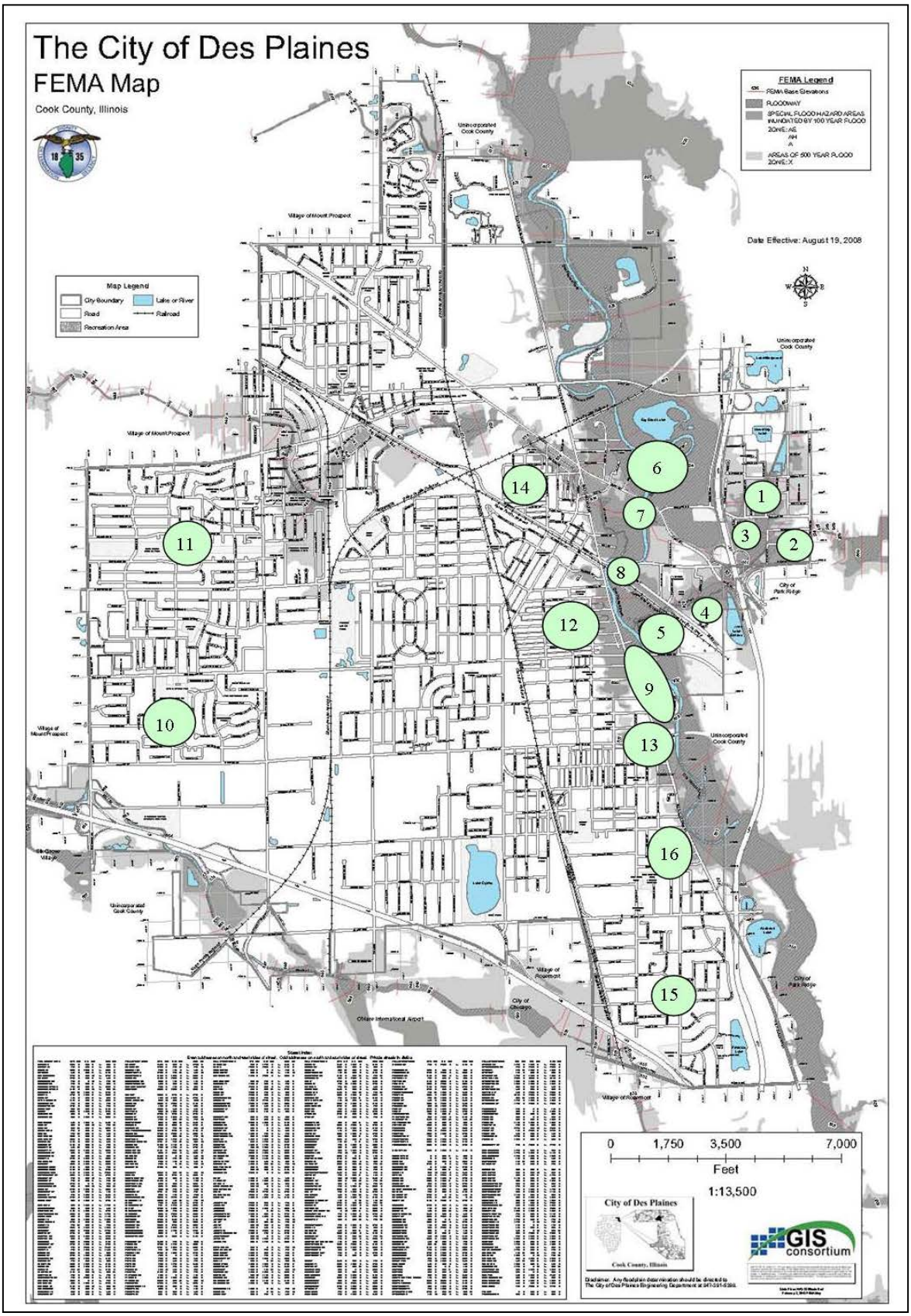
Section 3.4 explains the criteria for designation of the City's 16 repetitive loss (RL) areas. Map 6-1 shows the RL areas and the Des Plaines floodplain map. Repetitive loss properties deserve special attention because they are more prone to damage by natural hazards than any other properties in Des Plaines. Further, protecting repetitive loss buildings is a priority with FEMA and IEMA mitigation funding programs.

The 2002 Repetitive Loss Plan reviewed property protection alternatives for RL areas 1 through 9. The summary data and tentative recommendations are shown in Table 6-2. The plan noted that "in the case of RL areas 1 through 4 and 8, planned flood control projects will substantially reduce the flood threat to these properties. Therefore, the less expensive measures are recommended as an interim protection measure until the flood control projects are operational."

The recommendations in the table are tentative and for planning purposes. The recommendations were based on the flooding conditions and common building type in the area. Specific recommendations for any structure require an onsite and indoor building inspection.

A Flood Mitigation Assistance grant was received from Illinois Emergency Management Agency to elevate nine (9) Methodist Campground cottages as a result of 2008 flood (RL area 5); six have been completed. It should also be noted that the City has revised its floodway regulations and allows elevation and substantial improvements of historical buildings in the floodway, provided the project does not increase the building's footprint and the structure is protected to a level of one foot above the 100-year flood. This revises the recommendation for Area 5, the Campground.

As mentioned, the City is anticipating a grant from IEMA to the acquisition of properties on Big Bend Drive (RL area 6). RL areas 10, 11, 14 and 15 are local drainage problem areas. Areas 12, 13 and 16 are impacted by the Des Plaines River. Both MWRD and the US Army Corps of Engineers (Corps) have developed watershed and flood reduction plans for the Des Plaines River. The City will consider the potential MWRD and Corps regional efforts for aiding these RL areas.



Map 6-1 City of Des Plaines Repetitive Flood Areas & FEMA Map

Table 6-2. Repetitive Loss Property Protection Recommendations

Area	Structural project [1]	Acquisition	Elevation	Barrier/basement berm	Sewer Backup	Dry Floodproofing	Wet Floodproofing [2]	Insurance [3]	Key factors
1	P				A	A	A	P	Floodway prevents barrier option
2	P			A	A	A	A	P	
3	P			A	A	A	A	P	
4	P			A	A	A	A	P	
5		P					A	P	Building condition and location favor acquisition. City floodway prevents barrier and elevation options
6		P			A	P	P	P	Floodway prevents barrier option, number and cost of homes prevents acquisition
7					A	P	P	P	Floodway prevents barrier option
8	P				A	A	A	P	
9					A		P	P	Depth of flooding prevents barrier and dry floodproofing options
10				P	P	A	A	P	Barriers could be regrading yards
11				P	P	A	A	P	Barriers could be regrading yards

Recommended Protection Measures

P = Preferred protection measure(s) for this area

A = Alternative protection measure

These recommendations are based on the flooding conditions and common building type in the area. Each building should be individually evaluated before a construction project is initiated.

Notes:
1. In these areas, planned flood control projects discussed in Chapter 5 will substantially reduce the flood threat to these properties. Therefore, the less expensive property protection measures are recommended as an interim protection measure until the projects are operational.
2. Wet floodproofing is recommended for garages and unfinished basements
3. Flood insurance is recommended for all buildings subject to surface flooding. Sewer backup insurance is recommended in Areas #10 and #11

Repetitive Loss Plan, page 59

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 with low damage potential (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, ice storms, snow storms, and can be implemented by a local government at a relatively low cost.

4. While City-owned properties are adequately insured against damage by natural hazards, less than 50% of the privately owned buildings in the City's floodplains and 1% of the buildings in the rest of the City 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. Property protection measures can protect the most damage-prone buildings in the City: repetitive loss properties. General recommendations have been identified for each area.

6.10. Recommendations

The following recommendations for property protection measures. The recommendations are made in light of the five goals set for this plan (see box and page 4-6.)

6-1. 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 this message are covered in Chapter 9.

Mitigation Plan Goals

1. Educate citizens
2. Manage new development
3. Protect public services
4. Address flooding
5. Maximize use of State and Federal funds

6-2. Because properties in floodplains will be damaged sometime and there are so many ways to protect floodprone property, a special effort should be made to provide information and advice to floodplain property owners. Special attention should be given to encouraging the purchase of flood insurance and to protecting buildings in the repetitive loss areas.

6-3. The City should continue its forestry programs and maintain its status as a Tree City USA.

6-4. The City should continue its very effective sewer and flood protection rebate program. It should consider funding it from other sources of revenue in order to expand it to cover property protection measures for other hazards, such as tornado safe rooms.

6-5. The City should pursue a FEMA mitigation grant to help fund elevation of the buildings in all repetitive loss areas. If other areas are interested in similar projects, the City should help them, too.

6.11. References

1. CRS Coordinator's Manual, FEMA, 2006
2. Des Plaines City Code, 2006
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8. Institute for Business and Home Safety website, www.ibhs.org
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11. Responses to questionnaires submitted by City residents, 2002.
12. State Farm Insurance website, www.statefarm.com/consumer/lightng.htm
13. Taking Shelter from the Storm: Building a Safe Room Inside Your House, Federal Emergency Management Agency, FEMA-320, 1998.
14. Windshield surveys of repetitive loss areas conducted by French & Associates, Ltd., 2002.
15. Windstorm Mitigation Manual for Light Frame Construction, Illinois Emergency Management Agency, 1997.

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Chapter 7. Emergency Management

Des Plaines Accredited Emergency Management Program facilitates the development of a network of relationships among all elected officials, City's Incident Management Team members, federal, state, county and local partners and community stakeholders that understand their roles and are able to act when needed.

The Incident Management Team has considered the whole community in planning and training activities so that the broadest possible network of stakeholders is included and consulted as valuable partners.

Emergency management key components include:

Prevention/Protection

- Means actions taken to avoid an incident or to intervene to stop an incident from occurring.
- Involves actions taken to protect lives and property.
- Involves applying intelligence and other information to a range of activities that may include such countermeasures as:
  - Deterrence operations
  - Heightened inspections
  - Improved surveillance

Preparedness

Preparedness is defined as the range of deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from incidents. Preparedness is a continuous process involving efforts at all levels of government and between government and private-sector and nongovernmental organizations to identify threats, determine vulnerabilities, and identify required resources. Because it is not possible to completely prevent or mitigate every hazard that poses a risk, preparedness measures can help to reduce the impact of the remaining hazards by taking certain actions before an emergency event occurs. Preparedness includes plans or other preparations made to save lives and facilitate response and recovery operations.

The preparedness cycle outlines the sequence of events that should be utilized to Plan, Organize and Equip, Train, Exercise, Evaluate and Improve as a part of the overall Preparedness process.

Preparedness measures involve all of the players in the integrated emergency management system—local, Tribal, State, and Federal agencies and individuals and families—and, at the local level, may include activities such as:

- Developing an Emergency Operations Plan (EOP) that addresses identified hazards, risks, and response measures.
- Recruiting, assigning, training, and exercising staff that can assist in key areas of response operations.
- Identifying resources and supplies that may be required in an emergency.
- Designating facilities for emergency use.
- Individual preparedness activities and training.
- Community and private sector partnerships.

The Des Plaines Response Plan (RP)

The Des Plaines (RP) describes how the Incident Management Team will conduct operations under the National Incident Management System for day-today operation, special events, and in a disaster. The RP:

- Assigns responsibility to organizations and individuals for carrying out specific actions that exceed the capability or responsibility of any single agency.
- Establishes lines of authority and organizational relationships, and shows how all actions will be coordinated.
- Describes how people and property will be protected in major emergencies and disasters. Identifies personnel, equipment, facilities, supplies, and other resources that can be made available—within the jurisdiction or by agreement with other jurisdictions—for use during response and recovery operations.
- Identifies steps to address mitigation concerns during response and recovery operations.

<u>Mitigation</u>

Mitigation refers to activities that are designed to:

- Reduce or eliminate Long-Term Risk to persons or property, or
- Lessen the actual or potential effects or consequences of an incident.

Mitigation measures:

- May be implemented prior to, during, or after an incident.
- Are often developed in accordance with lessons learned from prior incidents.
- Can include efforts to educate governments, businesses, and the public on measures that they can take to reduce loss and injury.

Mitigation is accomplished in conjunction with an All-Hazard Vulnerability Assessment (AHVA). An AHVA helps to identify:

- The natural or technological hazard events that can occur in and around the community.

- The likelihood that such an event will occur.
- The consequences of the event in terms of casualties, destruction, disruption to critical services, and costs of recovery.

To be successful, mitigation measures must be developed into an overall mitigation strategy that considers ways to reduce consequences together with the overall risk from specific threats and other community goals.

Response

Response begins when an emergency incident is imminent or immediately after an event occurs. Response encompasses the activities that address the short-term, direct effects of an incident. Response also includes the execution of EOPs and of incident mitigation activities designed to limit the loss of life, personal injury, property damage, and unfavorable outcomes.

Response involves putting preparedness plans into action.

One of the first response tasks is to conduct a situation assessment. Our Mayor and Incident Management Team are responsible for emergency response and for continued assessment of its ability to protect its people and the property within the community. To fulfill this responsibility, responders and Des Plaines officials must conduct an immediate rapid assessment of the local situation.

Rapid assessment includes all immediate response activities that are directly linked to determining initial lifesaving and life-sustaining needs and to identifying imminent hazards. The ability of local governments to perform a rapid assessment within the first few hours after an event is crucial to providing an adequate response for life-threatening situations and imminent hazards. Coordinated and timely assessments enable Emergency Operation Center to:

- Prioritize response activities.
- Allocate scarce resources.
- Request additional assistance from mutual aid partners, as well as the State, quickly and accurately.

Good planning, training, and exercising before an event occurs can help reduce cascading events and their effects. Maintaining the discipline to follow the plan during response operations also reduces the effects of cascading events.

Recovery

The goal of recovery is to return the community's systems and activities to normal. Recovery begins right after the emergency. Some recovery activities may be concurrent with response efforts.

Recovery is the development, coordination, and execution of service- and site-restoration plans for impacted communities and the reconstitution of government operations and services through individual, private-sector, nongovernmental, and public assistance programs that:

- Identify needs and define resources.
- Provide housing and promote restoration.
- Address long-term care and treatment of affected persons.
- Implement additional measures for community restoration.
- Incorporate mitigation measures and techniques, as feasible.
- Evaluate the incident to identify lessons learned.
- Develop initiatives to mitigate the effects of future incidents.

Long-term recovery includes restoring economic activity and rebuilding community facilities and housing. Long-term recovery (stabilizing all systems) can take years.

Although recovery is primarily a responsibility of local government, if the emergency or disaster received a Presidential Declaration, a number of assistance programs may be available under the Stafford Act. There are two major categories of Federal aid: Public Assistance and Individual Assistance.

This chapter reviews the City'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
7.2 Warning
7.3 Response
7.4 Critical facilities protection
7.5 Recovery and mitigation

CRS credit: Emergency services can receive credit within Community Rating System (CRS). CRS Activity 610 (Flood Warning and Response) can credit the measures discussed in this Chapter.

7.1. Threat Recognition

Threat recognition is the key to being able to respond and to notify the public to a threat before it occurs. The first step in responding to severe weather or other natural hazard is to know when to get information on current weather conditions. With proper and timely

threat recognition systems, adequate warnings can be disseminated and advance protection measures can be implemented.

The Chicago Office in Plainfield, Illinois of the National Weather Service (NWS) is tasked with providing "weather, hydrologic, and climate forecasts and warnings for the Northern Illinois, Wisconsin, and Indiana, adjacent waters and lake areas, for the protection of life and property and the enhancement of the national economy." This is done through a collection of national and regional centers, and more than 120 local weather forecast offices (WFOs). They are charged with issuing weather forecasts, advisories, watches, and warnings on a daily basis.

The NWS operates NEXRAD, a nationwide network of Doppler weather radars which can detect precipitation and their velocities. Many of their products are broadcast on NOAA Weather Radio, a network of radio transmitters that broadcasts weather forecasts, severe weather statements, watches and warnings 24 hours a day.

NOAA Weather Radio All Hazards is a network of radio stations broadcasting continuous weather information directly from a nearby National Weather Service (NWS) office. It is operated by the NWS, an agency of the National Oceanic and Atmospheric Administration (NOAA) within the United States Department of Commerce. NOAA Weather Radio broadcasts National Weather Service warnings, watches, forecasts and other hazard information 24 hours a day. It also broadcasts alerts of non-weather emergencies such as national security, natural, environmental, and public safety through the Federal Communications Commission's (FCC) Emergency Alert System.

StormReady, a program started in 1999 in Tulsa, OK, helps arm America's communities with the communication and safety skills needed to save lives and property--before and during the event. StormReady helps community leaders and emergency managers strengthen local safety programs.

StormReady communities are better prepared to save lives from the onslaught of severe weather through advanced planning, education and awareness. No community is storm proof, but StormReady can help communities save lives.

The Storm Ready program encourages communities to take a proactive approach to improving local hazardous weather operations. The program is a “win” situation for everyone involved: community leaders; the NWS; emergency managers; and, the general public. Here are just a few of the benefits our community will realize by being StormReady:

- Improves the timeliness and effectiveness of hazardous weather warnings for the public;
- Provides detailed and clear recommendations which will help local emergency managers establish and improve effective hazardous weather operations. It can

also help justify costs and purchases needed to support hazardous mitigation and emergency response plans;

- Rewards local hazardous weather mitigation programs that have achieved a desired performance level;
- Provides a means to possibly acquire additional Community Rating System points assigned by the National Flood Insurance Program (NFIP);
- Provides an image incentive to communities, which once recognized, can identify themselves as being Storm Ready; and,
- Storm Ready can help ensure our community is prepared for other civil emergencies.

Storm Ready is a "grass roots" program sponsored by NOAA's National Weather Service that focuses on improving communication and severe weather preparedness in communities. It helps community leaders and emergency managers strengthen local hazard mitigation and emergency response plans. From tornadoes to tsunamis, floods to winter storms, and wildfires to hurricanes, your community will be better prepared knowing they have the best possible chance of being warned before a weather disaster strikes.

Implementation in Des Plaines:

Des Plaines is one of 75 Storm Ready cities and counties in Illinois. Weather conditions that contribute to localized flash flooding, tornadoes, and severe storms are monitored by the Emergency Operation Center Weather Station and 911 Communication Center staff. The City has trained volunteer spotters who can monitor conditions after being dispatched by the Emergency Operation Center when conditions are appropriate.

Where severe storms are possible, storm spotting groups such as SKYWARN in the United States and Northern Illinois coordinate amateur radio operators and localized spotters to keep track of severe thunderstorms and tornadoes. Reports from spotters and chasers are given to the National Weather Service and local emergency operation centers so that they have ground truth information to warn the general public. Spotting provides ground information and localized conditions that the National Weather Service might not know the extent or might not otherwise be aware of. They typically report events, such as structures struck by lightning, rotating wall clouds, funnel clouds--or conditions that exceed specific thresholds, such as extremely strong winds, significant hail or very heavy rainfall. The exact reporting thresholds can vary by region and may even dynamically change during a severe weather event. Spotters also give reports during winter storms, floods, hurricanes, and wildfires.

Des Plaines volunteer weather spotters and amateur radio operators are individuals who use equipment in the field or at our amateur radio station in the Emergency Operation Center to engage in two-way personal communications with other similar individuals on radio frequencies assigned to the amateur radio service. Amateur radio operators have

been granted an amateur radio license by a governmental regulatory authority. As a component of their license, amateur radio operators are assigned a call sign that they use to identify themselves during communication. There are about three million amateur radio operators worldwide.

7.2. Warning

After the threat recognition system alerts the City 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 more specific the warning, the greater is 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 Des Plaines in a variety of ways. The following are the more common methods:

Outdoor warning siren

- Outdoor warning sirens
- Sirens on public safety vehicles
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Door-to-door contact
- Mobile public address systems
- E-mail notifications
- Multiple or redundant systems are most effective – if people do not hear one warning, they may still get the message from another part of the system. Each has advantages and disadvantages:
- Radio and television provide a lot of information, but people have to know when to turn them on and what station to turn to.
- 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 phones lines are down. Nor do they work for unlisted numbers and calling screener services, although individuals can sign up for notifications.
- Where a threat has a longer lead time (e.g., a heat wave), going door-to-door and manual telephone trees can be effective.

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

Implementation in Des Plaines: The Des Plaines Homeland Security and Emergency Management Agency is responsible for disseminating warning information to the public and notifying response personnel during an emergency. The procedures followed are in the Response Plan's Annex Warning and Emergency Information and Annex Public Information. The following warning techniques are used:

- There are 11 outdoor warning sirens that cover the City
- A NOAA Weather Radio has been installed in health facilities, schools, and other critical facilities. Emergency management personnel are able to issue specific instructions over this system.
- Sirens and loudspeakers on public safety vehicles can be used.
- Residents are instructed to listen to WBBM News Radio (AM 780) for more information on severe weather and flooding watches and warning.
- People who have NOAA Weather Radio will be advised of the Weather Service predictions for severe weather and flooding watches and warning.
- The City can insert messages that are shown on all televisions that use Cable TV.

The greatest concern with the City's system raised by the Emergency Management Coordinator is that functional needs population may not have access to media, such as Cable TV and NOAA weather radios. The EMA Coordinator is working with Functional Needs Committee to meet FEMA CPG 301 and ADA EMA mandates.

7.3. Response

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

Preparation for major emergencies and disasters requires contingency planning, not only on the part of the Mayor, City Manager, and EMA Coordinator, but also by all departments and agencies of the City of Des Plaines Government. The Des Plaines Response Plan emphasizes the major situations that require City Government coordination and direction from all city departments/agencies, and may require assistance

and support from the County, State, and Federal Governments. This need for coordinated emergency operations distinguishes major emergencies and disasters from the emergencies that Police, Fire and other departments face or hospitals and doctors deal with on a daily basis. Planning is particularly important to emergency operations since the margin for indecision is so small. How this City reacts in the time span before a disaster strikes and to a few hours after will substantially influence the impact of the disaster on the local area. In major emergencies, City Government cannot wait, even for a few hours, for County and State assistance or direction. The City of Des Plaines must be prepared to immediately mobilize and coordinate the operations of the available city's department/agencies in order to minimize the loss of life and property. For this reason, Des Plaines Officials must assume a major responsibility for emergency and disaster preparedness.

The Emergency Operation Center (EOC) serves as an effective and efficient facility for coordinating the City's emergency response and recovery efforts. The EOC serves as the coordination center for the following Response Plan functions: Direction and Control, Communications, Warning/Emergency Information, Public Information, Disaster Intelligence/Damage Assessment, Evacuation, Mass Care, Health and Emergency Medical Services, Medical Examiner Forensic, Resource Management, Debris Management, Volunteers, Donations, Hazardous Materials, Terrorism, Law Enforcement and Investigation, Flooding Hazard and Ground Search and Rescue (GSAR).

Vendor's Emergency List will be updated annually by the Finance Department 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.

The City's Response Plan ensures that response and recovery activities are coordinated by the Incident Management Team in the Emergency Operation Center is implemented in a timely manner.

Flood stage forecast map: 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. For each predicted flood stage, 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. 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.

Shelters: An emergency response plan puts public safety as its top priority. The proper messages can save lives even if there are only a few minutes of warning time. People can seek safe havens from flooding on high ground, from tornadoes and severe storms in their basements and from extreme heat in air conditioned public facilities.

One of the most exposed sectors of the population is mobile home dwellers. They have no basements and their structures are particularly susceptible to wind damage. An emergency response plan should address the correct messages to disseminate and ensure that there are adequate shelters for people to evacuate to.

Implementation in Des Plaines: The City Emergency Operation Plan is titled *Response Plan.* It is based on the Federal Emergency Management principles that are designed to work with emergencies that have no warning and that unfold quickly, such as an earthquake or terrorist incident. The plan focuses on responsibilities of all stakeholders. As an Illinois Emergency Management Agency Accredited Program our plan is mandated for updated every two years.

The City does not have its own flood stage forecast map, but it does have access to a variation that developed by the Illinois Department of Natural Resources. Using GIS, IDNR can prepare a map showing the areas affected by predicted flood threats. This is available on a website that is accessible to local emergency services personnel, not the general public. While it can be helpful during a flood threat, its greatest benefit would be during flood response planning, in advance of an emergency.

The Weather Service's website for the Des Plaines River gage is monitored by Emergency Management, Public Works and Engineering, and Fire Department staff. When the River approaches a stage of 4.0, a series of actions are implemented by the various departments. The actions are based on past experience, including the 2007, 2008, 2009 and 2010 flood responses (the highest consecutive floods in memory). They include taking steps such as

- Monitor river levels
- Activate the Emergency Operations Center
- Close roads and bridges
- Distribute sand and sandbags
- Advise residents and businesses to evacuate

The City has over 500 mobile homes in three mobile home parks. None of them have special storm or tornado shelters.

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 able to better 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.

Implementation in Des Plaines: The City maintains up to date information and has regular contacts with critical facilities. It has no special warning or coordinated response activities with them.

7.5. Recovery and Mitigation

Under NIMS during a disaster, a Recovery and Mitigation Plan prepared by the Planning Section Chief and the Incident Management Team is a process related to preparing the community for the recovery of infrastructure, business and residential areas critical to the City of Des Plaines after a natural or human-induced disaster.

Recovery includes both short-term and long-term activities. Short-term operations seek to restore critical services to the community and provide the basic needs of the public. Long-term recovery focuses on restoring the city to its normal or improved state of affairs. This recovery period is also an opportune time to institute mitigation measures, particularly those related to the recent disaster.

The City of Des Plaines response function is completing its mission and entering into the recovery period. The plan should provide for the following:

1. To safeguard the lives of residents, to reduce property damage and return the City to pre-disaster conditions.
2. To develop and complete the Public Works and Engineering Department Debris Management Plan.
3. Complete an After Action Report Report/Improvement Plan.

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 City's floodplain development ordinance 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.

Implementation in Des Plaines: The Planning Section Chief and the Incident Management Team will prepare a Recovery and Mitigation Plans in accordance with Emergency Management principals after each incident.

7.6. Conclusions

1. The City has good measures to obtain early threat recognition of those weather-related hazards that can be predicted.

2. A variety of media are used to disseminate warnings, but there is a concern with the functional needs community.

3. City staff has experience with emergency operations and each department has instructions based on past experience.

4. There are no storm or tornado shelters in the City's three mobile home parks, areas that are particularly susceptible to wind damage.

5. The City Response Plan has been approved by Illinois Emergency Management Agency as part of the City's Accreditation in 2012.

7.7. Recommendations

The following recommendations are made for emergency services. The recommendations are made in light of the five goals set for this plan (see box and page 4-6.)

Mitigation Plan Goals

1. Educate citizens
2. Manage new development
3. Protect public services
4. Address flooding
5. Maximize use of State and Federal funds

7-1. The City should use the IDNR flood stage forecast map and the Des Plaines River gage flood crest predictions to develop a detailed flood warning and response system that would qualify the City for more credit under the Community Rating System. It would include:

- Maps that show areas and facilities affected at various flood levels
- Procedures that clarify when and how to issue a flood warning
- What public services, utilities, and critical facilities are affected
- What support is needed by those public services, utilities, and critical facilities
- A specific list of flood response activities
- Procedures and public information materials for post-disaster building inspections and identification of mitigation opportunities
- Resources needed to implement the planned actions

7-2. The City should continue their participation in the NWS StormReady program.

7-3. The City should continue to meet all annual IEMA requirements for the City's accredited emergency management program.

7-4. The Citizen Corps volunteers should discuss tornado and severe storm safety measures with the mobile home park owners and the managers of critical facilities.

7-5. The Citizen Corps volunteers should implement a public information program that would:

- Advise residents and businesses of the warning procedures and what to do when warnings are issued
- Be understood by all residents, including those who are not fluent in English
- Make the IDNR GIS based flood stage forecast map or an equivalent map available to the general public.

7.8. References

1. CRS Coordinator's Manual, Community Rating System, FEMA, 2006
2. CRS Credit for Flood Warning Programs, FEMA, 2006
3. Emergency Management: FEMA Professional Development Series includes seven Emergency Management Institute independent study courses that provide a well-

rounded set of fundamentals of emergency management principles., Federal Emergency Management Agency http://training.fema.gov/IS/

4. Flood Fighting, Illinois Department of Transportation, Division of Water Resources, 1985.
5. Developing and maintaining Emergency Operations Plans – Comprehensive Preparedness Guide (CPG) 101 version 2.0 November 2010, Federal Emergency Management Agency
6. 29 Illinois Administrative Code 301 Title 29; Emergency Services, Disasters, and Civil Defense, Illinois Emergency Management Agency
7. FY 2006 NIMSCAST Compliance Activities for EOPs II. Command and Management III. Preparedness IV. Resource Management and V. Communications and Information Management, Federal Emergency Management Agency
8. Interim Emergency Management Planning Guide for Special Needs – Populations Comprehensive Preparedness Guide (CPG) 301 Version 1.0 August 15, 2008, Federal Emergency Management Agency and DHS Office for Civil Rights and Civil Liberties
9. Guidelines on Community Local Flood Warning and Response Systems, Federal Interagency Advisory Committee on Water Data, 1985
10. Information on StormReady communities can be found on the National Weather Service website, www.nws.noaa.gov/stormready/
11. National Weather Service – Chicago Office website, http://www.crh.noaa.gov/lot/

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 the Department of Public Works and Engineering staff.

Five areas related to controlling floodwaters are reviewed in this chapter:

8.1 Des Plaines River projects
8.2 Farmers Creek projects
8.3 Channel improvements
8.4 Drainage and sewer improvements
8.5 Drainage system maintenance

Large flood control projects, like levees and reservoirs, are generally the most expensive type of mitigation measure in terms of installation costs, maintenance requirements and environmental impacts. They also have regional or watershed-wide benefits. In 2011, Lake County Illinois spent $2,470,185 on 11 projects to mitigate drainage and flooding problems. Within the Des Plaines River Watershed area, they replaced culverts, headed a clean-up of a wetland area and stabilized a streambank. Because of these factors, they are often planned, funded and implemented at a regional level by agencies such as the Illinois Department of Natural Resources' Office of Water Resources and the U.S. Army Corps of Engineers. Further, a thorough alternative assessment should be conducted before choosing a project that may cost millions and affect many properties.

In fact, these two agencies have cooperated extensively on planning flood control projects. The Corps assumed the lead in addressing the Des Plaines River and IDNR is the lead agency for studying flood control alternatives for Farmers Creek. They have investigated structural projects for the City's two largest flood problem areas and reported their findings, which are summarized in the first two sections of this chapter.

Regardless of the designing or owning agency, flood control projects have some advantages not provided by other mitigation measures:

- They can stop most flooding, protecting transportation routes and landscaping, in addition to buildings.
- Many projects can be built without disrupting homes and businesses.
- They can protect large areas at less cost than acquiring every property or retrofitting every building.
- 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.

Flood control projects also have shortcomings.

- They disturb the land and disrupt natural water flows, often destroying 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 an illusory 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.

Levee failure, 1993 Missouri River flood, illustrating one of the shortcomings of flood control projects − the creation of an illusory sense of security.

US Army Corps of Engineers

These advantages and disadvantages need to be kept in mind when reviewing the effectiveness, cost, and external impacts of flood control as a mitigation measure.

CRS credit: Structural measures can receive credit within Community Rating System (CRS). CRS Activity 530 (Flood Protection) can credit the measures discussed in this Chapter.

8.1. Des Plaines River Projects

The *Upper Des Plaines River Feasibility Report* was prepared by the U.S. Army Corps of Engineers, Chicago District, in 1999. The Corps conducted an extensive review of flood control alternatives, including

- ✓ a dam across the Des Plaines River at Wadsworth
- ✓ a dam on Mill Creek
- ✓ 53 smaller "offsite reservoirs" or expansions of existing reservoirs on various tributaries
- ✓ 13 "lateral storage areas" (sites adjacent to a channel that store high flows)
- ✓ 8 levee/floodwall alignments
- ✓ Levee 50 in Des Plaines (completed)
- ✓ Heritage Park compensatory storage (in progress)

The Corps conducted extensive analyses of the technical, economic and environmental impacts of the projects, both individually and in a variety of combinations with each other. The Corps also had to make sure that there would be a local sponsor who would support each measure. These analyses eliminated most of the alternatives. In most cases, the cost of buying the land, building the facility, and operating it over the years was more than the flood protection benefits. The report noted,

> In the Upper Des Plaines River basin, the topography and level of development made it difficult to locate enough storage to provide a 100-yr level of protection. Desirable site characteristics include, but are not limited to: attainability by floodwaters, impervious soil conditions, and a low water table.
>
> …This analysis showed that in order to obtain maximum damage reduction, flow peaks must be reduced at the first damage site (Gurnee, Illinois) and the major damage site (Des Plaines, Illinois). The most effective means of accomplishing this would be to construct a 20,000 acre-ft capacity reservoir off the mainstem upstream of Gurnee, Illinois and approximately 10,000 acre-feet capacity reservoir off the mainstem between Gurnee and Des Plaines. (*Upper Des Plaines River Feasibility Report,* page J-3)

The resulting recommended plan has the following six components:

- Raising the dam across the North Fork of Mill Creek in northern Lake County to increase the flood storage area by 500 acre-feet
- A lateral storage area in VanPatten Woods Forest Preserve (also in northern Lake County) to add 412 acre-feet of storage
- Expansion of the Buffalo Creek reservoir at Buffalo Grove (475 more acre-feet)

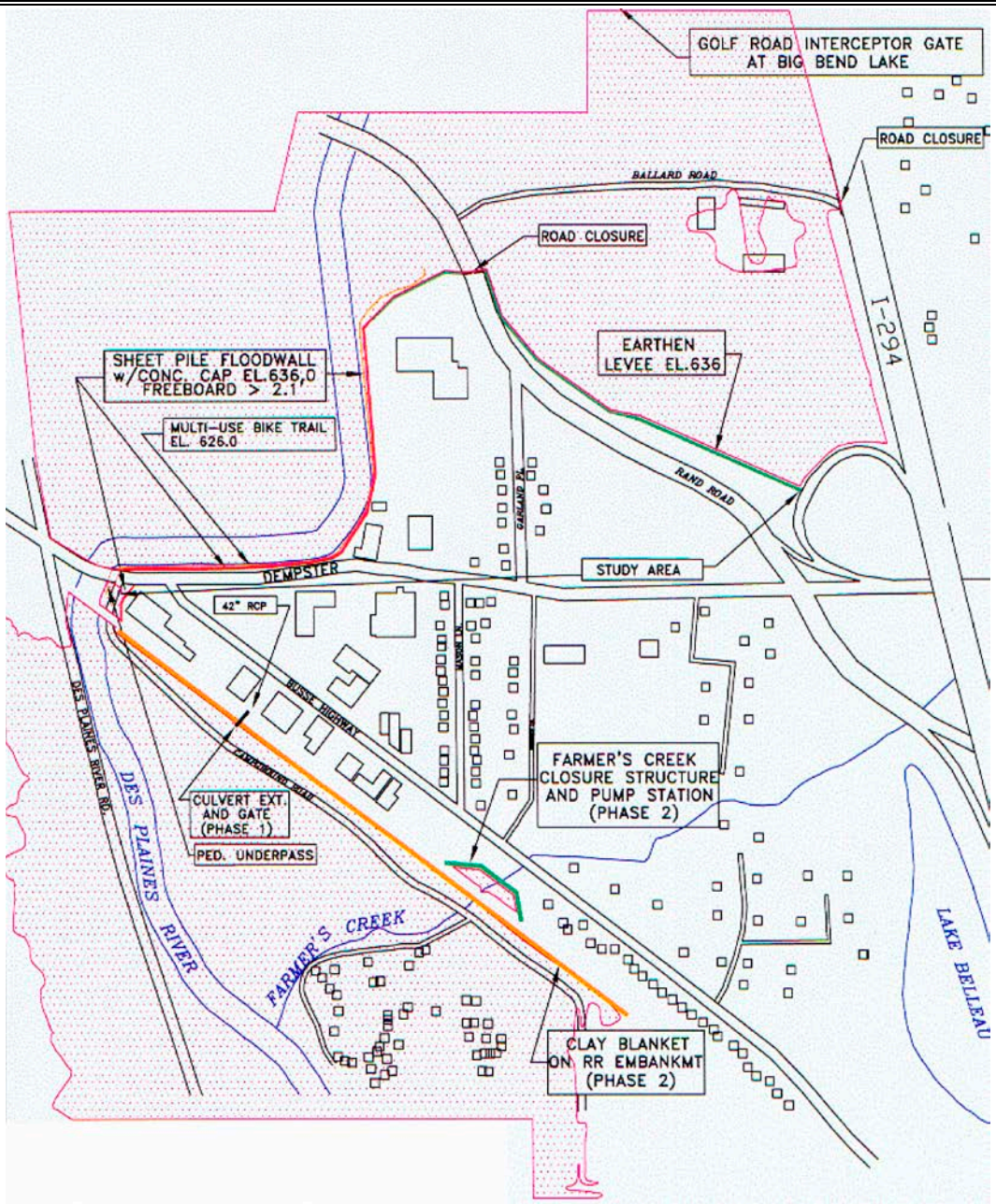
When they are completed, the two storage projects will result in a very small reduction in the base flood elevation in Des Plaines – less than two inches. The floodplain map may be revised in some locations to show areas on the edge of the floodplain as being above the base flood. However, this would not affect areas that are close to the river channel and that will not be protected by a levee.

Levee 50: The Rand Park Levee, or Levee 50, is completed.

Levee 50 protects 181 buildings in the Des Plaines River and Farmers Creek floodplains from the backwater effects of the 100-year flood on the Des Plaines River. However, there are still properties along Farmers Creek that are subject to flooding from Farmers Creek and its tributary, Prairie Creek. It should be noted that the project design includes an "overtopping plan" that minimizes damage when a greater than 100-year flood occurs.

Construction on Levee 50 at Miner Street.

The pump station on Farmers Creek is operational.



Map 8-2. Levee 50 Project

City of Des Plaines website

However, there will be a substantial flood insurance rate reduction for those properties that are removed from the mapped floodplain. The resulting reduction in the insurance premium rates from remapping is far greater than CRS Credits, so the rate reduction benefit is not duplicated by the CRS rate reduction.

8.2. Farmers Creek Projects

By preventing backwater flooding of the Des Plaines River, Levee 50 will have a major impact on flooding in the Farmers Creek floodplain. IDNR is also studying ways to reduce flooding on Farmers Creek and its tributary Prairie Creek. Because 2/3 of the

flood flows come from Prairie Creek, it is important to the City that it be included in these studies.

The culmination of this work was the release of the study findings in the draft report, *Farmers/Prairie Creek Strategic Planning Study*, in December 2005. IDNR looked at a variety of ways to lower flood levels:

- ✓ 12 alternative ways to increase flood storage in the watershed,
- ✓ 8 ways to enlarge the channel or otherwise improve carrying capacity,
- ✓ 1 levee alternative, and
- ✓ 15 combinations of the above.

The benefits and costs of each alternative were determined and benefit/cost ratios were calculated. The estimated costs ran as high as $8.7+ million, with most of the alternatives being in the $500,000 - $4,000,000 range. Of the 46 alternatives, only nine have favorable benefit/cost ratios. Most of the favorable projects were storage alternatives.

The report did not recommend individual projects. It did make three recommendations "to alleviate a substantial portion of flood damages in the watershed:"

1. Work with the Illinois Department of Natural Resources, Office of Water Resources to implement economically feasible alternatives in accordance with the terms of a local project sponsorship agreement outlined in this report;

2. Enforce local floodplain ordinances in accordance with National Flood Insurance Program guidelines to prevent future floodway encroachments (including temporary storage of equipment and materials), diminish future flood damage potential and minimize floodplain development in the watershed;

3. Actively remove debris and logs from the Farmers and Prairie Creek to minimize the potential for temporary flood profile increases due to log and debris jams in the channel.

8.3. Channel Improvements

By improving a channel's conveyance, more water is carried away at a faster rate. Three 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 have 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.

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

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.

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 3-6, 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.

Implementation in Des Plaines: The 1999 Corps study looked at dredging and channel improvements on the Des Plaines River and concluded:

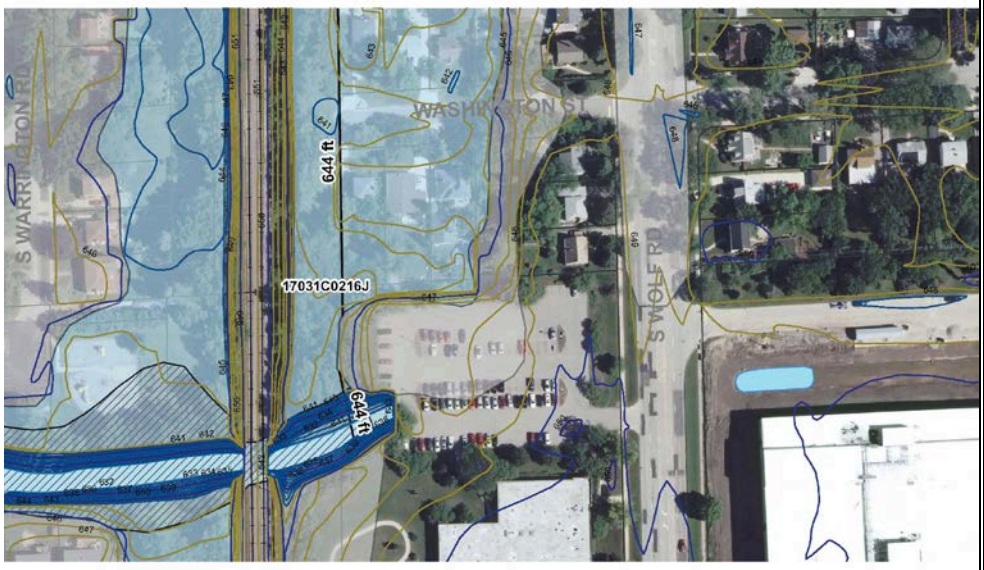
> The use of channel modifications has decreased primarily because of the potentially adverse environmental impacts…. The flat gradient of the Des Plaines River prohibits significant reduction of flood stages from localized channel improvements. The main obstacle to a localized channel modification plan in a very flat area, such as the Des Plaines River basin, is that floodwater will back up from whatever point the channel alteration plan stops. Therefore, a long reach of river must be dredged to obtain significant benefits….
>
> The 1961 State of Illinois flood control plan included dredging new channel dimensions from Hodgkins [southwest of Chicago]… upstream to Gurnee, Illinois. A modified version of this major channel modification plan was incorporated into the Reconnaissance study as Regional Alternative A. This option, at $107,184,000 in October 1988 costs, proved to be the most expensive of the regional options, and had a BCR [benefit/cost ratio] of 0.12, excluding real estate and mitigation costs; therefore, this plan was dropped from further consideration. (pages J-3 – J-4)

Diversions: The Illinois Department of Natural Resources performed some preliminary modeling of a diversion of high flows from the Des Plaines River to Lake Michigan and estimated rough costs. There is a unique problem with this approach. Because it is used as a drinking water source and is subject to international treaties with Canada, Lake Michigan must meet high water quality standards.

The U.S. Environmental Protection Agency indicated that the diverted water would need to be treated to the same level as wastewater discharge treatment levels. When the cost of adding the necessary water quality treatment was factored in, the project costs far out-weighed the anticipated benefits. There is also a U.S. Supreme Court ruling that governs diversions of water into or out of Lake Michigan.

There is a small scale diversion on Weller Creek. A large culvert upstream (west) of Wolf Road carries flows under the road to a secondary channel 1,000 feet downstream (see Map 8-3). This provides flood protection benefits to a few blocks north of where the diversion starts.

Map 8-3. Weller Creek Diversion



Channel crossings: Before the 1999 Corps of Engineers' feasibility study was prepared, there was a draft published in 1986. It found that bridge constrictions on the Des Plaines River were minimal.

> Existing and baseline conditions modeling of flood flows identified no significant bridge-induced flow constrictions on this river. The maximum stage increase at a bridge was 1.1 foot at Rockland Avenue during only the 100-year flood stage. Other bridges do not increase stages by more than 0.3 feet and most show between 0.0 and 0.1 feet head loss across the seven stage frequencies modeled.
>
> … Along the Des Plaines River, there are only 40 bridge crossings along an almost 70 mile river reach, significantly reducing bridge modification net benefits due to high costs and resulting in its being dropped as a feasible alternative. (Page 31)

A review of the Cook County Flood Insurance Study's stream profiles found one location on the tributaries to the Des Plaines River where a bridge or culvert obstructs flood flows. On Weller Creek, Golf Road causes a 2.5 – 3 feet backwater for the 10- and 100-year flood elevations. The profile and map are shown on the next page.

However, if the bridge were opened up, the higher flows would flood larger areas downstream (south) of Golf Road. The area immediately upstream of Golf Road, where the impact is greatest, includes a large park and a parking lot, so fewer homes and buildings are probably affected under the current situation.

Map 8-4 Weller Creek Floodplain at Golf Road

8.4. Drainage and Sewer Improvements

Man-made ditches and storm sewers help drain areas where the surface drainage system is inadequate, or where underground drainageways may be safer or more practical. Some properties are subject to very shallow surface flows. These flows may just be the runoff from the neighbors' yards, but they can cause significant damage to a basement.

Often the local drainage problem can be corrected with a little work to redirect the flows or install a tile or pipe to drain a chronically wet area. Sometimes this work simply restores the yard drainage system to its originally intended state, before unknowing owners put up fences or other obstructions to surface drainage.

Drainage improvements are one flood control project that owners may take upon themselves. All that may be needed is a shovel and some care taken to ensure that flows aren't diverted into someone else's building. Sewer improvements can be more complicated.

There are four basic types of sewer improvements:

1. Make the sewers large enough to handle the excess flows
2. Provide safe storage for overflows
3. Plug the leaks that let stormwater into the sanitary system
4. Prevent overloaded sewers from backing up into basements

This last approach has been implemented by individual property owners through backup valves and overhead sewers. It is discussed in more detail in Section 6.4.

The common problem with all four approaches is the expense. To dig up the many miles of a community's sewers and add larger pipes can be a tremendous cost. Storing the excess flows and plugging the leaks are also very expensive alternatives.

Although piping a ditch makes more room for surface use, pipe capacities are limited. A small storm sewer will be overloaded more frequently than the original open channel.

Implementation in Des Plaines: In 1986, the City adopted a Stormwater Master Plan that recommended 24 projects over a 20 year period. By 2003, the City reported that 17 of those projects had been completed. These have reduced the recurrence of street and yard flooding in areas outside the Des Plaines River floodplain. The remaining projects involved separating combined sewers and installing relief sewers, which are planned to be implemented in coordination with street rehabilitation work.

In 2003, the City prepared a new Stormwater Master Plan that looked at alternative solutions for 12 problem areas that were selected by the City based on historical reports of drainage and sewer problems. In 2011, additional areas were analyzed. The master plan identified projects for each area, most of them being new or larger storm sewers.

The Metropolitan Water Reclamation District has worked to ensure that all sanitary sewage is treated. This can be difficult in areas with combined sewers that are overloaded with stormwater from heavy rains. To counter this, the District constructed the Deep Tunnel project. The purpose of the tunnel is to provide storage capacity for the regional sewer system during times of heavy rainfall and flooding. It has had an impact on many areas of the City that experienced street flooding and sewer backups.

With its new stormwater management authority, the Metropolitan Water Reclamation District is exploring a new funding program to help pay for drainage improvements to correct problems that have an impact on more than one municipality.

For very local drainage and sewer problems, the City has helped property owners with the rebate program discussed in Chapter 6.

8.5. Drainage System Maintenance

Drainage system maintenance is an ongoing program to clean out blockages caused by overgrowth, bank erosion, or debris. "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 and

storage basins. The Metropolitan Water Reclamation District has a Small Streams Division which can assist with creek maintenance.

A regular inspection and maintenance program removes debris before it becomes an obstruction to stream flows.

Dr. Warren Campbell

Maintenance activities normally do not alter the shape of the channel or basin, but they do affect how well the drainage system can do its job. Sometimes it is a very fine line that separates debris that should be removed from natural material that helps form habitat.

Government agencies usually accept responsibility for maintaining facilities on public property. 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.

A model drainage system maintenance program does the following:

- Inspects the entire drainage system at least once each year;
- Checks known problem sites during or immediately after heavy storms;
- Responds to inquiries or complaints from citizens; and
- Removes debris soon after it is found.

Dumping regulations: One approach that can reduce drainage problems and the work-load 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.

Public information: 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, a drainage system maintenance program and an anti-dumping program should include public information materials that explain the need for maintenance, how individuals can help, the reasons for the dumping rules, and the penalties.

Implementation in Des Plaines: The City has a drainage system maintenance program that calls for twice a year inspections of all drainageways, including the Des Plaines

River. If problems are found, Department of Public Works and Engineering, Utility Service crews remove it. The program is closely coordinated with the City's water quality work under the National Pollutant Discharge Elimination System (NPDES) and is recognized as such by the Illinois Environmental Protection Agency.

Section 5-2-11 of the City Code prohibits dumping of any refuse, including yard waste and construction material, on private property or public places.

As with any such program, resident involvement and support is important. However, there are some areas where residents do not want City crews trespassing on their properties or altering their yards for a maintenance project. In other areas, residents are active in keeping storm sewer inlets clear, but are concerned about debris that comes from neighboring, not so cooperative, properties.

8.6. Conclusions

1. Much has been done to control flooding in Des Plaines. The City, the Metropolitan Water Reclamation District, the Illinois Department of Natural Resources, and the Corps of Engineers have reviewed flood control alternatives for both major stream flooding and local drainage and sewer problems. Cost effective projects have been funded and more are underway.

2. While many projects have been built or are underway, they will not produce a major reduction in flood heights along the Des Plaines River.

3. Opportunities for channel, drainage, and sewer improvements have been studied. Those that are cost effective will be constructed by the City over the years as annual funding allows.

4. The City has a drainage maintenance program, with supportive stream dumping regulations, that meets the standards of the CRS and NPDES. However, there could be some improvements in coordination with property owners at some specific sites.

8.7. Recommendations

The following recommendations are made for flood control. The recommendations are made in light of the five goals set for this *Plan* (see box and page 4-6.)

Mitigation Plan Goals

1. Educate citizens
2. Manage new development
3. Protect public services
4. Address flooding
5. Address other hazards
6. Maximize use of State and Federal funds

8-1. The Corps and IDNR should proceed and implement their projects on the Des Plaines River and Farmer/Prairie Creeks as recommended by their feasibility studies.

8-2. The City should ensure there is an adequate annual capital improvements budget to fund individual channel, drainage,

and sewer improvement projects each year. It should also monitor the developments in MWRD's new drainage improvement funding program, apply for funds where appropriate, and pursue CRS credits for its capital improvements program.

8-3. The City should continue inspections and maintenance of the drainage system and look at ways to better address site specific problems and coordination with property owners.

8-4. The City should initiate public information activities to educate property owners on drainage and sewer improvements, drainage maintenance, and stream dumping regulations.

8.8. References

- CRS Coordinator's Manual, Community Rating System, FEMA, 2006
- CRS Credit for Drainage System Maintenance, FEMA, 2006
- Farmers/Prairie Creek Strategic Planning Study, Illinois Department of Natural Resources, 2005.
- Flood Insurance Study, Cook County, Illinois, FEMA, November 8, 2000.
- Our Community and Flooding, A Report on the Status of Floodwater Management in the Chicago Metropolitan Area, Resource Coordination Policy Committee, 1998.
- Stormwater Master Plan, City of Des Plaines, 1986
- Stormwater Master Plan, City of Des Plaines, 2003
- Upper Des Plaines River, Illinois, Interim Feasibility Report and Environmental Impact Statement, U.S. Army Corps of Engineers, Chicago District, 1999 (and the October 1996 draft of this report).

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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 was 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 providing additional sources of information for those who want to learn more. It ends with an overall public information strategy in Section 9.5.

9.1 Outreach projects
9.2 Real estate disclosure
9.3 Technical information
9.4 Technical assistance

Information Brings Results

Dr. Shirley Laska of the University of New Orleans has studied various programs that encourage floodprone homeowner "self-protective behavior," including activities conducted in Northeastern Illinois after the 1986 Des Plaines River flood. 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….

"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.

CRS credit: Public information activities can receive credit within Community Rating System (CRS). CRS Activities 330 through 370 can credit the measures discussed in this Chapter.

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

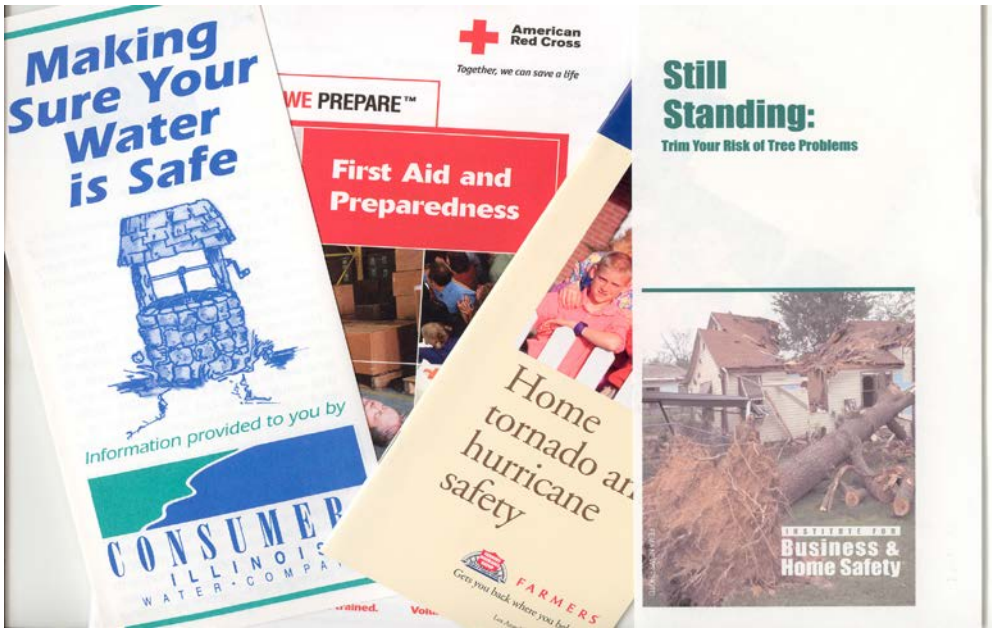
projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

The most effective types of outreach projects are mailed or distributed to everyone in the community or, in the case of flood hazards, 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.

Examples of other approaches include:

- Articles and special sections in local newspapers
- Presentations at meetings of neighborhood, civic or business groups
- Displays in public buildings or shopping malls
- Signs in parks, forest preserves, and along trails 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 public buildings and libraries (see examples, below)
- School programs, activities, and handouts
- Special meetings, such as floodproofing open houses



These brochures were all prepared and distributed by private organizations. From left to right: Consumer's Illinois Water Company (now Aqua Illinois), the Red Cross, Farmers Insurance Group, and the Institute for Business and Home Safety.

Implementation in Des Plaines: The City has a quarterly newsletter, "The Des Plaines Digest" which carries articles about flood protection. The Digest carried articles on the following hazard and mitigation topics:

Information from the Public Works and Engineering Department on flood protection

- Advice on protection from West Nile Virus
- Winter snow instructions
- Requests for people to sign up for emergency response volunteer groups
- City tree and branch collection procedures
- Reminders on keeping storm sewers and drainageways clear of debris
- Publicity on the sewer and flood protection rebates
- A table relating river gauge stage with elevations and historic flood levels
- Reminders on when a building permit is needed and how to apply for one
- Suggestions on contracts with home improvement contractors
- An article on immunizations for public health threats
- Fire safety tips

NEWS FROM THE PUBLIC WORKS & ENGINEERING DEPARTMENT

Curbside Collection

The City contracts ARC Disposal for residential garbage and recycling collection. Arc ***will not*** be collecting garbage on Thanksgiving Day, November 22, 2012, or Friday, November 23, 2012. If your garbage day is on Thursday or Friday, your collection day will be delayed by one day.

Your garbage day will remain as is for Columbus Day (October 8), Veteran's Day (November 11), and Christmas Eve (December 24).

Final Branch Collection

The final branch collection for 60016 begins September 4 and for 60018 begins on September 17. **Residents must have branches out by 7 AM on the first collection day.** All branches will be picked up within two weeks. Any branches put out late or incorrectly will not be collected. Large piles of branches will be left until all other branches are collected, then Public Works will come back to collect them.

Pool Draining Hints

In an effort to protect plants and wildlife from the effects of chlorinated water:

- **Use products that neutralize chlorine.** You can find these at pool supply stores.
- **Let the water sit.** This allows the chlorine to dissipate. This requires two days in the sun, minimum. Test the water to make certain that the concentrations are below 0.1 mg/liter.
- **Drain the pool over several days.** Don't let it drain onto private properties (other than your own) or onto public rights-of-way.

Leaf Disposal Options

Residents have three options for disposing of leaves:

1. **ARC Disposal**
   The garbage company will collect leaves on a weekly basis, provided that the leaves are in paper yard waste bags or 32-gallon containers marked with 12-inch red "X"s. The last day for leaf collection is December 7.
2. **Public Works**
   Leaves will be collected at 1111 Joseph Schwab Rd. Monday – Friday from 9 AM to 3 PM. Residents may leave only leaves – no bags, no containers, no grass clippings, no branches.
3. **Curbside**
   The City will collect leaves starting October 22. (see following article for more information)

If there is snow, leaves will not be collected until the snow is taken care of.

Help prevent street flooding. Remove debris from catch basins to allow water flow to the drains.

Do not connect your sump pump to your sewer. This can lead to sewer back up and is ILLEGAL.

PW Curbside Leaf Collection Program

To get this service, residents must:

- Have all leaves neatly raked into one 12-inch row in the street by 6 AM on the **FIRST** day of collection – otherwise the leaves WILL NOT be collected.

EXCEPTIONS: Residents on Algonquin Rd., Ballard Rd., Busse Hwy., Central Rd., E. River Rd., Elmhurst Rd., Golf Rd., Lee St., Mannheim Rd., Mt. Prospect Rd., Northwest Hwy., Oakton St., Potter Rd., Rand Rd., River Rd., Thacker/Dempster St., Touhy Ave., or Wolf Rd. **MAY NOT** put leaves on the street. Put them on the parkway.

- Keep leaves out of the drains to avoid flooding.
- ONLY leaves will be collected. This means that if any other lawn debris is present, no leaves will be taken.
- DO NOT park on the street on collection day from 6:30 AM to 3:30 PM.

Your zone is dependent on your garbage day (Monday – Zone 1, Tuesday – Zone 2, etc.). **The garbage company is not picking these leaves up.** The City will come by at some point during the day, not necessarily when the garbage is picked up.

Zone 1	Zone 2	Zone 3
October 25	October 26	October 22
November 1	November 2	October 29
November 14	November 16	November 5
November 27	November 28	November 20

Zone 4	Zone 5
October 23	October 24
October 30	October 31
November 7	November 9
November 21	November 26

Seepage vs Sewer Backup

If there is water coming through a crack in a basement wall or if there is a puddle along a basement wall, it is most likely seepage. This can be repaired by redirecting downspouts, sump pumps, and any other land that might direct water towards the house. Any cracks should be fixed by a contractor. Remove any wall coverings, including drywall. DO NOT INSTALL INTERIOR FOOTING TILES! It will be more expensive and messy than its performance will warrant.

If there is water coming through a floor, drain, toilet, or basement wall/floor interface, then there is a sewer backup. Sewer backup water is usually clear.
Visit ***www.desplaines.org/Services/FloodProtection/FloodRebateProgramDiagram.pdf*** or ***www.desplaines.org/ReferenceDesk/FormsandPermits/FloodRebateApp.pdf*** for sewer backup solutions.

4

Des Plaines "Digest," - fall 2012, page 4

The City sends a special mailing on flood issues each year to all properties in the floodplain. There is also a brochure on permit requirements for construction and remodeling in flood hazard areas.

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.

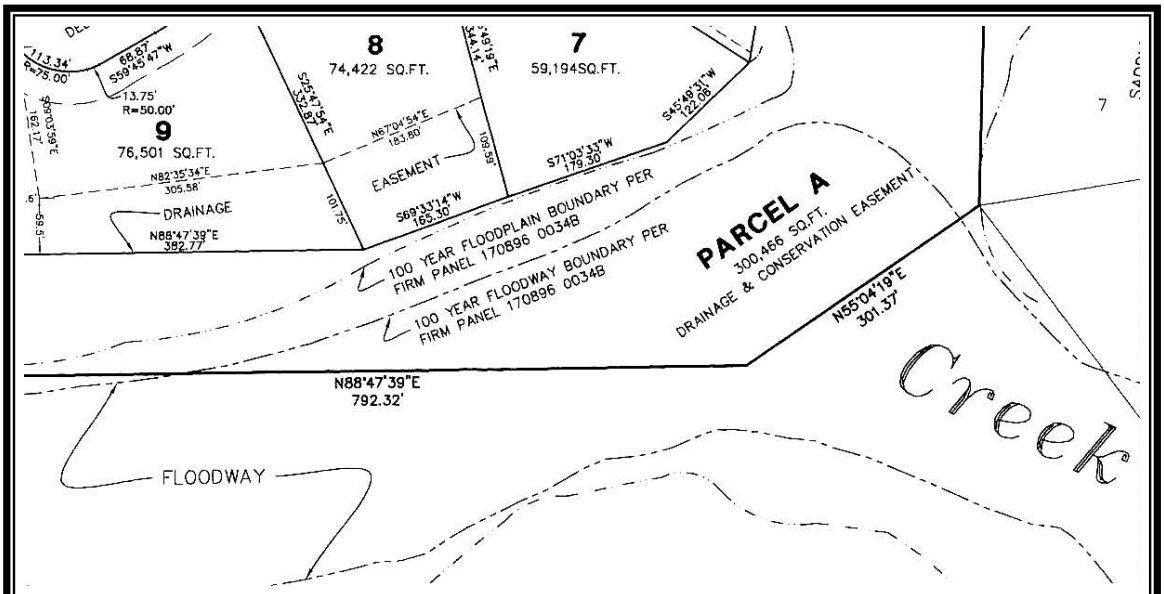
Flood insurance is required for buildings located within the A and AE Zones (see Map 2-1) if the mortgage or loan is federally insured. However, there is no legal requirement as to how far in advance of closing the disclosure must occur. Sometimes, local officials are called on the day of closing by 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 be 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).



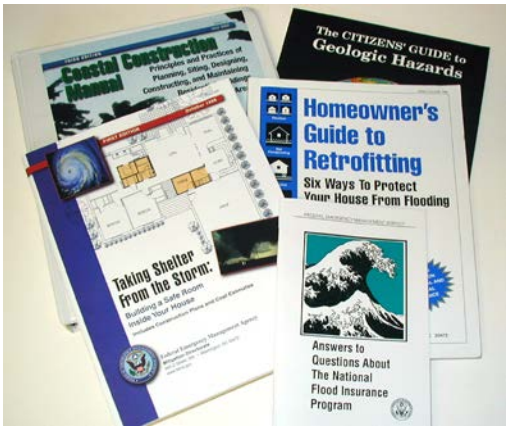
Subdivision plat with flood hazard disclosure

Implementation in Des Plaines: The Multiple Listing Service of Northern Illinois administers the Multiple Listing Service used by hundreds of real estate offices in the six Chicago area counties. MLS postings do not list potential hazards, such as whether a property is in a floodplain, although area real estate offices abide by the Illinois Residential Real Property Disclosure Act.

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



There are many hazard protection references that can be put in libraries

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 sties, 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, Red Cross disaster preparedness guidance, 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.

Implementation in Des Plaines: The Des Plaines Public Library has numerous publications on hazards and mitigation topics, including some for property owners on how to mitigate the effects of the hazards. A search of words on the Library's on-line card catalog had the following results:

- "Flood" − 236 references, including books on Curt Flood, Noah's ark, the Johnstown flood, and novels
- "Flood protection" − two guidebooks oriented to property owners
- "Tornado" − 61 references, including *Carole Lombard: the Hoosier tornado* and *The Wizard of Oz*
- "Tornado protection" − a book that is described as "The animals on a prairie wildlife refuge sense an approaching tornado and seek protection before it touches down and destroys everything in its path"
- "Sewer backup" − no hits, but a link to "sewerage" and a book on wastewater engineering
- "Drainage" − 10 books, three of them of use to a property owner plus the City's guide on the flood rebate program.
- "Lightning" − 246 titles
- "Lightning safety" − five books, one in Spanish

Website: The City's website (www.desplaines.org/) provides information on the City's offices and activities, frequently asked questions, codes and ordinances, and links to other agencies. The site has the following hazard related pages:

- A flood protection page with links to pages on the rebate program, floodplain construction rules, background on Levee 50, and the 2002 repetitive loss plan. "Related links" are to government agencies, such as the Corps of Engineers
- A link to the DNR homeowner's guide to flood protection
- An online bulletin board that encourages people to ask questions of Public Works and Engineering Department staff
- A page on the Forestry Division and its services

- A page on the West Nile Virus, including protection measures and a link to request help on draining standing water (see excerpt below)
- A page on the City's rebate programs
- A link to FloodSmart.gov for more information about the NFIP and flood insurance
- The "Cost of Flooding Tool"

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 staff 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 and Engineering Department staff can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Inspect homes for anchoring of roofing and tying 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

Implementation in Des Plaines: The Public Works and Engineering Department, Engineering Division, currently provides a map information service to any inquirer. Staff will advise if a property is in the mapped floodplain and, if so, will review the requirements for flood insurance. Staff is also available to visit a property to help determine the causes and suggest solutions to a flood, drainage or sewer problem.

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 6.
- 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 items 15 and 16.
- The process that will be followed to monitor and evaluate the projects – in Chapter 10's action item 2.

Public information topics: At its August 15, 2012 meeting, the Mitigation Planning Committee reviewed the various public information activities. An exercise was conducted to identify the most important topics that should be explained to the public.

Each Committee member was given the handout that appears on page 9-12. The handout lists 55 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 results were tallied at the meeting and the higher scoring topics were organized and combined. It was concluded that the following four general topics deserved the most attention. They are listed in order of importance:

- Personal safety and individual emergency response actions (e.g., knowing the warning signals and flood safety precautions)
- Actions being taken by the government, such as the status of flood control projects and permit requirements
- Actions a person can take to reduce his/her property's exposure to damage
- The benefits of open space, protecting water quality and wetlands, etc.

A second exercise was conducted to identify the most effective ways to convey the various messages to residents and businesses. The handout on page 9-13 was given to each Committee member. It shows 31 different ways to communicate messages to the public. The Committee members were asked to identify the five most important ways.

After a review of the results, the higher scoring selections were organized and combined. It was concluded that the following four general categories of media are preferred for explaining hazard mitigation topics to the public. They are listed in order of preference

- Written information sent out to residents and businesses, including the City-wide newsletter, utility bill stuffers and newspaper articles
- Special presentations, publications, and displays, such as talks to neighborhood groups, special events, handouts, and a homeowner's protection handbook
- Digital outreach projects such as cable TV and e-mail notices
- Additional technical information provided on the website, from City staff, and/or through neighborhood representatives

Flood Safety

- Do not walk through flowing water. Drowning is the number one cause of flood deaths. Currents can be deceptive; six inches of moving water can knock you off your feet. Use a pole or stick to ensure that the ground is still there before you go through an area where the water is not flowing.
- Do not drive through a flooded area. More people drown in their cars than anywhere else. Don't drive around road barriers; the road or bridge may be washed out.
- Stay away from power lines and electrical wires. The number two flood killer after drowning is electrocution. Electrical current can travel through water. Report downed power lines to ComEd at 1-800/EDISON
- .Look out for animals that have been flooded out of their homes and who may seek shelter in yours. Use a pole or stick to poke and turn things over and scare away small animals.

- Look before you step. After a flood, the ground and floors are covered with debris including broken bottles and nails. Floors and stairs that have been covered with mud can be very slippery.
- Be alert for gas leaks. Use a flashlight to inspect for damage. Don't smoke or use candles, lanterns, or open flames unless you know the gas has been turned off and the area has been ventilated. If you suspect a gas leak, call NiCor at 1-888/642-6748 (toll free).
- Carbon monoxide exhaust kills. Use a generator or other gasoline-powered machine outdoors. The same goes for camping stoves. Charcoal fumes are especially deadly -- cook with charcoal outdoors.
- Clean everything that got wet. Flood waters have picked up sewage and chemicals from roads, farms, factories, and storage buildings. Spoiled food, flooded cosmetics, and medicine can be health hazards. When in doubt, throw them out.
- Take good care of yourself. Recovering from a flood is a big job. It is tough on both the body and the spirit and the effects a disaster has on you and your family may last a long time.

Adapted from *Guide for Flood Protection in Northeastern Illinois*

Public Information Topics

There are a variety of messages that can be delivered to property owners, businesses, school children and other members of the "public." The following are listed in alphabetical order.

Please review these messages and check off the **10** that you think are the most important. Scratch out any messages that should not be used and feel free to suggest different words.

— Beautifying the riverfront
— Benefits of open space
— Dealing with contractors
— Earthquake safety precautions
— Economic impact of natural hazards
— Emergency protection measures
— Family preparedness
— Flood Insurance Rate Maps
— Flood safety precautions
— Floodproofing a business
— Floodproofing a house
— Health hazards
— How to evacuate during a storm/flood
— How to get out of buying flood insurance
— How to build a safe room
— Local drainage protection
— Making sure your yard drains
— Materials on the website
— Past disasters in the City
— Precautions to take for a pandemic
— Precautions to take for a heat wave
— Preparing a building for a winter storm
— Preserving and protecting wetlands
— Protecting a manufactured home from wind
— Protecting water quality
— References in the public library
— Reporting construction violations
— Reporting dumping violations
— Retrofitting a building for tornado protection
— Retrofitting for earthquake protection
— Rules against dumping in streams
— Rules on building in the floodplain
— Safety in buildings
— Safety in vehicles
— Sewer backup protection measures
— Sources of assistance
— Status of flood control projects
— Status of implementing the mitigation plan
— Storm safety precautions
— Sources of financial assistance for a project
— Substantial damage regulations
— Tornado safety precautions
— Warning signals
— Ways to protect a building from hail
— What a flood insurance policy covers
— What state and federal agencies are doing
— What to do after a disaster
— What the city is doing
— When flood insurance must be purchased
— Whether a building is in a floodplain
— Who is responsible for flooding
— Why channel maintenance is important
— Why it floods
— Wind protection measures
— Winter storm safety precautions
— Other: _____
— Other: _____
— Other: _____
— Other: _____

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.

— Cable TV notices
— Displays in home improvement stores
— Educational programs in grade schools
— Educational programs in high schools
— Educational programs in junior high
— Handouts/flyers at public places
— Homeowner's flood protection handbook
— Mass mailing to all floodplain residents/businesses
— Mass mailing to all residents/businesses
— Multi-hazard protection handbook
— Newspaper articles
— Newspaper supplements
— News releases
— Open houses/contractors' shows
— City-wide newsletter
— Park/recreation department educational programs
— Presentations at neighborhood meeting
— Presentations to banks and lenders
— Presentations to contractors
— Presentations to insurance agents
— Presentations to organizations or clubs
— Presentations to real estate agents
— References available in the library
— Shopping mall displays
— Special events (e.g., "Tornado Awareness Week")
— Technical advice from city staff
— Telephone book/"Yellow Book"
— Utility bill stuffers
— Videos/Cable TV programs
— Visits to a home by city staff
— Web site with links to other sources
— Other: _____
— Other: _____

Handout used to determine the best ways for a public information program to convey messages to residents and businesses.

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 the City is not including much hazard or mitigation information in its current activities. The library and website could be reorganized a bit to better facilitate finding relevant technical information.

3. Current practices that disclose hazards to buyers of property are either dependent on the seller or provide the information late in the process. However, correcting this shortcoming should be done at a regional or state level.

4. The most important topics to cover in public information activities are:

   - Personal safety and emergency response actions
   - Government programs
   - Property protection measures
   - Natural and beneficial floodplain functions

5. The preferred ways to get the messages out are:

   - Newsletters, flyers and newspapers
   - Special presentations, publications and displays
   - Cable TV and e-mail notices
   - City staff and website (for technical information)

9.7. Recommendations

9-1. The City should continue implementing the following public information activities:

- Articles in the *Des Plaines Digest*
- Information on the City's website
- Flood hazard information from the Flood Insurance Rate Map and other sources
- Staff advice and consultations with inquirers
- Hazard and mitigation references in the public library

9-2. The City should design and initiate the following new activities:

- A PowerPoint presentation on the hazards that threaten the City and how people can protect their families and their properties. The City should publicize that staff are available to give the talk to interested civic or neighborhood organizations.
- Displays on the hazards and protection measures that can be set out in City Hall, at stores and fairs, and at other appropriate activities.
- Flood hazard and protection displays for placement along the riverwalk.
- Short illustrated messages relevant to the season for use as e-mail and cable TV notices. For example, reminders on lightning safety would be disseminated before summer thunderstorm season and winter storm preparations would be sent out in the late fall.

9-3. The current and new activities should cover the following topics:

- Personal safety and emergency response actions
- Government programs
- Property protection measures
- Natural and beneficial floodplain functions
- Other appropriate topics that are credited by the Community Rating System

9-4. When the annual evaluation report for this hazard mitigation plan is prepared, it should include an evaluation of the effectiveness of all of the previous year's public information activities and recommend needed changes to them.

9.8. References

1. City of Des Plaines public informational materials.
2. City of Des Plaines website, www.desplaines.org
3. CRS Coordinator's Manual, Community Rating System, FEMA, 2006.
4. CRS Credit for Outreach Projects, Federal Emergency Management Agency, 2006.
5. Floodproof Retrofitting: Homeowner Self-Protective Behavior, Shirley Bradway Laska, University of Colorado, 1991.
6. Guide to Flood Protection in Northeastern Illinois (Homeowner's booklet), Illinois Association for Floodplain and Stormwater Management, 2005
7. Stormwater Management Public Information Resource Guide, South Suburban Mayors and Managers Association, 1999

8. Public Emergency Preparedness Guide, City of Des Plaines, 2003

A complete list of references recommended for local libraries is found in Section 354 in the CRS Coordinator's Manual.

Chapter 10. Action Plan

10.1. Background

This chapter contains the 2013 *Des Plaines Hazard Mitigation Plan* implementation action plan. The action items contained in this chapter are from the 2007 *Plan*'s action items and the hazard mitigation recommendations made at the end of Chapters 5-9. The goals and priorities of the City's overall mitigation program are outlined here. .

City of Des Plaines Hazard Mitigation Goals: The overall direction of the City's hazard mitigation direction can be summarized under the five goals established by the Mitigation Planning Committee and listed at the end of Chapter 4:

1. **Education**

   Educate the citizens of Des Plaines on the hazards they are exposed to and how they can protect their lives, health, and property.

2. **Regulation**

   Manage new development so that it will not increase threats to existing properties or adversely affect open and natural areas.

3. **Public Services**

   Place a priority on measures that protect public services, critical facilities and utilities.

4. **Flooding**

   Devote special attention to flooding problems, including the Des Plaines River, areas that are repetitively flooded, local drainage, and sewer backup.

5. **Other Natural Hazards**

   Identify mitigation strategies that protect lives, health and property from the impacts of severe summer storms, wind events, including tornadoes and microbursts, severe winter storms and earthquakes.

6. **Financing**

   Maximize the use of State and Federal funds.

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 factors: Five factors were used to prioritize what should be pursued in the upcoming five years and included in this action plan:

1. **Natural Hazards:** the Planning Committee concluded that natural hazard priorities in the City of Des Plaines for the 2013 *Plan* update should be:

a. Floods
b. Severe Summer Storms
c. Wind Events
d. Severe Winter Storms
e. Earthquakes

Sewer back-up in included in severe summer storms, and both tornadoes and microbursts are included in wind events. While some hazards are greater than others, every hazard is addressed in one or another of the recommended action items.

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 thunderstorms, microbursts and drought/heat is primarily a life safety one. Appropriate measures for life safety threats are emergency warning and public information activities.

3. **Costs and benefits:** The Committee 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 Committee concluded that the benefits (in terms of reduced property damage, adverse economic impact prevented, lives saved, and/or health problems averted) outweighed the costs for the recommended action items.

   Further, FEMA grant rules and state and federal flood control programs ensure that no major expenditure will be made without first conducting a detailed benefit/cost analysis of the proposed project.

4. **Affordability:** Not only must the benefits exceed the costs, the projects must be affordable given the City's available resources and staffing. In some cases, the total cost was not clear, so an action item recommends pursuing more information. Action item 12, for example, calls for a detailed review of the requirements to become a StormReady community before deciding whether it should be pursued.

5. **Environmental impact:** The impact of a project on both the natural and human environment was considered. A project such as removing the obstruction to Weller Creek flows at Golf Road was discarded because of the disruption it would cause to downstream neighborhoods.

The Planning Committee first reviewed the 16 action times in the 2007 *Plan*. Some action items, such as demonstration elevation project have been completed and removed from the action plan. New action items for 2013 were identified based the activities recommended in Chapters 5-9 and on the priority factors listed above. The 2013 prioritization resulted in 14 action items that should be pursued over the next five years. The Planning Committee ranked the action items in priority order for the benefit of residents and property owners and based on the goals of this *Plan*.

10.2. *Plan* Implementation Action Items

Fourteen action items are recommended in the following pages, in order of the Planning Committee's prioritization. Each action item starts with a short description, followed by five subheadings that identify

- The agency or office responsible for implementing the action item
- The deadline for accomplishing the action item
- The cost of implementation
- The benefits of implementing the action item
- A reference to the *Plan* chapter or section that discuss the topic and make recommendations

The discussions in the earlier chapters provide more background and direction on each action item. All of the action items can be tied to the goals listed at the end of Chapter 4 and the recommendations at the ends of Chapters 5 – 9.

Action Item 1. *Plan* Adoption: Adopt this 2013 *City of Des Plaines Hazard Mitigation Plan* by resolution of the City Council. A draft adoption resolution is included in Section 10.4 of this Chapter. As in 2007, the resolution calls for the continuation of the Mitigation Planning Committee.

Responsible Agency: City Councils.

Deadline: 6 months.

Cost: Staff time.

Benefits: Formal adoption of the revised plan ensures that City staff are authorized and instructed to implement the action items. Adoption is also a requirement for recognition of the plan by FEMA mitigation funding programs and the Community Rating System.

Plan Reference: Chapters 1 and 10.

Action Item 2. Plan Implementation and Maintenance: To implement and maintain this *Plan*, the Mitigation Planning Committee will:

- Act as a forum for hazard mitigation issues,

- Disseminate hazard mitigation ideas and activities to all participants,
- Continue to collect public input,
- Monitor implementation of this Action Plan,
- Report on progress and recommended changes each year to the City Council, and
- Draft the five-year update mandated for continued FEMA recognition of the *Plan*.
- Continue to apply for Federal Grants for buyouts of repetitive loss properties.

The Mitigation Planning Committee serves as an advisory body to the City. Its primary mitigation duty is to collect information and report to the City Council and the public on how well this *Plan* is being implemented.

An annual progress report will be published by September 30th of each year. This will be per this *Plan* and also for the City's annual recertification with the CRS program.

Responsible office: Chair (Assistant Director of Public Works and Engineering), Mitigation Planning Committee. Staff support for the Committee and drafting the reports will be provided by the Public Works & Engineering Department, Engineering Division., Utility Maintenance Division, and Community and Economic Development Department.

Deadline: The annual progress report will 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.

Action Item 3. Public Information Efforts: The City will develop public information messages that address the following topics:

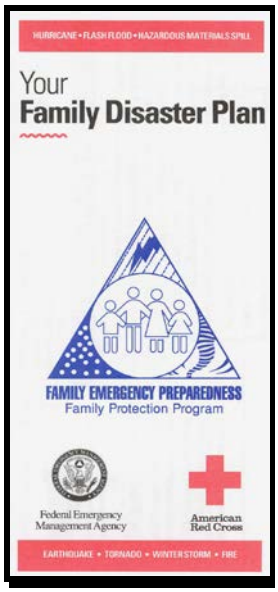
- Personal safety and emergency response actions, including warning procedures, safety in mobile homes, and health precautions
- Property protection measures, including insurance, that address flooding, sewer backup, severe storms and wind events
- Government programs, including permit requirements, the City's rebate program, ongoing flood and drainage improvements, drainage maintenance, and dumping regulations
- Other appropriate topics that are credited by the Community Rating System

The City will review the following public information topics and projects. They will be revised as appropriate to cover all of the hazards facing the City and to include the latest language credited by the CRS.

- Articles in the *Des Plaines Digest*
- Information on the City's website
- Flood hazard information from the Flood Insurance Rate Map and other sources
- Staff advice and consultations with inquirers
- Hazard and mitigation references in the public library
- The City's multi-hazard *Public Emergency Preparedness Guide*
- The City participated in a meeting in May 2013 in regards to an update request from a local State Representative from the April 2013 floods and the aforementioned HMGP buyout.
- The City of Des Plaines participates on the Upper Des Plaines River/Tributaries Advisory Committee by the Northwest Municipal Conference NWMC

The following ideas will be reviewed by the City's Public Information Officer. She will report to the Mitigation Planning Committee on the costs and benefits of implementing them.

- A short checklist for residents to review how prepared their families are and where they can go for more information on subjects where they are not prepared
- Projects with the school districts
- A PowerPoint presentation for interested civic or neighborhood organizations
- Displays on the hazards and protection measures that can be used at the Library, organizational meetings, Taste of Des Plaines, AugustFest, block parties, etc.
- Signs in floodprone neighborhoods that show how high past floods have gone and relate river gage readings to the area
- Putting flyers, such as the Red Cross' family disaster plan brochure (illustrated to the right), in public places and the City's welcome packet for new residents
- A hazard mitigation e-mail subscription list
- Short illustrated messages relevant to the season for e-mail and cable TV notices



Some of these media, such as e-mail notices, presentations, and short handouts, can readily be tailored to the audience and translated into other languages.

Responsible office: Public Information Office

Deadline: Current projects are ongoing. For new projects, the PIO will report to the Mitigation Committee by August 31 each year on how well the projects went, what changes should be made, and what new projects should be tried.

Cost: Staff time.

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.

This action item will ensure that they are technically correct and put in terms understandable by the recipients. As noted by the studies quoted on page 9-1, when properly conveyed, a message can produce protective actions by property owners and individuals.

Plan Reference: Chapter 5, 6, 7, 8 and 9.

Action Item 4. Continued Participation in the Community Rating System: The City is currently a CRS Class 7. This status should be maintained through continued implementation of the credited activities, including some that are also Action Items in this *Plan*. The City through discussions with FEMA has enough points for a Class 6 and will be promoted to this class, if they can show that they did property damage assessments for all flood damaged property during the April 2013 flood event. The City hired outside consultants to assist in the damage assessment and used the SDE software to determine substantial damage.

Responsible office: Public Works and Engineering Department, Engineering Division. Technical support can be provided by the Insurance Services Office.

Cost: Staff time.

Benefits: There are many benefits to CRS participation, as explained in Section 1.5. 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.

Plan Reference: Chapters 1 and 5.

Action Item 5. Continued Implementation of NFIP Requirements. When they are up for revision, the City's comprehensive plan and the zoning, subdivision, floodplain, and stormwater management ordinances will be revised to incorporate mitigation provisions, especially:

- Protection of new development from natural hazards
- Zoning of appropriate vacant floodprone areas and use of tools such as PUD, dedication, or acquisition, to preserve them as open space
- Mandating storm shelters in new mobile home parks
- Requiring all building sites in new developments to be above flood levels

- Requirements to bury utility lines has been adopted in section 13-2-5. W of the City Code.
- Prohibiting new critical facilities from the floodplain
- Prohibiting enclosures under elevated buildings to deter later modifications of the floodable areas
- Setting a lowest floor and lowest opening height standard on all new buildings built outside the floodplain. The City now has this standard. The top of foundation is to be 18" higher than the centerline of the street.
- Incorporation of best management practices in drainage and stormwater management facilities
- Continue to apply for Federal Grants. The $30,000 Increased Cost of Compliance (ICC) money is not enough to raise any structures in Des Plaines
- The City is filling out a pre-application for additional funding for buyouts based on the Federal Declaration of the April 2013 floods.
- Establishing a permanent mitigation planning committee

The mitigation necessary to prevent the evacuations and minimize the damage that flooding causes would be for the City of Des Plaines to be granted the $10.9 million dollars that they applied for in 2009 with the HMGP for buyout of 31 repetitive loss homes along with an additional $55 million to buy out another 220 homes that experienced severe damage. Elevating these homes is not an option since they would lose their basements which would lower their market value considerably. Also, rescuing residents in these elevated homes would still be a hazard for our fire and police departments to access these homes.

Responsible office: Community and Economic Development Department, with support from the Public Works and Engineering Department, Engineering Division.

Deadlines: Review the suggestions for the comprehensive plan as it is being worked on.

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.

Plan Reference: Chapter 5.

Action Item 6: Seek Mitigation Grant Funding Cost Beneficial Projects

The City should continue to apply for mitigation grant funding through available IEMA and FEMA programs for mitigation planning and mitigation projects that address the priority hazards presented in this *Plan*. As required by IEMA and FEMA programs,

projects must be cost beneficial. Projects can include property protection for flood, wind, severe storm and earthquake hazards.

Responsible Agency: The Public Works and Engineering Department, and the Community and Economic Development Department.

Deadline: As needed.

Cost: 25% of plan or project cost (non-federal share). Potential funding sources include HMGP, PDM, and FMA.

Benefits: The City, along with residents and property owners, would benefit from the available grant funding.

Plan Reference: Chapter 6

Action Item 7. Continued Participation in 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. Des Plaines has been designated as a StormReady community. To continue to qualify, the City must meet certain criteria for severe weather warning of problems and public information. The City will review the requirements for becoming a StormReady community in detail.

Responsible office: City's Homeland Security and Emergency Management Agency.

Deadline: Ongoing.

Cost: Staff time.

Benefits: As with the Community Rating System, StormReady can be used as a yardstick to ensure the City's programs meet national standards. By meeting the StormReady standards the City 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.

Plan Reference: Chapters 7 and 9.

Action Item 8. Improve Emergency Response: As an IEMA Accredited Emergency Management Program, the City of Des Plaines is required to have an Illinois Emergency Management Agency Multi-Year Training and Exercise Planning Plan (2012, 2013 and 2014) and follow the FEMA Homeland Security Exercise and Evaluation Program (HSEEP).

HSEEP exercise and evaluation doctrine is flexible, scalable, adaptable, and is for use by stakeholders across the whole City. HSEEP doctrine is applicable for exercises across all mission areas—prevention, mitigation, response, and recovery. HSEEP supports the Des Plaines Response Plan by providing a consistent approach to exercises and measuring progress toward building, delivering, and sustaining core capabilities. The City has met all the requirements for the past three years (beginning in 2011), and will continue to

meet the requirements while examining approaches to enhance protection of life, health, safety and property in the City for all hazards.

Responsible office: City's Homeland Security and Emergency Management Agency.

Deadline: Annual and ongoing.

Cost: Staff time.

Benefits: Early recognition of an impending flood or other hazards can save lives and prevent property damage. Plans and annual exercises help City staff take appropriate actions before an event occurs. With the proper response actions, much property can be protected at a relatively low cost to the City. A plan that has been carefully prepared, and that utilizes all available data on the hazard and its potential impact, and that is regularly exercised will make the City's flood response activities more effective and more efficient.

Plan Reference: Chapter 7.

Action Item 9. Regional Stormwater Management: Actively participate in regional stormwater, flooding, and watershed activities, including the Metropolitan Water Reclamation District's stormwater management planning, the Northwest Municipal Conference's Stormwater Management Committee, and the Upper Des Plaines River Ecosystem Partnership. Help make their efforts effective and to the benefit of the City of Des Plaines. The new authority given to the MWRD makes this especially important. The Director of Public Works and Engineering is on the committee to draft the first storm water ordinance for Cook County, Illinois.

As previously mentioned, the City has hired engineering consultants to perform numerous flood studies from the 2008 flood and the 2011 flood. Their recommendations were used to design projects that were built as stated in the flood control project section (10.3.8)

Responsible office: Public Works and Engineering Department, Engineering Division

Deadline: Ongoing. Be sure to have a representative at each organization's meetings.

Cost: Staff time.

Benefits: Development outside the floodplain and outside the City can contribute to increased flooding and water quality problems in Des Plaines. By monitoring and participating in activities in the upstream watershed, staff can ensure that actions by others will not be detrimental to the City. Working closely with MWRD programs will help the City make maximum use of the District's funding programs. Better coordination with others in the watershed can improve the City's CRS credit for stormwater management, too.

Plan Reference: Chapters 5 and 8.

Action Item 10. Urban Forestry: Continue the City's policies and programs to maintain trees that threaten utility lines and buildings. Continue the cost sharing program with residents that want to replace removed trees with trees appropriate for the location. The City is currently removing all ash trees that are infected with the emerald ash borer.

Responsible office: Public Works and Engineering Department, General Services Division

Deadline: Ongoing.

Cost: Staff time.

Benefits: A properly written and enforced urban forestry program 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. Continuation of the current activities will ensure the City's continued status as a Tree City USA.

Plan Reference: Chapter 6

Action Item 11. Rebates: Continue and expand the rebate program to provide a financial incentive for low cost retrofitting projects that protect properties from natural hazards. The current programs to fund surface flooding, drainage, and sewer backup protection measures will be continued. The City will explore using general funds to expand the program to include other protection measures, such as tornado safe rooms, lightning rods, and earthquake protection like strapping water heaters and cabinets to the wall. The City also had a generator rebate program which was greatly received. The rebate money that the city offered was used up in a matter of hours.

The Des Plaines city council in 2011 budgeted $50,000 for a rebate program to help subsidize the purchase of portable generators by residents affected by power outages. Residents who are considering purchasing new generators as well as homeowners who already bought one as of June 1, 2011 would be eligible to apply for the program. The city rebate would cover 50 percent of the cost of a portable generator up to $250.

A typical portable home generator powered by gasoline, ranging in capacity from 1,800 watts to 8,000 watts, could cost roughly $400 to $1,000. Automatic, standby generators that run on natural gas and kick in during a power outage to power an entire house can cost between $3,000 and $10,000.

Responsible office: Finance Department

Cost: Staff time and $120,000 has been budgeted for the generator, sewer and flooding rebates.

Benefits: A 30% rebate for a project means that for every dollar spent by the City, $5 will be spent to protect a property from damage. This has been shown to be a real cost saver compared to Public Works and Engineering Department projects like drainage improvements and replacing pipes.

Plan Reference: Chapter 6.

Action Item 12. Drainage System Maintenance: The City will continue to notify the Metropolitan Water Reclamation District**'s** Small Streams Maintenance Program (SSMP) when there is an obstruction in the tributary creeks to the Des Plaines River so there small streams group can clean them. We also clean ditches and swales on an as-needed basis. The procedures and CRS credit will be reviewed as part of Action Item 3 to ensure that the City will receive the maximum possible CRS credit for drainage maintenance.

Table 10-xx presents a summary of sewer improvements from the City's 5-year capital improvement program. An effective and well-maintained sewer system is an important component of drainage system.

Responsible office: Public Works and Engineering Department, Utility Services Division

Cost: Staff time.

Benefits: A plugged culvert or storm sewer inlet can result in 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 activity like this can prevent $1,000's in flood damage, closed streets and threat to people.

Plan Reference: Chapter 8.

Action Item 13. Flood Control Projects: The City will work with the Illinois Department of Natural Resources, the U.S. Army Corps of Engineers, and neighboring communities to complete the planned projects on the Des Plaines River and Farmers Creek. The City is facilitating talks between the Army Corps of Engineers, the MWRD, and the Illinois Department of Natural Resources in regards to reconstructing Big Bend Lake and constructing a levee.

Responsible office: Public Works and Engineering Department, Engineering Division

Deadline: Ongoing

Benefits: Studies by the Corps of Engineers and IDNR have shown these projects to be cost-effective approaches to reducing flood losses on the main stem of the Des Plaines River. The Corps' 1999 feasibility report estimated that the complete Des Plaines River package of projects will reduce flood losses by over $6 million per year and have a benefit/cost ratio of 1.69 (pages 78 – 79). IDNR's draft Farmers/Prairie Creek report identifies cost-effective alternatives for Farmers Creek, but specific projects have not yet been selected.

Since 2008, the City of Des Plaines has spent almost 5 million dollars on flood mitigation. This mitigation includes both additional storm sewer and sewer separation. Please see table on next page.

Plan Reference: Chapter 8.

Action Item 14: Incorporate the *Hazard Mitigation Plan* into Other City Plans: When they are up for revision, the City's comprehensive plan and the zoning, subdivision, floodplain, and stormwater management ordinances will be revised to incorporate mitigation provisions, especially:

- Protection of new development from natural hazards
- Zoning of appropriate vacant floodprone areas and use of tools such as PUD, dedication, or acquisition, to preserve them as open space
- Mandating storm shelters in new mobile home parks
- Requiring all building sites in new developments to be above flood levels
- Requirements to bury utility lines has been adopted in section 13-2-5. W of the City Code.
- Prohibiting new critical facilities from the floodplain
- Prohibiting enclosures under elevated buildings to deter later modifications of the floodable areas
- Setting a lowest floor and lowest opening height standard on all new buildings built outside the floodplain. The City now has this standard. The top of foundation is to be 18" higher than the centerline of the street.
- Incorporation of best management practices in drainage and stormwater management facilities
- Continue to apply for Federal Grants. The $30,000 Increased Cost of Compliance (ICC) money is not enough to raise any structures in Des Plaines
- The City is filling out a pre-application for additional funding for buyouts based on the Federal Declaration of the April 2013 floods.
- Establishing a permanent mitigation planning committee

The mitigation necessary to prevent the evacuations and minimize the damage that flooding causes would be for the City of Des Plaines to be granted the $10.9 million dollars that they applied for in 2009 with the HMGP for buyout of 31 repetitive loss homes along with an additional $55 million to buy out another 220 homes that experienced severe damage. Elevating these homes is not an option since they would lose their basements which would lower their market value considerably. Also, rescuing residents in these elevated homes would still be a hazard for our fire and police departments to access these homes.

Responsible office: Community and Economic Development Department, with support from the Public Works and Engineering Department, Engineering Division.

Deadlines: Review the suggestions for the comprehensive plan as it is being worked on.

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.

Plan Reference: Chapters 4 and 5.

Table 10-2. Sewer Summary Improvements

City of Des Plaines 5-Year Capital Improvement Program
Summary for Sewer

2008 PROJECT ID	LOCATION	LIMITS	LENGTH	ACTIVITY	COST	FUNDING SOURCE	JUSTIFICATION
1058	DOREEN DR	ALGONQUIN-WESTFIELD	508	SEWER SEPARATION	$76,195	CPF	STREET EVALUATION
1060	EARL AV	ALGONQUIN-FOREST	1,329	SEWER SEPARATION	$199,395	CPF	STREET EVALUATION
1057	IRONWOOD DR	SUFFIELD-DEAD END	319	SEWER SEPARATION	$47,832	MFT	STREET EVALUATION
1061	SOUTHWEST PL	ALGONQUIN-W GRANT	556	SEWER SEPARATION	$83,325	CPF	STREET EVALUATION
1056	SUFFIELD ST	GOOD-POTTER	659	SEWER SEPARATION	$98,843	MFT	STREET EVALUATION
1059	WESTFIELD LN	DEAD END-DOREEN	266	SEWER SEPARATION	$39,906	MFT	STREET EVALUATION

2009 PROJECT ID	LOCATION	LIMITS	LENGTH	ACTIVITY	COST	FUNDING SOURCE	JUSTIFICATION
1243 *	CUMBERLAND PKY	GOLF-WARRINGTON	1,959	STORM SEWER	$200,000	CPF	STORMWATER MASTER PLAN
1244 *	DAVIS CT	CUMBERLAND-WARRINGTON	630	STORM SEWER	$94,487	CPF	STORMWATER MASTER PLAN
1245 *	FLETCHER DR	MT PROSPECT-CUMBERLAND	1,044	STORM SEWER	$156,538	CPF	STORMWATER MASTER PLAN
1246 *	MEYER CT	CUMBERLAND-DAVIS	1,356	STORM SEWER	$203,413	CPF	STORMWATER MASTER PLAN
1247 *	WARRINGTON RD	MT PROSPECT-GOLF	2,916	STORM SEWER	$350,000	CPF	STORMWATER MASTER PLAN
1248 *	WESTGATE RD	WARRINGTON-FLETCHER	1,126	STORM SEWER	$168,914	CPF	STORMWATER MASTER PLAN
1062	HOWARD AV	MT PROSPECT-CLEARWATER	1,272	SEWER SEPARATION	$190,741	CPF	STREET EVALUATION
1063	PEARSON ST	ELLINWOOD-RIVER	788	SEWER SEPARATION	$118,180	TIF	STREET EVALUATION
1065	THIRD AV	OAKWOOD-DEMPSTER	851	SEWER SEPARATION	$127,576	MFT	STREET EVALUATION

2010 PROJECT ID	LOCATION	LIMITS	LENGTH	ACTIVITY	COST	FUNDING SOURCE	JUSTIFICATION
1293 *	ASH ST	FARGO-DEAD END	376	STORM SEWER	$56,408	CPF	STORMWATER MASTER PLAN
1299 *	OXFORD RD	FOREST-OAKTON	1,313	STORM SEWER	$67,000	MFT	CITY COUNCIL
1297 *	RITA RD	LYMAN-GOOD	654	STORM SEWER	$21,000	CPF	CITY COUNCIL
1291 *	SPRUCE AV	HOWARD-DEAD END	1,698	STORM SEWER	$254,693	CPF	STORMWATER MASTER PLAN
1069	BEDFORD LN	MILLERS-BRADLEY	772	SEWER SEPARATION	$115,800	CPF	STREET EVALUATION

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*-indicates new project
C-indicates carryover project

CPF-CAPITAL PROJECTS FUND
MFT-MOTOR FUEL TAX FUND
WATER-WATER FUND
TIF-TIF FUND

Table 10-5. Sewer Summary Improvements

City of Des Plaines 5-Year Capital Improvement Program
Summary for Sewer

2010 PROJECT ID		LOCATION	LIMITS	LENGTH	ACTIVITY	COST	FUNDING SOURCE	JUSTIFICATION
1068		BIRCHWOOD AV	WOLF-DOUGLAS	1,139	SEWER SEPARATION	$170,842	CPF	STREET EVALUATION
1190		GOOD AV	BALLARD-CHURCH	1,215	SEWER SEPARATION	$182,257	CPF	STREET EVALUATION

2011 PROJECT ID		LOCATION	LIMITS	LENGTH	ACTIVITY	COST	FUNDING SOURCE	JUSTIFICATION
1285		MARSHALL DR	WILLE-DEAD END	1,323	STORM SEWER	$198,452	CPF	STORMWATER MASTER PLAN
1286	*	MARSHALL DR	OAKTON-N END	1,330	STORM SEWER	$199,444	CPF	STORMWATER MASTER PLAN
1162		HAWTHORNE LN	RAND-DEAD END	1,206	SEWER SEPARATION	$180,896	CPF	STREET EVALUATION
1163		JUNIOR TER	HAWTHORNE-DEAD END	547	SEWER SEPARATION	$82,083	CPF	STREET EVALUATION
1159		LINCOLN AV	OXFORD-WOLF	952	SEWER SEPARATION	$142,761	CPF	STREET EVALUATION
1165		SHERWOOD RD	HAWTHORNE-DEAD END	483	SEWER SEPARATION	$72,378	CPF	STREET EVALUATION

2012 PROJECT ID		LOCATION	LIMITS	LENGTH	ACTIVITY	COST	FUNDING SOURCE	JUSTIFICATION
1294	*	BELLAIRE AV	UNIVERSITY-BALLARD	2,232	STORM SEWER	$63,000	MFT	CITY COUNCIL
1268	*	SEMINARY AV	POTTER-LYMAN	1,289	STORM SEWER	$193,418	CPF	CITY COUNCIL
1160		CORA ST	ALGONQUIN-OAKWOOD	1,386	SEWER SEPARATION	$207,880	CPF	STREET EVALUATION
1266	*	PINE ST	EVERETT-HOWARD	1,331	SEWER SEPARATION	$199,599	CPF	STREET EVALUATION
1267	*	SIXTH AV	VAN BUREN-FOREST	912	SEWER SEPARATION	$121,000	MFT	CITY COUNCIL

TOTAL FUNDED = $4,684,256

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*-indicates new project
C-indicates carryover project

CPF-CAPITAL PROJECTS FUND
MFT-MOTOR FUEL TAX FUND

WATER-WATER FUND
TIF-TIF FUND

10.3 *Plan* Implementation, Maintenance and Continued Public Involvement

Action Items 1 and 2 presents the City activities to ensure the implementation and maintenance of the *Hazard Mitigation Plan*. The 2013 *Plan* will be adopted by the City Council, and the Mitigation Planning Committee will meet to evaluate and monitor progress on implementation.

Action Item 2 calls for the City's Mitigation Planning Committee to act as a forum for hazard mitigation issues,

- Disseminate hazard mitigation ideas and activities to all participants,
- Continue to collect public input,
- Monitor implementation of this Action Plan,
- Report on progress and recommended changes each year to the City Council, and
- Draft the five-year update mandated for continued FEMA recognition of the *Plan*.
- Continue to apply for Federal Grants for buyouts of repetitive loss properties.

The Mitigation Planning Committee serves as an advisory body to the City. Its primary mitigation duty is to collect information and report to the City Council and the public on how well this *Plan* is being implemented. Mitigation Planning Committee meetings will be announced through the City website or newsletters and will be open to the public for continuing public input. The Committee includes members of the public, but additional public participation and comments will be welcome annually and at during the 5-year update planning process.

An annual progress report will be published by September 30th of each year. This will be per this *Plan* and also for the City's annual recertification with the CRS program. Table 10-1 that shows the action items and their relationship to the *Plan*'s goals should assist the Mitigation Planning Committee their annual review.

At the annual meeting, along with an assessment of the implementation efforts, the Committee will determine if other mitigation issues or efforts, based on any natural hazard occurrences or input from communities or the public, should be added to the *Plan*. If any substantial revisions to the *Plan* are recommended to the action plan in any year (prior to the next five year update), the revised *Plan* must be adopted by the City Council. A five-year update is required for FEMA's mitigation funding programs.

As discussed in Chapter 1, the City conducted a public input survey for the 2013 update of this *Plan* and the City's use of a flood damage survey. The City can utilize the surveys again at anytime to collect additional input. The City also has contact information on the City's website for inquiries and concerns.

Table 10-1. Action Items, Goals and Recommendations							
Action Item	**Goal 1. Educate citizens**	**Goal 2. Manage new development**	**Goal 3. Protect public services**	**Goal 4. Address flooding**	**Goal 5. Address other natural hazards**	**Goal 5. Max use of State/Federal funds**	**Reference Chapter**
10.2. *Plan* Implementation Action Items							
1. *Plan* adoption	X	X	X	X	X	X	1
2. Monitoring and reporting	X	X	X	X	X	X	1 and 10
3. Public information efforts	X	X		X	X		5, 6 and 8
4. Community Rating System	X	X	X	X	X	X	5 though 9
5. NFIP implementation		X		X			5
6. Mitigation grant funding			X	X	X	X	5, 6,8 and 9
7. StormReady	X		X	X	X		7
8. Improve emergency response	X		X	X	X		7
9. Regional stormwater management		X		X		X	5 and 8
10. Urban forestry	X		X		X		6
11. Rebates				X			6
12. Drainage system maintenance			X	X			8
13. Flood control projects			X	X		X	8
14. *Mitigation Plan* into other plans		X	X	X	X		5

10.4 *Plan* Adoption Resolution

The following resolution is recommended for adoption of this *Hazard Mitigation Plan* by the City Council and charging the Mitigation Planning Committee with monitoring its implementation.

Resolution No.

Whereas the City of Des Plaines is subject to flooding, tornadoes, winter storms, and other natural hazards that can damage property, close businesses, disrupt traffic, and present a public health and safety hazard; and

Whereas the Mitigation Planning Committee, comprised of representatives from key City departments, neighborhood associations, academia, and organizations involved in mitigation activities, has prepared a recommended *Hazard Mitigation Plan* that reviews the options to protect people and reduce damage from the hazards; and

Whereas the recommended *Hazard Mitigation Plan* has been widely circulated for review by the City's residents and federal, state and regional agencies and has been supported by those reviewers;

Now, therefore, be it resolved that:

1. The *Hazard Mitigation Plan* is hereby adopted as an official plan of the City of Des Plaines.

2. The director of each City office identified as "responsible office" for the *Mitigation Plan's* action items shall ensure that the action item is implemented by the listed deadline.

3. The Mitigation Planning Committee is hereby charged to monitor implementation of the *Mitigation Plan* and report to the City Council and the public on progress and recommendations.

4. The Committee shall meet as often as necessary to prepare or review mitigation activities and progress toward implementing the *Hazard Mitigation Plan*. It shall meet at least once each year to review the status of ongoing projects.

5. The schedule of Committee meetings on mitigation issues shall be posted in appropriate public places.

6. All meetings of the Committee shall be open to the public. All official progress reports shall be provided to the media and made available to the public.

7. By September 30 each year, the Committee shall prepare an annual evaluation report on the *Mitigation Plan* for the City Council. The report will cover the following points:

    a. A description of how the evaluation report was prepared and how it is submitted to the City Council, released to the media, and made available to the public.

    b. How the reader can obtain a copy of the original plan;

c. A review of each action item, including a statement on how much was accomplished during the previous year;

d. A discussion of why any objectives were not reached or why implementation is behind schedule; and

e. Recommendations for new action items or revised recommendations.

8. By September 30 of each fifth anniversary of the adoption of the *Hazard Mitigation Plan*, the Committee shall prepare an update in accordance with the FEMA criteria in effect at that time. The update shall be submitted to the City Council.

9. The Public Works and Engineering Department shall provide staff support for the Committee's work.

ADOPTED this the _____ day of _____, 2013.

_____
City Clerk

APPROVED this the _____ day of _____, 2013.

_____
Mayor

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Appendix A. Public Involvement and Coordination

As noted in Chapter 1, the City of Des Plaines undertook a number of steps to collect public input for the 2013 updated of their *Hazard Mitigation Plan*. Public involvement and input was provided through:

- Resident participation on the City's Mitigation Planning Committee (See page 1-3 for Planning Committee membership)
- Outreach projects and the City's website
- Flood damage questionnaires used by the City for the development of the 2007 Plan
- A public input survey for the 2013 update of this Plan
- Public meeting

Examples of these efforts are included in this Appendix. Information on the public meeting is included at the end of this appendix.

A.1. Outreach Activities

City residents and property owners are advised of the mitigation planning effort through news and the City's website. The draft 2013 Hazard Mitigation Plan was available on the City's website for review and comments, as shown to the right.

A.2. Public Input Surveys

The general public was encouraged to participate in a public input survey that was advertized through the City's website and at City Hall. The survey was available online and at City Hall. The public input survey addressed all natural hazards that impact Des Plaines, and also focused on the 2013 plan update needs and communication preferences.

For the 2007 Plan, the City made use of a flood-related survey that is still available to residents. The flood-related survey helps the City understand the location of flood damage and the nature of the flooding. A copy of the questionnaire is provided on the following page.

Flood Protection Questionnaire

The City of Des Plaines has begun a master planning effort to reduce problems in repetitively flooded areas. The attached questionnaire is part of this effort. This information will only be used for internal planning purposes and will not be distributed. Completing the questionnaire is voluntary. but the more information the City has, the better. A flood mitigation plan will be prepared and reviewed at public meetings late in the summer. If you have questions. please call the Engineering Department at 847-391-5390. Please mail this questionnaire back to the City of Des Plaines Eng Dept. (1420 Miner St. 60016) or return this questionnaire with your water bill to City Hall. Thank you.

Property address: _____

1. Has your home or property ever been flooded or had a water problem? ☐ Yes ☐ No
   1f "yes," please complete this entire questionnaire.
   If "no," please complete questions 6 - 9.

2. In what years did it flood?_____

3. Where did you get water and how deep did it get?

   ☐ In basement: _____deep. ☐ In crawl space: _____deep.
   ☐ Over first floor: _____deep.
   ☐ Water kept out of house by sandbagging, sewer valve or other protective measure.
   ☐ In yard only.

4. What do you feel was the cause of your flooding? Check all that affect your building.

   ☐ Storm sewer backup ☐ Sanitary sewer backup
   ☐ Sump pump failure/power failure ☐ Saturated ground/leaks in basement walls
   ☐ Standing water next to house
   ☐ Overbank flooding from_____River/Lake
   ☐ Other: _____

5. Have you installed any flood protection measures on your property'?

   ☐ Sump pump ☐ Backup power system/generator
   ☐ Overhead sewers or sewer backup valve ☐ Sewer plug or standpipe
   ☐ Waterproofed walls ☐ Moved things out of the basement
   ☐ Regraded yard to keep water away from building
   ☐ Other: _____

6. When did you move into the building? _____

7. What type of foundation does your building have?
   ☐ Slab ☐ Crawlspace ☐ Basement

8. Do you have flood insurance or a sewer/basement flood rider to your homeowner's insurance?
   ☐ Yes ☐ No

9. Do you want information on protecting your house from flooding or sewer backup? ☐ Yes ☐ No If yes, please include your full mailing address. _____

Please include any comments you may have about flooding in your area.

The 2013 public input survey asked questions about all hazards and people's readiness for the impacts of hazards. The survey was made available online and on paper at the City Hall. A copy of the survey with a summary of responses is included on pages A-7 and A-7 of this Appendix.

City of Des Plaines Hazard Mitigation Plan – Public Input Needed

The City of Des Plaines is in the process of updating the City's Hazards Mitigation Plan. The Mitigation Plan, first developed in 2007, identifies activities and projects to reduce the damages caused by natural hazards such as floods, tornadoes, and severe winter and summer storms. Mitigation means anything that can be done to reduce the impact of a natural hazard.

Public input and comments are important to the Mitigation Plan update. All residents and property owners are encouraged to complete a short survey that can be found on the Internet at: http://www.surveymonkey.com/s/XJHJKZV, or is available at City Hall, 1420 Miner Street, Des Plaines, Illinois.

Survey responses provided will help the City of Des Plaines prioritize natural hazards that could impact residents and property owner, and to determine how to be better prepared for natural hazard emergencies.

A.3. Public Meeting

A public meeting on the draft plan was held on September 19, 2013. A news release was issued and below is a copy of the sign-in sheet.

ATTENDANCE SHEET

City of Des Plaines
Public Works and Engineering Department
1420 Miner Street
Des Plaines, IL 60016
Tel: 847-391-5390
Fax: 847-391-5619

DES PLAINES ILLINOIS

Project Name: 2013 Hazard Mitigation Planning Committee – Public Meeting

Date: September 19, 2013 Time: 9:00 AM Place: Room 101

Name	Company	E-mail Address	Phone Number
Jon Duddles	City of Des Plaines	jduddles@desplaines.org	847-391-6127
Tim Watkins	City of Des Plaines	twatkins@desplaines.org	847-391-5468
Tim Rodder	" "	trodder@desplaines	847-391-6121
John Pluta	" "	JPLUTA@desplaines.org	847-391-5396
Al Biancalana	" "	ABIANCALANA@DESPLAINES.ORG	847-391-5372
Scott Mangum	" "	SMANGUM@DESPLAINES.ORG	847-391-5392
Joan Cabang	" "	JCABANG@Desplaines.org	847 391-5385
Linda Carruth	Resident	lindacarruth@comcast.net	847-635-7092
Butch Ehrke	City of Des Plaines	BEHRKE@DESPLAINES.ORG	847-391-6961
Jane Johnson	City of Des Plaines	jjohnson@desplaines.org	847/391-5386
Molly O'Toole	Consultant	molly@mollyotoole.com	630-889-9774

A.4. Agency Coordination

To coordinate the 2013 Plan update effort with other agencies, letters sent to

- Cook County
- Mount Prospect
- Elk Grove Village
- Park Ridge
- Rosemont
- Chicago

- Elk Grove Township
- Maine Township
- Wheeling Township
- Northfield Township

- Northwest Municipal Conference
- Illinois Emergency Management Agency
- Illinois Department of Natural Resources
- Illinois State Water Survey
- Federal Emergency Management Agency
- U.S. Geological Survey
- U.S. Fish & Wildlife Service
- U.S. Army Corps of Engineers
- National Weather Service
- ISO
- Oakton Community College
- North Cook Soil & Water Conservation District
- MWRD
- American Red Cross

The text of the letter sent is shown on the following page.

-- Text of Coordination Letter –

[Date]

[Address Block]

Dear _____:

The purpose of this letter is to let you know that City of Des Plaines is in the process of updating the City's 2007 Hazard Mitigation Plan (Plan) and we welcome your comments and input. Our mitigation efforts focus on flooding, tornados and severe winter and summer storms.

The Des Plaines Mitigation Planning Committee, which is made up of municipal officials and staff and other stakeholders, has been working on the Plan update and we will have our next meeting on _____. If you are interested in attending, please let me know and we will provide you with meeting details. Our mitigation meetings are always open to the public. A copy of the Plan is available on the City's website (www.desplaines.org) under "City Services" and "Flooding Information."

Our Plan identifies activities that can be undertaken at all levels of government and by the private sector that can reduce the safety and health hazards and property damage caused by natural hazards. Our Plan meets the hazard mitigation planning requirements of the Disaster Mitigation Act of 2000 (DMA 2000), the floodplain management planning requirements of the Community Rating System (CRS) by the Federal Emergency Management Agency (FEMA). And please note that the City of Des Plaines will also be participating with Cook County in the development of the Cook County Hazard Mitigation Plan.

If you have any questions, please feel free to contact me at 847-391-5385 or jlaberg@desplaines.org.

Sincerely,

John La Berg, P.E., CFM
Public Works and Engineering Department

Responses from collected surveys are shown as percentages next to the choice/option.

City of Des Plaines Hazard Mitigation Plan Survey

This survey can be completed online at: http://www.surveymonkey.com/s/XJHJKZV. Or you may answer the questions below.

1. Welcome to the public input survey for the development of the City of Des Plaines Hazard Mitigation Plan! We appreciate your time. First, what river or stream area of Des Plaines do you live or own property nearest to?

- ☐ Des Plaines River – 55%
- ☐ Farmers Prairie Creek – 0%
- ☐ Weller Creek – 19%
- ☐ Willow Creek – 7%
- ☐ Feehanville Ditch – 0%
- ☐ Other – 5%
- ☐ Don't know – 14%

2. In approximately the past 10 years, have you or someone in your household or business experienced flood problems? (Check all that apply.)

- ☐ Flooding Above First Floor of House or Building – 0%
- ☐ **Flooding in Basement – 60%**
- ☐ Sewer Backup – 38%
- ☐ Yard Flooding – 65%
- ☐ Street Flooding – 76%
- ☐ Other – 7%
- ☐ No Problems – 13%

3. If you have had flood problems, where did flood water come from? (Check all that apply.)

- ☐ The river or creek level rising and coming onto my property. – 24%
- ☐ **Heavy rain that can't drain away. – 90%**
- ☐ The sewer backing up. – 50%
- ☐ Debris in the street or stream that created a problem. – 34%
- ☐ A levee or earthen berm failed. – 3%
- ☐ A detention basin or lake overflowed. – 5%
- ☐ Other – 13%

4. **What natural hazards besides floods** are concerns for your family or business? (Check all that apply.)

- ☐ Dam Failure – 2%
- ☐ Drought – 19%
- ☐ Earthquake – 9%
- ☐ Extreme cold – 26%
- ☐ Extreme heat – 21%
- ☐ Groundwater – 21%
- ☐ Hail - 46%
- ☐ Ice storm - 40%
- ☐ High wind/microburst – 65%
- ☐ Lightning – 30%
- ☐ Severe shoreline erosion – 5%
- ☐ Sewer backup – 63%
- ☐ Snow storm – 47%
- ☐ Thunderstorm – 30%
- ☐ Tornado – 58%
- ☐ Other – 7%

5. How prepared do you feel should a natural hazard occur within our community?

- ☐ Not at all prepared – 7%
- ☐ Somewhat prepared – 64%
- ☐ Adequately prepared – 18%
- ☐ Well prepared – 9%
- ☐ Very well prepared – 2%

City of Des Plaines September 2013

6. What steps have you taken to prepare your home or business for natural hazards? (Check all that apply.)

- ☐ Food supply – 36%
- ☐ Water supply – 50%
- ☐ **Flashlight – 93%**
- ☐ Batteries – 73%
- ☐ Battery-powered radio – 50%
- ☐ Medical supplies (First Aid Kit) – 59%
- ☐ Practiced a fire escape plan – 32%
- ☐ Received First Aid/CPR training – 36%
- ☐ Fire extinguisher – 75%
- ☐ Discussed utility shutoffs – 25%
- ☐ Flood insurance – 25%
- ☐ Sewer backup insurance rider – 23%
- ☐ Backup sump pump – 50%
- ☐ Overhead sewer – 16%
- ☐ Generator – 43%
- ☐ Other – 7%

7. What are the most effective ways for you to receive information on how to protect you, your home or business from damage due to floods or other natural hazards? (Check all that apply.)

- ☐ Newspapers – 22%
- ☐ Television – 44%
- ☐ Radio – 36%
- ☐ Websites – 73%
- ☐ Twitter/Facebook – 24%
- ☐ Schools – 7%
- ☐ Mail – 36%
- ☐ Fact sheet/brochure – 49%
- ☐ Extension Service – 2%
- ☐ Public Workshops/Meetings – 20%
- ☐ Fire Department/Law Enforcement – 16%
- ☐ Public Health Department – 4%
- ☐ Municipal/County Government – 20%
- ☐ Other – 13%

8. How do you feel our community is doing to make people aware of the natural hazards that they may face?

- ☐ Excellent – 4.5%
- ☐ Good – 43%
- ☐ Fair – 45.5%
- ☐ Poor – 7%

9. Would you like more information about the efforts of the Des Plaines Mitigation Planning Committee or the Des Plaines Hazard Mitigation Plan? If 'yes' or 'maybe' please be sure to include your name and address in Item 10.

- ☐ Yes- 15%
- ☐ No – 66%
- ☐ Maybe – 19%

10. Optional: Please provide your name, street address, phone number and e-mail address below.

_____

_____

_____

Thank you!

City of Des Plaines September 2013

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Appendix B. Summary of Changes

B.1. Summary of Plan Changes – 2007 to 2013

The following is a brief summary of changes made in the 2013 *City of Des Plaines Hazard Mitigation Plan*, Des Plaines, Illinois, from the 2007 version of the *Plan*:

Executive Summary: Updated and new summary of 2013 action plan included.

Chapter 1 - Introduction: Updated, and a new section to describe the *Plan* update process, and to describe the Mitigation Planning Committee activities and public input activities.

Chapter 2 – Hazard Profile: Updated with available data, including descriptions of hazard events that occurred in Des Plaines between 2007 and 2013.

Chapter 3 – Vulnerability Assessment: Repetitive loss properties section updated and new maps included. Dollar values used where not revised, since little economic growth has taken place since 2007. Hazards are prioritized by Planning Committee.

Chapter 4 - Goals: Reviewed, reaffirmed and one new goal added.

Chapter 5 - Preventive Measures: Updated.

Chapter 6 - Property Protection: Updated.

Chapter 7 – Emergency Services: Updated.

Chapter 8 – Structural Measures: Updated.

Chapter 9 – Public Information: Updated.

Chapter 10 – Action Plan: New action plan fro 2013 that reflects 2007 action items that were completed, and to include new action items. The action items were prioritized by the Mitigation Planning Committee.

B.2. Summary of Action Plan Changes – 2007 to 2013

Table B-1 lists the 2007 action items and the 2013 action items included in Chapter 10 of the Des Plaines hazard Mitigation Plan and describes the status of the2007 action items and the changes or updates made to them in 2013.

Table B-1
City of Des Plaines 2007 Action Plan Status and 2013 Action Plan Updates

2007 Plan Action Item	Status	2013 Plan Action Item	Change/Update
10.2. Program Action Items			
1. *Plan* Adoption	Completed.	1. *Plan* Adoption	Plan update must be adopted.
2. Monitoring And Reporting	Ongoing.	2. Monitoring And Reporting	Continue.
3. Community Rating System	Ongoing.	3. Continued Participation in the Community Rating System	No change. Ongoing.
4. Regulatory Review	Ongoing.	14. Incorporate the Hazard Mitigation Plan into Other City Plans	Re-titled and reprioritized.
5. Regulatory Administration	Ongoing.	5. Continued Implementation of NFIP Requirements	Re-titled.
6. Riverwalk	Ongoing.		This effort is ongoing but removed from the City's priority action items.
7. Regional Stormwater Management	Ongoing.	7. Regional Stormwater Management	Continue; reprioritized.
8. Urban Forestry	Ongoing.	10. Urban Forestry	Continue; reprioritized.

2007 Plan Action Item	Status	2013 Plan Action Item	Change/Update
9. Rebates	Program implementation is continuing	11. Rebates	No change ; program will continue
10. Demonstration Elevation Project	Action item completed in the Methodist Campground	n/a	n/a
11. Flood Response Plan	Flood stage maps have been developed. Plan continues to be implemented and updated.	8. Improve Emergency Response	The 2007 action item was expanded to include plans, exercises and training of City officials for all hazards
12. StormReady	Completed. The City is a StormReady community	7. Continued Participation in StormReady	Action item updated
13. Flood Control Projects	Ongoing	13. Flood Control Projects	Continue.
14. Drainage System Maintenance	Ongoing	12. Drainage System Maintenance	Continue.
15. Public Information Projects	Ongoing	3. Public Information Efforts	The 2007 action items were combined in the 2013 Plan, in part, due to the changes in the CRS program.
16. Public Information Messages	Ongoing		

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