Repetitive Loss Plan

Big Bend Drive, 1986

A Plan for Repetitive Flooding in Des Plaines

October 1, 2002

Prepared for the City of Des Plaines Engineering Department

Prepared by French & Associates, Ltd., Park Forest, Illinois

CITY OF DES PLAINES
1420 Miner / Northwest Highway ■ Des Plaines, Illinois 60016-4498 ■ (847) 391-5300

Note for the October 1 Edition:

Changes from the September 9 draft are shown

with vertical lines in the margin

Contents

1. Introduction 1
1.1. Background 1
1.2. Planning Process 2

2. Repetitive Loss Areas 6
2.1. Area #1 Bellaire 8
2.2. Area #2 Seminary 9
2.3. Area #3 Forest Edge 10
2.4. Area #4 Apple Creek 11
2.5. Area #5 Campground 12
2.6. Area #6 Big Bend 13
2.7. Area #7 Scott Nolan Center 14
2.8. Area #8 1723-53 Busse 15
2.9. Area #9 Campbell 16
2.10. Area #10 Windsor 17
2.11. Area #11 Westmere 18

3. Flooding and the Flood Problem 19
3.1. Flood Risk 19
3.2. Des Plaines River Flooding 20
3.3. Flood Data 22
3.4. Safety and Health Hazards 23
3.5. Property Damage 25
3.6. Critical Facilities 27
3.7. Future Trends 28

4. Goals 31
4.1. Findings 31
4.2. Goals 32

5. Structural Projects 33
5.1. Des Plaines River Report 34
5.2. Farmers Creek Projects 37
5.3. Other Flood Control Projects 37
5.4. Drainage and Storm Sewer Improvements 38
5.5. Channel Maintenance 39
5.6. Conclusions and Recommendations 40

6. Preventive Measures 41
6.1. Planning 41
6.2. Zoning 42
6.3. Open Space Preservation 43
6.4. Building Codes 44
6.5. Floodplain Development Regulations 44
6.6. Stormwater Detention 47
6.7. Conclusions and Recommendations 48

7. Property Protection 49
7.1. Acquisition/relocation 49
7.2. Building Elevation 50
7.3. Barriers 51
7.4. Sewer Backup Protection 52
7.5. Dry Floodproofing 53
7.6. Wet Floodproofing 54
7.7. Insurance 55
7.8. Property Protection Funding 57
7.9. Conclusions and Recommendations 58

8. Emergency Services 60
8.1. Threat recognition 60
8.2. Warning 61
8.3. Response 62
8.4. Post-Flood Recovery and Mitigation 64
8.5. Conclusions and Recommendations 65

9. Natural Resource Protection 66
9.1. Wetland Protection 66
9.2. Erosion and Sedimentation Control 69
9.3. River Restoration 70
9.4. Best Management Practices 71
9.5. Dumping Regulations 72
9.6. Conclusions and Recommendations 73

10. Public Information 74
10.1. Outreach Projects 74
10.2. Map Information 75
10.3. Library 75
10.4. Websites 76
10.5. Technical Assistance 77
10.6. Real Estate Disclosure 77
10.7. Educational Programs 78
10.8. Conclusions and Recommendations 79

11. Action Plan 80
11.1. Summary of Conclusions and Recommendations 80
11.2. Action Items 82
11.3. Plan Adoption 86

Appendix A. References 88

1. Introduction

1.1. Background

The City of Des Plaines has several flood problem areas within its corporate limits, but the major flood problem is concentrated along the Des Plaines River and Farmers Creek. These areas have always flooded. Recent damaging floods occurred in 1986, 1987 , 1996, 1997, and 1999.

Over the years, the City has implemented measures to protect its residents and businesses from flooding and from financial losses due to floods. These include:

- Joining the National Flood Insurance Program (NFIP) in 1972 so that property owners could purchase flood insurance to protect their properties from losses due to flooding,
- Adopting more stringent floodplain development regulations and joining the Regular Phase of the NFIP in 1981,
- Joining the Community Rating System (CRS) in 1993 to lower flood insurance premiums for residents,
- Participating with the US Army Corps of Engineers and the Illinois Department of Natural Resources on the Des Plaines River Flood Damage Reduction Study,
- Planning and implementing a variety of flood control and sewer improvement projects, and
- Establishing a rebate program to encourage property owners to install measures to stop sewer backup.

All the City's efforts to mitigate flood losses have helped, but they have not eliminated the flood problem. In particular, repetitive flooding of the same area deserves special attention.

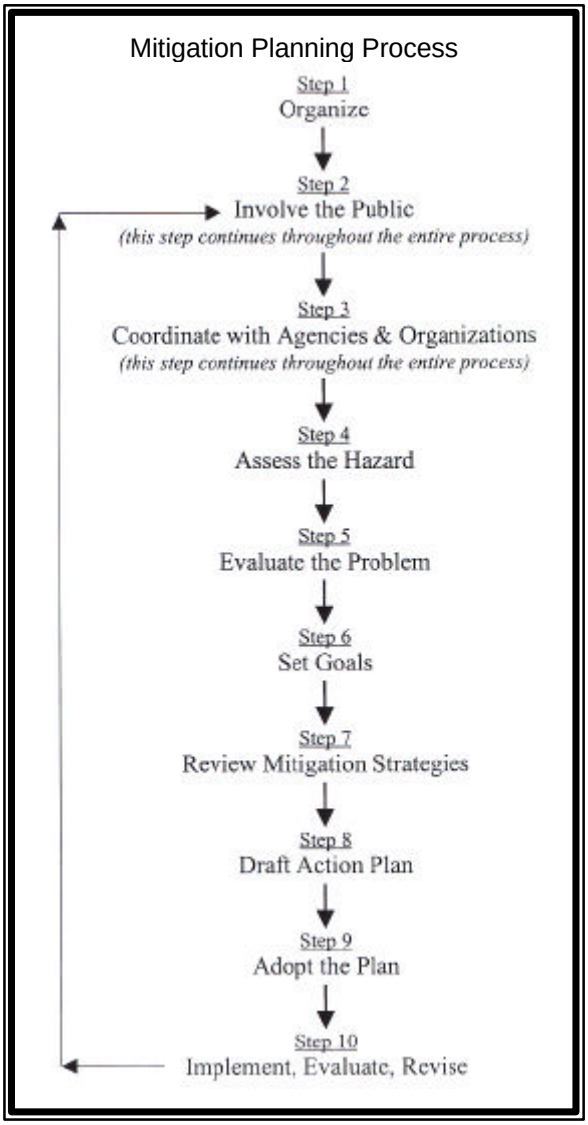
Repetitive Losses: A "repetitive loss property" is one which has received two flood insurance claim payments for at least $1,000 each since 1978. These properties are important to the National Flood Insurance Program and its Community Rating System because they account for one-third of the country's flood insurance claim payments. Therefore, as a condition of participating in the CRS, FEMA requires that the community adopt a plan to address these losses.

Objective: This *Repetitive Loss Plan* meets FEMA's repetitive loss planning criteria and is designed to identify the most cost-effective ways the City can reduce its repetitive flooding problem. It should be noted that this plan focuses on 11 separate repetitive loss areas. Other planning efforts are addressing stormwater, watershed and multi-jurisdictional concerns. Generally, this plan complements and supports those efforts. It should also be noted that most of this plan's recommended actions will benefit all floodprone properties in Des Plaines, not just those in the 11 areas.

1.2. Planning Process

This *Repetitive Loss Plan* was prepared by a project team of staff from the City's Engineering Department and from French & Associates, Ltd. (F&A). A standard 10-step process was followed, based on guidance and requirements of the Federal Emergency Management Agency (FEMA). This process is summarized in the flow chart below.

1. Public Involvement



The planning process will succeed only if the right people are involved. Three groups make for a successful program:

- Staff from offices responsible for implementing the plan
- Owners of the flooded properties
- Community stakeholders

Staff involvement included the project manager for the City, John LaBerg. F&A interviewed staff from other offices and a draft of the plan was later circulated to all affected departments.

Owners of all properties in the City were sent a one-page questionnaire with the Spring edition of the City's newsletter, *The Des Plaines Digest*. The questionnaire asked about the respondents' flood history, what steps they had taken to protect themselves from flooding, and what suggestions they had for the City's program. A copy of the questionnaire is on the next page. 697 questionnaires were returned. Of those, 27 were in or near the identified repetitive loss areas.

In 1999, the Des Plaines Civic Association surveyed 153 floodplain residents along Farmers Creek, Weller Creek and the Des Plaines River. The results from these questionnaires are discussed in later sections.

Stakeholders and community leaders interested in flooding are represented on the City's Flood Committee, whose members received the draft plan in September. The plan was then posted on the City's website. Newspaper notices and other publicity ensured that other stakeholders were made aware of the plan and their opportunity to provide input.

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 attach a 34-cent stamp or turn 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
   If "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.

A public meeting was held September 19 to explain and receive comments on the draft plan. Owners of properties in the repetitive loss areas were sent invitations to the meeting. The invitation also told of the availability of the plan on the website and at City Hall and the Public Library. This offered property owners and all members of the public a chance to review and comment on the plan. Over 60 people attended and many spoke.

2. Coordination

During the planning process, contacts were made with agencies and organizations to determine how their programs affect or could support the City's flood mitigation efforts. At the end of the planning process, each of these agencies and organizations was sent a summary of the draft plan and asked to comment in time for the September 19 public meeting.

City of Des Plaines
- Flood Control Committee
- Engineering
- Community Development
- Consumer Protection
- Public Works
- Emergency Management Agency

Civic Organizations
- Des Plaines Chamber of Commerce and Industry
- Craig Manor Homeowners Association
- Cumberland Terrace Civic Club
- Des Plaines Civic Association
- Hawthorne Lane Civic Association
- Lunkerbusters Fishing Club of Des Plaines
- Izaak Walton League of America
- Des Plaines River Watershed Alliance

Neighboring Communities
- City of Park Ridge
- Village of Rosemont
- City of Mount Prospect
- Village of Glenview
- Cook County Department of Planning and Development

Regional Agencies
- Des Plaines Park District
- Forest Preserve District of Cook County
- Cook County Sheriff, Emergency Management Agency
- North Cook Soil and Water Conservation District
- Metropolitan Water Reclamation District
- Northeastern Illinois Planning Commission
- Cook County Stormwater Management Commission

State Agencies
- Illinois Emergency Management Agency
- Illinois Department of Natural Resources
  - Office of Water Resources, Division of Planning
  - Office of Water Resources, Division of Resource Management

Federal Agencies
- Federal Emergency Management Agency, Region V
- U.S. Army Corps of Engineers, Chicago District
- Natural Resources Conservation Service

The project team also looked at other plans and reports for the areas. These included:

– *Our Community and Flooding, A Report on the Status of Floodwater Management in the Chicago Metropolitan Area*, Resource Coordination Policy Committee, 1998.

– *Upper Des Plaines River, Illinois, Interim Feasibility Report and Environmental Impact Statement*, U.S. Army Corps of Engineers, 1999

– Illinois Department of Natural Resources plans for Farmers and Prairie Creek (unpublished)

– *Proposed Flood Control Plan*, Technical Sub-Committee, Des Plaines Flood Control Committee, 2002

Additional references are listed in Appendix A.

3. Mitigation Strategies

Everything that could affect flood damage in the repetitive loss areas was considered. The process was not limited to just a few alternatives such as a levee or acquisition project. Six general strategies were explored. These strategies are the subject of chapters 5 – 10 in this *Plan*.

– structural projects – e.g., levees, reservoirs, channel improvements
– preventive – e.g., zoning, floodplain, stormwater management , and other ordinances
– property protection – e.g., floodproofing, acquisition, insurance
– emergency services – e.g., warning, sandbagging, evacuation
– natural resource protection – e.g., wetlands protection, best management practices
– public information – e.g., outreach projects, technical assistance

After the many alternatives were reviewed, F&A 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 the last chapter of this *Repetitive Loss Plan*.

2. Repetitive Loss Areas

FEMA's list of repetitive loss properties includes 46 addresses in the City of Des Plaines. The addresses and their flood insurance claim history are protected by the Privacy Act and are not listed in this public document. However, the Engineering Department has the detailed data and can review them with the owners. It is likely that the majority of the current owners were not the owners at the time of the repetitive flooding, especially since 2/3 of the properties have not had flood insurance claims since 1987.

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.

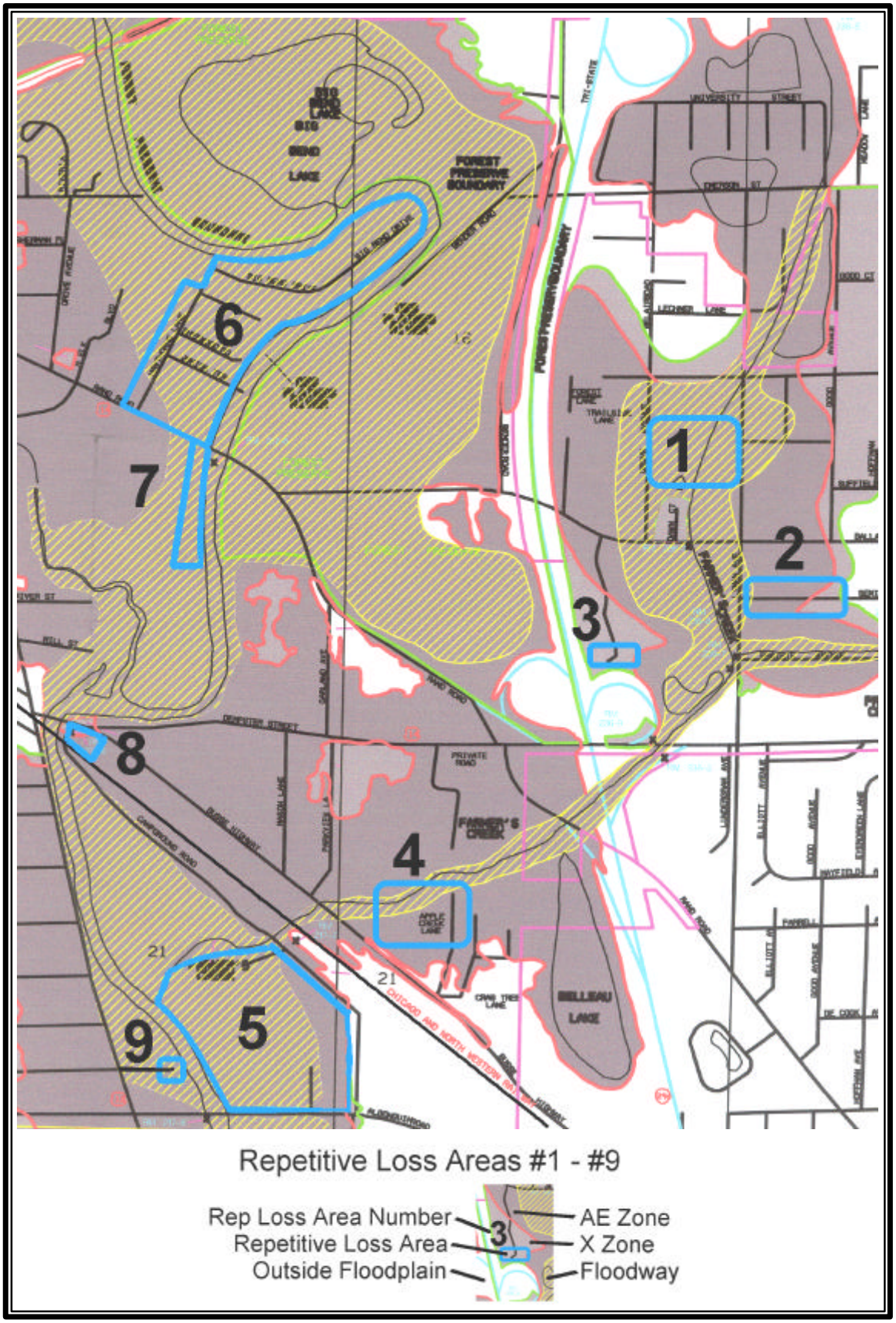
This grouping process resulted in 11 repetitive loss areas in the City of Des Plaines. This plan focuses on the areas rather than individual properties (except for the two areas that have only one property). On the next page is a map showing the location of the nine repetitive loss areas in the floodplain. The other 2 are in the western portion of the City.

Claims records go back to 1978. Four properties received six claims and three have received five claims, but most properties were only flooded twice, in 1986 and then in 1987. All 11 areas were affected by the record rainfall and river flooding of August 1987. Nine of them were also flooded in September 1986. Only the three lowest areas on the Des Plaines River have had flood insurance claims since 1987.

Area	Flood source	Flood Data				Number of Bldgs	
		FIRM Zone	Flood way	Velocity (fps)	Warning time	Homes	Other
1. Bellaire	FC/DPRBW	AE	Yes	0.5	< 1 hour	10	
2. Seminary	FC/DPRBW	AE	Part	0.2	< 1 hour	11	2
3. Forest Edge	FC/DPRBW	X	N/A	0.7	< 1 hour	1	
4. Apple Creek	FC/DPRBW	AE	No	N/A	< 1 hour	5	
5. Campground	Des Plaines River	AE	Yes	1.0	1+ day	110	17
6. Big Bend	Des Plaines River	AE	Yes	0.4	1+ day	95	
7. Scott Nolan	Des Plaines River	AE	Yes	1.0	1+ day		2
8. 1723-53 Busse	Des Plaines River	AE	No	1.0	1+ day		1
9. Campbell	Des Plaines River	AE	Yes	1.0	1+ day	3	
10. Windsor	Local drainage	X	N/A	N/A	< 1 hour	7	
11. Westmere	Local drainage	X	N/A	N/A	< 1 hour	13	
Total						255	23

Repetitive Loss Area Summary Table

FC/DPRBW = Farmers Creek plus Des Plaines River backwater flooding
fps = feet per second


1
2
3
4
5
6
7
8
9
Repetitive Loss Areas #1 - #9
Rep Loss Area Number
Repetitive Loss Area
Outside Floodplain
AE Zone
X Zone
Floodway

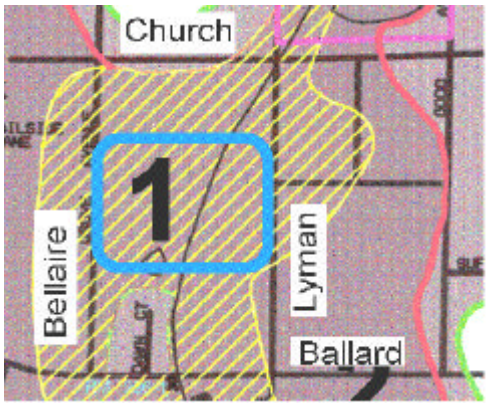
2.1. Area #1 Bellaire

Location: Bellaire Ave, north of Ballard Road

Past floods: September 1986, August 1987

Base flood data:

FIRM Zone: AE
Base flood elevation: 633
Velocity: 0.2
Warning time: <1 hour (Farmers Creek),
1 day (Des Plaines River backwater)



Area #1 map

Source of Flooding: Farmers Creek.

Number and type of buildings: Farmers Creek runs between Bellaire Avenue and Lyman Avenue. There are 10 single family homes in the Farmers Creek floodway. They are on basement or slab foundations.

Flood insurance claims data: In addition to the one property on FEMA's repetitive loss list, six other homes in this area received claims from the 1986 or 1987 floods. The average claim was $3,800, reflecting relatively shallow flooding.

No questionnaires were returned from this area.

Roadside ditch in Area #1

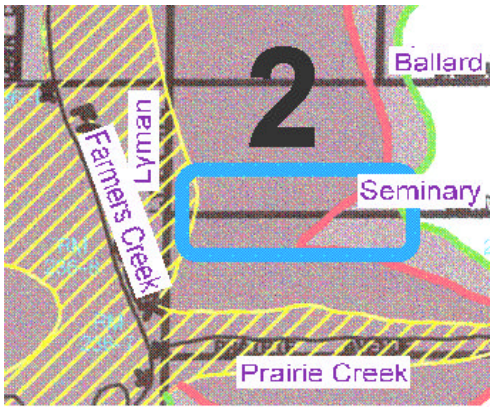
2.2. Area #2 Seminary

Location: Seminary Ave, west of Potter Road

Past floods: March 1979, September 1986, August 1987

Base flood data:

FIRM Zone: AE
Base flood elevation: 633
Velocity: 0.2 feet per second
Warning time: <1 hour (Farmers Creek),
1 day (Des Plaines River backwater)



Area #2 map

Source of Flooding: Farmers Creek, backwater from Des Plaines River, and local drainage. The area is very flat with minimal roadside ditches.

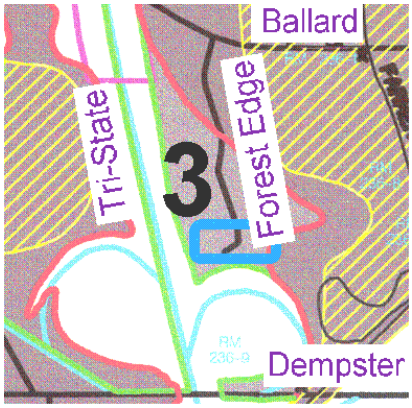
Number and type of buildings: Ten homes along Seminary Avenue and three buildings on Lyman Avenue south of Seminary. Some of the homes on the south side of Seminary are higher and are not included. The buildings are on slab or split level foundations.

Flood insurance claims data: In addition to the one property on FEMA's repetitive loss list, one other had claims paid in both 1986 and 1987, but damage from the second flood did not meet FEMA's $1,000 threshold. There was a total of one claim paid in 1979, three in 1986 and five in 1987. The average claim for 1986 and 1987 was $3,000.

No questionnaires were returned from this area.

Area #2

2.3. Area #3 Forest Edge



Area #3 map

Location: Forest Edge Lane, south of Ballard Road

Past floods: September 1986, August 1987, February 1997

Base flood data:

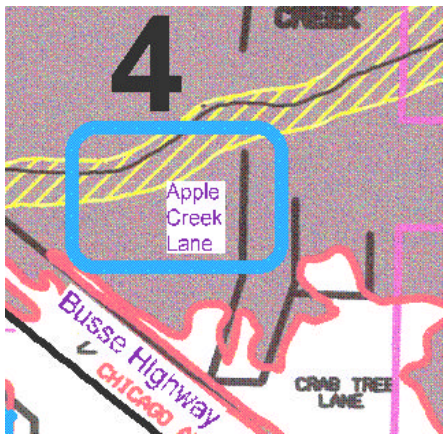
FIRM Zone: X (shaded, i.e., 500-year floodplain)
Base flood elevation: 633
Velocity: 0.7 feet per second
Warning time: <1 hour (Farmers Creek), 1 day (Des Plaines River)

Source of Flooding: Farmers Creek and backwater from Des Plaines River

Number and type of buildings: There are two homes at the southern end of Forest Edge Lane. One is higher and has no flood insurance claims history. The other is lower and had three claims paid.

Flood insurance claims data: As there is only one property in this area, there is no photograph. The flood insurance claims information is kept confidential.

2.4. Area #4 Apple Creek



Area #4 map

Location: Apple Creek Lane and nearby Busse Highway

Past floods: September 1986, August 1987, February 1994, May 1996, February 1997, April 1999

Base flood data:

FIRM Zone: AE/X
Base flood elevation: 633
Velocity: 2 feet per second
Warning time: <1 hour (Farmers Creek), 1 day (Des Plaines River)

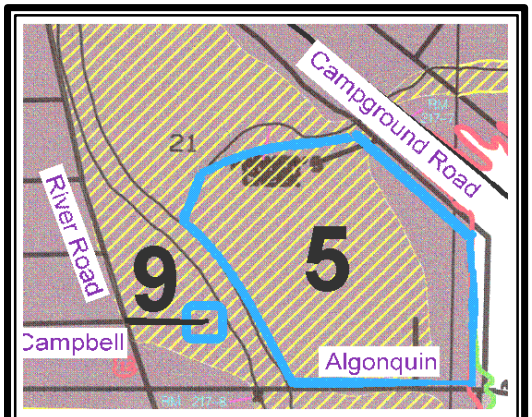
Source of Flooding: Farmers Creek and backwater from Des Plaines River.

Number and type of buildings: There are five homes on Apple Creek Lane and Busse Highway subject to flooding by Farmers Creek. All five are located below elevation 633, the elevation of the base flood. Several have lower level entrances, such as a garage or walkout basement.

Flood insurance claims data: Three of these homes received claim payments. The average claim in 1986 was $13,200. The average claim in 1987 was $9,800. One of the three (not the house in the photo) received claim payments for the five floods since 1986. The total claim payment was almost $100,000, making this property a high priority for a mitigation project.

Area #4

2.5. Area #5 Campground



Area #5 map

Location: Methodist Campground, north of Busse Highway

Past floods: April 1979, July 1982, December 1982, April 1983, March 1985, November 1985, September 1986, August 1987, February 1994, May 1996, February 1997, April 1999

Base flood data:

FIRM Zone: AE
Base flood elevation: 633
Velocity: 1 foot per second
Warning time: <1 hour (Farmers Creek), 1 day (Des Plaines River)

Source of Flooding: Des Plaines River and Farmers Creek. The entire site is in the Des Plaines River floodway and floods to a depth of approximately 3 feet during a 100-year flood.

Number and type of buildings: This historical area is primarily summer cabins, some over 100 years old. Parts of the area are operated as a summer youth camp. All but one of the cabins are seasonal residences. There are 110 residential buildings and 17 non-residential structures, including two tabernacles, a dining hall, and outdoor restrooms. The Campground also provides day camps and other activities for the community.

The cabins are on crawlspace foundations. Some, including several repetitive loss properties on FEMA's list, have been elevated.

Flood insurance claims data: 106 claims have been submitted for this area, of which 86 have been paid for an average payment of $6,000. A total of $638,000 have been paid in flood insurance claims for Area #5. Several properties have received 5 or 6 claims, although two of these have been elevated.

Area #5 during a recent flood

The campground owns the land and it has its own source of water, so individual buildings do not receive City water or water bills. The water billing addresses are used for the City's newsletter. Therefore, the residents of Area #5 did not receive the questionnaire in the Spring newsletter.

2.6. Area #6 Big Bend

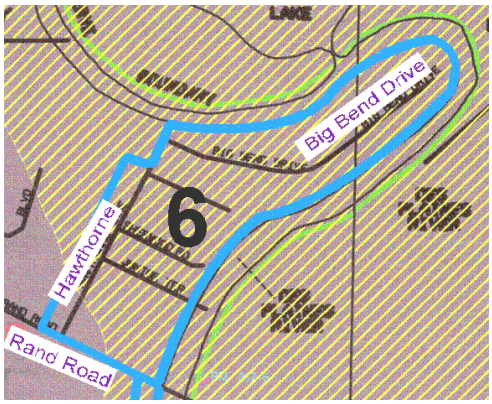
Location: Big Bend Drive and the adjoining streets of Hawthorne Lane, Sherwood Road, Hawthorne Terrace and Junior Terrace.

Source of Flooding: Des Plaines River

Past floods: March 1979, July 1982, December 1982, April 1983, September 1986, August 1987, May 1996, October 2001

Base flood data:

FIRM Zone: AE
Base flood elevation: 635
Velocity: 1 foot per second
Warning time: 1 day



Area #6 map

Number and type of buildings: There are 47 homes on Big Bend Drive, most of them on split level foundations. They were built in the 1960's. There are 48 homes on the other streets. They include raised ranches and split levels. Those on Hawthorne Lane were built earlier. The others are contemporaries with the homes on Big Bend Drive.

Flood insurance claims data: Of the 95 buildings in this area, 50 have had claim payments. The average claim for the floods before 1986 was $3,265. In 1986, the average was $16,550. In 1987, it was $8,365. These figures are the highest of all the repetitive loss areas (except for the one building in Area #6, the Scott Nolan Center), reflecting the higher property values and the deeper flooding, especially in 1986.

There were only 11 questionnaires returned from this area, but they corroborate the deep flooding in 1986 and 1987. Depths of up to 7.5 feet in basements were reported.

Area #6

Area #6 under water, 1986

2.7. Area #7 Scott Nolan Center

Location: The Maryville Scott Nolan Center hospital, south of Rand Road on the Des Plaines River.

Source of Flooding: Des Plaines River

Past floods: September 1986, August 1987

Base flood data:

FIRM Zone: AE
Base flood elevation: 634
Velocity: 1 foot per second
Warning time: 1 day

Area #7 map

Number and type of buildings: The Scott Nolan Center is one large mental health hospital building on the banks of the Des Plaines River. There is a full basement under parts of it. There is also a separate garage/maintenance building.

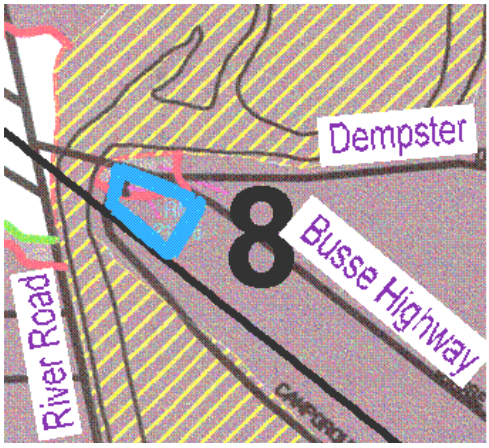
After the site was flooded in 1987, the owner installed numerous flood protection facilities. Initially these include short floodwalls with closures in front of various openings. Later a perimeter floodwall was constructed, the parking area was filled and several large pumps were installed. The pumps are tested monthly, but staff is not sure where the closures for the openings in the short walls are located. It is expected that the newer perimeter floodwall will make the interior short floodwalls unnecessary.

Flood insurance claims data: There were only the two claims from the 1986 and 1987 floods. Both paid the maximum coverage for the structure and the contents. Given the value of the property, these claims probably covered only a small part of the total damage.

Area #7 under water, 1986

One of the short wall/closure systems

2.8. Area #8 1723-53 Busse



Area #8 map

Location: Busse Highway and the Des Plaines River

Source of Flooding: Des Plaines River

Past floods: September 1986, August 1987

Base flood data:

FIRM Zone: AE
Base flood elevation: 633.5
Velocity: 1 foot per second
Warning time: 1 day

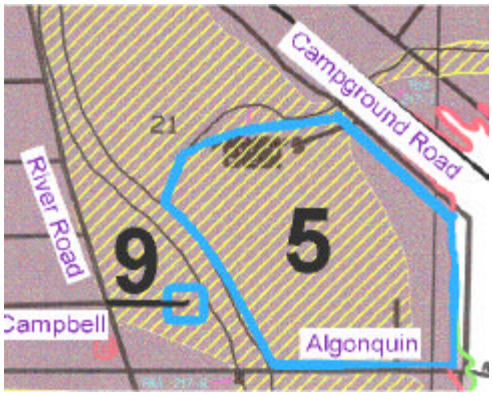
Number and type of buildings: This is a one-building area. It is a commercial building on a slab foundation. The section to the east (on the left side in the photo below) is several feet lower than the main building on the west. This arrangement may account for the double address, although the flood insurance claims treat it as one structure ("1723-53 Busse Highway").

Until recently, the building was used as a car dealership. It is now vacant. The City is working with developers. It is ensuring that the next owner is aware of the hazard and will floodproof the property before it is reopened.

Flood insurance claims data: There were only the two claims from the 1986 and 1987 floods. As there is only one property in this area, the details of the flood insurance claims cannot be provided.

Area #8 – 1723-53 Busse Highway

2.9. Area #9 Campbell



Area #9 map

Location: Campbell Avenue and the Des Plaines River

Source of Flooding: Des Plaines River. Residents report local drainage problems when the street floods.

Past floods: September 1986, August 1987

Base flood data:

FIRM Zone: AE
Base flood elevation: 633
Velocity: 1 foot per second
Warning time: 1 day

Number and type of buildings: There are three homes at the end of Campbell Avenue that are of bilevel construction. Two have garages at the lower level.

Flood insurance claims data: Only one of the three properties appears on the FEMA repetitive loss list. However, one of the others had a small claim in 1987.

None of the owners of these properties responded to the questionnaire.

Area #9

2.10. Area #10 Windsor

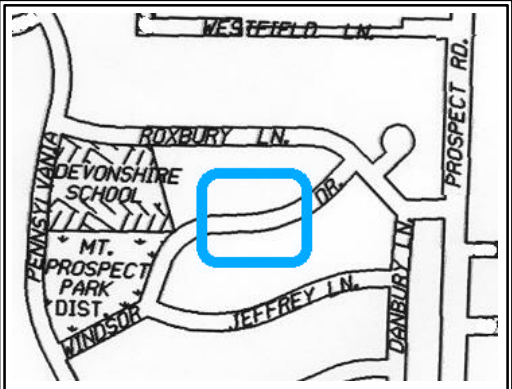
Location: Windsor Drive

Source of Flooding: Local drainage

Past floods: August 1982, December 1982, August 1987, October 2001

Base flood data:

FIRM Zone: X
Base flood elevation: N/A
Velocity: N/A
Warning time: < 1 hour



Area #10 map

Number and type of buildings: There are seven homes on Windsor Drive between Jeffery Lane and Roxbury Lane subject to street flooding. They are mostly split levels and basement foundations. This portion of Windsor Drive shows as a low area on topographic maps. Water tends to collect in the center of the block.

Only one of the properties appears on the FEMA repetitive loss list. Four claims were submitted, but only the August 1982 and August 1987 were paid, each for less than $1,500. Either the damage exceeded the deductible or the new rules for more limited basement coverage resulted in no claims paid for the other two events. No other properties have claims records.

No questionnaires were returned from this area. Two nearby properties have received City rebates for sewer backup protection projects. One neighbor reported basement flooding in 1987 which has since been fixed by installation of a sewer backup valve.

Area #10

2.11. Area #11 Westmere

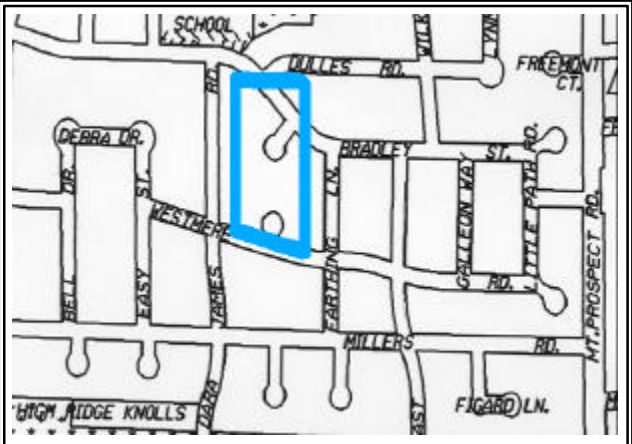
Location: Westmere Court

Source of Flooding: Local drainage

Past floods: September 1978, March 1979, 1987, 1997, 1999, 2000, 2001

Base flood data:

FIRM Zone: X
Base flood elevation: N/A
Velocity: N/A
Warning time: < 1 hour



Area #11 map

Number and type of buildings: There are 13 homes on Westmere Road and Bradley Street, most with basements.

Only one of the properties appears on the FEMA repetitive loss list (1978 and 1979). One other property received a claim in 1978. Questionnaires were returned for 13 properties in this general area. Two reported no problem, the other 11 reported shallow basement flooding (under 15") due to flooded streets when the storm sewers are overloaded.

This area is within Area 4 of the City's new stormwater master planning effort. There have been some storm sewer improvements in this area and more are being considered.

Some questionnaire respondents reported sanitary sewer backup. Three of the 13 properties have received rebates from the City for sewer backup protection projects.

Area #11

3. Flooding and the Flood Problem

Chapter 2 reviews Des Plaines' 11 repetitive loss areas. These 11 areas have 278 buildings that are currently subject to repetitive flooding. All but 20 of these buildings (93%) are in the floodplains of the Des Plaines River and Farmers Creek. The flooding on Farmers Creek was either caused by or aggravated by backwater flooding on the Des Plaines River. In short, the Des Plaines River is the primary flood problem facing the City's repetitive loss areas.

This chapter reviews flooding in general. It discusses historic flooding versus the risk of future flooding, flooding on the Des Plaines River, and the impact of flooding on people and property. While Chapter 2 describes the 11 repetitive loss areas and provides flood data on each, this chapter describes what those data mean.

3.1. Flood Risk

Repetitive loss areas have been selected for attention because they have flooded several times. Past floods are indications of what can happen in the future, but flood studies and mitigation plans should be 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.

Des Plaines has had several different flood studies and a new stormwater study is currently underway. The official flood-plain study for insurance and regulatory purposes is the *Flood Insurance Study* for Cook County by the Federal Emergency Management Agency (FEMA), November 6, 2000.

FEMA uses the "base" flood as the basis for its regulatory requirements and flood

What are the odds of another flood?

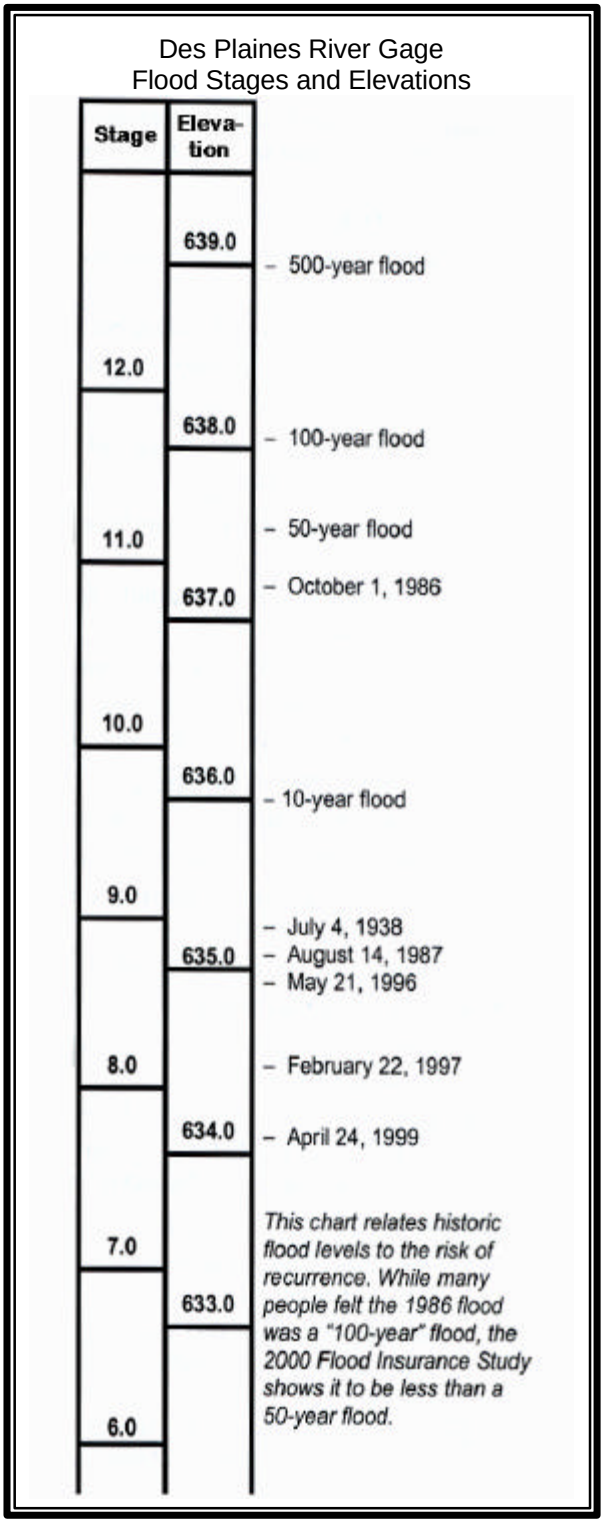
The term "100-year flood" has caused much confusion for people not familiar with statistics. Another way of looking at it is to think of the odds that a base flood will happen sometime during the life of a 30-year mortgage (26% chance).

Chance of Flooding over a Period of Years

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

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

insurance rate setting. This plan uses the base flood, too. The base flood is the one percent chance flood, i.e., the flood that has a one percent (one out of 100) chance of occurring in any given year. The one percent chance flood has also been called the 100-year flood. The base floodplain is shown an "AE Zone" on FEMA's Flood Insurance Rate Maps (FIRMs). It is the darker shaded area on the maps on pages 7 – 16.



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 lighter shaded "X Zone" on FIRMs and maps on pages 7 - 16.

3.2. Des Plaines River Flooding

Nine of the 11 repetitive loss areas are either on the Des Plaines River or subject to backwater flooding from the River up Farmers Creek. There is also a large amount of data on the River.

The relative heights of the historic and predicted floods are shown for the Des Plaines River gage at Des Plaines in the chart to the left. 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 626.31 feet above sea level. Water that reaches a stage of 8.0 feet at the gage is 634.4 feet above sea level, which was roughly the height of the February 22, 1997 flood level.

All dates of claims for the repetitive loss properties affected by the Des Plaines River coincide with Des Plaines River

gage readings of stage 6.6 feet or higher. The official flood stage is 5.5 feet.
The 1986 flood exceeded the base flood elevation in effect at the time. However, a newer study of the Des Plaines River concluded that the earlier Flood Insurance Study underestimated the true risk.

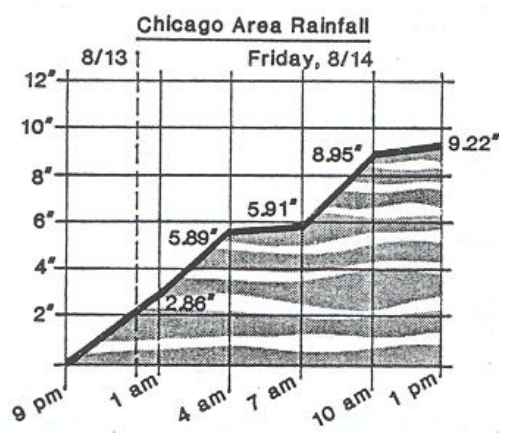
There were several reasons why the new study showed a higher flood risk:

- The newer study included more years of gage records. The later years have been wetter than the earlier ones on the records. 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 discharge 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.

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 on page 20 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: "It seemed like deja vu to many residents of the Des Plaines River basin in the Chicago area when. for the second time in less than a year, the River and its tributaries overflowed their banks and wreaked havoc for thousands of home-owners 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.



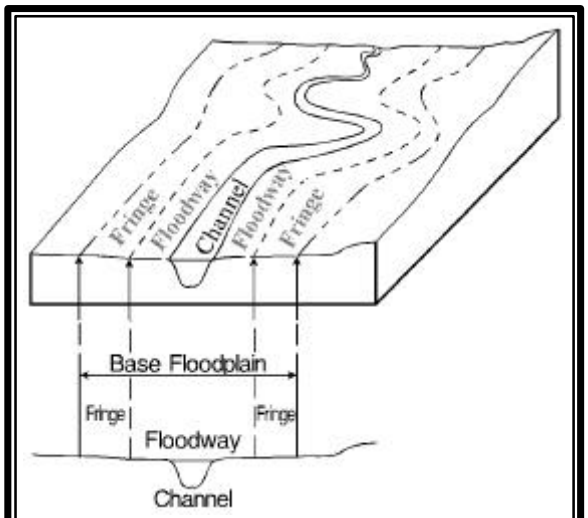
Illinois Floodlines, Winter 1987

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, previous page). 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 severe local drainage and stormwater flooding. This is reflected in the flood insurance claims data reported for each of the repetitive loss areas. The repetitive loss areas away from the Des Plaines River, 10 and 11, did not have claims in 1986, but Area #10 did have a claim in 1987.

3.3. Flood Data

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

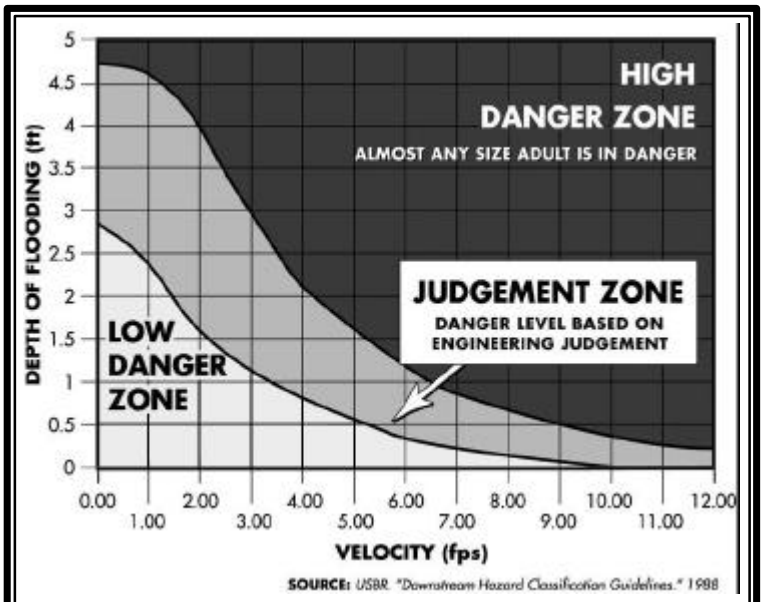
The floodway is shown as the shaded AE Zone with lighter diagonal lines on the maps on pages 7 – 16. Areas 5, 6, 7 and 9 are entirely in the floodway of the Des Plaines River.

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. 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 Farmers Creek drop only 1 – 2 feet per mile. Stream this flat have low average floodway velocities, ranging from 0.2 to 2.0 feet per second. Therefore, flood velocity is a relatively low hazard.

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 can cause as much damage 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.

Farmers Creek is in a small urban watershed 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. The same short warning time is also used for Areas #10 and #11, where the streets will flood quickly after the start of a heavy local rain.

In contrast, the Des Plaines River has a relatively slow rate of rise. In 1986, it took eight 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. Street and yard flooding from local storms typically last only a few hours.

3.4. Safety and Health Hazards

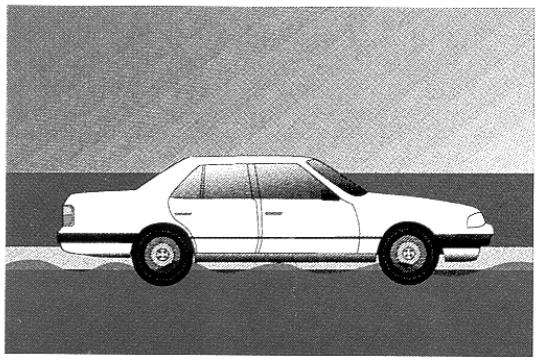
Safety: Des Plaines has not experienced any fatalities during past floods. In the 1986 flood, four people were killed by the flooding in other areas. One person drowned when his boat capsized and three people had heart attacks fighting the flood.

A car will float in less than 2 feet of moving water and can be swept downstream into deeper waters (see illustration, next page). This is one reason floods kill more people

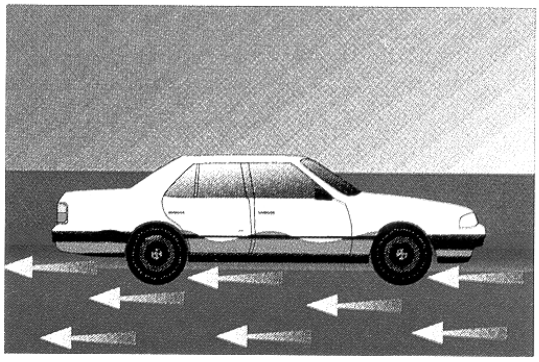
trapped in vehicles than anywhere else. Victims of floods have often put themselves in perilous situations by ignoring warnings about travel and closed roads and underpasses.

Electrocution is the second most frequent 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.

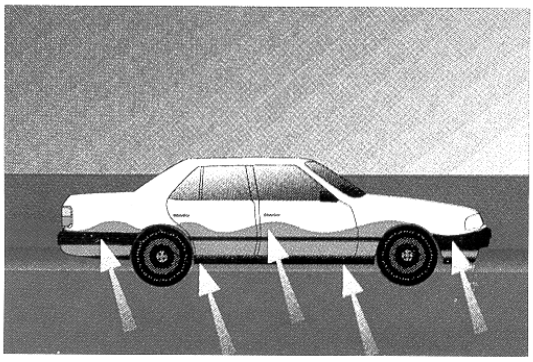
Health: There is no available data on health problems caused by floods in Des Plaines. While such things are not reported, three general types of health problems accompany floods. The first comes from the water itself. Floodwaters carry whatever was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where cattle and hogs are kept can contribute polluted waters to the receiving streams.



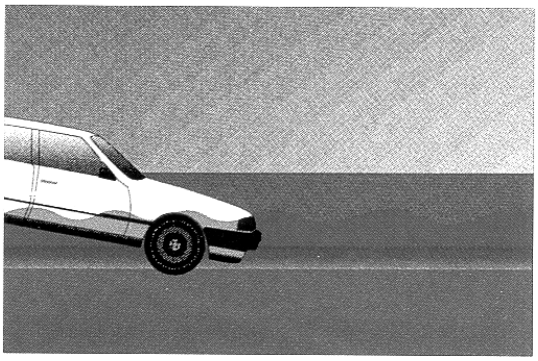
Water weighs 62.4 lbs. per cubic foot and typically flows downstream at 6 to 12 miles an hour.



When a vehicle stalls in the water, the water's momentum is transferred to the car. For each foot the water rises, 500 lbs. of lateral force are applied to the car.



But the biggest factor is buoyancy. For each foot the water rises up the side of the car, the car displaces 1,500 lbs. of water. In effect, the car weighs 1,500 lbs. less for each foot the water rises.



Two feet of water will carry away most automobiles.

Effects of shallow water on cars

Source: *Flash Floods and Floods … The Awesome Power*, National Weather Service

Flood waters saturate the ground which leads to infiltration into sanitary sewer lines. Infiltration and lack of treatment lead to overloaded sewer lines which back up into low lying areas and some homes. Even though diluted by flood waters, raw sewage can be a breeding ground for bacteria, such as e coli, and other disease causing agents.

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

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

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

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

3.5. Property Damage

Building damage: 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."

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.

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

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

The longer these materials are wet, the more moisture, sediment and pollutants they will absorb. 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 damages most household contents

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.

Effects of soaking on walls, floors and cabinets

In short, while a building may look sound and unharmed after a flood, the waters can cause a lot of damage. As shown in the photo to the left, 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.

Flood insurance payments: A readily available source of building damage data is flood insurance claim payments. FEMA has paid 357 insurance claims for flood damage to Des Plaines properties since 1978 for a total of $4,343,095.

The table shows the highest average payments were from the 1986 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 victims to purchase a flood insurance policy.

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
Total	357	$4,343,095	$12,166

Flood insurance claim payments
Source: FEMA, 2002

The average payment for structural damage was $8,700. The average payment for contents damage was $7,700. However, nearly half of the claim payments had no payments for contents coverage, which is probably due to the fact that banks only require structural coverage.

Combining these average claim payments and adding $2,000 for the deductibles, produces an average dollar cost of past flooding of $18,400 for each building. These figures do not include items not covered by a flood insurance policy, such as landscaping and automobiles, and the value of lost family heirlooms, so they still understate the true cost of flooding to the property owners.

Further, these averages are for the entire City. By their nature, repetitive loss properties in Areas #1 – #9 are subject to deeper and more frequent flooding because they are closer to the river. It can be safe to say that each flood causes an average of $20,000 – $25,000 in physical damage to each building in these nine repetitive loss areas.

3.6. Critical Facilities

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

> Buildings or locations vital to the flood response and recovery effort, such as police and fire stations and telephone exchanges and
>
> Buildings or locations that, if flooded would create secondary disasters, such as hazardous materials facilities and nursing homes.

The vast majority of the properties in the repetitive loss areas are single family homes and not considered critical facilities. The one property that is a critical facility is the Maryville Scott Nolan Center in Area #7. This is a resident mental health facility. It is not a hospital that would be needed to treat disaster victims, but special precautions are needed if the building had to be evacuated.

3.7. Future Trends

Growth potential: Des Plaines and the surrounding area is growing. The best available predictors of future development trends are the forecasts for changes in population and households made by the Northeastern Illinois Planning Commission (NIPC). In 2000, NIPC issued the following forecast for Des Plaines:

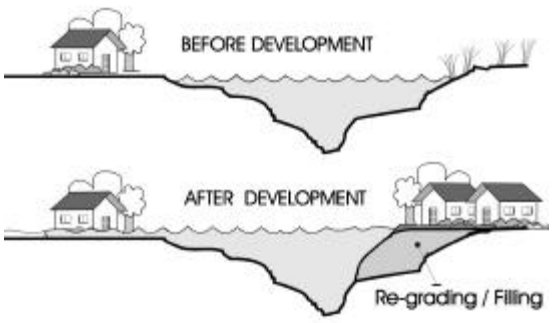
NIPC Forecasts for Des Plaines		
	1990 Census	2020 NIPC Forecast
Population	53,223	59,570
Households	19,990	24,126
Employment	62,684	74,732

Source: Northeastern Illinois Planning Commission

While there will be only a 12% increase in population, families will not be getting bigger, so there will be a 20% increase in the number of households. There will also be a 19% increase in the number of jobs. These numbers mean more buildings in the City. The future of the City's flood problem depends in part on where these new structures will go.

Floodplain development: Cook County's comprehensive plan noted the following:

> A very significant trend has been the desire on the part of the real estate development community to build on sites with significant environmental concerns, such as wetlands and floodplain, areas that are prone to flooding, have significant topographic relief, or have significant stands of mature hardwood vegetation. In large part, this is a testament to the vitality of the Cook County economy. Previously these parcels of land were passed over as being too difficult to develop, however, the scarcity of developable land has resulted in these parcels now being considered for development. (page 75)

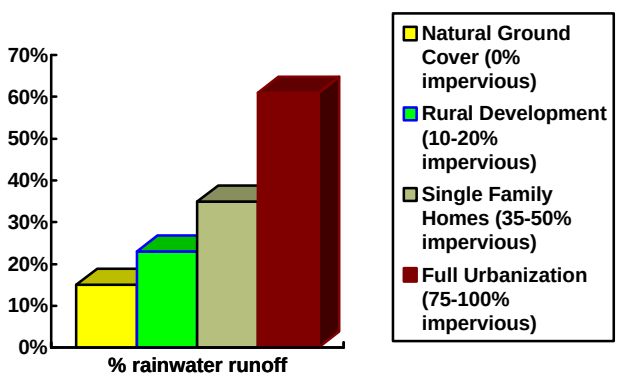


Development in the floodplain can aggravate flooding

A community's flood problem can become worse if new development is allowed that does not account for the flood hazard. Flood problems are greatly increased when buildings and other forms of development are located in the floodplain. As development occurs near channels, overbank flood flows are obstructed. As a result, flood levels rise upstream. Development that fills in floodplains means less area to store floodwaters. If there is no compensation for this loss of storage, water surface levels will rise downstream.

Watershed development: The City of Des Plaines can control what is built in its own floodplains, but has less control over what is done upstream, in the watershed that drains into the City. Development in the watershed also has an impact on flooding.

Stormwater runoff increases when vacant land is replaced with rooftops, pavements and storm sewers (see chart). Unconstrained watershed development often will aggravate downstream flooding and overload the community's drainage system.



Development in the watershed increases stormwater runoff

As the Des Plaines River is the main source of flooding in the City, development in the River's watershed will determine future flood heights. Most of that watershed is in Lake County. The *Lake County Flood Hazard Mitigation Plan* (draft) notes

> The greatest increase in flood damage caused by new development will probably occur along the main stem of the Fox and Des Plaines Rivers and around the shorelines of developed lakes. There are several reasons why future flood damage is likely to worsen in these areas.
>
> First, of the four Lake County watersheds, the Fox and Des Plaines have the greatest amount of land still available for development.
>
> Second, as large river watersheds, any increase of runoff volume will have its greatest flood impact along these receiving waters. Even small increases in runoff will compound based on the sheer number of sites and acres being developed in the Fox and Des Plaines watersheds. As a result, the Fox and Des Plaines Rivers and some of the natural lakes are likely to continue experiencing increases in base flood elevation.
>
> The magnitude of future flooding along the Fox and Des Plaines Rivers in Lake County will also depend on how well future development avoids and protects floodplains and wetlands. Planning, regulatory authority and acquisition are the three tools that will have the strongest influence on wetlands and floodplain protection.

According to the *Lake County Flood Hazard Mitigation Plan* (draft), the impact new development has on flood damage in Lake County will largely depend upon four primary factors:

1. How well wetlands and floodplains are protected and managed;
2. How much more of the landscape is covered by impervious surface;

3. How well new development sites are designed to minimize runoff;
4. Future development trends in the Wisconsin portion of the Des Plaines watershed.

If land continues to be developed as it has in the past with little attention given to the amount of impervious surface, new development will almost certainly result in increased flood heights on the Des Plaines River. On the other hand, if through the use of development site designs and best management practices, the volume and rate of runoff from developed areas is significantly reduced, localized flood damage should not increase.

4. Goals

4.1. Findings

The previous two chapters review the impact of flooding in the repetitive loss areas. The findings from these chapters are summarized as follows:

1. The City of Des Plaines has 11 areas with repetitive flooding problems, based on flood insurance claim payments. A total of 278 buildings are affected, most of them single family homes. There is only one site considered a critical facility.

2. Nine of these areas (with 258 buildings) are in the floodplains of the Des Plaines River and Farmers Creek, along the eastern edge of the City. The Des Plaines River is the primary cause of past flood damage in these areas.

3. Two of the areas are outside the mapped floodplain, in the western portion of the City. The 20 buildings in these areas are subject to flash flooding due to local drainage problems.

4. All of the repetitive loss properties are subject to shallow, slow moving water. Flood warning time is very short for six of the areas. There is at least one day of warning time for the five areas on the Des Plaines River (which have 228 or 88% of the properties).

5. Flooding in these areas is not considered life threatening, but does present a public health and safety risk. The bigger problem is property damage. It is estimated that each flood causes an average of $20,000 - $25,000 damage to each building.

6. Without appropriate regulations on new development in the floodplain and the watershed, the flood problem can be expected to get worse.

Added to this summary of the problem are the following planning considerations:

7. Living and working in these areas has real advantages. It means proximity to natural areas, recreational opportunities, and local businesses. In many cases, residents have little desire to move. Therefore, this plan should focus on protecting most of the properties in place.

8. Residents and property owners can be part of the solution. It is their property being flooded and there are many things that they can do to protect themselves and reduce their exposure to damage.

9. People should not expect 100% protection from the forces of nature. Flood hazard mitigation does not mean eliminating all threats, it means reducing the impact of the threats.

10. To be successful, flood mitigation must account for both the natural and human facets that comprise the floodplain. Mitigation measures need to minimize disruption to the community and the environment.

11. Mitigation measures need to be effective and affordable. This means they will take time to plan, fund and implement.

4.2. Goals

With the above findings in mind, the following goals are used to determine the appropriate actions for the City of Des Plaines.

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.

5. Structural Projects

Structural projects keep flood waters away from an area. They modify the drainage system by construction of reservoirs, detention basins, levees, floodwalls, channel improvements, modifications to crossings and roadways, and/or storm sewer and drainage improvements. This chapter also reviews maintenance activities that prevent obstructions in the drainage system from aggravating flooding.

Structural projects offer advantages not provided by other measures, but as shown below, they also have major shortcomings. The appropriateness of using structural flood control depends on individual project area circumstances.

Since structural flood control is generally the most expensive type of mitigation measure in terms of installation costs, maintenance requirements and environmental impacts, a thorough alternative assessment should be conducted before choosing a structural project. In some circumstances smaller flood control measures may be included in a package of several recommended measures for a project area where non-structural measures would not be practical or effective.

Larger structural flood control projects have regional or watershed-wide implications and can be very expensive. Because of this, they are often planned, funded and implemented at a regional level by agencies such as the Illinois Department of Natural Resources Office of Water Resources and the U.S. Army Corps of Engineers.

In fact, these two agencies have cooperated extensively on planning flood control projects. The Corps has assumed the lead in addressing the Des Plaines River and IDNR is preparing a plan for Farmers Creek. They have investigated structural projects and reported their findings, which are summarized in this section.

Pros and Cons of Structural Flood Control Projects

Advantages	Shortcomings
May provide the greatest amount of protection for land area used.	They disturb the land and disrupt natural water flows, often destroying wildlife habitat.
Because of land limitations, may be the only practical solution in some circumstances.	They require regular maintenance, which if neglected, can have disastrous consequences.
Can incorporate other benefits into structural project design such as water supply and recreational uses.	They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage.
Regional detention may be more cost-efficient and effective than requiring numerous small detention basins.	They can create a false sense of security as people protected by a project often believe that no flood can ever reach them.
	Although it may be unintended, in many circumstances they promote more intensive land use and development in the floodplain.

5.1. Des Plaines River Report

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

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 reviews eliminated most of these 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:

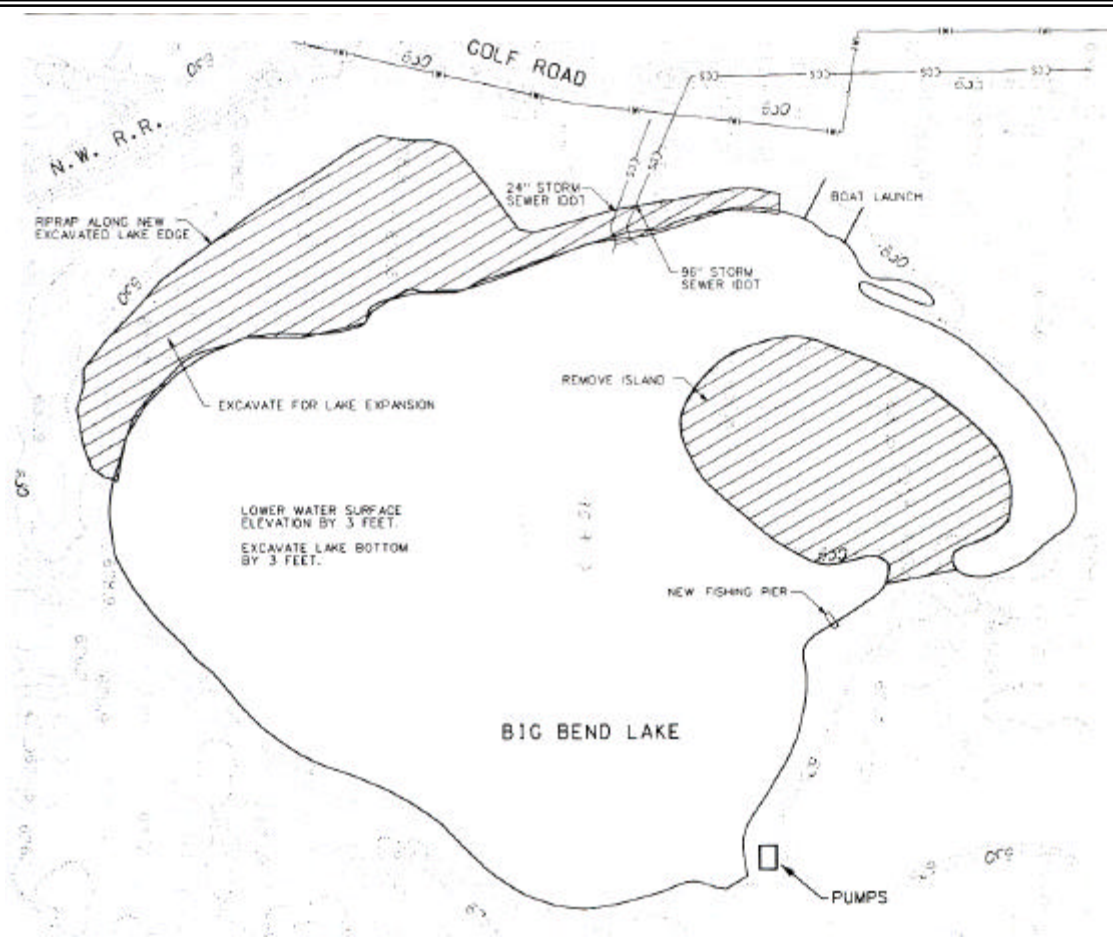
- Raising the dam across the North Fork of Mill Creek in northern Lake County to increase the flood storage area by 500 acre-feet
- A lateral storage area in VanPatten Woods Forest Preserve (also in northern Lake County) to add 412 acre-feet of storage
- Expansion of the Buffalo Creek reservoir at Buffalo Grove (475 more acre-feet)
- Raising roads in Mount Prospect and Prospect Heights to act as a levee.
- Expanding Big Bend Lake, just north of Area #6 on the Des Plaines River (587 acre-feet). See the illustration on the next page.

– Constructing an earthen berm, sheet pile floodwall and pumping station in an area east of the Des Plaines River, between Rand Road and Busse Highway. This project is known as Rand Park Levee or Levee 50 and is shown on the next page.

The cost of the six projects is estimated at $50.5 million, of which $32.8 million would come from the Corps and $17.7 million would have to be paid by the State and local governments. They are scheduled to be completed in 2007.

When they are completed, the four storage projects will result in a very small reduction in the base flood elevation – 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 5, 6, 7 and 9, which are close to the river channel and will not be protected by a levee.

Rand Park Levee: Currently, IDNR is proceeding with the design and construction of the Rand Park Levee. This project will be fully funded by the State and the City and will count toward the non-federal share. This approach will get the entire project moving more quickly.



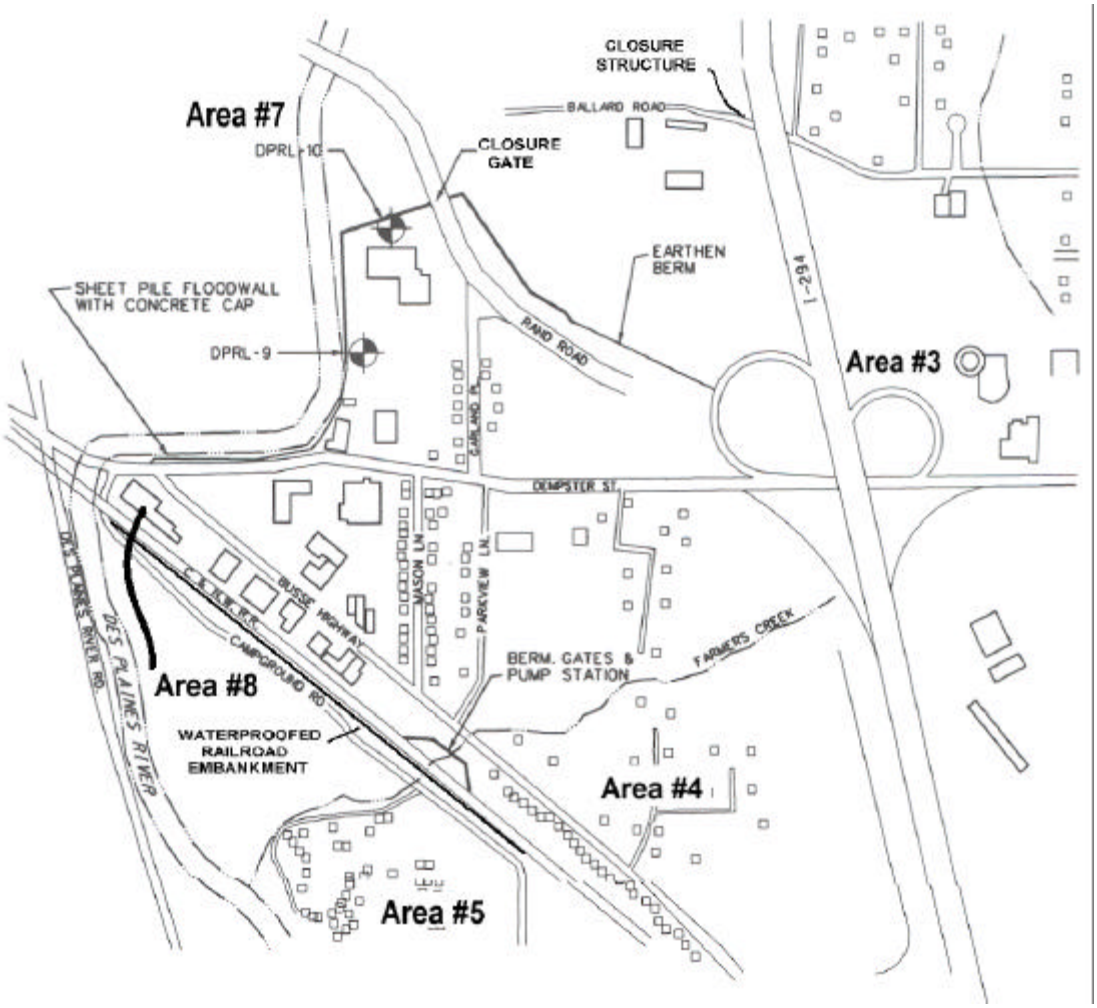
Proposed Big Bend Lake Expansion

Upper Des Plaines River Feasibility Report, Sheet 37

The Rand Park Levee plans include:

- Waterproofing the railroad embankment with a layer of clay so it will act as a levee,
- Putting interior storage, a closure structure and pump station on Farmer's Creek,
- Building a 100-year frequency flood protection floodwall/levee east and north from the railroad to the tollway interchange,
- Installing closure structures on Rand and Ballard Roads,
- Installing a backflow gate on the Golf Road storm sewer into Big Bend Lake, and
- Developing a multi-use trail along the alignment.

The project is being constructed in stages. It should be noted that the levee and pump station will cost in the neighborhood of $60,000 each year. This includes mowing, inspections, and electricity for the pumping station.



Proposed alignment for the Rand Park Levee, showing nearby repetitive loss areas
Upper Des Plaines River Feasibility Report, Sheet 33

Benefits: When it is completed in 2005, the Rand Park Levee will protect 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. These include repetitive loss Areas #1 – #4 and #8. Areas 5 and 7 are just outside the area to be protected (see map, previous page). However, Areas #1 – #4 will still be subject to flooding from Farmers Creek and its tributary, Prairie Creek.

5.2. Farmers Creek Projects

By preventing backwater flooding of the Des Plaines River, the Rand Park Levee will have a major impact on flooding in the Farmers Creek floodplain. Therefore, 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.

IDNR staff are looking at three storage sites in Des Plaines on Farmers Creek and two sites in Park Ridge on Prairie Creek. Different scenarios are being run in computer models to see which sites or combination of sites would bring the greatest flood protection for the dollar.

This work includes collecting surveyed information on each floodprone building. Such information could be made available to the owners to help them assess their individual risks and the cost of actuarial flood insurance (see section 7.7 on page 56).

A second project has been proposed for Farmers Creek. An "Illinois First" grant has been appropriated through IDNR to make improvements on the channels of Farmers and Prairie Creeks. The project, to be conducted by the City and Maine Township, would clear out blockages, regrade some channel banks, and reduce future maintenance costs. While a useful project to improve the channels, it will not have an impact on overbank flood levels.

Benefits: If IDNR finds a cost-effective solution, flood levels on the two streams would be lowered, benefiting Areas # 1 – #4. When coupled with the Rand Park Levee, it is possible that these areas would be removed from the mapped floodplain.

5.3. Other Flood Control Projects

There are other ways to control flooding besides reservoirs and levees. The 1999 Corps study looked at **dredging and channel improvements** 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 alternation 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)

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 outweighed the anticipated benefits. There is also a U.S. Supreme Court ruling that governs diversions of water into or out of Lake Michigan.

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)

5.4. Drainage and Storm Sewer Improvements

Man-made ditches and storm sewers help drain areas where the surface drainage system is inadequate, or where underground drainageways may be safer or more practical. Storm sewer improvements include installing new sewers, enlarging small pipes, and preventing back flows. Particularly appropriate for depressions and low spots that will not drain naturally, drainage and storm sewer improvements usually are designed to carry the runoff from smaller, more frequent storms.

The City has a 1986 Storm Water Management Master Plan and is currently preparing a new one. Pursuant to the 1986 plan, the City constructed numerous drainage system and storm sewer improvements. These have reduced the recurrence of street and yard flooding in areas outside the Des Plaines River floodplain.

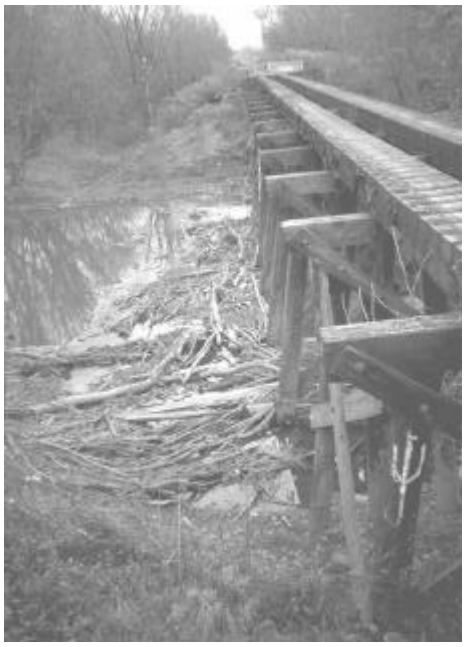
Drainage improvements have been looked at for Areas 1 and 2 with limited roadside drainage ditches. It was concluded that given the very flat terrain, surface water would still not be removed very efficiently. Further, the flooding that damaged the buildings and caused the resulting repetitive flood insurance claims in Areas #1 – #9 was not caused by local drainage problems, but overbank flooding.

Drainage and storm sewer improvements are being investigated for Areas #10 and #11, as well as other areas of the City outside of the floodplain, as part of the stormwater master planning currently underway. Sometimes, the benefits of a project do not justify the costs. For example, a relief sewer for Area #11 was estimated to cost over $3 million.

5.5. Channel Maintenance

"Channels" include stream channels, swales, ditches and culverts. Channel maintenance is an ongoing program to clean out blockages caused by an accumulation of sediment or overgrowth of weedy, non-native vegetation or debris, and remediation of streambank erosion sites. "Debris" refers to a wide range of blockage materials that may include tree limbs and branches that accumulate naturally, or large items of trash or lawn waste accidentally or intentionally dumped into channels.

Maintenance activities normally do not alter the shape of the channel, 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.



Periodic inspections and debris removal are needed to prevent dams

Government agencies usually accept responsibility for maintaining facilities on public property. However, in Illinois, the responsibility for drainageway maintenance on private property, when no easements have been granted, is with the individual private property owner. This generally often results in very little maintenance being accomplished.

The City has a drainage system maintenance program that calls for twice a year inspections of all drainageways, including Farmers and Prairie Creeks and the Des Plaines River. If problems are found, Department of Public Works crews remove it. The City's procedures have been looked at in light of the credit for this work under the Community Rating System. Some revisions to the formal procedures are required to continue to receive the maximum CRS credit, but no major changes in the way inspections and maintenance are performed are needed.

5.6. Conclusions and Recommendations

The following conclusions and general recommendations are made based on the findings of this chapter. These are consistent with the *Proposed Flood Control Plan* of the Des Plaines Flood Control Committee.

1. The Corps and IDNR should proceed and implement their projects as recommended by the *Upper Des Plaines River Feasibility Report*.

2. IDNR should proceed and complete its flood protection study for Farmers and Prairie Creeks. When completed, the City should review the findings and determine whether it should participate in a project, if any is recommended.

3. Other flood control approaches should not be pursued for the Des Plaines River and Farmers Creek. Rather, the City should focus its flood control efforts on the projects recommended by the Corps and IDNR studies.

4. Property owners in Areas 1 – 4 and 8 will be protected from Des Plaines River flooding by the Rand Park Levee. Hopefully, they will be protected from the Farmers Creek project(s), but the study has not been completed.

5. Property owners along the Des Plaines River in Areas 5, 6, 7 and 9 should not expect a major reduction in flood heights.

6. There appear to be no affordable drainage or storm sewer improvements that would reduce local drainage flooding in the 11 areas.

7. The City should continue inspections and maintenance of the drainage system, but update its written procedures to maintain its credit under the Community Rating System.

6. Preventive Measures

Preventive measures are designed to keep the problem from occurring or getting worse. Their objective is to ensure that future development does not increase the damage caused by a flood or other hazard and that new construction is protected from those hazards. Preventive measures are usually administered by building, zoning, planning, and/or code enforcement offices.

The first three measures discussed in this chapter, planning, zoning, and open space preservation, work to keep damage-prone development *out* of the hazardous or sensitive areas. The next three measures, building codes, floodplain development regulations and subdivision regulations, impose construction standards on what is allowed to be built *in* the floodplain. The last measure review, stormwater management, addresses the runoff of stormwater from new developments onto other properties and into floodplains.

6.1. Planning

"Planning" can cover a variety of community plans including, but not limited to, comprehensive plans, land use plans, transportation plans, capital improvement plans, and economic development plans. While plans generally have limited authority, they reflect what the community would like to see happen in the future. Plans also guide other local measures such as capital improvements and the development of ordinances.

Land use plans: Comprehensive and land use plans generally identify how a community should be developed and are the most likely tools for hazard mitigation. Use of the land can be tailored to match the hazards on that land, typically by reserving flood prone areas for parks, recreational trails, open space, golf courses, or similar compatible uses.

The City and Cook County both have comprehensive plans with land use elements. Both call for preserving existing open space in the Des Plaines River floodplain. The Cook County plan designates all undeveloped floodplains as "environmentally sensitive" and recommends that they only be developed as planned unit developments (PUD), an approach that facilitates setting aside the sensitive areas in return for other considerations for the developer.

The City's comprehensive plan breaks the City into subareas. The Des Plaines River floodplain is in the Des Plaines River Subarea. The objectives of the Des Plaines River subarea plan are to:

- 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.

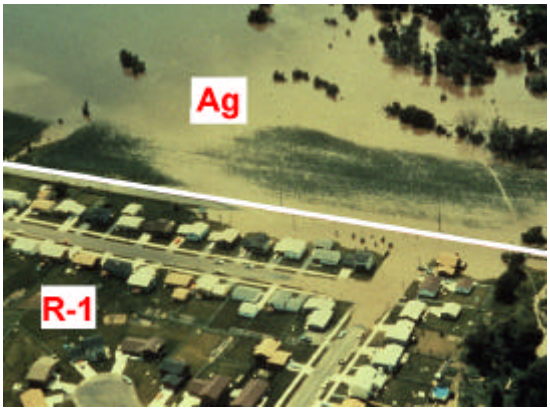
The Des Plaines River subarea plan does not deal with flooding or propose activities to provide flood protection. It does recommend channel maintenance, but primarily as a tool to improve appearances.

Capital improvement plans: A community's capital improvement program states where major public expenditures will be made over the next 5-20 years. Capital expenditures may include acquisition of land for public uses, such as parkland, wetlands, or natural areas, and extension or improvement of roads, utilities, channels and drainage structures.

The Engineering Department prepared the City's 2002 – 2006 Capital Improvement Program for infrastructure improvement. A total of $23.5 million will be needed for projects such as street, sidewalk and drainage improvements. Because the floodplain is built up, there are no major improvements that will encourage new development. On the other hand, $170,000 is budgeted each year, 2002 – 2004, for the Farmers Creek projects discussed in Section 5.2. Over $2 million is slated for sewer and drainage projects.

6.2. Zoning

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



A zoning ordinance establishes districts so floodprone lands can be preserved for agricultural, conservation, or other uses that suffer minimal damage from a flood.

Des Plaines' zoning ordinance identifies existing public lands, but does not have special zones for lands open for private development. 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 6.5).

6.3. Open Space Preservation

Des Plaines River forest preserves are excellent examples of floodplain open space that serve the entire community.

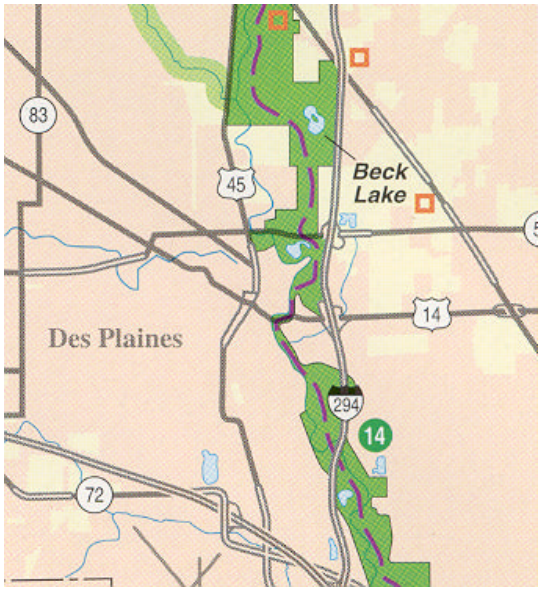
Keeping the floodplain open and free from development is the best approach to preventing flood damage. Preserving open space is beneficial to the public in several ways. Preserving floodplains, wetlands, and natural water storage areas maintains the existing stormwater storage capacities of an area. These sites can also serve as recreational areas, greenway corridors and provide habitat for local flora and fauna. In addition to being preserved in its natural landscape, open space may also be maintained as a park, golf course, or in agricultural use.

Approximately 30% of the Des Plaines River and Farmers Creek floodplains 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.

The Des Plaines Civic Association's 1999 survey found very strong resident support for maintaining and expanding floodplain open space. Both the Forest Preserve and Park Districts would like more land in the floodplain, especially adjacent to existing properties or to complete a greenway. However, they would need financial support for the acquisition and any clearance of structures.



Completing the Des Plaines River greenway is one of the priorities of the Northeastern Illinois Regional Greenways

6.4. Building Codes

Hazard protection standards for all new and improved or repaired buildings can be incorporated into a local building code. These standards should include criteria to protect a building from local drainage problems, high winds, and other forces of nature (separate floodplain management regulations address overbank flooding).

Most communities in Illinois that have a building code have adopted the *National Building Code* of the Building Officials and Code Administrators International, Inc. (BOCA). This is being replaced by the International Code series. The I-Codes have more provisions for natural hazard protection, but it is up to the community to adopt a separate flood section. The City of Des Plaines has just adopted the current series of I-Codes.

Just as important as the code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. For example, there were many reports of buildings that lost their roofs during Hurricane Andrew because sloppy construction practices did not put enough nails in them.

The Building Code Effectiveness Grading Schedule (BCEGS) is used by the insurance industry to determine how well new construction is protected from wind, earthquake and other non-flood hazards. It is similar to the 10-year old Community Rating System and the century-old fire insurance rating scheme: community programs are reviewed and scored: a class 1 community is the best and a class 10 community has little or no program.

With the recent adoption of the International series of codes, Des Plaines' Building Code Effectiveness Grading Schedule classification improved to a Class 3/3. This reflects high scores in three general activities: administration, plan review and field inspection.

6.5. Floodplain Development 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.

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.

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:

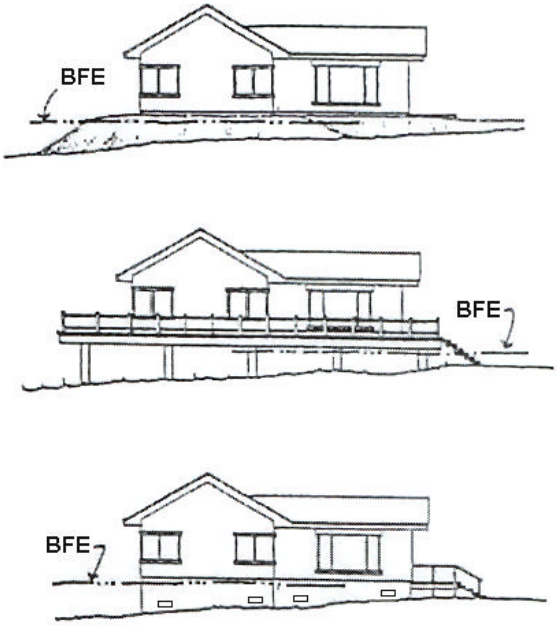
1. All development in the regulatory floodplain must have a permit from the community. "Development" is defined as any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of materials.

2. The regulatory floodplain is the floodplain mapped on the November 6, 2000, Cook County Flood Insurance Rate Map.

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 22). 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. 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 City has enacted some regulatory standards that exceed the minimum FEMA and state requirements that are summarized on the previous page. These include:

- Freeboard of 1 foot (Sections 9-14-2, 9-14-9(C)1(a), 9-14-9(C)2(a). 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 9-14-6(B)2, 9-14-7(B)2(b), and 9-14-8(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 and Prairie Creeks.
- Prohibition of hazardous materials (Section 9-14-9(A)). Certain dangerous, flammable, and otherwise hazardous materials must be kept out of the floodplain.
- Compaction and dimension requirements for filling (Section 9-14-9(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.

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."

Related to floodplain regulations are subdivision regulations. These govern how land will be subdivided into individual lots, and set the construction and location standards for the infrastructure the developer builds to serve those lots, including roads, sidewalks, utility lines, storm sewers, and drainageways. Because almost all of them have already been subdivided, subdivision regulations will not provide a flood protection benefit to the repetitive loss areas.

Similarly, 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.

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 suffer substantial damage during past floods. This is because of the relatively shallow flooding and the high property values. None of the past claims for the single-family homes in the 11 repetitive loss areas was for more than $35,000.

Except for a future 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.

6.6. Stormwater Detention

As shown in the chart on page 29, development outside a floodplain can contribute significantly to flooding problems. Runoff is increased when natural ground cover is replaced by urban development. To prevent stormwater from flooding roads and buildings, developers construct storm sewers and improve ditches to carry the water away more efficiently.

This combination of increased runoff and more efficient stormwater channels leads to increases in downstream storm peaks and changes in the timing when storm peaks move downstream. Unconstrained watershed development often will overload a community's drainage system and aggravate downstream flooding.

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

Retention ponds manage the increased runoff from new developments.

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.

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 for other communities in the watershed. The Cook County communities in the Farmers and Prairie Creek watersheds 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.

Communities in the Lake County portions of the City's watersheds must enforce the even tougher standards of the Lake County Stormwater Management Commission (uniform release rates of 0.04 and 0.15 cubic feet per second).

Although these regulations address the rate of stormwater release, they do not effectively regulate the increased *volume* of runoff. Controlling the increased rate of runoff through detention may reduce flooding impacts in small watersheds, but detention has little effect on flooding along large rivers such as the Des Plaines. The increased volume of runoff ultimately collects in these large river basins resulting in higher flood elevations.

6.7. Conclusions and Recommendations

The following conclusions and general recommendations are made based on the findings of this chapter.

1. Because most of the repetitive loss areas have already been subdivided and built up, preventive measures will not have a great impact on preventing and reducing repetitive flood losses.

2. Existing open spaces along the Des Plaines River in both Cook and Lake Counties should be preserved as open space through public ownership and zoning restrictions.

3. The City should continue to enforce the provisions of Chapter 14. It should not loosen the standards for new construction in the floodplain. This will ensure that future construction in the mapped floodplain, including substantial improvements, will be protected from the base flood.

4. The City should work with the Cook County and Lake County Stormwater Management Commissions to explore stormwater management measures that limit increases in the volume of runoff leaving new developments in the Des Plaines River watershed.

7. Property Protection

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches to protect buildings and other property: Keep the water from touching the building (acquisition/relocation, elevation, barriers, and sewer backup protection), keep the water from damaging the building (floodproofing), and insure the building. Each approach is appropriate for different flood and building conditions.

7.1. Acquisition/relocation

Getting a building out of the path of flooding is the surest and safest way to protect it. While almost any building can be moved, the cost goes up for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. However, experienced building movers know how to handle any job.

Building relocation

Relocation can be expensive, with costs ranging for $30,000 for a small wood frame building to over $60,000 for masonry and slab on grade buildings. Two story houses are more expensive to move because of the need to relocate wires and avoid overpasses. Additional costs may be necessary for acquiring a new lot on which to place the relocated building and for restoring the old site. Larger buildings may have to be cut and the parts moved separately.

Like relocation, acquisition of buildings in a floodprone area ensures that they will no longer be subject to damage. The major difference is that acquisition is 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.

Sometimes acquired buildings are relocated out of the floodplain and reused, either by a public agency or by the owner, who buys it back at a reduced price and assumes the cost of clearing the site. Acquisition followed by demolition is more appropriate for buildings that are difficult to move—such as larger, slab foundation, or masonry structures—and for structures in relatively poor condition that are not worth protecting.

This home was acquired in 2000 by the Lake County Stormwater Management Commission and the site was cleared for open space.

One problem that sometimes results from an acquisition project is a “checkerboard” pattern in which nonadjacent properties are acquired. This can occur when some owners, especially those who have and prefer a waterfront location, prove reluctant to leave. Creating such an acquisition pattern in a community simply adds to the maintenance costs that taxpayers must support, but does not reduce the emergency response costs.

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.

7.2. Building Elevation

If a building is not removed from the floodplain, the next most effective property protection measure is raising it above the flood level. Water flows under the building, causing little or no damage to the structure or its contents. Alternatives are to elevate on continuous foundation walls (creating an enclosed space below the building) or elevation on compacted earthen fill.

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

Elevating a building will change its appearance. If the required amount of elevation is low, the result is similar to putting a building on a 2- or 3-foot-high crawlspace. If the building is raised 2 feet, the front door would be three steps higher than before. If the building is raised 8 or more feet, the lower area can be wet floodproofed and used for parking and for storage of items that will not be damaged by flood waters.

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 state and FEMA floodplain management regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

Buildings with basements can be elevated, too. However, only the first floor and higher floors are elevated. The basement remains as the foundation. All utilities are elevated and the basement is filled in with sand to protect the walls from water pressure.

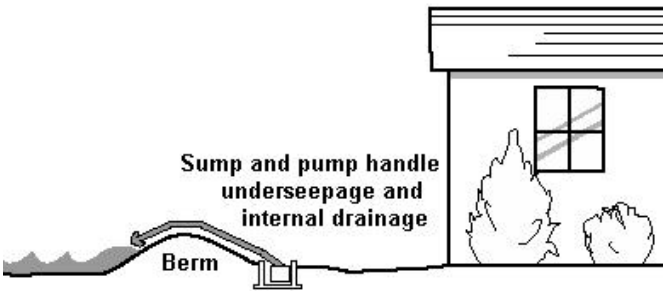
Precautions: During a flood, the streets, utilities, and other infrastructure that serve a building will still be exposed to flood damage. The building may be isolated and without utilities, and therefore unusable. There will also be a risk to the occupants who may try to enter or leave the building during a flood. Another problem arises when newly created lower stories are used for storage of items subject to flood damage.

7.3. Barriers

Barriers keep surface floodwaters from reaching a building. A barrier can be built of dirt or soil ("berm") or concrete or steel ("floodwall"). The standard design for earthen berms is three horizontal feet for each vertical foot (3:1 slope). As a result, an area six feet wide is the minimum needed for each foot in height. Floodwalls need less room, but are more expensive. Barriers must be placed so as not to create flooding or drainage problems on neighboring properties, nor can they be constructed in the floodway.

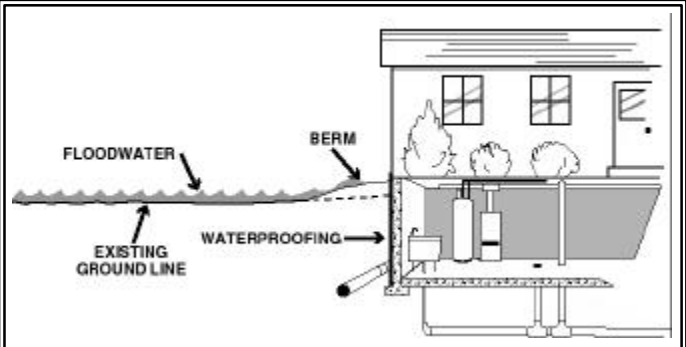
Barriers can be close to the structure

Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, a barrier needs to handle 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.



Internal drainage is handled by a sump and pump

Basements: A variation on the barrier approach is the basement protection berm. Basements and the lower floors of split levels can be protected from surface water by construction of low walls around stairwells or using backfill. First, a waterproofing compound is applied to the walls. Walls are built up around the window wells and basement stairwells (without blocking basement windows that are needed for emergency exits). An earthen berm is placed against the side of the house. A subsurface drain and one or two sump pumps are also needed. The drains and pumps can keep up with the seepage before it gets through the berm and reaches the basement walls.



Basement protection berm

The 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.

Precautions. A barrier can only be built so high. It can be overtopped by a flood higher than expected. Berms made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and maintained. Barriers can settle over time, lowering their protection level. A floodwall can crack, weaken, and lose its watertight seal.

During a flood, the streets, utilities, and other infrastructure that serve a building will still be exposed to flood damage. The building may be isolated and without utilities, and therefore unusable. There will also be a risk to the occupants who may try to enter or leave the building.

Floodwall on the Des Plaines River

Some barriers have openings for driveways and sidewalks, as illustrated in the photo to the left. Closing these openings is dependent on someone being available and strong enough to put the closure in place. Another precaution is to account for water in the sewer lines that may back up under the barrier and flood inside the building (see the next section on sewer backup protection).

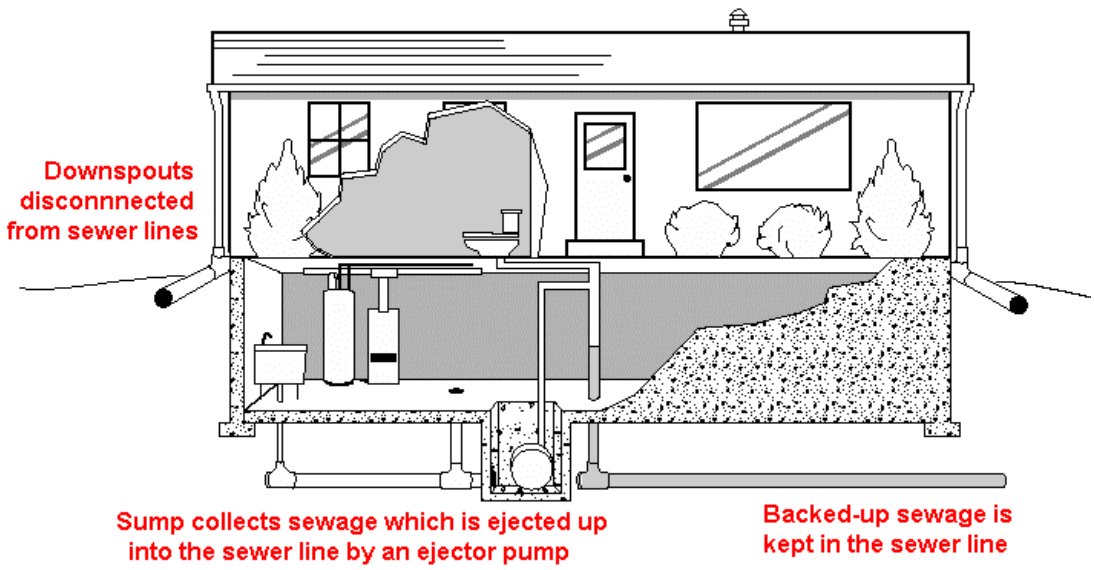
7.4. Sewer Backup Protection

Cross connections between the sanitary and storm sewers and infiltration and inflow can overload the sanitary sewers during a storm. Buildings that have downspouts, footing drain tile, and/or a sump pump connected to the sanitary sewer service may be flooded inside during heavy local rains. These should be disconnected. Rain water and surface water should be directed out onto the ground where it will flow away from the building.

Floor drain plug

Four other approaches may be used to protect a structure against sewer backup: floor drain plugs, floor drain stand-pipes, overhead sewers, and backflow protection valves. The first two devices keep water from flowing out of the lowest opening in the building, the floor drain. They cost less than $25. However, if water becomes deep enough in the sewer system, it can flow out of the next lowest opening, such as a toilet or tub, or it can overwhelm a drain plug by hydrostatic pressure and flow into the building through the floor drain.

The other two measures are more secure, but more expensive ($4,000-$6,000). An overhead sewer keeps water in the sewer line during a backup (illustrated below). The alternative is a backflow protection valve located in the sewer line between the building and the sewer main under the street.



Overhead sewer

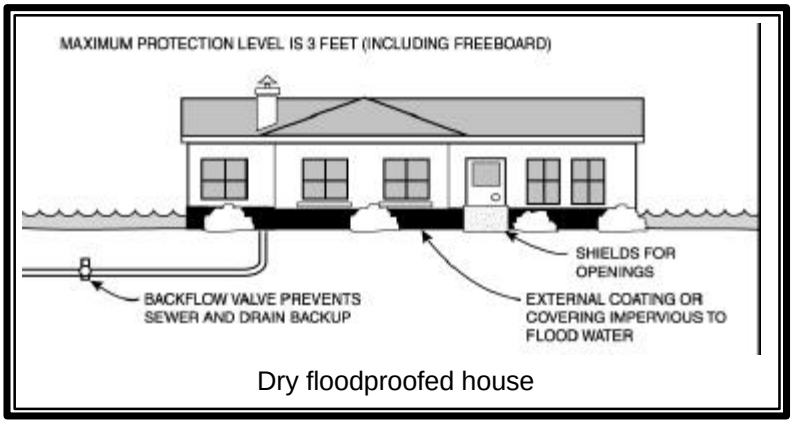
The flood protection questionnaire asked "Have you installed any flood protection measures on your property?" Many respondents have done a variety of things for sewer backup problems:

- 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)

7.5. Dry Floodproofing

This term covers several techniques for sealing up a building to ensure that floodwaters cannot get inside it. All areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings (doors, windows, and vents) are closed, either permanently, with removable shields, or with sandbags.

Dry floodproofing is only appropriate for buildings on concrete slab floors (without basements) and with no cracks. To ensure that the slab is watertight and sound, an engineering analysis is recommended. The maximum flood protection level for dry floodproofing is three feet above the slab. Deeper water will put pressure on the walls and slab floor that they are not built to withstand.



Dry floodproofed house

Dry floodproofing of new and existing *non*-residential 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 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. Four people reported that they have covered or replaced their basement windows. Hopefully, they have taken other steps to prevent water pressure from damaging their basement walls.

Precautions: The streets, utilities, and other infrastructure that serve a building will still be exposed to flood damage. The building may be isolated and without utilities, and therefore unusable. There will also be a risk to the occupants who may try to enter or leave during a flood.

Closing the openings is dependent on someone being available and strong enough to put the closure in place. Another precaution is to account for water in the sewer lines that may back up under the barrier and flood inside the building (see previous section on sewer backup protection).

It is very tempting for the owner of a dry floodproofed building to try to keep the flood out if floodwaters get deeper than two or three feet. This can result in collapsed walls, buckled floors, and danger to the occupants.

7.6. Wet Floodproofing

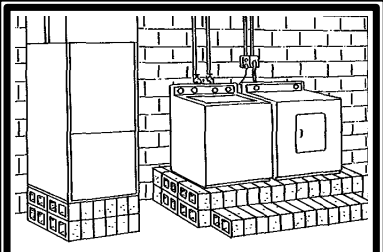
Wet floodproofing means letting the water in and removing everything that could be damaged by a flood. There are several ways to modify a building so that floodwaters are allowed inside, but minimal damage is done to the building and its contents. These techniques range from moving a few valuable items to rebuilding the floodprone area.

In the latter case, structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater, and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Wet floodproofing is not feasible for one-story houses because the flooded areas are the living areas. However, many people wet floodproof their basements, crawlspaces, garages, and accessory buildings simply by relocating all hard-to-move valuables, such as the furnace, heavy furniture and electrical outlets. Light or moveable items, like lawn furniture and bicycles, can be moved if there is enough warning. Fuse and electric breaker boxes should be located high and near a door in order to safely turn the power off to the circuits serving floodprone areas.

Wet floodproofed garage

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.



Where flood depths are shallow, a few blocks can protect valuable contents.

The flood protection questionnaire asked "Have you installed any flood protection measures on your property?" 126 respondents (18%) reported that they have moved items out of their basements, a simple and inexpensive wet floodproofing measure.

Precautions: During a flood, the streets, utilities, and other infrastructure that serve a building will still be exposed to flood damage. The building may be isolated and without utilities, and therefore unusable. There will also be a risk to the occupants who may try to enter or leave the building during a flood.

Moving contents is dependent on adequate warning and the presence of someone who knows what to do. Flooding a basement or garage where there is electricity, paint, gasoline, pesticides, or other hazardous materials creates a safety hazard. There will still be a need for cleanup, with its accompanying health problems.

7.7. Insurance

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. Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the National Flood Insurance Program (NFIP). Currently over 1,300 Des Plaines properties are covered by the NFIP.

Flood insurance coverage is provided for insurable buildings and their contents damaged by a "general condition of surface flooding" in the area. Building coverage is for the structure. This includes all things that typically stay with the building when it changes ownership, including:

- Utility equipment, such as a furnace or water heater
- Wall-to-wall carpeting
- Built-in appliances
- Wallpaper and paneling

Ten percent of a residence's building coverage may apply to a detached garage or carport. Other appurtenant structures must be insured under a separate policy.

Contents coverage is for the removable items inside an insurable building. A renter can take out a policy with contents coverage, even if there is no structural coverage. Certain items are not insurable. These include:

- Items outside a building, such as fences, car ports, landscaping and driveways,
- Jewelry, artwork, furs and similar items valued at more than $250
- Finished structural parts of a basement, such as paneling and wall to wall carpeting
- Animals and livestock
- Licensed vehicles
- Money or valuable papers
- Contents in a basement

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.

In most cases, a 30-day waiting period follows the purchase of a flood insurance policy before it goes into effect. The objective of this waiting period is to encourage people to keep a policy at all times. People cannot wait for the river to rise before they buy their coverage.

Basements: There is limited coverage for basements and the below grade floors of bilevels and trilevels. The NFIP defines "basement" as "Any area of the building, including any sunken room or sunken portion of a room, having its floor below ground level (subgrade) on all sides."

Coverage under building or structural coverage is limited to specific items needed for the operation of the building, such as a furnace, water heater, clothes washer and dryer. There is very limited coverage for finishings, such as wallpaper and carpeting, and contents.

Cost: The tables on the next page show the costs for a single family home located in the base floodplain with the standard $1,000 deductibles. Rates are lower for buildings that are elevated above the base flood level. The cost of coverage is also 10% lower in Des Plaines because the City participates in the Community Rating System (CRS).

Single Family Home on Slab or Crawlspace					
Amount of coverage	**Cost for coverage**	**ICC**	**Less CRS**	**Constants and fee**	**Annual premium**
$100,000 structural coverage	$465	$75	– $79	$80	$789
$40,000 contents coverage	$248				
$50,000 structural coverage	$340	$75	– $57	$80	$596
$20,000 contents coverage	$158				
Single Family Home with Basement, Bilevels and Trilevels					
Amount of coverage	**Cost for coverage**	**ICC**	**Less CRS**	**Constants and fee**	**Annual premium**
$100,000 structural coverage	$555	$75	– $86	$80	$858
$40,000 contents coverage	$234				
$50,000 structural coverage	$365	$75	– $60	$80	$618
$20,000 contents coverage	$158				

Source: *Flood Insurance Agent's Manual*, FEMA, May 2002
ICC = Increased Cost of Compliance, CRS = Community Rating System discount

Basement backup insurance: The NFIP will cover seepage and sewer backup for an additional deductible provided there is a general condition of flooding in the area that was the proximate cause of the basement getting wet.

Several insurance companies have sump pump failure or sewer backup coverage that can be added to a homeowner's insurance policy. Each company has different amounts of coverage, exclusions, deductibles, and arrangements. Most are riders that cost extra. Most exclude damage from surface flooding that would be covered by a National Flood Insurance policy. The cost varies from nothing to up to about $75 for a rider on your homeowner's insurance premium.

7.8. Property Protection Funding

FEMA has two programs to purchase and clear floodprone buildings. The Flood Mitigation Assistance Program puts a priority on repetitive loss properties and provides $200,000 - $300,000 to Illinois each year. The Hazard Mitigation Grant Program has more funds, but is only available after a disaster declaration by the President. Under the Disaster Mitigation Act of 2000, these programs will require a multi-hazard City-wide mitigation plan after November 2004 (this repetitive flood loss plan will not qualify).

Many insurance policies will only pay to repair the damage incurred. If damage is severe enough, the owner may have additional costs to bring the building up to current codes. Flood insurance now covers these costs (up to $20,000) when there is a flood. This is called "Increased Cost of Compliance" (ICC) coverage and is automatically included in all policies.

The Illinois Department of Natural Resources periodically receives appropriations for property protection activities. For example, in fiscal year 2001, it had $5 million to acquire repetitive loss properties in Northeastern Illinois.

Since 1990, the City's Flood Rebate Program has provided up to 20% of the cost (up to $1,000) for installation of flood protection measures. Most of the funded projects have been for sewer backup protection. Over the last 3 ½ years, this program has funded 209 projects at an average cost to the City of $755. This innovative rebate program has received awards for its public-private partnership approach to protect buildings from sewer backup flooding.

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.

7.9. Conclusions and Recommendations

1. There are several ways to protect individual properties from flood damage. Each is appropriate in certain situations and each has advantages and disadvantages. All have been used in Des Plaines.

2. Many people are not aware of the various ways they can protect their own property. A public information program could produce many voluntary property protection projects.

3. Property owners can implement some of these property protection measures at little cost, especially for sites in areas of low flood hazard. For other measures, such as acquisition and elevation, the owners may need financial assistance.

4. The City should continue its rebate program to help property owners protect themselves from flooding and sewer backup. The program should be publicized more so more people will become aware of it.

5. The table on the next page identifies which measures are recommended for the 11 repetitive loss areas. Note: In the case of Areas 1-4 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.

   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. The Illinois Department of Natural Resources has data on each building in the Farmers Creek floodplain (Areas #1 – #4), including floor elevations, that would facilitate such individual evaluations.

6. It is possible that some very low properties will still be unprotected after the structural projects are constructed. The floor elevations should be reviewed to determine what properties will be subject to flooding and appropriate property protection measures should be examined.

7. Areas 5 and 6 (the Campground and Big Bend) have 80% of the repetitive loss properties. These buildings can only be protected by property protection measures that will cost $10,000 - $20,000. This is much more than the traditional projects that have been funded by the rebate program. The rebate program should be examined to see if a higher cost share or higher limit on funding would encourage more property protection measures by owners.

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					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

8. Emergency Services

Emergency services measures protect people during and after a disaster. At the state level, programs are coordinated by the Illinois Emergency Management Agency. The Cook County Emergency Management Agency is operated through the County Sheriff's Office. Des Plaines has its own part-time emergency manager.

8.1. Threat recognition

The first step in responding to a flood is knowing that one is coming. Without a proper and timely threat recognition system, adequate warnings cannot be disseminated and other emergency services activities can only react after the problem starts.

The U.S. Geological Survey maintains the Des Plaines gage on the Des Plaines River. This is described in Section 3.2 on page 20. Real time river levels are reported on the Geological Survey's web site. The data can be accessed at the following website: http://il.water.usgs.gov/nwis-w/IL/data.components/rt.cgi?statnum=05529000 This tells the user *current* conditions.

A good system will predict the time and height of the flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels. On larger rivers, including the Des Plaines, the measuring and calculating is done by the National Weather Service which is in the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA).

On the Des Plaines River, the Weather Service can issue a specific *prediction* of when and how high the river will crest at the four major gage sites. As the example below shows, the City can receive up to three days advance notice of when the Des Plaines River will flood and how high it will go. Recent predictions have been accurate to within one-half foot.

THE FOLLOWING RIVER FORECASTS ARE BASED ON OBSERVED PRECIPITATION AND FORECAST PRECIPITATION FOR THE NEXT 24 HOURS:

LOCATION	FLD STG	OBSERVED STG	DAY TIME	FORECAST 7AM WED	THU	FRI
DES PLAINES RIVER						
RUSSELL	07	9.5	TUE 6 PM	9.8	9.8	9.6
GURNEE	07	7.7	TUE 6 PM	8.9	10.3	10.8
DES PLAINES	05	2.3	TUE 6 PM	2.6	3.5	5.3
RIVERSIDE	06	4.7	TUE 8 PM	4.8	5.1	5.5

NOAA Weather Wire flood predictions, Tuesday, June 13, 2000

See the graph on page 20 to relate stage to elevation above sea level at the Des Plaines gage.

Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio. The NOAA Weather Wire is monitored by the state and County emergency management agencies The Weather Channel also keeps viewers up to date on NOAA watches and warnings.

On smaller rivers, locally established rainfall and river gages are needed to establish a flood threat recognition system. There are none on the tributaries to the Des Plaines River.

The National Weather Service may issue a "flash flood watch." This means the amount of rain expected will cause ponding and other flooding on small streams and depressions. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available.

In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

8.2. Warning

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

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

Watch: conditions are right for flooding

Warning: a flood has started or has been predicted

A more specific warning may be disseminated by the community in a variety of ways. 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. Outdoor warning sirens can reach the most people quickly (except those around loud noise, such as at a factory or during a thunderstorm), but they do not explain what hazard is coming. Radio and TV provide a lot of information, but people have to know to turn them on.

Outdoor warning siren

In Des Plaines, the following techniques are used:

- There are 11 outdoor warning sirens that cover the City
- A system of "live voice messengers" 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
- People who have NOAA Weather Radio will be advised of the Weather Service predictions for the Des Plaines River gage.
- The City can insert messages that are shown on all televisions that use Cable TV

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). In Des Plaines, residents are instructed to listen to WBBM News Radio (AM 780) for more information.

8.3. Response

The protection of life and property is the foremost important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

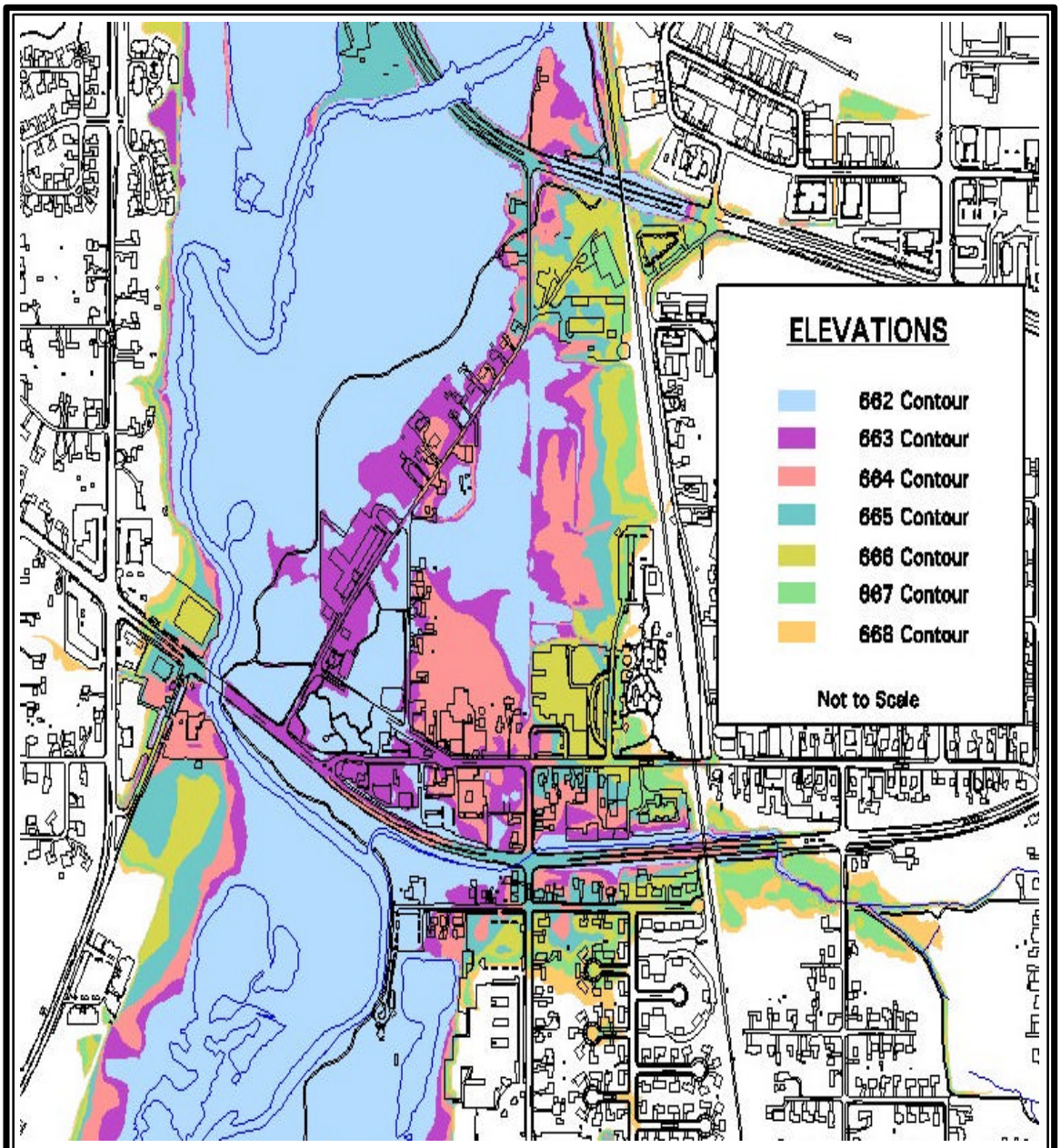
Planning is best done with adequate data. One of the best tools is a flood stage forecast map that shows what areas would be under water at various flood stages (see example, next page). Emergency management staff can identify the number of properties flooded, which roads will be under water, which critical facilities will be affected, etc.. With this information, an advance plan can be prepared that shows problem sites and determines what resources will be needed to respond to the predicted flood level.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to make sure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner.

Engineering and Fire Department staff use the Des Plaines River gage flood predictions, but the City does not have a flood stage forecast map. The City's emergency management office has a list of actions to undertake when the Des Plaines River reaches certain levels, but the levels are keyed to readings at gages on Miner Street and Rand Road, not the predicted levels at the USGS Des Plaines gage.

The list of actions is based on past experience, which does include the 1986 flood, which was almost a 50-year flood according to the current official study. These actions include taking steps such as

- Start monitoring river levels,
- Activate the Emergency Operations Center, which is in the basement of City Hall,
- Close roads and bridges,
- Distribute sand and sandbags, and
- Advise residents and businesses to evacuate.



Des Plaines River Flood Stage Forecast Map

This map, developed by the Village of Gurnee, shows which areas will go underwater at various elevations. These figures can be related to stage readings at the Gurnee Gage.

The vast majority of the properties in the repetitive loss areas are single family homes. Only one property is considered a "critical facility," the Maryville Scott Nolan hospital in Area #7. This is a resident mental health facility. It is not a hospital that would be needed to treat disaster victims, but special precautions are needed if the building had to be evacuated. The City has no special flood response arrangements with the hospital.

8.4. Post-Flood Recovery and Mitigation

After a disaster, communities should undertake activities to protect public health and safety, facilitate recovery and help prepare people and property for the next disaster. Throughout the recovery phase, everyone wants to get "back to normal." The problem is, "normal" means the way they were before the disaster, exposed to repeated damage from future disasters. Appropriate measures include the following:

Recovery actions

- Patrolling evacuated areas to prevent looting
- Providing safe drinking water
- Monitoring for diseases
- Vaccinating residents for tetanus
- Clearing streets
- Cleaning up debris and garbage
- Regulating reconstruction to ensure that it meets all code requirements

Mitigation actions

- Conducting a public information effort to advise residents about 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 substantially or repeatedly damaged properties from willing sellers
- Planning for long term mitigation activities
- Applying for post-disaster mitigation funds

Requiring permits, conducting inspections, and enforcing the National Flood Insurance Program's (NFIP) substantial improvement/substantial damage regulations (see box, page 45) can be very difficult for local, understaffed overworked offices after a disaster. If these activities are not carried out properly, not only does the municipality miss a tremendous opportunity to redevelop or clear out a hazardous area, it may be violating its obligations under the NFIP.

The City of Des Plaines has no formal plans for post-disaster mitigation, although several of the above listed activities have been implemented after past floods.

8.5. Conclusions and Recommendations

1. The City has a flood warning and response system which has worked in the past and has been improved based on lessons learned. However, much of it has not been written up as a formal part of the City's emergency management procedures.

2. The City should prepare a flood stage forecast map that links Des Plaines River gage flood crest predictions to flooding in specific areas of the City. This will facilitate flood warning and response activities.

3. Among other benefits, a more formal warning and response system could qualify the City for more credit under the Community Rating System. It would include:

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

4. The City should implement a public information program to advise residents and businesses of the warning procedures and what to do when warnings are issued.

9. Natural Resource Protection

Natural resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. In so doing, these activities enable the naturally beneficial functions of floodplains and watersheds to be better realized. These measures are implemented by a variety of public and private parties ranging from local park districts, forest preserves and regulatory agencies to land developers and farmers.

It should be noted that many of the measures discussed in this section are under consideration by the Upper Des Plaines Initiative. This is a cooperative effort by local, state and federal agencies to identify multi-objective projects to augment the Corps' flood control efforts. Other efforts are being led by the Upper Des Plaines River Ecosystem Partnership (http://homepage.interaccess.com/~niwca/desplaines.htm) and the Des Plaines River Watershed Alliance (http://www.desplaineswatershed.org/)

9.1. Wetland Protection

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

Wetlands

- Store large amounts of floodwater *
- Reduce downstream flood peaks
- Reduce flood velocities
- Protect shorelines from erosion
- Filter water making it cleaner
- Are groundwater recharge and discharge sites
- Provide habitat for species that cannot live or breed anywhere else

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

The National Wetland Inventory identifies areas that are likely to have wetlands. The Inventory lists several different types of wetlands in Des Plaines:

Lacustrine Unvegetated (Big Bend Lake)	23 acres
Palustrine – seasonally flooded (Des Plaines River floodplain)	58 acres
Palustrine – forested (upland Farmers Creek floodplain)	95 acres
Riverine Unvegetated (along the channel of the Des Plaines River)	75 acres
Total Wetlands Area	251 acres

There are three major approaches to protecting these valuable areas, regulation of development, public information, and acquisition and/or restoration.

Regulation: Wetlands are regulated by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency under Section 404 of the Clean Water Act. Before a "404" permit is issued, the plans are reviewed by several agencies, including the Corps and the U.S. Fish and Wildlife Service. Each of these agencies must sign off on individual permits. There are also nationwide permits that allow small projects that meet certain criteria to proceed without individual permits.

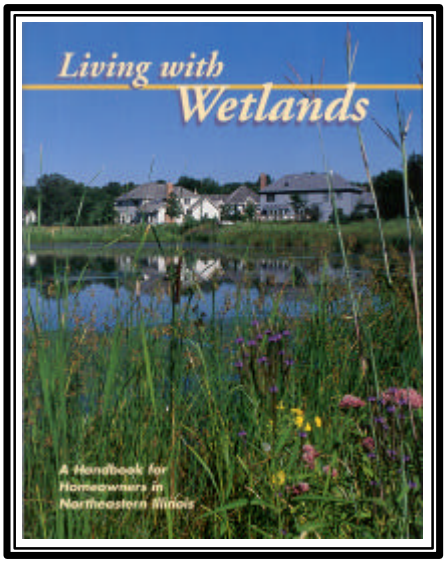
Generally, these agencies want to protect wetlands by preventing development that will adversely affect them. If a permit is issued, the impact of the development is typically required to be mitigated. Wetland mitigation can include creation, restoration, enhancement or preservation of wetlands. The appropriate type of mitigation is addressed in each permit.

For example, the work on the Rand Park Levee (see pages 35 – 36) will involve damage to less than an acre of wetland in the vicinity of the closure structure and pump station on Farmer's Creek at the railroad. The design includes the cost for "mitigation banking," i.e., contributing to a fund to restore or preserve wetlands elsewhere in the watershed.

One concern with Corps of Engineers wetland regulations, is that the Corps' jurisdiction is limited to wetlands that are connected to the "waters of the United States." A recent court ruling clarified this and limited the Corps' protection even more in small, isolated wetland areas. Many states and communities have their own wetland protection programs. They address the gaps in Federal regulations, particularly to cover smaller wetlands and unregulated activities.

The Lake County Stormwater Management Commission recently amended its regulations to fill the recently created jurisdiction gap over isolated wetlands, which will help downstream communities like Des Plaines. However, most communities in the Cook County part of the Des Plaines River watershed, including Des Plaines, have not moved to fill this regulatory gap.

Public information: Educating property owners and local officials on the benefits and methods of protecting wetlands pays off in later land use decisions. There are some excellent public information materials, such as "Living with Wetlands."



Restoration: Publicly or privately funded restoration projects have been undertaken. One of the most important is the Des Plaines River Wetlands Demonstration Project which is discussed in the box on the next page. Des Plaines is a downstream beneficiary of this work. The Emergency Management staff reports having already seen the benefits of this project in reduced flooding.

Wetlands Demonstration Project

The Des Plaines River Wetlands Demonstration Project is located in northern Lake County. The following was taken from materials supplied by the manager, Wetlands Research, Inc., Wadsworth.

On 550 acres in northeastern Illinois, hydraulically-controlled experimental wetlands are being constructed where abandoned farm fields once stood. The rehabilitated ecosystems provide the ideal conditions for research into the natural processes of aquatic systems.

In addition to serving as a major research site, the project also demonstrates to the public and policy makers the multi-functional value of wetlands, transitional prairies and upland oak grove buffers. The site illustrates why wetlands have been called the most productive ecosystems on earth.

Approximately 3 miles of the upper Des Plaines River courses through the site, carrying contaminants from agricultural and urban runoff and from small treatment plants. Eighty percent of the 215-square-mile watershed is agricultural, contributing the herbicide atrazine in concentrations that, on occasion, exceed drinking water standards. The water also violates the state's standards for iron, copper and fecal coliforms. Based on the results of benthic surveys, the stream is classified as semi-polluted.

Turbidity is the primary water quality problem of the river. It delivers to the site more than 5,000 tons of suspended solids per year. The resulting turbidity prevents light from penetrating the water, inhibiting the growth of plants and the habitation of sight-feeding fish such as pike.

The efficiency of the experimental wetlands as watershed treatment systems, has been established. The observed changes in water quality are impressive: analyses indicate that the experimental wetlands trap more than 80 percent of the sediments and nutrients contained in the incoming river water. This research shows that to use constructed wetlands such as these to improve the water quality of an entire watershed would require converting only 2 to 4 percent of the land area to this use.

Further, the benefits of wetland restoration are readily apparent at the site. The river, once obscured by a wall of weedy vegetation, is now visible through a rehabilitated oak grove. Restored mesic prairies are increasing in diversity, thus supporting a wider variety of fauna species. Water rests on land that formerly was drained for farming.

The Des Plaines River Wetlands Demonstration Project is one of the nation's largest, systematic research sites dedicated to demonstrating how wetlands can be restored to solve pressing environmental problems. The Project's restoration activities, research results and public education efforts will provide new and greatly needed information about how—and at what cost—wetland ecosystems can be re-established and used to manage this country's water and wildlife resources. This information will be applicable throughout the nation, wherever wildlife habitat, pollution abatement and flood storage are scarce and in demand.

9.2. Erosion and Sedimentation Control

Construction projects expose large areas to erosion

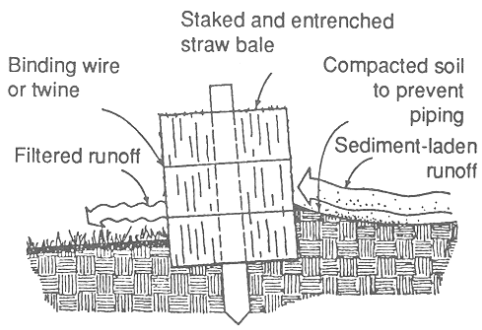
Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along streambanks and shorelines as the volume and velocity of flow or wave action destabilize and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

Sediment suspended in the water tends to settle out where flowing water slows down. It can clog storm sewers, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands.

When channels are constricted and flooding cannot deposit sediment in the bottomlands, even more is left in the channels. The result is either clogged streams or increased dredging costs.

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

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



Straw bales catch sediment

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

Chapter 16 of the City Code has erosion and sedimentation control requirements for construction in the City. It affects relatively small sites (<100 cubic yards or < 5,000 square feet of excavation, fill or combination). These requirements score very well under the Community Rating System.

9.3. River Restoration

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

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve “retrofitting” the shoreline with willow cuttings, wetland plants, and/or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots. The illustration below shows how this can work for retention ponds.

A tale of two retention basins

Both of these retention basins are in Northeastern Illinois. On the left, the traditional design used steep slopes and rock rip-rap to stabilize the shore line. The site is plagued with geese. The basin on the right uses natural plantings which provides a more attractive setting and the tall grasses have kept geese away.

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

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

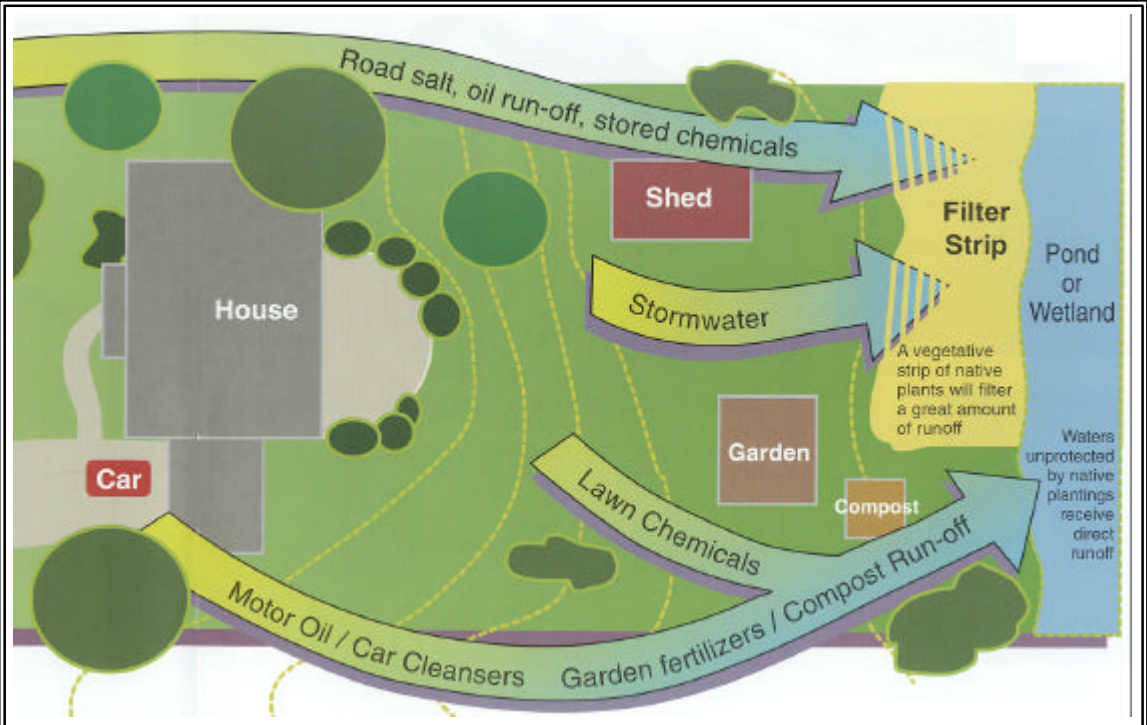
The last bullet deserves special attention. Studies have shown that after establishing the right vegetation, long term maintenance costs are lower than if the banks were concrete. The Natural Resources Conservation Service estimates that over a ten year period, the combined costs of installation and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

9.4. Best Management Practices

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

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

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment).



Grass filter strips clean stormwater runoff and improve water quality.

Living With Wetlands, A Handbook for Homeowners in Northeastern Illinois

In addition to preventing increases in downstream flooding and minimizing water quality degradation, BMPs preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple use of drainage and storage facilities.

BMPs can be implemented during construction and as part of a project's design to permanently address nonpoint source pollutants. There are three general ways they can do this:

- Avoidance: Setting construction projects back from the stream.
- Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
- Cleanse: Stopping pollutants after they are en route to a stream, such as using grass drainageways that filter the water and retention and detention basins that let pollutants settle to the bottom before they are drained (see previous page).

In addition to improving water quality, BMPs can have flood related benefits. By managing runoff, they can attenuate flows and reduce the peaks after a storm. Combining water quality and water quantity measures can result in more efficient multi-purpose stormwater facilities. For example, BMPs that enhance the infiltration of stormwater will result in less volume of runoff.

The City of Des Plaines' stormwater management regulations (Section 890, Appendix A) do not have any special water quality or BMP provisions. However, the Environmental Protection Agency's new NPDES Phase II requirements, which take effect next Spring, will require water quality provisions in more City activities. It should also be noted that residents have reported that the Des Plaines River is cleaner than it was 20 years ago.

9.5. Dumping Regulations

BMPs usually address pollutants that are liquids or suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' ability to convey or clean stormwater (see photo, page 39).

Stream dumping sign

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard not realizing that it is needed to drain street runoff. They may not understand how regrading their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

Section 8-4-11 of the City Code prohibits dumping of any refuse, including yard waste and construction material, on private property or public place. If this provision were publicized, the City would receive additional credit under the Community Rating System.

9.6. Conclusions and Recommendations

1. A flood mitigation program can take advantage of interest in protecting wetlands and natural floodplain functions and utilize natural resource protection programs to support flood protection.

2. The City's regulations for erosion and sediment control and stream dumping meet national criteria and should continue to be enforced.

3. The City should consider strengthening its regulations on wetland protection and best management practices.

10. Public Information

A successful flood loss reduction 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 protection steps and protect the natural and beneficial functions of floodplains and watersheds.

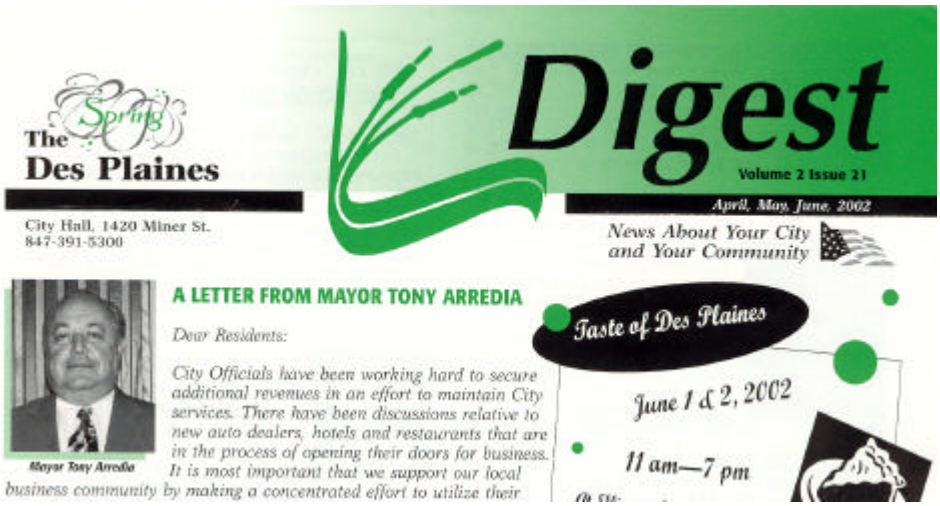
10.1. Outreach Projects

Outreach projects are the first step in the process of orienting property owners to property protection and assisting them in designing and implementing a project. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Research has found that the most effective types of outreach projects are mailed or otherwise distributed to floodprone property owners or to everyone in the community. Other approaches include the following:

- Articles and special sections in newspapers
- Radio and TV news releases and interview shows
- Hazard protection video for cable TV programs or to loan to organizations
- Presentations at meetings of neighborhood, civic or business groups
- Displays in public buildings or shopping malls

The City has a quarterly monthly newsletter, “The Des Plaines Digest” which carries articles about flood protection. The City also sends a special mailing on flood issues each year to all properties in the floodplain, All of these projects can be used to introduce concepts such as property protection, flood safety and flood insurance. The other measures in this chapter provide more detailed information to the public.

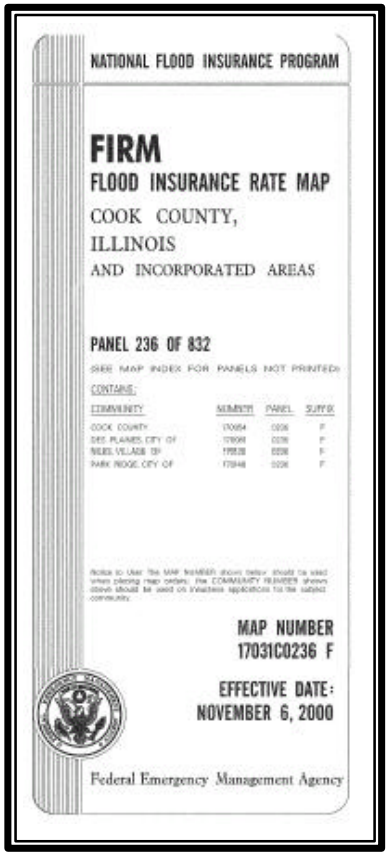

Spring
The Des Plaines
Digest
Volume 2 Issue 21
April, May, June, 2002
City Hall, 1420 Miner St.
847-391-5300
News About Your City and Your Community
A LETTER FROM MAYOR TONY ARREDIA
Mayor Tony Arredia
Dear Residents:
City Officials have been working hard to secure additional revenues in an effort to maintain City services. There have been discussions relative to new auto dealers, hotels and restaurants that are in the process of opening their doors for business. It is most important that we support our local business community by making a concentrated effort to utilize their
Taste of Des Plaines
June 1 & 2, 2002
11 am—7 pm

This edition of the *Des Plaines Digest* was used to distribute the flood questionnaire.

10.2. Map Information

Many benefits stem from providing map information to inquirers. Residents and businesses who are aware of the potential hazards can take steps to avoid problems and/or reduce their exposure to flooding. Real estate agents and house hunters can find out if a property is floodprone and whether flood insurance may be required.

Flood maps have a wealth of information about past and potential flood hazards. However, they can be hard to obtain and many people have trouble reading maps. Therefore, communities that provide map information from FEMA's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study perform a valuable public information service. Communities 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.


NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
COOK COUNTY,
ILLINOIS
AND INCORPORATED AREAS

PANEL 236 OF 832

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COOK COUNTY	170054	0236	F
DES PLAINES, CITY OF	170091	0236	F
NILES, VILLAGE OF	170128	0236	F
PARK RIDGE, CITY OF	170148	0236	F

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
17031C0236 F

EFFECTIVE DATE:
NOVEMBER 6, 2000

Federal Emergency Management Agency

Communities can often supplement what is shown on the FIRM with maps that complement and clarify the FIRM and information on additional topics, such as repetitive loss areas, wetlands, flooding outside mapped areas. When the information is provided, community staff could also explain insurance, property protection measures and mitigation options that are available to property owners.

The Engineering Department 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. This services receives the maximum number of points from the Community Rating System.

Precaution: A map information service needs to remind inquirers that being outside the mapped floodplain is no guarantee that a property will never get wet.

There are many references on flood protection for property owners.

10.3. Library

The community library is an obvious place for residents to seek information on hazards, hazard protection, and protecting natural resources. Historically, libraries have been the first place people turn to when they want to research a topic.

Interested property owners can read or check out handbooks or other publications that cover their situation. Libraries also have their own public information campaigns with displays, lectures, and other projects, which can augment the activities of the local government.

A search for "flood" and related topics in the Des Plaines Public Library's catalog found over 50 references. However, only two of them would help property owners. As part of the Community Rating System cycle verification, the collection is being brought up to date with more recent national and local materials.

10.4. Websites

Today, websites are becoming more popular as sources of information and research tools. They provide quick access to a wealth of public and private sites. 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.

The City's website (www.desplaines.org/) provides information on the City's offices and activities, frequently asked questions, codes and ordinances, links to other agencies in the County, and a link to the real-time river levels at the Des Plaines River gage. With relatively few changes, it could receive credit under the Community Rating System.

The City's website has a host of information

10.5. Technical Assistance

While general information helps, most property owners do not feel ready to floodproof their buildings without help or 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.

Some building department or public works staff visit properties and offer suggestions. Most can recommend or identify qualified or licensed companies, an activity that is especially appreciated by owners who are unsure of the project or the contractor.

Technical assistance can be provided in one-on-one sessions with property owners or can be provided through seminars. For instance, seminars or "open houses" can be provided on retrofitting structures, selecting qualified contractors, and carrying out preparedness activities.

The Engineering Department does provide many of these services. Staff can provide inquirers with site-specific flood information (e.g., how high past floods were in a neighborhood). Staff is also available to visit a property to help determine the causes and suggest solutions to a flood, drainage or sewer problem.

10.6. Real Estate Disclosure

Many times after a flood, people say they would have taken steps to protect themselves if only they had known they had purchased a property in the floodplain. Three regulations, one federal and two state, require that a potential buyer of a parcel be told of any flood hazard.

Federal law: Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building that the property is in a floodplain as shown on the Flood Insurance Rate Map.

Flood insurance is required for buildings located within the base floodplain if the mortgage or loan is federally insured. However, because this requirement has to be met only 10 days before closing, often the applicant is already committed to purchasing the property when he or she first learns of the flood hazard.

Illinois Residential Real Property Disclosure Act: This law, which went into effect on October 1, 1994, 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, or if the seller is aware of a radon problem, a mine subsidence hazard, or structural defects.

This State law is not wholly reliable because the seller must be aware of a problem and willing to state it on the disclosure form. Due to the sporadic occurrence of flood events, a property owner may legitimately not be aware of potential flooding problems with a property being sold or purchased.

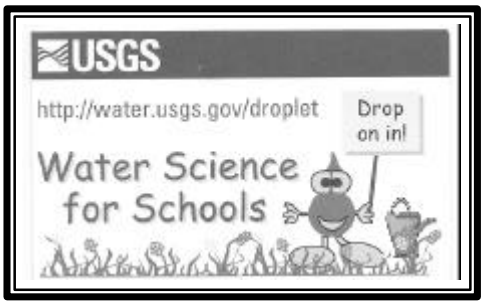
Illinois Compiled Statutes: Chapter 55, Section 5/3-5029 requires that all subdivision plats must show whether any part of the subdivision is located in a Special Flood Hazard Area. This provision is also in Chapter 14, Section 9-14-10(B) of the City Code.

In 1986, after the October flood, the Des Plaines City Council considered amending the real estate transfer tax ordinance to mandate notifying buyers the local flood hazards. The Council concluded that Federal and State requirements were more appropriate.

10.7. Educational Programs

A community's most important natural resource is its children. These future generations will inherit the resources, infrastructure and development left to them. They will also be facing the same natural forces that cause periodic flooding, tornadoes, storms and other hazards. These watersheds and floodplains will be theirs to farm, build on and care for.

Environmental education programs can teach children about natural hazards, the forces that cause them, the factors that cause problems, and the significance of protecting the natural and beneficial functions of watersheds and floodplains. These programs can be undertaken by schools, park and recreation departments, conservation associations, and youth organizations, such as the Boy Scouts, Campfire Girls and summer camps. An activity can be as involved as course curriculum development or as simple as an explanatory sign near a river.



Youth educational programs are not limited to children. Often adults learn about innovative concepts or new ideas from their children. If the children come home with an assignment for their new water quality monitoring project, the parents become interested in finding out about water quality monitoring.

There are many programs that provide support and curriculum materials for school and other educational programs. These include web sites ("FEMA for Kids," USGS' "Water Science for Schools," etc.), posters, coloring books, games, and references. These items and, possibly, hands-on models where students can see the effects of different land use practices may be available through the local soil and water conservation district.

There are several regional education support groups, like Project WET (Water Education for Teachers), Chicago Wilderness and the Chicago River Schools Network. These groups have a variety of programs, but most of them are environmental programs that focus on protecting natural functions rather than protection of people from hazards.

10.8. Conclusions and Recommendations

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. Some of the public information activities can be implemented by City staff. Other public information activities require coordination with other organizations, such as schools and real estate agents. There are several area organizations that can provide support for public information and educational programs.

3. The following topics should be covered in public information activities.

   a. Status of flood control projects and what the City and other agencies are doing
   b. The benefits and costs of flood and other types of insurance
   c. Retrofitting a house or a business to protect it from floods
   d. Rules on building in the floodplain
   e. Rules on dumping in waterways
   f. Sources of assistance

4. The following media should be used to convey these messages.

   a. City-wide newsletter
   b. Technical advice from City staff
   c. Mass mailing to all floodplain residents
   d. Visits to a home by City staff
   e. References available in the public library
   f. Information and links on the City's website

11. Action Plan

11.1. Summary of Conclusions and Recommendations

Chapters 2 and 3 present the flood threat that is facing the City's repetitive loss areas. Chapter 4 sets four goals for this plan:

1. Protect existing properties
2. Keep the problem from getting worse
3. Use City funds most efficiently
4. Maximize property owner participation

Chapters 5 – 10 review the six major strategies that the City can pursue to reach these goals. At the end of each of these chapters, the findings are reviewed as conclusions and recommendations. These are summarized here under the four goals to set the stage for the action items. In the parentheses at the end of each statement is the chapter that has more information on the topic.

1. Protect existing properties

a. The Corps and IDNR should proceed and implement the flood control projects that have been recommended for the Des Plaines River and that will be recommended for Farmers and Prairie Creeks. (5. Structural Projects)

b. The City should continue inspections and maintenance of the drainage system, but update its written procedures to maintain its credit under the Community Rating System. (5. Structural Projects)

c. The table on page 59 identifies which protection measures are recommended for the 11 repetitive loss areas. These range from acquisition to flood insurance. However, in the case of Areas #1 – #4 and #8, planned flood control projects will substantially reduce the flood threat to these properties. The priority for property protection approaches should therefore be for Areas #5 – #7 and #9 – #11. (7. Property Protection)

d. The City should prepare a more formal warning and response system. It should be based on a flood stage forecast map that links flood crest predictions at the Des Plaines River gage to specific areas of the City. (8. Emergency Services)

2. Keep the problem from getting worse

a. The City should continue to enforce the provisions of its floodplain management regulations to ensure that future construction and reconstruction in the floodplain will be protected from the base flood. (6. Preventive Measures)

b. The City should work with the Cook County and Lake County Stormwater Management Commissions to explore stormwater management measures that limit increases in the volume of runoff leaving new developments in the Des Plaines River watershed. (6. Preventive Measures)

c. The City's regulations for erosion and sediment control and stream dumping meet national criteria and should continue to be enforced. Regulations protecting wetlands and water quality should be considered. (9. Natural Resource Protection)

3. Use City funds most efficiently

a. The City should continue to participate as a local sponsor for the flood control projects underway by the Corps and IDNR. (5. Structural Projects)

b. The City should continue its rebate program to help property owners protect themselves from flooding and sewer backup. The program should be publicized more. (7. Property Protection)

c. Areas 5 and 6 (the Campground and Big Bend) have 80% of the repetitive loss properties. These buildings can only be protected by property protection measures that will cost $10,000 - $20,000. This is much more than the traditional projects that have been funded by the rebate program. The rebate program should be examined to see if a higher cost share or higher limit on funding would encourage more property protection measures by owners. (7. Property Protection)

4. Maximize property owner participation

a. Property owners can implement some property protection measures at little cost. For other measures, such as acquisition and elevation, the owners may need financial assistance. (7. Property Protection)

b. The City should implement a public information program to advise residents and businesses of the warning procedures and what to do when warnings are issued. (8. Emergency Services)

c. The following topics should be covered in public information activities.

1) Status of flood control projects and what the City and other agencies are doing
2) The benefits and costs of flood and other types of insurance
3) Retrofitting a house or a business to protect it from floods
4) Rules on building in the floodplain
5) Rules on dumping in waterways
6) Sources of assistance (10. Public Information)

d. The following media should be used to convey these messages.

1) City-wide newsletter
2) Technical advice from City staff
3) Mass mailing to all floodplain residents
4) Visits to a home by City staff
5) References available in the public library
6) Information and links on the City's website (10. Public Information)

11.2. Action Items

This section lists eight action items to implement this plan. They are listed by responsible office. They are summarized by benefiting repetitive loss area in the matrix on page 85. The recommended flood loss reduction measures are:

- Pursue the Corps and IDNR flood control projects for Areas 1 – 4 and 8
- Provide technical and financial assistance for those areas where property protection measures would be most useful, Areas 6, 7, 9, 10 and 11.
- Work with the residents of Area 5, which will have minimal flood protection from the flood control projects and where most property protection measures are not appropriate, to determine the best protection measures for each building.

Engineering Department

1. Corps and IDNR Projects

   a. Description: Monitor and assist the efforts of the Corps of Engineers and the Illinois Department of Natural Resources' projects to reduce flooding on the Des Plaines River and Farmers and Prairie Creeks. Assist IDNR as needed to complete the Farmers Creek channel improvements. It should be noted that those areas on the Des Plaines River that will not be protected by the Rand Park Levee (Areas 5, 6, 7, and 9) will benefit from only a slight reduction in flood levels.

   b. Deadline: Ongoing

   c. Budget: $750,000 is the City's share of the Rand Park Levee. There is no cost share for the Farmers and Prairie Creeks channel improvements. The cost of the retention projects on these streams has not yet been determined by IDNR.

2. Property Protection Assistance

   a. Description: Provide reference materials and technical assistance to property owners interested in retrofitting or insuring their buildings. This service should be publicized and made available to all interested parties.

   b. Deadline: Ongoing

   c. Budget: Staff time.

3. Property Protection Funding

   a. Description: Review State and Federal sources of property protection funding to determine if they would be appropriate for the City. Review the costs and benefits of expanding the Flood Rebate Program to see if a higher cost share or higher limit on funding would encourage more property protection measures by owners. Provide a report for the City Manager on appropriate funding mechanisms and whether certain areas should be high or low priorities (e.g., areas slated for a protection by flood control project).

   b. Deadline: Prepare the report by April 30, 2003

   c. Budget: Staff time.

4. Stormwater Management Standards

   a. Description: Work with the Cook County and Lake County Stormwater Management Commissions to explore stormwater management measures that limit increases in the volume of runoff leaving new developments in the Des Plaines River watershed.

   b. Deadline: Ongoing

   c. Budget: Staff time.

5. Campground Protection

   a. Description: Area 5, the Campground, will have minimal flood protection from the flood control projects. Given the type and condition of the buildings and the depth of flooding, most property protection measures are not appropriate. Work with the owners to review the property protection measures of acquisition and elevation and sources of funding. No work should be done without the full cooperation of the owners.

   b. Deadline: Prepare a status report to the City Manager on owner interest and sources of funding by July 31, 2003.

   c. Budget: Staff time (for the report); a budget for property protection funding would be developed as part of the report.

Community Development

6. Development Regulations

   a. Description: Continue to enforce the regulations that preserve open space in the floodplain and ensure that new construction and substantial improvements will be protected from the base flood and adjacent areas will be protected from the impact of new construction. In coordination with NPDES Phase II efforts, review possible regulatory revisions that would provide better protection for wetlands and water quality.

b. Deadline: Prepare a report for the City Manger on possible regulatory revisions by July 31, 2003

c. Budget: Staff time.

Emergency Manager

7. Flood Response Plan

a. Description: Prepare a formal warning and response system based on a flood stage forecast map that links flood crest predictions at the Des Plaines River gage. Apply for CRS credit for the plan.

b. Deadline: Have a draft plan for the City Manager by September 30, 2003.

c. Budget: Staff time.

Public Relations

8. Outreach Projects

a. Description: Develop and publish the following projects:

– Publicity on City flood protection services, including references in the Library

– Flood protection information (floodproofing, insurance, etc.) in articles in the "Des Plaines Digest"

– An annual mailing to all properties in the mapped floodplain and in the identified repetitive loss areas.

– A page on the City's website that includes flood protection information and links to other helpful sites

b. Deadline: Have all projects published by September 30, 2003. Update and repeat them each year.

c. Budget: Staff time plus printing and postage ($2,000).

Area\Action Item	1. Corps and IDNR Projects	2. Property Protection Assistance	3. Property Protection Funding	4. Stormwater Management	5. Campground Protection	6. Development Regulations	7. Flood Response Plan	8. Outreach Projects
1. Bellaire	X	X	X			X	X	X
2. Seminary	X	X	X			X	X	X
3. Forest Edge	X	X	X			X	X	X
4. Apple Creek	X	X	X			X	X	X
5. Campground		X	X	X	X	X	X	X
6. Big Bend		X	X	X		X	X	X
7. Scott Nolan		X	X	X		X	X	X
8. 1723-53 Busse	X	X	X	X		X	X	X
9. Campbell		X	X	X		X	X	X
10. Windsor		X	X					X
11. Westmere		X	X					X

Matrix of Action Items and Benefiting Repetitive Loss Areas

Note: Action item 1. the proposed projects on the Des Plaines River and Farmers Creek will provide minimal flood reduction to those areas not protected by the Rand Park Levee, i.e., Areas 5, 6, 7 and 9.

11.3. Plan Adoption

It is recommended that the City Council adopt this plan by October 21, 2002, with the following resolution. All five items in the resolution are requirements for continued credit under the Community Rating System.

Resolution No. ____

Whereas the City of Des Plaines has been faced with repetitive overbank flooding and drainage problems that have flooded buildings, closed businesses, disrupted traffic, and presented a general public health and safety hazard; and

Whereas the City's Engineering Department has prepared a recommended *Repetitive Loss Plan* that reviews the City's options to protect 11 identified repetitive loss areas from flooding; and

Whereas the recommended *Repetitive Loss 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 *Repetitive Loss Plan* is hereby adopted as an official plan of the City of Des Plaines.

2. By September 30 each year, the Engineering Department shall prepare an annual evaluation report to the Mayor and City Council on the *Repetitive Loss Plan*. The report will cover the following points:

    a. A review of the original plan.

    b. A review of any floods that occurred during the previous calendar year.

    c. A review of the action items in the original plan, including how much was accomplished during the previous year.

    d. A discussion of why any action items were not completed or why implementation is behind schedule.

    e. Recommendations for new projects or revised action items. Such recommendations shall be subject to approval by this Council as amendments to the adopted plan.

3. The Engineering Department's annual report shall be distributed to the City Council and the media.

4. The City Manager is charged with supervising the implementation of the plan's recommendations within the funding limitations provided by the City Council or other sources.

5. The Engineering Department will prepare an update of the *Repetitive Loss Plan* by September 30, 2007 and submit it to the City Council for adoption. The update shall meet all the requirements of a Community Rating System repetitive loss plan in effect at that time.

ADOPTED this the _____ day of _____, 2002

_____
Clerk of the City of Des Plaines, Illinois

APPROVED this the _____day of_____, 2002

_____
Mayor of the City of Des Plaines, Illinois

Appendix A. References

1. *Best Management Practices Guidebook for Urban Development*, Northeastern Illinois Planning Commission, 1992.

2. *Comprehensive Plan*, City of Des Plaines, 1995

3. *Cook County Comprehensive Land Use Plan*, 1999 (excerpts)

4. *CRS Coordinator's Manual*, Community Rating System, FEMA, 2002

5. *CRS Credit for Drainage System Maintenance*, FEMA, 2002

6. *CRS Credit for Flood Warning Programs*, FEMA, 1999

7. Des Plaines City Code, 2002

8. *Environmental Consideration in Comprehensive Planning*, Northeastern Illinois Planning Commission, 1994.

9. *Flood Fighting*, Illinois Department of Transportation, Division of Water Resources, 1985.

10. Flood Insurance Agent's Manual, FEMA, 2002

11. *Flood Insurance Study*, Cook County, Illinois and Incorporated Areas, Federal Emergency Management Agency, November 6, 2000.

12. *Flood Proofing Techniques, Programs and References*, U.S. Army Corps of Engineers National Flood Proofing Committee, 1991.

13. *Flood Proofing: How to Evaluate Your Options*, U.S. Army Corps of Engineers, 1993.

14. "Floodproofed Sites in Illinois," French & Associates, 1992.

15. *Guide to Flood Protection in Northeastern Illinois*, Illinois Association for Floodplain and Stormwater Management, 1997.

16. *Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding*, Federal Emergency Management Agency, FEMA-312, 1998.

17. *Living With Wetlands, A Handbook for Homeowners in Northeastern Illinois*, The Wetlands Initiative, 1998

18. *Local Flood Proofing Programs*, U.S. Army Corps of Engineers, 1994.

19. *Northeastern Illinois Regional Greenways Plan*, Northeastern Illinois Planning Commission, 1992

20. *Our Community and Flooding, A Report on the Status of Floodwater Management in the Chicago Metropolitan Area*, Resource Coordination Policy Committee, 1998.

21. *Proposed Flood Control Plan*, Technical Sub-Committee, Des Plaines Flood Control Committee, April 2002 (draft).

22. *Protecting Nature in Your Community*, Chicago Wilderness and Northeastern Illinois Planning Commission, 2000.

23. Responses to questionnaires submitted by City residents, 2002.

24. *Stormwater management - The Benefits of Alternative Approaches*, South Suburban Mayors and Managers Association, 2000.

25. *Stormwater Management Public Information Resource Guide*, South Suburban Mayors and Managers Association, 1999

26. *Stream Corridor Restoration Principles, Processes and Practices*, Federal Interagency Stream Restoration Working Group, 1998. Copies available through the USDA Natural Resource Conservation Service.

27. Telephone conversations or meetings with:

    a. John LaBerg, Engineering Department, City of Des Plaines
    b. Don Meseth, Emergency Manager, City of Des Plaines
    c. Loren Wobig, Illinois Department of Natural Resources
    d. Paul Cathey, Des Plaines Park District
    e. Dave Kircher, Cook County Forest Preserve District
    f. Dennis Dreher, Northeastern Illinois Planning Commission
    g. Tom Curran, Maryville Scott Nolan Center

28. *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).