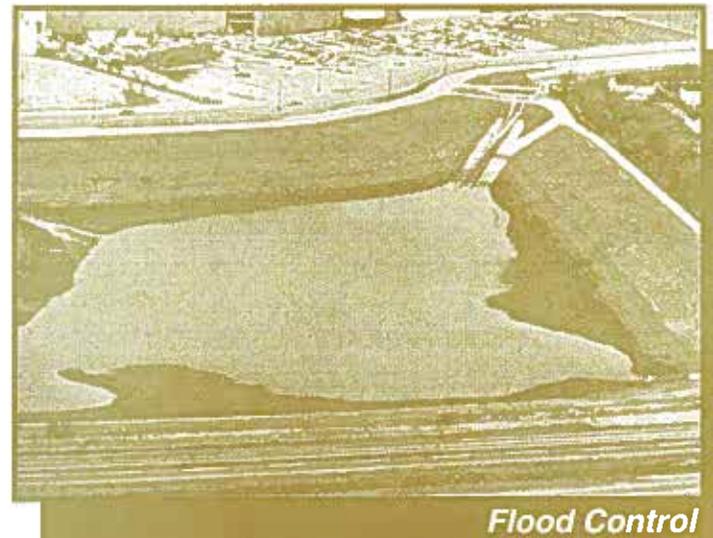
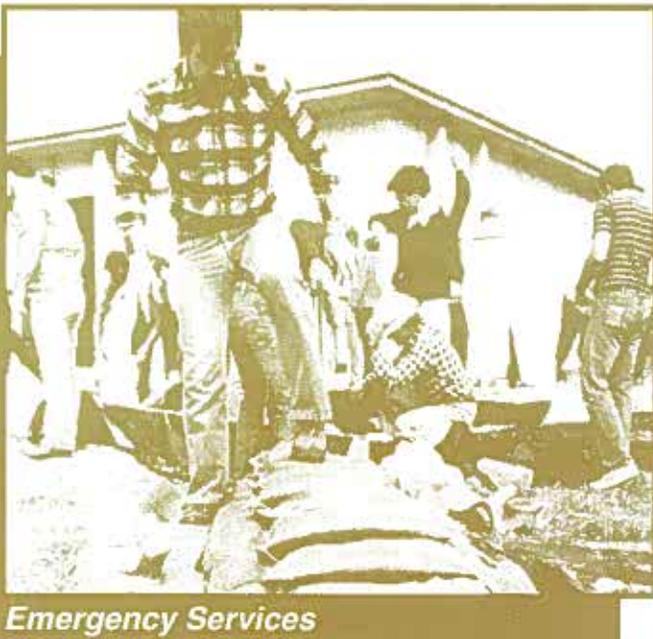
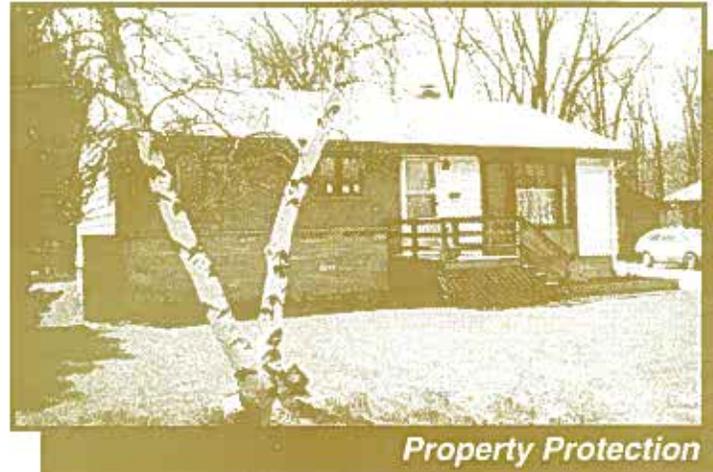
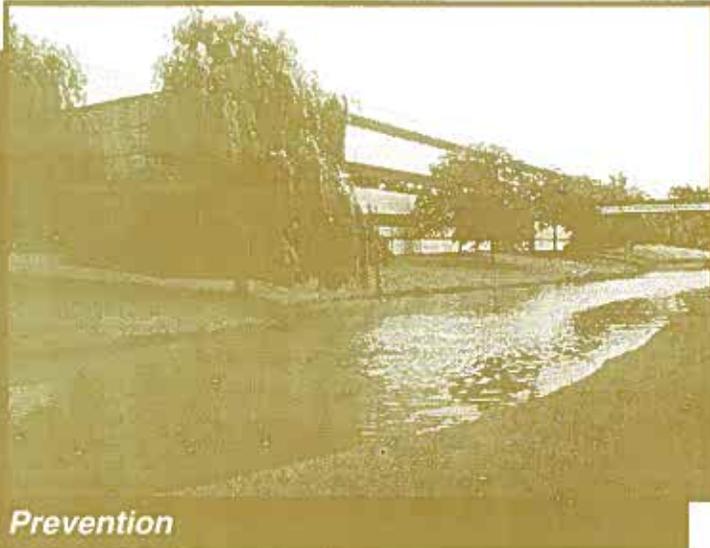


Flood Hazard Mitigation

in Northeastern Illinois

A GUIDE FOR LOCAL OFFICIALS



northeastern illinois planning commission
222 South Riverside Plaza • Suite 1800 • Chicago, Illinois 60606

Flood Hazard Mitigation In Northeastern Illinois A Guidebook for Local Officials

Northeastern Illinois Planning Commission
222 S. Riverside Plaza, Suite 1800
Chicago, Illinois 60606
(312)454-0400

July 1995

Price: \$13.00

This guidebook was prepared by the Northeastern Illinois Planning Commission with financial assistance from the US Department of Commerce, Economic Development Administration (Flood Recovery/Mitigation Grant number 06-06-61015). The statements and descriptions in this guidebook are those of the authors and do not necessarily reflect the views of the Economic Development Administration.

Prepared by

French & Associates, Ltd.
Park Forest, Illinois

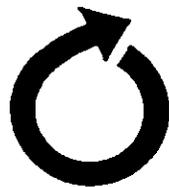


Northeastern Illinois is diverse in its land use and complex in its political structure. It has some of the most productive farms on earth — also one of the world's greatest cities. It contains 3,714 square miles of land and 38 square miles of water. It is home to 7 million people, organized in more than 1,250 units of government.

In 1957, following a decade of rapid urbanization in the Chicago suburban area, the Illinois General Assembly created the Northeastern Illinois Planning Commission (NIPC) to conduct comprehensive planning for the six-county greater Chicago region.

The Commission has three statutory charges: conduct research and collect data for planning; assist local government; and prepare comprehensive plans and policies to guide the development of the counties of Cook, DuPage, Kane, Lake, McHenry and Will.

By necessity, regional planning deals with general development policies not local land use detail. NIPC supports and coordinates county and municipal planning. The Commission has advisory powers only and relies upon voluntary compliance with its plans and policies.



northeastern illinois planning commission

222 South Riverside Plaza • Suite 1800 • Chicago, Illinois 60606 • (312) 454-0400 • FAX (312) 454-0411

EXECUTIVE COMMITTEE

Arthur F. Hill Jr.
President

Jerry Butler
Vice President

Olivia Gow
Secretary

Herbert T. Schumann
Treasurer

Patricia Sjurseth
Vice President for Planning

Alan D. Cornue
Vice President for Water Resources

Ruth K. Kretschmer
Past Commission President

Donna P. Schiller
Past Commission President

Sheila H. Schultz
Past Commission President

Charlie A. Thurston
Past Commission President

Phillip D. Peters
Executive Director

COMMISSIONERS

Appointed by the Governor of Illinois

James Berg

Alan D. Cornue

Ruth K. Kretschmer

Donna P. Schiller

Charlie A. Thurston

Appointed by the Mayor of Chicago

Patrick J. Levar, Alderman,
45th Ward, Chicago

Ed H. Smith, Alderman,
28th Ward, Chicago

Mary Ann Smith, Alderman,
48th Ward, Chicago

Valerie B. Jarrett, Commissioner,
Department of Planning
and Development

Rosanna A. Marquez,
Director of Programs

Elected by the Assembly of Mayors

Lyle W. Clem, Trustee,
Village of Algonquin

Jo Ann Eckmann, Mayor,
Village of Libertyville

Kyle R. Hastings, President,
Village of Orland Hills

William O'Hille, Mayor,
City of Geneva

Sheila H. Schultz, President,
Village of Wheeling

Rae Rupp Srch, President,
Village of Villa Park

Anthony Uremovic, Councilman,
City of Joliet

Appointed by the County Board Chairmen

Jerry Butler, Member,
Cook County Board of Commissioners

Danny K. Davis, Member,
Cook County Board of Commissioners

Herbert T. Schumann, Member,
Cook County Board of Commissioners

Olivia Gow, Member,
DuPage County Board

Patricia Sjurseth, Member,
Kane County Board

Richard Raffis, Member,
Lake County Board

Donald Doherty, Member,
McHenry County Board

Raymond Semplinski,
Will County Board

Appointed by the Board of the Regional Transportation Authority

Donald L. Totten

Appointed by the Board of the Chicago Transit Authority

Arthur F. Hill Jr.

Appointed by the Board of Metra

W. Warren Nugent

Appointed by the Board of Pace

Carl F. Roth

Appointed by the Board of the Metropolitan Water Reclamation District of Greater Chicago

Patricia Young

Appointed by the Board of the Illinois Association of Park Districts

Appointment Pending

Appointed by the Board of the Chicago Park District

Appointment Pending

Appointed by the Board of the Illinois Association of Wastewater Agencies

A. E. Machak

Flood Hazard Mitigation in Northeastern Illinois

Preface

This guidebook is for county and municipal staffs who want to prevent or reduce the damage and disruption caused by floods. It explains how to develop a flood hazard mitigation plan that addresses flood problems using mitigation measures that are most appropriate for the local community.

- Chapter 1 explains the guidebook's fundamental approach to hazard mitigation along with an overview of flooding conditions in northeastern Illinois.
- Chapter 2 details the four basic hazard mitigation strategies and measures to implement them.
- Chapter 3 leads community planners through the steps to develop an effective mitigation plan before a flood occurs. The pre-flood planning process is for those communities with plenty of time. Mitigation planners can proceed methodically through each step, taking the time needed to prepare a mitigation program tailored to local needs and flooding conditions.
- Chapter 4 guides community officials after a flood. The post-flood planning process accounts for time constraints, new data on flooding and flood damage provided by the recent flood, and disaster assistance programs that may help.
- Appendix A lists the agencies involved in flood hazard mitigation and related activities.
- Other appendices provide references and examples of items mentioned in the text.

The term "community" is used throughout this guidebook. In this context, a community is any city, village, county or other public entity with the desire and authority to design and implement measures to reduce a flood hazard that threatens its residents and businesses.

While the window of opportunity for mitigating hazards will be open after a flood, communities are advised not to wait for a disaster to initiate planning. **Pre-flood planning is always preferred.** There will be more time to conduct a careful review of the flood problem and all of the options for mitigating it.

Two central themes in hazard mitigation are coordination and public input. Only when people, neighborhoods and agencies work together can a community truly succeed in mitigating the flood hazards it faces.

Acknowledgements

Project manager: Dennis Dreher, Northeastern Illinois Planning Commission
Principal author: French Wetmore, French & Associates, Park Forest, Illinois
Editing: Ladybug Hollow Ink, Urbana, Illinois

The guidebook could not have been possible without the technical input and assistance of many experts in flood hazard mitigation. The following were members of the Project Advisory Committee:

Bob Allen, McHenry County Department of Planning & Development
L. D. Barron, Cook County Department of Planning & Development
Eldred H. Du Sold, City of Prospect Heights
Mark L. Fowler, Northwest Municipal Conference
Andri Franke, West Central Municipal Conference
Jan Horton, Illinois Emergency Management Agency
Judy Johnson, South Suburban Mayors and Managers Association
Ward Miller, Lake County Stormwater Management Commission
Molly O'Toole, Illinois Department of Natural Resources, Office of Water Resources
Vince Parisi, Illinois Department of Natural Resources, Office of Water Resources
Tom Price, Northeastern Illinois Planning Commission
Richard J. Roths, Federal Emergency Management Agency
Alan Schlindwein, Lake County Stormwater Management Commission
Barry Valentine, McHenry County Emergency Services and Disaster Agency
John Variakojis, Metropolitan Water Reclamation District of Greater Chicago
Cyndie Wilhelm, consultant
Ora Windmon, US Economic Development Administration

Disclaimer

This guidebook is a general introduction to flood hazard mitigation and the planning process that selects the most appropriate mitigation strategies for a community. To determine the best mitigation measures for specific sites, a community should obtain additional guidance from engineers, planners, emergency managers, and other professionals experienced in the various mitigation measures.

Reproduction

This guidebook is published to help communities in northeastern Illinois. It is designed to be easily copied. Permission to reproduce all or any section is hereby granted. A copy of the text is available on IBM disk in WordPerfect 6.0 from the Northeastern Illinois Planning Commission's Publications Office, 312/454-0400.

Flood Hazard Mitigation in Northeastern Illinois

Contents

Preface i

1. Introduction

1.1 Purpose 1-1

1.2 Flood Hazard Mitigation 1-2

1.3 Flooding in Northeastern Illinois 1-3

1.4 The Flood Hazard Today 1-5

2. Mitigation Strategies and Measures

2.1 Prevention 2-1

 2.1.1 Planning 2-1

 2.1.2 Zoning 2-2

 2.1.3 Open space preservation 2-4

 2.1.4 Floodplain regulations 2-5

 2.1.5 Wetland regulations 2-7

 2.1.6 Stormwater management 2-8

 2.1.7 Watershed measures 2-10

 2.1.8 Soil erosion and sediment control 2-11

 2.1.9 Channel maintenance 2-12

 2.1.10 Drainage protection 2-13

 2.1.11 Real estate disclosure 2-14

2.2 Property Protection 2-15

 2.2.1 Building relocation 2-15

 2.2.2 Acquisition 2-15

 2.2.3 Building elevation 2-17

 2.2.4 Barriers 2-18

 2.2.5 Dry floodproofing 2-19

 2.2.6 Wet floodproofing 2-21

 2.2.7 Sewer backup protection 2-22

 2.2.8 Insurance 2-23

 2.2.9 Community programs 2-25

2.3 Emergency Services 2-27

 2.3.1 Flood threat recognition 2-27

 2.3.2 Flood warning 2-28

 2.3.3 Flood response 2-30

 2.3.4 Critical facilities 2-31

 2.3.5 Health and safety maintenance 2-32

2.4	Flood Control	2-33
2.4.1	Reservoirs	2-34
2.4.2	Levees and floodwalls	2-35
2.4.3	Diversions	2-36
2.4.4	Conveyance improvements	2-36
2.4.5	Drainage and storm sewer improvements	2-37
3.	Pre-Flood Mitigation Planning	
3.1	Organize	3-3
3.1.1	Staff resources	3-3
3.1.2	Public involvement	3-4
3.1.3	Planning committee	3-4
3.1.4	Technical assistance	3-6
3.2	Hazard Inventory	3-6
3.2.1	Flood hazard areas	3-7
3.2.2	Flood hazard data	3-9
3.2.3	Other hazards	3-12
3.3	Problem Assessment	3-12
3.3.1	Land use and buildings	3-13
3.3.2	Property protection scoring system	3-14
3.3.3	Critical facilities	3-14
3.3.4	Natural areas	3-15
3.3.5	Future development	3-15
3.3.6	Problem statement	3-17
3.4	Coordinate	3-18
3.4.1	Why coordinate	3-18
3.4.2	Community needs and goals	3-20
3.4.3	Other agencies	3-20
3.5	Review Mitigation Measures	3-22
3.5.1	Thorough review	3-22
3.5.2	Balanced program	3-22
3.6	Public Input	3-23
3.6.1	Public input workshop	3-23
3.6.2	Public meeting(s)	3-24

3.7	Draft Action Plan	3-25
3.7.1	Selecting the appropriate measures	3-25
3.7.2	Drafting the plan	3-25
3.7.3	Budgeting	3-26
3.7.4	Post-flood activities	3-28
3.7.5	Circulating the draft	3-29
3.8	Implement and Evaluate	3-30
3.8.1	Adoption	3-30
3.8.2	Implementation	3-30
3.8.3	Monitoring and evaluation	3-31
3.8.4	Responding to opportunities	3-32
4.	Post-Flood Recovery and Mitigation	
4.1	The Post-Flood Setting	4-2
4.1.1	Emergency response procedures	4-2
4.1.2	Damage assessments	4-3
4.1.3	Disaster assistance	4-4
4.1.4	State and federal post-flood mitigation activities	4-6
4.1.5	Local responsibilities	4-8
4.2	Organizing for Post-Flood Mitigation	4-10
4.2.1	Staff resources	4-10
4.2.2	Public involvement	4-11
4.2.3	Technical assistance	4-12
4.2.4	Training	4-12
4.3	Reconstruction	4-13
4.3.1	Reconstruction requirements	4-13
4.3.2	Building condition assessment	4-14
4.3.3	Regulatory procedures	4-15
4.3.4	Substantially damaged buildings	4-17
4.3.5	Contractor quality control	4-20
4.4	Public Information	4-21
4.4.1	The mitigation message	4-21
4.4.2	Getting the message out	4-23
4.5	Post-Flood Mitigation Planning	4-25
4.5.1	The planning process	4-25
4.5.2	Mitigation opportunities	4-27
4.5.3	Reconstruction moratorium	4-28
4.5.4	Coordination	4-29
4.5.5	Adoption and implementation	4-29

Appendices

A. Mitigation Agencies A-1

 A.1 Local Agencies A-1

 A.2 State Agencies A-5

 A.3 Federal Agencies A-8

 A.4 Private Organizations A-15

B. Acronyms B-1

C. Property Protection Scoring System C-1

D. Sample Plan Adoption Resolution D-1

E. Substantial Damage Worksheets E-1

F. Sample Moratorium Resolution F-1

G. Excerpts from a Local Mitigation Plan G-1

H. The Community Rating System H-1

I. References I-1

Chapter 1.

Introduction

Chapter 1. Introduction

A flood is a natural occurrence. Flood damage is not.

Since the beginning of time, rivers and lakes have left their normal beds to inundate the adjacent land. Floods have caused problems, however, only in relatively recent times. *Flood problems* are the result of human development that has come to occupy what is usually dry land adjacent to bodies of water or natural depressions.

Floods become *flood hazards* only when they pose a danger or cause destruction, such as when they inundate developed areas. Floods damage buildings and infrastructure, threaten health and safety, destroy crops, and disrupt business and traffic, making what had been a natural (and often benign) occurrence a hazard to people and modern development.

Few flood problems are found where floodplains have been left vacant, or have been occupied by low-damage uses, such as farming and recreation. But flood damage can be tremendous in urban areas where floodplains have been intensely developed.

Urban areas have an added flooding complication. Development in the watershed upstream changes the surface of the land, increasing the amount and rate of stormwater runoff. This overloads both the natural streams and the manmade ditch and sewer systems that receive the runoff.

As a result, areas that did not flood naturally now get inundated, and floodplains get flooded more often.

1.1 Purpose

People can do something about the problems caused by floodplain development and watershed urbanization.

While flooding cannot always be stopped — and in many cases, should not be prevented — flood hazards can be reduced. As their definitions attest, the words "flood hazard mitigation" mean taking measures that minimize or reduce the impacts of flooding on human development.

Webster's Definitions

Flood: *a temporary condition of inundation of normally dry land areas*

Hazard: *a source of danger*

Mitigate: *to cause to become less harsh or hostile, to make less severe*

This guidebook describes the steps needed to reduce the impact of flooding in urban areas. While it is designed for use by local officials in northeastern Illinois, it should prove useful to officials and residents of any metropolitan area.

1.2 Flood Hazard Mitigation

This guidebook defines *flood hazard mitigation* as "everything that can be implemented to reduce property damage and the threat to life and public health from flooding."

"Everything" is the critical word. Each community should consider *all* possible measures for mitigating flood hazards, and each community should seek support from as many programs and agencies as possible.

Figure 1-1 Flood Hazard Mitigation Measures

Prevention

Planning
 Zoning
 Open space preservation
 Floodplain regulations
 Wetland regulations
 Stormwater management
 Watershed measures
 Soil erosion and sediment control
 Channel maintenance
 Drainage protection
 Real estate disclosure

Property Protection

Building relocation
 Acquisition
 Building elevation
 Barriers
 Dry floodproofing
 Wet floodproofing
 Sewer backup protection
 Insurance
 Community programs

Emergency Services

Flood threat recognition
 Flood warning
 Flood response
 Critical facilities
 Health and safety maintenance

Flood Control

Reservoirs
 Levees and floodwalls
 Diversions
 Conveyance improvements
 Drainage/sewer improvements

The history of the response to flooding in northeastern Illinois offers cogent examples of mitigation and the many measures that can be used. Communities in the area have typically relied on two broad kinds of measures:

- *Remedial structural measures*, such as reservoirs and channel improvements, that keep floodwaters away from damage-prone development.
- *Preventive nonstructural measures*, such as regulating development to keep it away from the floodplain, detaining stormwater on the sites of new developments, and acquiring floodprone lands for open space.

Each mitigation measure is appropriate in different situations. Structural flood control projects can be the most efficient way to protect an existing critical facility or a concentration of damage-prone buildings. But in developing areas, regulations and acquisition make more sense, as they are inexpensive ways to prevent the creation of flood problems.

"Everything that can be implemented" is an all-encompassing definition. To make "everything" more manageable, this guidebook categorizes mitigation measures into four basic strategies. The four strategies and their measures are listed in Figure 1-1 and are detailed in Chapter 2.

1.3 Flooding in Northeastern Illinois

Two factors have governed flooding in northeastern Illinois:

- The area is relatively flat.
- Much of it is urbanized.

Early measures

For early European settlers, northeastern Illinois resembled the Everglades — the ground was continually wet and covered by prairie grasses. Like the Everglades, which has been dubbed "the river of grass," they described the Des Plaines River as a wide wet swale, not a flowing stream contained within defined channel banks.

Most early settlements bypassed the low floodplains close to the area's rivers. But settlement could not be avoided at the mouth of the Chicago River, where the land was needed for uses that depended on access to river and lake transportation. However, the land along the Chicago River proved so wet that first floors of buildings were abandoned and new streets were built at the second-floor level.

To facilitate farming and construction of roads and buildings, the area's settlers put in place an extensive drainage system. Swales were made into deeper ditches to carry water away faster. Starting in the late 1800's, farmlands were drained with underground tiles. Water that used to keep prairie grass roots wet was now drained off the land.

With residential subdivisions and other urban development came more underground drains and larger, more efficient ditches and sewers.

Into the first half of the 20th century, most suburban development continued to avoid the banks and floodplains of the larger rivers. In fact, the waterfront areas were set aside as public open space. For example, the Cook County Forest Preserve District acquired about 80 percent of the Des Plaines River's floodplain during the 1920's. The remaining 20 percent has been developed, becoming the site of severe flood problems.

The problem grows

After World War II, Chicago's suburbs grew at exponential rates. "Waterproof" basement walls and sump pumps handled high ground water. Development pressures eventually overwhelmed what had been empty floodplains. However, a relatively dry period from 1945 to the early 1970's lulled people into believing that there were no water problems. Most of the flood problems in suburban northeastern Illinois can be traced to developments that were built between 1945 and 1975.

While there had been substantial flooding since 1945, most notably in 1954 and 1957, it was the heavy storms of 1972 that spurred local government leaders to action. Estimated to be a 50-year flood in some areas, the storms of '72 inundated not only roads, bridges, houses and businesses, but brought an added dimension of calamity by flooding or overloading sewer systems. Sewage backed up into streets and basements and flooded wastewater treatment plants let polluted water into the area's rivers.

Chicago itself was not exempt from flooding. While the City and its near suburbs had an extensive system of combined sewers -- that is, underground pipes that collect and carry both stormwater and sewage to wastewater treatment plants -- heavy rains overloaded this system.

Excess water overflowed at both ends of the system. At the upstream end, overloaded sewers backed up into the streets and inundated basements. At the downstream end, polluted water was of such quantity that it bypassed treatment plants and flowed untreated into rivers.

When the Chicago River threatened to escape its banks, the locks at the mouth had to be opened. Polluted water flowed into Lake Michigan, endangering the area's drinking water and forcing the closure of many beaches.

Chicago and the inner suburbs respond

One agency has been responsible for treating wastewater for the City and its near suburbs. Formerly called the Metropolitan Sanitary District of Greater Chicago, what is now the Metropolitan Water Reclamation District (MWRD) devised a pollution control plan to treat polluted stormwater before it enters the river system.

The Tunnel and Reservoir Plan, or "TARP," was developed with financial assistance from federal and state environmental protection and flood control agencies. Large tunnels were bored more than 150 feet underground. During heavy storms, runoff flows into the tunnels for storage until treatment can be arranged.

Since the tunnels began to come on line in the 1980's, the Chicago River locks into Lake Michigan have been opened only once every four or five years. Before, they had to be opened four or five times a year.

The tunnel system is not big enough to carry or store water from very large storms. Therefore, the MWRD and other state and local agencies are pursuing the reservoir portion of TARP. This will connect the tunnel system with large reservoirs that can store the heavy flow from larger storms until it can be treated.

When it is completed, the system will provide flood control benefits to Chicago and 51 suburbs. MWRD plans are for it to protect over 350,000 homes susceptible to sewer backup. Even so, problems remain in some areas, as many local sewers are too small to convey flow to the tunnels.

Other suburban communities respond

Other communities have been tackling their flood problems since the early 1970's. Watershed steering committees were formed under the leadership of MWRD, the Illinois Department of Transportation, Division of Water Resources (now the Department of Natural Resources, Office of Water Resources), and the U.S. Soil Conservation Service (now the Natural Resources Conservation Service).

Master plans for each watershed were developed. They included major flood control projects, acquisition programs, and preventive programs to keep flood problems from getting worse.

Flood control projects included retention basins, channel modifications and multi-purpose reservoirs, sometimes built in cooperation with park or forest preserve districts. Other recommended programs included:

- Acquiring, then clearing buildings from the floodplain.
- Requiring state permits for new construction in the floodplain.
- Enacting local regulations to require new development in the watershed to provide on-site detention of stormwater runoff.

The 1970's also saw the arrival of a variety of local, state and national nonstructural programs. Organizations and programs like the Friends of the Chicago River and the Land and Water Conservation Fund brought more attention to treating rivers and floodplains as public resources, and assets to their communities.

The 1970's also brought the National Flood Insurance Program (NFIP) to the area. The insurance program provided maps of the 100-year floodplains for the area, and required cities and counties to regulate development in those floodplains.

In return, residents were able to purchase federally-subsidized flood insurance. Now, almost every community in northeastern Illinois is in the NFIP, and over \$40 million in flood insurance claims have been paid out.

Figure 1-2 NFIP Claims Paid in Northeastern Illinois, 1978-1994

<u>County</u>	<u>Claims</u>	<u>Dollars paid</u>
Cook	4,562	\$19,964,327
DuPage	1,682	10,259,531
Kane	164	1,034,327
Lake	779	3,507,235
McHenry	401	1,349,220
Will	<u>1,055</u>	<u>5,901,431</u>
	8,643	\$42,016,071

1.4 The Flood Hazard Today

In spite of these efforts, flooding since 1972 has continued and flood losses have increased.

Floods resulted in Presidential disaster declarations in one or more northeastern Illinois counties in 1979, 1982, 1986, 1987 and 1993. They occurred in all four seasons and were caused by snowmelt, intense thunderstorms over relatively small areas, and/or prolonged rains over large areas.

Smaller floods occur somewhere in the region virtually every year. While they may not get the attention of the Federal government's disaster assistance programs, they cause a great deal of damage and suffering at the local level.

Impact on people

Flooding robs people of their property, possessions and time.

Floods pose health hazards from polluted water, mildew, and fatigue. They also generate stress on people, and cause mental health strains from property damage and the loss of irreplaceable family treasures.

Property damage can be measured in dollars; the losses to people of time, energy and emotional well-being cannot. In addition, these intangible losses are not covered by any insurance or disaster assistance programs.

Economic impact

Floods can cause severe damage to the local economy.

Buildings and inventories are simply lost to water. Income is lost as businesses are forced to close by floodwater, or lose customers who cannot get to the establishments.

The loss of income can have a ripple effect on jobs and other related businesses. Floods are renowned for adding one problem too many to struggling businesses and forcing them to close or relocate out of the area.

Infrastructure damage

Flooding of streets, highways and underpasses affects many more people than just those who live in floodplains. In fact, most flood deaths in the area have been a result of driving or riding into floodwaters.

When flooding enters a water or wastewater treatment plant, the entire community may lose its water supply and have its sanitary sewers overloaded. Overloaded sewers can flood streets and basements with sewage. Downstream communities may be flooded by polluted water.

Flood statistics

Flooding is no small problem for northeastern Illinois communities, their residents, and their economies.

In 1991, it was estimated that the City of Chicago and 50 Cook County suburbs served by the Tunnel and Reservoir Plan faced \$151 million in average annual property damage.

By MWRD estimates, the 200 other suburbs were susceptible to over \$28 million in flood losses each year. This latter area includes 64,000 acres of floodplain with over 18,000 residences and over 400 businesses potentially affected by a major flood.

The trend

The trend is toward more flood damage.

The comparison of the 1954 and 1987 floods in Figure 1-3 illustrates this. While the 1954 storm covered an area ten times larger than the 1987 storm did, the amount of damage was the same.

Figure 1-3 Flood Comparison

	<u>1954</u>	<u>1987</u>
Area hit by 6" rains (square miles)	3,529	355
Area hit by 9" rains (square miles)	735	75
Damage (millions of 1987 dollars)	\$100	\$100

Source: 1987 Governor's Flood Control Task Force report

Changes in land use between 1954 and 1987 caused most of the increase in the value of damaged property.

The need for planning

While flood problems are getting worse, the ways to deal with them are changing.

Fewer flood control projects are being built because they are expensive, they can adversely affect the environment, and their costs often exceed their benefits. Consequently, there is no longer a "simple" solution to build a structural project that controls flood water.

With fewer dollars and more attention to environmental impacts and the concerns of residents, communities must look at more ways to deal with their flood problems.

The flood hazard mitigation planning process does this. As this guidebook will show, mitigation planning can bring new and effective solutions to bear on an old problem.

[This page intentionally blank.]

Chapter 2.

Mitigation Strategies and Measures

Chapter 2. Mitigation Strategies and Measures

Four basic strategies may be applied to mitigate flood hazards. Each strategy has different measures that are appropriate for different conditions. In many communities, a different person may be responsible for each strategy. The four strategies are described briefly below.

2.1 *Prevention:*

Through prevention, flood problems are kept from getting worse. The use and development of floodprone areas is limited through planning, land acquisition, or regulation. Preventive measures are usually administered by building, zoning, planning, and/or code enforcement offices.

2.2 *Property protection:*

Property protection usually is undertaken by property owners on a building-by-building or parcel basis. Government agencies can provide information and technical or financial assistance to owners who want to elevate, floodproof, insure, or otherwise protect their property.

2.3 *Emergency services:*

Emergency measures are taken during a flood to minimize its impact. These measures are the responsibility of city or county emergency management staff and the owners or operators of critical facilities.

2.4 *Flood control:*

Keeping floodwaters away from an area with a levee, reservoir or other structural project is the goal of flood control. Flood control activities are usually designed by engineers and managed or maintained by public works staff.

2.1 Prevention

Prevention measures are designed to keep the problem from occurring or getting worse. They ensure that future development does not increase flood damage or they maintain the drainage system's capacity to carry away floodwaters.

2.1.1 Planning

Comprehensive plans and land use plans identify how a community should be developed. Use of the land can be tailored to match the land's hazards, typically by reserving flood hazard areas for open space, golf courses, backyards, or similar compatible uses.

For more information

Each strategy and measure is summarized in this chapter. The discussion on each measure ends with a "For more information" section which identifies agencies and/or references that can help.

Appendix A lists the agencies and their addresses, telephone numbers, and summaries of their programs.

Appendix I has information on obtaining copies of the references.

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

**Planning for Parks in the Floodplain
Will Minimize Property Damage**



A community's capital improvement program identifies where major public expenditures will be made over the next 5 to 20 years. Capital expenditures may include acquisition of land for public uses, such as parkland, and extension or improvement of roads and utilities.

If the community's long range plan calls for preserving the floodplain as open space, then the capital improvement program should support the plan by acquiring floodprone areas for parks and by not improving or extending roads into the floodplain.

Where appropriate: All communities that expect growth and are willing to guide it are prime candidates for developing land use plans.

Limitations: Plans are only as strong as the local authorities want them to be. To be effective, they must be implemented, which may require additional legal measures, such as a zoning ordinance.

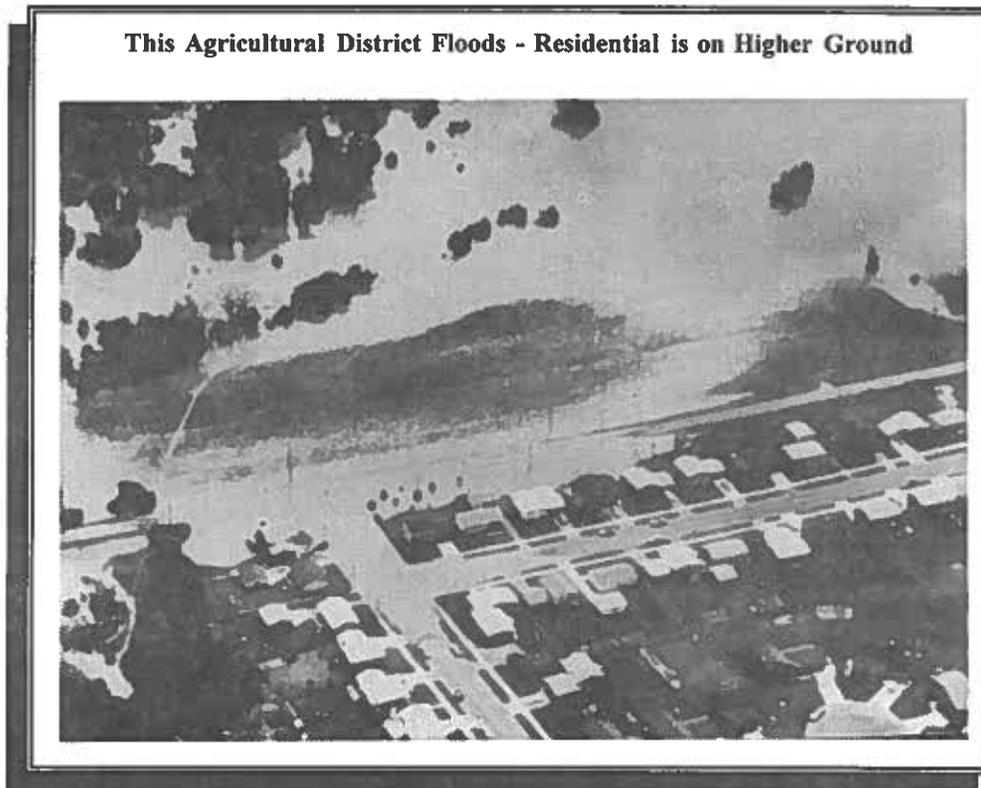
For more information: Technical advice can be found at the county planning agencies and the North-

eastern Illinois Planning Commission (see Sections A.1.2 and A.1.1 in Appendix A). A basic reference for northeastern Illinois communities is *Environmental Considerations in Comprehensive Planning*.

2.1.2 Zoning

A zoning ordinance regulates development by dividing the community into zones or districts and setting development criteria for each district. There are two approaches that can prevent inappropriate floodprone development: separate districts and overlay zoning.

Separate districts: The floodplain can be designated as one or more separate zoning districts that only allow development that is not susceptible to damage by flooding. Appropriate districts include public use, conservation, agriculture, and cluster or planned unit developments that keep buildings out of the floodplain, wetlands, and other areas that are not appropriate for intensive development.

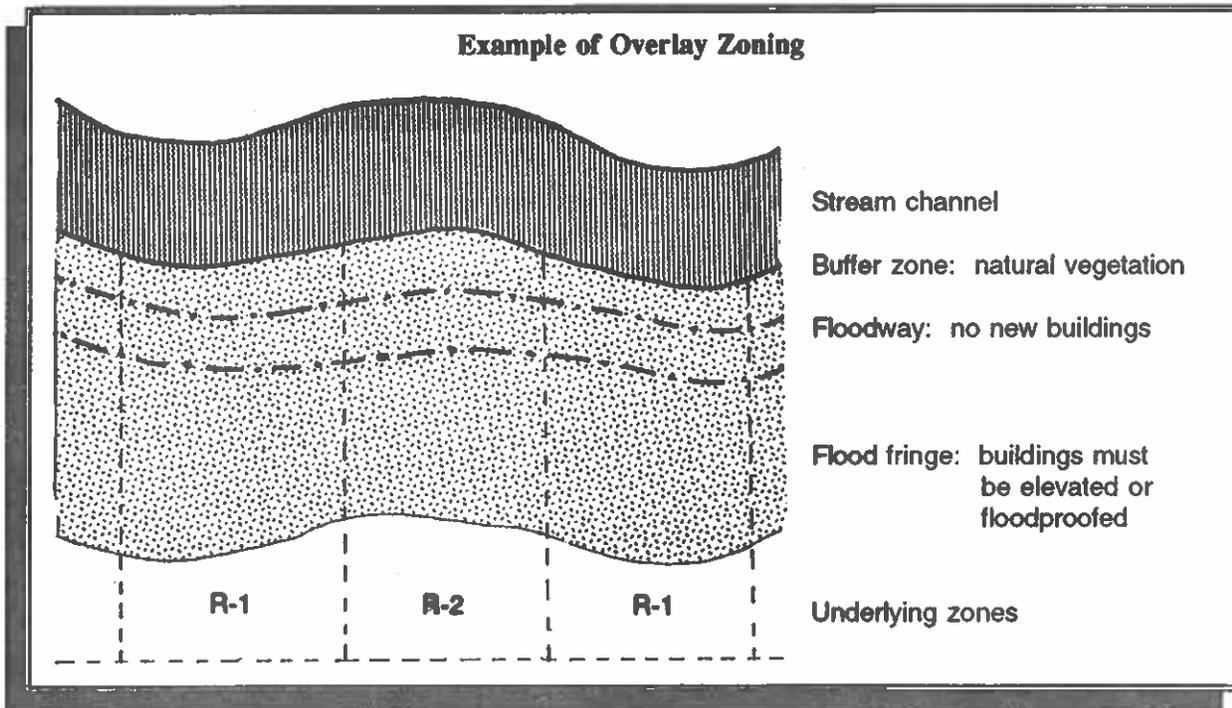


Overlay zoning adds special requirements in areas subject to flooding. The areas can be developed in accordance with the underlying zone, provided the flood protection requirements are met. As illustrated on the next page, there may also be setbacks or buffers to protect stream banks and shorelines or to preserve the natural functions of the channels and adjacent areas.

Where appropriate: Communities that expect development or redevelopment should adopt zoning ordinances.

Limitations: Some zoning regulations have been nullified because they placed too many restrictions on the use of private property and those restrictions could not be justified as needed for public health, safety or welfare. Some zoning requirements have been nullified when the community did not develop the technical data to support them.

For more information: Technical advice can be found at the county planning agencies and the Northeastern Illinois Planning Commission (NIPC) (see Sections A.1.2 and A.1.1 in Appendix A). NIPC's *Model Stream and Wetland Protection Ordinance* describes the overlay zoning approach.



2.1.3 Open space preservation

Keeping the floodplain open — free from development — is the best approach to preventing flood damage.

Preserving open space is beneficial to the public in several ways. By preserving floodplains and natural sites for water storage, such as wetlands and low-lying areas, important recreational areas are secured while habitats for local flora and fauna are similarly protected.

Floodplains are excellent sites for scenic recreation areas and greenways. Through their open space preservation programs, forest preserve districts and other local governments have prevented millions of dollars in damage through the foresighted acquisition of tens of thousands of floodprone acres.

Open space preservation should not be limited to floodplains, as some sites in the watershed may be key to controlling runoff that adds to the flood problem (*see Section 2.1.7*).

Land use and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made if the owner agrees to not build on the floodprone part or the part set aside in the easement.

In some cases, the owner is allowed to develop the area for low hazard uses or to transfer the right to develop other flood-free parcels (known as "TDR" or transfer of development rights).

Easements do not always have to be purchased. Flood flow, drainage, or maintenance easements can be required of developers as a condition for approving the development. These are usually linear parcels along property lines or channels.

Maintenance easements also can be provided by streamside property owners in return for a community channel maintenance program.

Where appropriate: Open space preservation is encouraged in undeveloped areas in floodplains, wetlands, other watershed storage areas, natural areas, and along streams and drainageways.

Limitations: Reaching agreement on an easement can be complicated. Enforcing it requires vigilance by the community.

For more information: Technical advice can be found at the Openlands Project, county planning agencies, and the Northeastern Illinois Planning Commission (*see Sections A.4.1, A.1.2 and A.1.1 in Appendix A*). There are funding programs to help acquire open space for recreational use or to preserve natural areas (*see Appendix A, sections A.3.7 and A.3.10*). See also *Northeastern Illinois Regional Greenways Plan and Environmental Considerations in Comprehensive Planning*.

2.1.4 Floodplain regulations

In addition to zoning ordinances, regulations on construction in floodplains are usually found in one or more of three locations: subdivision ordinance, building code, and/or a separate "stand alone" floodplain ordinance.

If the zoning for a site allows a structure to be built, then the applicable subdivision and building regulations will impose construction standards to protect buildings from flood damage and prevent the development from aggravating the flood problem.

Subdivision regulations: Subdivision regulations govern how land will be subdivided into individual lots, often requiring that every lot have a buildable area above flood level.

These regulations set construction and location standards for the infrastructure provided by the developer, including roads, sidewalks, utility lines, storm sewers and drainageways. (*Storm sewer and drainage standards are discussed in the section on storm-water management.*)

Building codes: The building code should establish flood protection standards for all construction. These should include criteria to ensure that the foundation will withstand flood forces and that all portions of the building subject to damage are above, or otherwise protected from, flooding.

Most northeastern Illinois communities have adopted the Building Officials and Code Administrators' (BOCA) National Building Code. Chapter 18 of the 1993 edition sets standards for protecting foundations against flood damage, including requirements for soil testing and prepared fill.

Minimum regulatory requirements: Most communities with a flood problem in northeastern Illinois participate in the National Flood Insurance Program (NFIP). The NFIP sets minimum requirements for the participating communities' subdivision regulations and building codes. The Office of Water Resources (OWR) has additional regulatory requirements for communities in northeastern Illinois. The NFIP and OWR minimum requirements are summarized in Figure 2-1.

Figure 2-1 Minimum Floodplain Regulation 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 agree to regulate new construction in the 100-year floodplain. To reduce confusion, the 100-year floodplain is called the "base floodplain" and the elevation of the 100-year flood is known as the "base flood elevation."

The base floodplain is shown as the "Special Flood Hazard Area" on the Flood Insurance Rate Map (FIRM) provided by FEMA. The base floodplain is designated as an "A" Zone. The 500-year floodplain is shown as a "B" Zone and areas above the 500-year flood level are shown as "C" Zones. On newer maps, the B and C zones are called "X" zones. The designation as B, C, or X Zone does not mean that the area is not subject to local drainage problems or overbank flooding from streams or ditches smaller than the FEMA mapping criteria.

Additional floodplain regulatory requirements are set by state law and administered by the Office of Water Resources. There are five major floodplain regulation requirements in northeastern Illinois. These are the minimum requirements. Cities and counties often have additional or more restrictive regulations.

1. All development must have a permit from the community. "Development" is defined as any man-made change to the land, including new buildings, improvements to buildings, filling, grading, mining, dredging, etc.
2. Only "appropriate uses" are allowed in the floodway. The floodway is the channel and central portion of the floodplain that is needed to convey the base flood. 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 Office of Water Resources. The result of this requirement is that vacant floodways will essentially remain as open space, free of insurable buildings or other obstructions.
3. New buildings are allowed outside the floodway, but they must be protected from damage by the base flood. Residences must be elevated above the base flood elevation. Nonresidential buildings must be elevated or floodproofed.
4. When an addition, improvement or repair to an existing building is valued at more than 50% of the value of the original building, then it is considered a substantial improvement. A substantial improvement is treated as a new building. See also Section 4.3.4 on substantial damage requirements.
5. Any filling, building or other obstruction placed in the floodplain reduces the amount of floodwater that can be stored. Developers must remove an equal or greater volume of fill to compensate for the loss of storage.

Communities are encouraged to adopt local ordinances which are more stringent than the state or federal criteria. This is especially important in areas with older maps that may not reflect the current hazard. These could include prohibiting damage-prone uses (such as garages, sheds, parking lots and roadways) from the floodway or requiring structures to be elevated one or more feet above the base flood elevation.

Where appropriate: Any area with surface flooding is appropriate for floodplain regulations.

Limitations: As with any regulatory program, property owners may not be aware of the need for permits, or may resist getting permits, especially after a flood.

Because many existing floodplain maps are out of date, caution should be exercised when utilizing them for regulations. Conservative safety factors are highly recommended.

Some of the requirements, such as floodway construction criteria or substantial improvement rules, can be technically complicated. However, assistance is available from FEMA and OWR.

For more information: Technical assistance is provided by the Office of Water Resources, FEMA and NIPC (see Sections A.2.1, A.3.1 and A.1.1 in Appendix A). The basic references are *Model Flood Plain Ordinance for Communities Within Northeastern Illinois*, *Floodplain Regulations*, and *Floodplain Compliance*.

2.1.5 Wetland protection regulations

Wetlands are usually found in floodplains or depressional areas. They provide numerous natural and beneficial functions that warrant protection.

Many wetlands in northeastern Illinois are subject to the Corps of Engineers' Section 404 regulations. Corps permits are required for projects that will place fill or dredged materials in a wetland. Before a permit is issued, the plans are reviewed by several agencies, including the US Fish and Wildlife Service and the US Environmental Protection Agency.

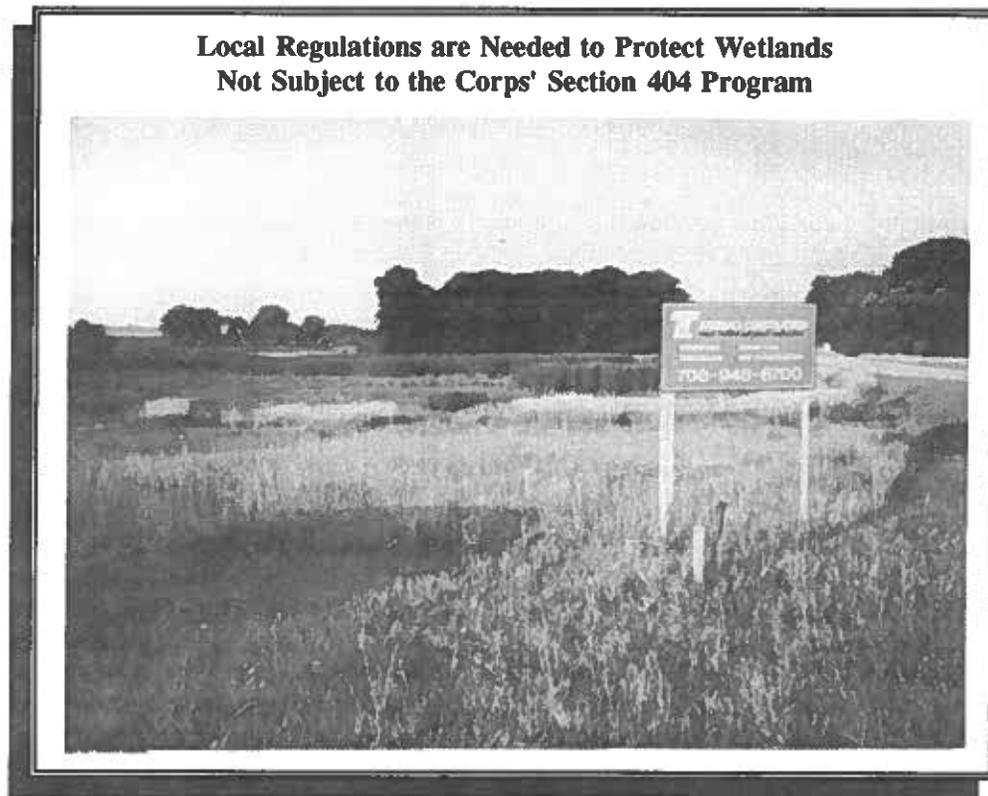
Wetlands
<ul style="list-style-type: none">• Store large amounts of floodwaters• Reduce flood velocities and erosion• Filter water, making it cleaner for those downstream• Provide habitat for species that cannot live or breed anywhere else

Some communities also have their own wetland protection programs. Local programs are important for addressing gaps in the federal regulations, particularly for smaller wetlands and unregulated activities.

Where appropriate: Any community that seeks to preserve the natural and beneficial functions of wetlands should consider instituting wetland regulations.

Limitations: In many areas, smaller wetlands are not mapped, so projects may be built by owners who don't know the area should be protected. The Corps' authority is generally limited to filling wetlands. They can be impounded or otherwise damaged without a 404 permit being required. Therefore, communities should consider their own more comprehensive regulations.

For more information: Technical advice can be found at the county stormwater planning agencies, the Northeastern Illinois Planning Commission, the US Army Corps of Engineers, the US Fish and Wildlife Service, and the Illinois Department of Natural Resources (*see Sections A.1.2, A.1.1, A.3.4, A.3.10, and A.2.3 in Appendix A*). Suggested references for northeastern Illinois communities are *Environmental Considerations in Comprehensive Planning* and *Model Stream and Wetland Protection Ordinance*.



2.1.6 Stormwater management

Development outside a floodplain can contribute significantly to flooding problems. Runoff is increased when natural ground cover is replaced by urban development (*see Figure 2-2*). The history of flooding in northeastern Illinois discussed in Section 1.3 illustrates what happens when an area is urbanized.

Unconstrained watershed development often will aggravate downstream flooding and overload the community's drainage system. Effective stormwater management policies require developers to build detention basins and utilize other "best management practices" ("BMPs") to minimize increases in runoff rates and volumes in comparison to pre-development conditions.

Many developments utilize wet basins as landscaping amenities and for water quality BMPs. In some cases, watershed planners identify the most effective location for a basin. Communities then require developers to contribute funds for a regional basin in lieu of constructing on-site detention.

Since detention only controls runoff rates, and not runoff volumes, there is a need for other BMPs to enhance the infiltration of stormwater. Swales, infiltration trenches, vegetative filter strips, and permeable paving blocks are recommended additions to the standard detention requirements.

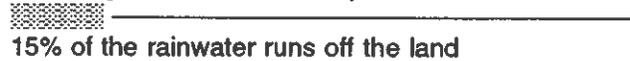
Stormwater management requirements are generally found in subdivision ordinances.

Minimum requirements for stormwater management regulations have been set by the Metropolitan Water Reclamation District (Cook County) and the stormwater management agencies of DuPage and Lake County. DuPage and Lake Counties have coordinated water quantity requirements with water quality criteria to reduce pollutants in stormwater runoff.

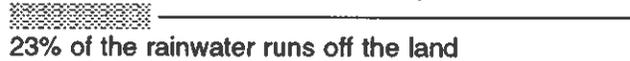
In other counties, stormwater regulations are addressed by the individual communities.

Figure 2-2 Development Affects Surface Runoff

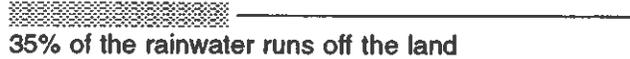
Natural ground cover, 0% impervious surface



Rural development, 10% - 20% impervious surface



Single family homes, 35% - 50% impervious surface



Full urbanization, 75% - 100% impervious surface



Data from NIPC based on average annual rainfall of 38 inches in northeastern Illinois, 1981 - 1993.

Regional Detention Basins Can Minimize the Impact of Increased Runoff Caused by New Development



Where appropriate: Stormwater management requirements are encouraged for all new developments.

Limitations: The community must bear the cost of maintaining detention features after the developer leaves. Even with the best BMPs, development will increase runoff volumes.

For more information: Guidance is available from the Northeastern Illinois Planning Commission, the county stormwater management committees, and the Metropolitan Water Reclamation District (*see Sections A.1.1, A.1.2, and A.1.3 in Appendix A*). See also *Model Stormwater Drainage and Detention Ordinance*.

2.1.7 Watershed measures

Figure 2-2 shows the impact of runoff after an area is developed. Agricultural practices also can cause stormwater problems. Subsurface drainage and row cropping can speed the runoff onto downstream properties. Because farmland is usually bare, stormwater runoff can carry large amounts of sediment that can fill in downstream drainage facilities.

Ultimately, flood prevention must be viewed from a watershed perspective. Watershed measures should emphasize approaches that reduce runoff volumes and storing surface runoff naturally.

The runoff can be slowed down by watershed measures, such as vegetation, terraces, contour plowing and no-till farm practices. Slowing runoff on the way to a drainage channel increases infiltration into the soil and controls the loss of topsoil from erosion and the resulting sedimentation.

Butterfield Creek Watershed Storage

A study of the Butterfield Creek watershed in southern Cook County showed that while 50% of the watershed had been developed, the flat upland undeveloped portion contained natural ponding areas that stored over 1700 acre-feet of water during a 100-year rain.

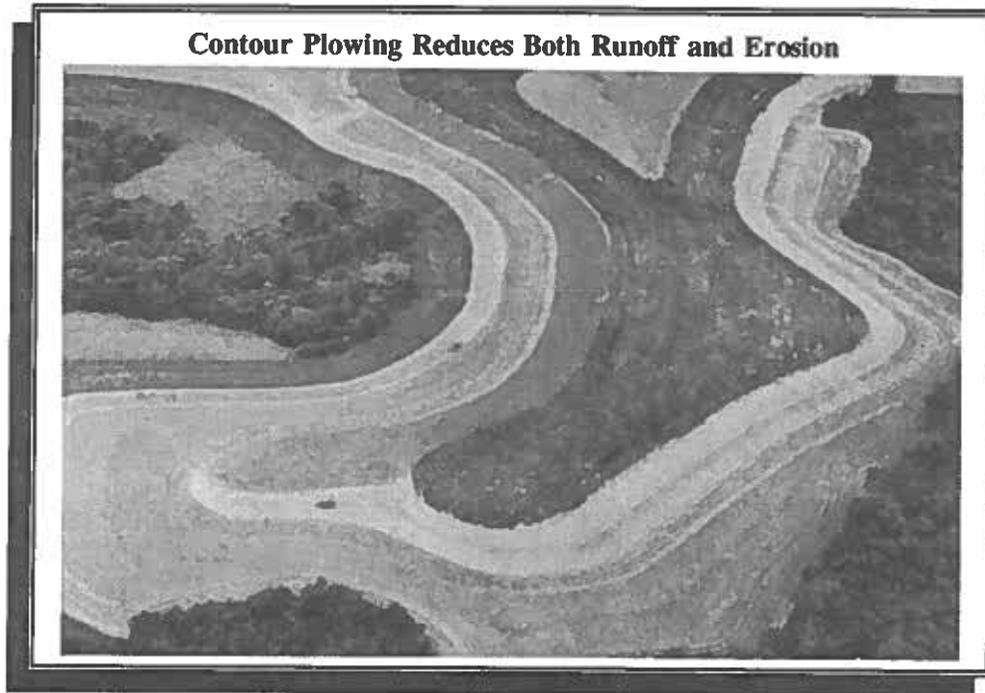
If these areas were to be developed, the 100-year flood discharge of Butterfield Creek would increase by as much as 100% in some locations. Accordingly, the communities in the Butterfield Creek watershed are purchasing and otherwise reserving these areas so they won't be developed.

Protecting areas that naturally hold water is another effective type of watershed measure. Most watersheds have wetlands, depressions and other natural storage areas, which, if preserved from development, help reduce the impact of urbanization.

Where appropriate: Modifications to farming practices and urban development are most effective on steeper slopes where the most runoff and erosion occurs. Preserving storage areas is most effective in flat areas with natural depressions.

Limitations: These measures are usually implemented in areas beyond a municipality's jurisdiction. It can be hard to convince owners of property who are not near the flood problem to modify their drainage practices at their own expense.

For more information: Soil and Water Conservation Districts and their Natural Resources Conservation Service staff have both the expertise in watershed measures and the contacts with watershed landowners (*see Sections A.1.4 and A.3.5 in Appendix A*). NIPC and the county stormwater planning agencies can provide assistance on watershed planning techniques (*see Sections A.1.1 and A.1.2 in Appendix A*).



2.1.8 Soil erosion and sediment control

As rain hits the ground — especially where there is bare dirt, as on farm fields and at construction sites — soil is picked up and washed downstream.

This erosion of soil produces sedimentation in waterways that may be far from the eroded area. Sediment tends to settle where the river slows down and will gradually fill in the channel.

Erosion and sediment control has two principal components: minimize erosion with vegetation and capture sediment before it leaves the site. Specific measures can be taken on farms and construction sites.

Farm practices such as contour plowing, terracing and no-till help reduce agricultural erosion and keep topsoil where it is needed.

Soil loss can be cut at construction sites with techniques such as mulching, seeding, and erosion blankets. Silt fences and sediment traps slow runoff so sediment is dropped on-site before it gets to a watercourse. The key is to get these measures used, particularly on construction sites or at the downstream end of plowed fields.

Where appropriate: All watersheds are candidates for erosion and sediment control measures.

Limitations: As with any regulatory program, the community must have trained staff to educate developers and property owners, to monitor compliance, and to enforce the requirements.

For more information: Soil and Water Conservation Districts, the Natural Resources Conservation Service, and NIPC provide technical advice (see Sections A.1.4, A.3.5 and A.1.1 in Appendix A).

The basic references are *Procedures and Standards for Urban Soil Erosion and Sedimentation Control in Illinois* ("the green book"), *Model Soil Erosion and Sediment Control Ordinance*, and the video, *Erosion and Sediment Control Procedures and Practices for Construction Sites*.

2.1.9 Channel maintenance

Channel maintenance is an ongoing program to clean out blockages caused by overgrowth or debris. This work is usually done by a public works or drainage district crew.

Channel maintenance addresses vegetative growth and debris that can block flows. Channel maintenance activities normally do not affect the shape of the channel, but they do affect how well the channel can do its job.

Vegetative maintenance should focus on the removal of non-native, invasive species, such as common buckthorn. Recommended alternative vegetation includes deep-rooted prairie plants which are effective at stabilizing streambanks but do not contribute woody debris.

Channel Maintenance in DuPage County



Where appropriate: Smaller streams in all watersheds should be the targets of channel maintenance programs. Annual cleanup campaigns should be conducted in late fall through winter, before spring flows and when there are no leaves restricting visibility.

Limitations: If done improperly, channel clearing can allow bank erosion and destroy natural habitats.

Channel inspection and maintenance must be conducted year-round.

Property owners must consent to the maintenance program, in many cases, which may require legal negotiations to obtain maintenance easements.

For more information: Agencies that can provide technical advice include local drainage districts, the US Army Corps of Engineers, the Natural Resources Conservation Service, and the Office of Water Resources (*see Sections A.3.4, A.3.5 and A.2.1 in Appendix A*).

References include *Stream Preservation Handbook* and *CRS Credit for Drainage System Maintenance*. DuPage County has a model program which is explained in *DuPage County Stream Maintenance Program Report*.

2.1.10 Drainage protection

Small amounts of debris can accumulate or be accidentally or intentionally dumped into channels and detention basins. They obstruct low flows or accumulate to become major blockages.

Stream dumping regulations are one approach to preventing intentional placement of trash or debris in watercourses.

Many communities have nuisance regulations that prohibit dumping garbage or other "objectionable waste" on public or private property. Some prohibit the discharge of polluted waters into natural outlets or storm sewers. Waterway dumping regulations need to also apply to "nonobjectionable" materials, such as grass clippings or tree branches which can kill ground cover or cause obstructions.

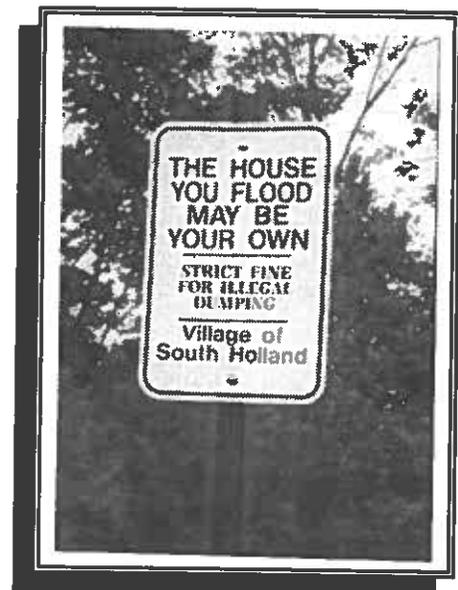
Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard not realizing that it is needed to drain street runoff. Similarly, they may not understand how regrading their yard, or discarding leaves or branches in a watercourse can cause a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

Therefore, a drainage protection program should include public information materials that explain the reasons for the rules as well as the penalties. Regular inspections to catch violations also should be scheduled.

Where appropriate: All waterways, including street ditches, should be placed under stream dumping regulations. Obstructions have their greatest impact in smaller streams and ditches, so an anti-dumping program has its greatest effect there.

Limitations: Finding dumped materials is easy; locating the source of the refuse is hard. Usually the owner of property adjacent to a stream is responsible for keeping the stream clean. This may not be fair for sites near bridges and other public access points.

For more information: Example dumping ordinance language can be found in *CRS Credit for Drainage System Maintenance*. Public information examples are in *CRS Credit for Outreach Projects*.



2.1.11 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 floodprone property.

Three regulations — one federal, two state — require that a potential purchaser 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.

Because this requirement has to be met only five days before closing, often the applicant is already committed to purchasing the property when he or she first learns of the flood hazard.

This requirement does not affect renters or instances where properties are purchased without mortgages from federally regulated lenders. Enforcement of this law is up to the federal agencies that regulate lending institutions, such as the FDIC.

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 information is of limited use, as most buyers do not check a plat. A title search should discover this information, but it may be provided after the buyer is committed to the deal.

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.

The information is based on the seller's general knowledge and experience; no special study is needed. This means, for example, that the seller does not have to check a Flood Insurance Rate Map to determine if the property could flood.

Where appropriate: Real estate disclosure can help everywhere.

Limitations: Enforcement of these regulations can be difficult. Compliance with the federal lending requirements has been spotty, but has been improving in recent years. The best approach for a community is to work with the local real estate agencies to encourage them to use the latest maps and provide assistance to them as needed.

For more information: Information on the federal lending requirements can be obtained from the FEMA Mitigation Division (*see Section A.3.1 in Appendix A*). The basic reference is *Mandatory Purchase of Flood Insurance Guidelines*. The best source of information on how the Residential Real Property Disclosure Act affects a community is a real estate agent.

2.2 Property Protection

Property protection measures are used to modify buildings subject to flood damage rather than to keep floodwaters away.

A community may find these to be inexpensive measures because often they are implemented by or cost shared with property owners. Many of the measures do not affect the buildings' appearance or use, making them particularly appropriate for historical sites and landmarks.

2.2.1 Building relocation

Moving a building to higher ground is the surest and safest way to protect it from flooding.

While almost any building can be moved, the cost goes up for heavier structures, such as those made of brick, and for large or irregularly shaped buildings. There are many experienced house movers in northeastern Illinois who know how to handle any job.

Where appropriate: Communities with areas subject to ice jams, flash flooding, deep waters or other high hazard where the only safe approach is to remove the building should consider a relocation program.

Smaller, wood frame buildings on crawlspaces or basements are easier to move because they are lighter and it is easier to place jacking and moving equipment underneath the floor.

Relocation is also preferred for large lots with portions outside the floodplain or where the owner has a new flood-free lot available.

Limitations: Relocation can be expensive. The cost can average \$25,000 and exceed \$50,000 depending on the type, weight and size of the house, whether it has to be cut and moved in parts, and the cost of a new lot. However, there are some government loans or grants available (*see Appendix A, Sections A.3.1 and A.3.12*).

Buildings that have suffered frequent flooding may be contaminated or structurally weakened and should be demolished.

For more information: *Elevating or Relocating a House to Reduce Flood Damage, Design Manual for Retrofitting Flood-prone Residential Structures, and Protect Your Home from Flood Damage.*

2.2.2 Acquisition

Like relocation, acquisition ensures that buildings in a floodprone area will cease to 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.

Acquisition



Acquisition is appropriate for repetitively flooded areas. This site was flooded again before the foundation could be removed.

Acquiring and clearing buildings from the floodplain is not only the best flood protection measure available, it is also a way to convert a problem area into a community asset and obtain environmental benefits.

Occasionally acquisition and relocation projects are undertaken jointly. The purchasing agency sells the building for salvage and the new owner relocates the structure rather than demolish it.

Sometimes arrangements are made to allow the previous owner to buy back the building at the salvage value. This way, the owner gets to keep the house but have enough money from the sale to pay for a new lot and moving expenses.

Where appropriate: While acquisition works against any type of flood hazard, it is more cost-effective in areas subject to ice jams, flash flooding, deep waters, or other severe flood hazards where other property protection measures are not feasible.

Communities that want to clear floodprone areas, or redevelop them for other uses, such as recreation or riparian habitat, will find acquisition to be necessary.

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

Limitations: Cost is the number one concern with acquisition. An acquisition budget should be based on the median price of similar properties in the community, plus \$10,000 to \$20,000 for appraisals, abstracts, title opinions, relocation benefits and demolition.

Cost may be lower following a flood. For example, the community may have to pay only the difference between the full price of a property and the amount of the flood insurance claim received by the owner.

Communities should avoid creating a "checkerboard" acquisition 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. Creation of a checkerboard in a community simply adds to maintenance costs that taxpayers must support.

Smaller towns may be concerned if a large area is affected, for they may risk losing residents, businesses and/or revenue from property taxes and utility fees.

For more information: *Elevating or Relocating a House to Reduce Flood Damage, Design Manual for Retrofitting Flood-prone Residential Structures, and Protect Your Home from Flood Damage.*

2.2.3 Building elevation

Raising a house above the flood level is the best way to protect a structure that cannot be removed from the floodplain. Water flows under the building, causing no damage to the structure or its contents.

Raising a building above the flood level is cheaper than moving it, and can be less disruptive to a neighborhood. Commonly practiced in flood-prone areas nationwide, this protection technique is required by law for new and substantially damaged residences located in a floodplain. House moving contractors know the techniques to elevate a building.

Elevating a structure will change its appearance. If the needed degree of flood protection is low, the result is similar to putting a house on a two or three-foot crawlspace. If the house is raised two feet, the front door would be three steps higher than before. If the house is raised eight feet, the lower area can be wet floodproofed for use as a garage and for storage of items not subject to flood damage.

Building Elevation



This house near the Des Plaines River was elevated two feet to a level one foot above the 100-year flood. The owner paid a contractor \$5,000 to raise the structure and did the rest of the work himself. It has endured subsequent floods with no damage.

Where appropriate: Smaller, wood frame buildings on crawlspaces are the cheapest to elevate.

Use of this technique is safest where flood depths do not exceed six feet and velocities are slow.

Limitations: Elevation can be expensive. The price to raise a wood frame building on a crawlspace has run as low as \$5,000 when the owner does much of the work. Otherwise, the cost averages \$15,000 to \$25,000. Raising a structure with brick walls resting on a slab foundation can cost \$25,000 to \$50,000.

During flooding, the building may be isolated and without utilities, and therefore unusable. Newly created lower stories may be occupied or used for storage, putting household goods at risk for flood damage.

Some owners object to the change in appearance that elevating a house causes. If no one else in the neighborhood has elevated other homes, owners are concerned that their home will stand out and affect property values.

For more information: *Elevating or Relocating a House to Reduce Flood Damage, Elevating Flood-Prone Buildings: A Contractor's Guide, Design Manual for Retrofitting Flood-prone Residential Structures, and Protect Your Home from Flood Damage.*

2.2.4 Barriers

Barriers — levees, floodwalls and berms — keep floodwaters from reaching a building.

Plans for using these structures must include ways to handle leaks, water seepage under the barrier and rainwater that accumulates inside the barrier. Therefore, they need a sump and/or drain tile to collect the internal ground and surface water, a pump to remove the water, and a pipe to send it over the barrier.

See section 2.4.2 for more information on levees and floodwalls.

Landscaped Floodwall, Des Plaines River



Berms are commonly used in areas subject to shallow flooding. Not considered engineered structures, berms are made by regrading or filling an area.

Low floodwalls may be built around stairwells to protect the basement and lower floor of a split-level home. By keeping water away from the building walls, the problems of seepage and hydrostatic pressure are reduced.

The cost can range from practically nothing, when the homeowner regrades the yard or builds a berm with local fill, to \$10,000 for a concrete floodwall with drain tiles and sump pump.

Where appropriate: Barriers are recommended where the depth of flooding is three feet or less.

Barriers may be used to protect any type of building, although buildings with basements will be more susceptible to underseepage.

Floodwalls are more appropriate on small lots where there is little room for a levee.

Care must be taken in locating barriers. They must be placed so as not to create flooding and/or drainage problems on neighboring properties. All barriers must be kept out of regulatory floodways.

Limitations: Private levees, floodwalls and berms are more susceptible to deterioration than publicly-held structures, as maintaining them falls to the property owner, not a public agency.

Private barriers do not eliminate the need for flood insurance, as they normally address only smaller, more frequent floods. They often have to rely on human intervention to close openings or operate pumps. Insurance is needed for those times when there is no one present who knows what to do when the flood arrives.

For more information: *Design Manual for Retrofitting Flood-prone Residential Structures and Protect Your Home from Flood Damage.*

2.2.5 Dry floodproofing

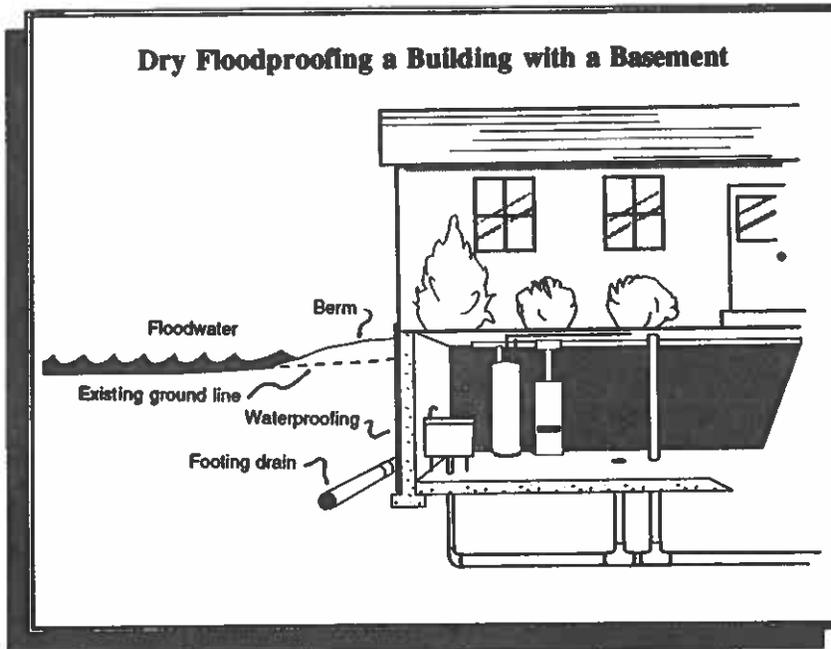
Through dry floodproofing, a building is sealed against floodwaters. Buildings with crawlspaces generally are not dry floodproofed because water can seep under walls into the crawlspace. However, two kinds of structures can benefit from dry floodproofing.

Buildings on slab: All areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows, sewer lines and vents, are closed, either permanently, with removable shields, or with sandbags.

Many dry floodproofed buildings cannot be distinguished from those that have not been modified.

Where appropriate: Dry floodproofing should be used only where the flood depth is less than three feet, and floodwaters will have little velocity. Most building walls and floors are not strong enough to withstand the hydrostatic pressure from more than three feet of water.

Buildings with basements: Houses with basements or other floors below grade can be protected with a backfill approach. A waterproofing compound is applied to the walls and fill is placed against the side of the house.



The goal is to protect the house against contact with surface water or saturated ground. Such contact will greatly increase the amount of pressure against the basement walls, which may result in structural failure.

Therefore, installation of a subsurface drain tile and one or two sump pumps is a must. Properly sized drains and pumps can handle any water that will naturally seep through the fill to reach the house.

Where appropriate: Buildings with basements or floors below grade may be dry floodproofed only with the waterproofing berm approach shown above and only where the flood protection level is lower than the first floor.

In such a situation, the basement area should not be used as a bedroom where the occupants could be caught by surprise if water comes in.

Limitations: Dry floodproofing may involve closing openings and turning on pumps. These actions are dependent on adequate warning and the presence of someone who knows what to do.

As with barriers, flood insurance is highly recommended for those occasions when the protection level is overtopped or when there is no one available to take the proper steps.

An owner may be tempted to try to keep out floodwaters deeper than the design flood protection level. This can result in collapsed walls, buckled floors and danger to the occupants.

It should be noted that floodplain management regulations do not allow new buildings to be dry floodproofed.

For more information: *Design Manual for Retrofitting Flood-prone Residential Structures* and *Protect Your Home from Flood Damage*.

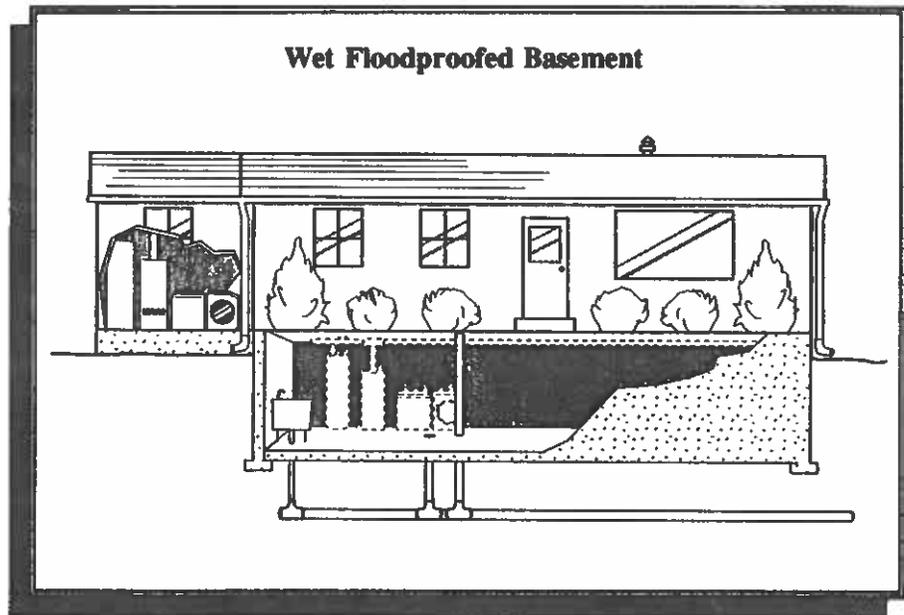
2.2.6 Wet floodproofing

"Wet floodproofing" includes protection measures that deal with floodwaters *in* the building. Wet floodproofing approaches range from moving a few valuable items to rebuilding the floodable area.

Water standing on the ground outside a basement will quickly build up pressure against the basement walls, putting the equivalent pressure of six to seven feet of water on the walls and floor. Most walls and floors are not built to withstand hydrostatic pressure of more than three feet of water. As a result, sometimes basement walls and floors that have been waterproofed may be cracked, buckled or broken by the pressure of floodwater.

Several low-cost steps can be taken to wet floodproof a structure:

- Sanitary sewer openings, such as floor drains, must be plugged.
- Everything subject to damage by water or sediment must be moved to a higher level or out of the building. For example, the electrical panel and the furnace could be relocated to an upper floor.
- Where flooding is not expected to be deep, items needing protection may be placed on platforms or blocks.



- Owners should be prepared to move lighter items, such as lawn furniture or bicycles, after a flood warning is issued.

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

Where appropriate: Wet floodproofing will work wherever there is an area above the flood protection level to which items can be relocated or temporarily stored.

Wet floodproofing works best in buildings with unfinished basements, garages, sheds, commercial and industrial facilities, and buildings with contents that are either water resistant or easily moved. One-story houses are not appropriate for wet floodproofing because the likely flooded zone comprises living areas.

Many wet floodproofing techniques can be incorporated during repairs, reconstruction or remodeling. For example, damaged wallboard in a basement can be removed and the concrete walls can be covered with water resistant paint.

Wet floodproofing is sometimes the only way to protect a historic building that cannot be moved or elevated.

Limitations: Owners are often reluctant to "abandon" large areas of their buildings in anticipation of a flood.

A plan to move contents relies on adequate warning and the presence of someone who knows what to do. Flood insurance is highly recommended for those occasions when the protection level is overtopped or when there is no one available to take the proper steps.

There will still be a need for clean up, with its accompanying potential for health problems.

For more information: *Design Manual for Retrofitting Flood-prone Residential Structures and Protect Your Home from Flood Damage.*

2.2.7 Sewer backup protection

In areas where sanitary and storm sewers are combined, basement flooding can be caused by stormwater overloading the system and backing up into the basement through the sanitary sewer line.

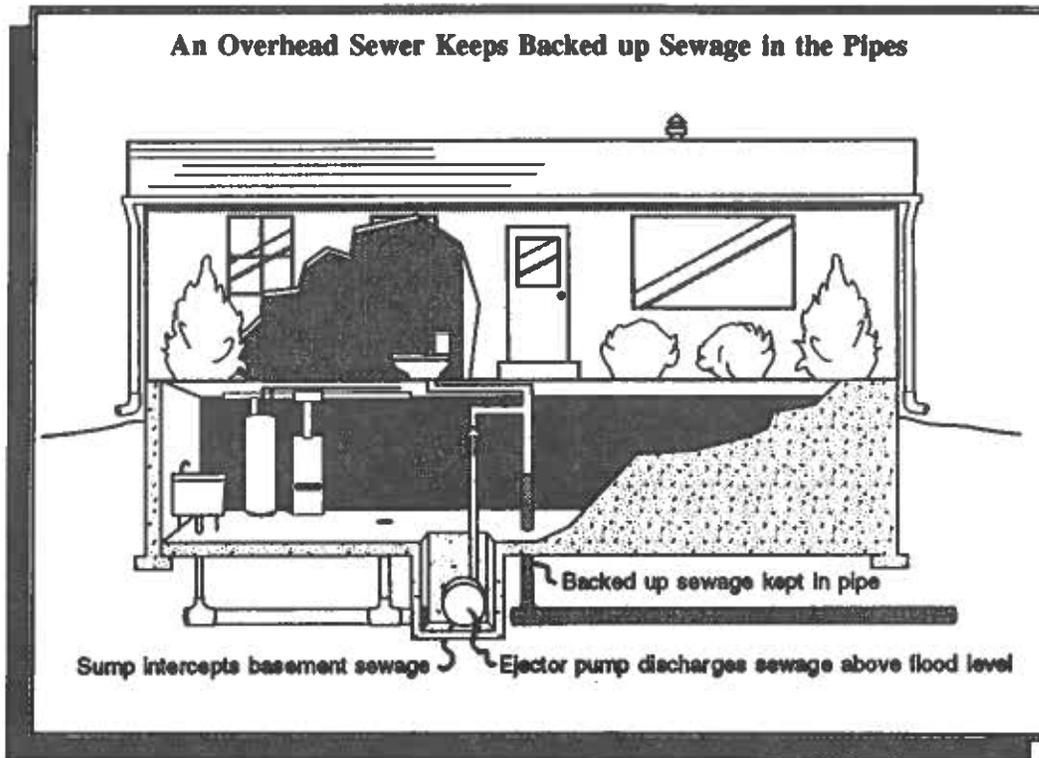
In areas where sanitary and storm waters are carried in separate pipes, the same thing can happen when there are cross connections between the storm and sanitary sewers or infiltration or inflow problems in the lines.

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

Four other approaches may be used to protect a structure against sewer backup: floor drain plug, floor drain standpipe, overhead sewer, and backup valve.

The first two devices keep water from flowing out of the lowest opening in the house, which is the floor drain. They cost less than \$25. However, if the water gets deep enough in the sewer system, it can flow out of the next lowest opening in the basement, such as a toilet or laundry tub.

The latter two devices are more secure, but more expensive (\$3,000 to \$4,000). An overhead sewer, as illustrated on the next page, keeps water in the sewer line during a backup. A backup valve allows sewage to flow out while preventing backups from flowing into the house.



Where appropriate: All four approaches are appropriate for split levels, basements, and other locations where water in the sewer lines can back up into a building. Plugs and standpipes are only useful where the backup causes shallow flooding (lower than the next lower opening).

Limitations: Plugs and standpipes need to be carefully installed, as a little debris may prevent a good seal. In older houses, sewer lines under a basement floor may be clay tile; a buildup of pressure may break them. Sewer lines in newer houses usually are cast iron, making breakage unlikely.

For more information: *Flooded Basements: A Homeowner's Guide*

2.2.8 Insurance

Insurance does not prevent flooding or flood damage; it helps an owner pay for repairs and replacement items damaged in a flood.

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.

While most homeowner's insurance policies do not cover a property for flood damage, there are two ways an owner can insure a building: National Flood Insurance and basement backup insurance.

National Flood Insurance: All northeastern Illinois communities with a significant surface flooding problem participate in the National Flood Insurance Program (NFIP).

Their participation allows any local insurance agent to sell a separate flood insurance policy under rules and rates set by the Federal Insurance Administration. Rates do not change after claims are paid; they are set on a national basis. *Sample rates as of 1995 are shown in Figure 2-3.*

Figure 2-3 Sample Flood Insurance Premiums

<u>In floodplain</u>	<u>Structural coverage</u>	<u>Contents coverage</u>	<u>Annual Cost</u>
Yes	\$80,000	\$40,000	\$681
Yes	\$10,000	\$20,000	\$261
No	\$80,000	\$40,000	\$471
No	\$10,000	\$20,000	\$214

Rates are for older buildings with basements. Lower premiums are available for newer buildings built in accordance with floodplain regulations, for buildings outside the floodplain that have not been flooded in the past, for coverage with higher deductibles, and in communities in the Community Rating System.

Flood Insurance Manual, March 1995, pp Rate 2, Rate 8, Rate 10, Rate 11

Flood insurance is required as a condition of certain types of federal aid and most bank loans and mortgages for buildings in the floodplain shown on FEMA's Flood Insurance Rate Maps. However, many policy holders drop it after a few dry years and/or do not purchase it for the building's contents. In spite of the federal law, fewer than one floodplain property in four is covered.

The recently enacted National Flood Insurance Reform Act makes it even more appropriate to purchase and keep a flood insurance policy. There is now a 30-day waiting period before coverage goes into effect.

If a person who was required to purchase insurance as a condition of receiving disaster assistance dropped the policy, then disaster assistance would not be provided again. Public buildings will have the amount of insurance coverage they should have carried deducted from any disaster assistance they may be eligible for after a flood.

Basement backup insurance: National Flood Insurance covers seepage and sewer backup for an additional deductible provided there is a general condition of flooding in the area which was the proximate cause of the basement getting wet.

Several insurance companies offer coverage for damages incurred should a sump pump fail or sewer line backup. Most exclude damage from surface flooding that would be covered by the NFIP.

Each company has different amounts of coverage, exclusions, deductibles, and arrangements. The cost varies from nothing, to up to \$70 for a rider on the homeowner's insurance premium.

Where appropriate: NFIP coverage is good regardless of flood velocities, duration, warning time, or other flood hazards. The NFIP does not insure buildings for subsurface flooding, including seepage and sewer backup.

Private basement backup insurance is appropriate for buildings with basements.

Limitations: The NFIP requires a "general condition of flooding," so a very local problem may not be covered.

National Flood Insurance will not cover finished portions of a basement nor will it cover property outside a building such as landscaping, driveways, walls or fences.

Some private insurance companies offering basement coverage may cancel the coverage or increase the premium if the policy holder collects on a claim.

For more information: Local insurance agents have information on both NFIP and private insurance. (*See also Appendix A, section A.3.3.*)

2.2.9 Community programs

Property owners usually implement their own property protection measures. Therefore, a community mitigation program should include measures to encourage and assist owners. A community's plan may provide three kinds of help: pertinent information, technical advice and financial assistance.

Information: A community has passive and active ways to inform residents about flood hazards and damage mitigation.

Passive ways to provide information, such as through references in the public library, may not bring immediate reductions in flood damage. However, they can have a long term effect when people make construction or land use decisions later.

In addition to the library, many elementary and high schools have geography or science classes that are appropriate for sessions on flooding, natural hazards, and preserving the natural functions of floodplains and wetlands. Park and forest preserve districts have signs, lectures, and education programs for children and adults.

Active approaches include outreach projects, such as notices to floodprone property owners, to introduce the idea of property protection and identify sources of assistance. Other approaches, such as cable television shows, notices in public buildings, or booths at shopping centers, help but are not as effective as notices specifically directed to the owners of properties that should be protected.

More intensive efforts include distribution of handbooks and videos on property protection, public meetings with neighborhood groups, and "open houses." The last is a variation on the public meeting that includes exhibits by local contractors, insurance agents, building officials, the Red Cross, and others expert in flood protection who display their wares and answer questions.

Technical Assistance: In one-on-one sessions with property owners, community officials can provide advice and information on matters such as identifying flood hazards at the site, correcting local drainage problems, floodproofing, dealing with contractors, and funding.

Flood Assistance Program

The Village of South Holland has established a Flood Assistance Program to help its citizens. A member of the code enforcement staff is available to visit homes and advise on protection measures for surface flooding and sewer backup.

This person also administers a financial assistance program that pays 25% of the cost of property protection measures. The Village has a well-stocked library, and it regularly sends out notices about protection measures and services.

Technical assistance can be given in telephone conversations, as complimentary critiques of the owner's plans or ideas, and in visits to the building.

A more intensive effort is a written "flood audit," which provides the owner with a written description of the flood hazard at the site and specific recommendations to protect the site or building.

Financial Assistance: Communities in north-eastern Illinois have provided financial assistance as low-interest loans, rebates, cost-sharing and 100 percent grants. Community staff also provide information on financial assistance available from state and federal programs, such as those discussed in Appendix A.

Where appropriate: Providing information and technical assistance can help every property owner, and is one of the least expensive measures a community can undertake. Every step taken by a property owner can reduce flood damages.

Limitations: Some community staff members are hesitant to provide advice due to a lack of knowledge about property protection measures or concern about liability should a recommended measure fail. Both of these concerns can be overcome through training using manuals, technical assistance, and courses available from FEMA and the Corps of Engineers.

For more information: Guidance on establishing a community program to provide information and technical assistance to property owners can be found in *Flood Proofing Techniques, Programs and References, Local Flood Proofing Programs, and CRS Credit for Public Information Programs*. Information on financial assistance programs is available from the agencies in Appendix A.

2.3 Emergency Services

Emergency services measures protect people during and after a flood. All counties in northeastern Illinois and many cities and villages have emergency management offices to coordinate warning, response, and recovery during a disaster. At the state level, their work is coordinated by the Illinois Emergency Management Agency (IEMA).

2.3.1 Flood threat recognition

The first step in responding to a flood is knowing that one is coming.

A flood threat recognition system provides early warning to emergency managers. A complete system measures rainfall, snow conditions, soil moisture, and stream flows upstream in order to calculate the time and height of the flood crest downstream.

On large rivers, the flood threat recognition work is done by the National Weather Service. The Weather Service is in the National Oceanic and Atmospheric Administration (NOAA). Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio. Currently, this system covers selected locations on the Des Plaines, Fox, Kankakee and Little Calumet Rivers (*see Figure 2-4*).

Communities on smaller rivers must develop their own systems. They may install rain and river gauges in key locations, then gather data from them electronically or manually.

Emergency managers use graphs or computer models to translate data into a flood threat prediction. Such systems have been implemented by some communities along Salt Creek and the North Branch of the Chicago River.

Where appropriate: Communities located near streams and watersheds large enough to provide adequate lead time are candidates for setting up their own flood alert systems. Generally, flooding comes too fast in watersheds smaller than 10 - 20 square miles.

Limitations: If the system overstates the flood threat, a lot of energy and resources can be wasted responding to a nonexistent threat. A false warning also can create the hazard of "crying wolf" — people won't heed the next warning.

On the other hand, a system that understates the threat can create worse problems: the flood will catch the community unprepared, resulting in damage that could have been prevented, especially to vehicles and other items that could have been moved out of harm's way.

Figure 2-4 National Weather Service River Stage Forecast Stations

Des Plaines River

Russell

Gurnee

Des Plaines

Riverside

Fox River

Algonquin

Dayton

Kankakee River

Momence

Wilmington

Little Calumet River

Munster, IN

South Holland

For more information: The National Weather Service has information on the NOAA Weather Radio and can provide technical assistance on establishing a local flood threat recognition system (see Section A.3.8 in Appendix A). See also *River Stages in Illinois: Flood and Damage Data*.

2.3.2 Flood warning

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

A complete warning system should have a public information component so people can relate a warning to their situation and know what to do when a flood threatens. Summary safety information should be provided. If time allows, the warning can include information on evacuation and where temporary shelters will be established.

A flood warning may be disseminated in a variety of ways, as listed in Figure 2-5, which also describes the pros and cons of each system.

These methods of disseminating a warning — be it for floods, tornadoes, or severe storms — are in widespread use throughout northeastern Illinois.

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.

Most flood warning programs have two levels of notification:

1. A flood watch — conditions are right for flooding.
2. A flood warning — a flood has started or is expected to occur in the community.

The National Weather Service often issues a "flash flood watch" for urban areas, a notice that the amount of rain expected will cause ponding and other flooding on small streams where much of the watershed has been urbanized.

Where appropriate: Everywhere. While a warning system based on a flood threat recognition system will be more accurate and helpful, one that relies only on National Weather Service watches will still help people.

Limitations: Issuing a warning does not mean people will react promptly or properly. People need to be advised of what the warnings mean and what actions they should take.

For more information: More information and assistance is available from the county emergency management office, the Illinois Emergency Management Agency and the National Weather Service (see Sections A.2.4 and A.3.8 in Appendix A).

Figure 2-5 Pros and Cons of Various Warning Media

Mass warning systems: sirens, whistles, church bells, etc.

Advantages: Often already available in the fire department
 Reaches large numbers of people rapidly in urban areas
 Instills sense of urgency

Disadvantages: Cannot convey an explanation of the problem or instructions on what to do
 May suddenly fail if dependent on telephone or electrical power for operation
 Expensive for use in rural areas

Radio, television, and cable systems

Advantages: Receivers widely available
 Low or no initial investment
 Reaches large numbers of people rapidly during daylight and evening hours
 Suitable for both urban and rural areas
 Can convey explanation of problems and instructions for action

Disadvantages: Dependent on electrical power
 Few people are likely to be listening during late night and early morning
 Local stations may be off the air during late night and early morning hours

Mobile public address systems

Advantages: Reaches large numbers of people rapidly
 Conveys sense of urgency
 Low or no initial investment
 Can convey an explanation of problem and instructions for action
 Suitable for both urban and rural areas
 Person giving the warning can adapt procedures to the situation

Disadvantages: Local travel or flying may be prevented by weather or flooding conditions
 May tie up police or other vehicles when they are needed

Fan out systems: telephone trees, block captains, etc.

Advantages: Low or no initial investment
 Can convey explanation of problem and instructions for action
 Suitable for both urban and rural areas

Disadvantages: Messages may become garbled through many relays
 Vulnerable to rumors and speculation
 Slow
 Vulnerable to telephone system disruption

Door-to door contact

Advantages: Can convey explanation of problem and instructions for action
 Can give residents written instructions
 Conveys sense of urgency
 Persuasive
 Suitable for both urban and rural areas
 Low or no initial investment

Disadvantages: Slow
 May interfere with other essential duties

2.3.3 Flood response

Once a flood threat is recognized, the first priority is to alert others through the flood warning system. The second priority is to respond with actions that can prevent or reduce damage or injury.

Such actions (and the responding parties) include:

- Activating the emergency operations center (emergency manager)
- Sandbagging certain areas (public works or township road department)
- Closing streets or bridges (police or sheriff's department)
- Shutting off power to threatened areas (utility company)
- Releasing children from school (school district)
- Ordering an evacuation (mayor)
- Opening evacuation shelters (churches, schools, or the Red Cross)
- Monitoring water levels (engineer)
- Guarding sandbag walls and other protection measures (police)

Sandbagging is a Popular Flood Response Measure



A flood response plan is the best way to ensure that all bases are covered and that the response activities are appropriate for the expected flood threat. It is developed in coordination with the agencies or offices that are given various responsibilities.

A flood response plan should include a flood stage forecast map. This map relates flood levels to topographic information to show where various floods will go. The plan should identify different activities for the different flood levels.

Such advance planning is needed to ensure that response measures, such as sandbagging, are the most efficient activities for the areas that are predicted to flood.

Drills and exercises should be conducted between floods to ensure that key participants understand their duties. The result is a coordinated effort implemented by people who have experience working together so that available resources will be used most efficiently.

Where appropriate: All situations. Even where there is no flood threat recognition system, a written flood response plan can ensure that nothing is forgotten during the initial phase of reacting to storms and flooding.

Limitations: Careful planning and stockpiling are necessary to ensure the availability of people and supplies on short notice.

If not properly planned or keyed to the flood threat, flood response can be a wasted effort when the flood exceeds predicted levels.

Property owners may resist evacuation in order to protect their belongings.

Response operations, especially at night or in fast currents, can pose a danger to those responding.

For more information: More information and assistance is available from the county emergency management office and the Illinois Emergency Management Agency (*see Section A.2.4 in Appendix A*). References include *Flood Fighting* and *CRS Credit for Flood Warning Programs*.

2.3.4 Critical facilities

Protecting critical facilities during a flood is a vital part of any emergency services effort.

If a critical facility is flooded, workers and resources may be unnecessarily drawn away from protecting the rest of the community. If such a facility is prepared, it will be better able to support the community's flood response efforts.

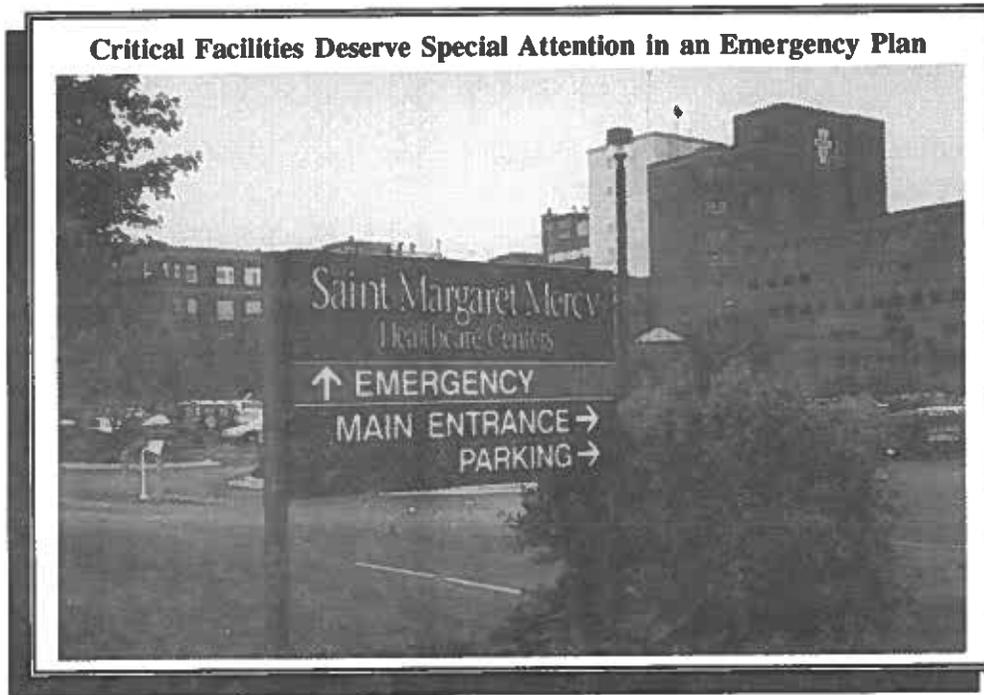
Critical facilities fall into two categories:

1. Buildings or locations vital to the flood response effort:

- emergency operations centers
- police and fire stations
- hospitals
- township highway garages
- selected roads and bridges
- suppliers of needed materials
- evacuation routes

2. Buildings or locations that if flooded would create secondary disasters:

- hazardous materials facilities
- water and wastewater treatment plants
- schools
- nursing homes



Most critical facilities have full-time professional managers or staff who are responsible for the facility during a disaster. These people often have their own emergency response plans. State law requires hospitals, nursing homes, and other public health facilities to develop such plans.

Many facilities would benefit from early flood warning, flood response planning, and coordination with community flood response efforts.

Where appropriate: Each community must identify which facilities are considered critical. All such facilities should have their own flood response plan coordinated with the community's.

Limitations: Owners or operators of critical facilities may be reluctant to voluntarily spend time and resources to develop a plan that they may think they won't need.

For more information: More information and assistance is available from the county emergency management office and the Illinois Emergency Management Agency (*see Section A.2.4 in Appendix A*).

2.3.5 Health and safety maintenance

Preventing dangers to health and safety is critical after a flood.

The flood response plan should identify appropriate measures to take. These include:

- Patrolling evacuated areas to prevent looting
- Providing safe drinking water

- Vaccinating residents for tetanus
- Clearing streets
- Cleaning up debris and garbage

The plan also should identify which agencies will be responsible for carrying out these measures. Normally, they are the police, sheriff, or public health authorities.

Where appropriate: All situations.

Limitations: Many people are more interested in returning to and repairing their flooded properties than in taking health and safety precautions. A public information program to counter this tendency is an essential part of any flood response plan.

For more information: More information and assistance is available from the county emergency management office, the Illinois Emergency Management Agency, and the Illinois Department of Public Health (*see Sections A.2.4 and A.2.5 in Appendix A*). A good reference to advise residents about health and safety measures is *Repairing Your Flooded Home*.

2.4 Flood Control

Flood control measures are used to prevent floodwaters from reaching properties, thus preventing damage.

These measures are "structural" because they involve construction of man-made structures to control water flows. Because of their size and cost, structural projects typically are implemented with the help of state or federal flood control agencies such as the Office of Water Resources, the US Army Corps of Engineers, and the Natural Resources Conservation Service.

Most flood control projects have shortcomings besides their sheer cost:

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

Kingery West

One nationally recognized flood protection project, Kingery West, was built in the 1970's on Salt Creek in DuPage County. 75 homes were acquired and removed. The rest of the subdivision was protected with a 100-year levee. Feeling safe, residents dropped their flood insurance.

Due to increased watershed development and a lack of maintenance, the flood of 1987 swept over the levee and flooded those who thought they were protected. The residents of the 75 homes that had been acquired were in new locations, high and dry.

Because most flood control projects will have regional or watershed-wide implications, they are often planned at a regional level. Nonetheless, communities should participate in and coordinate with regional flood control studies.

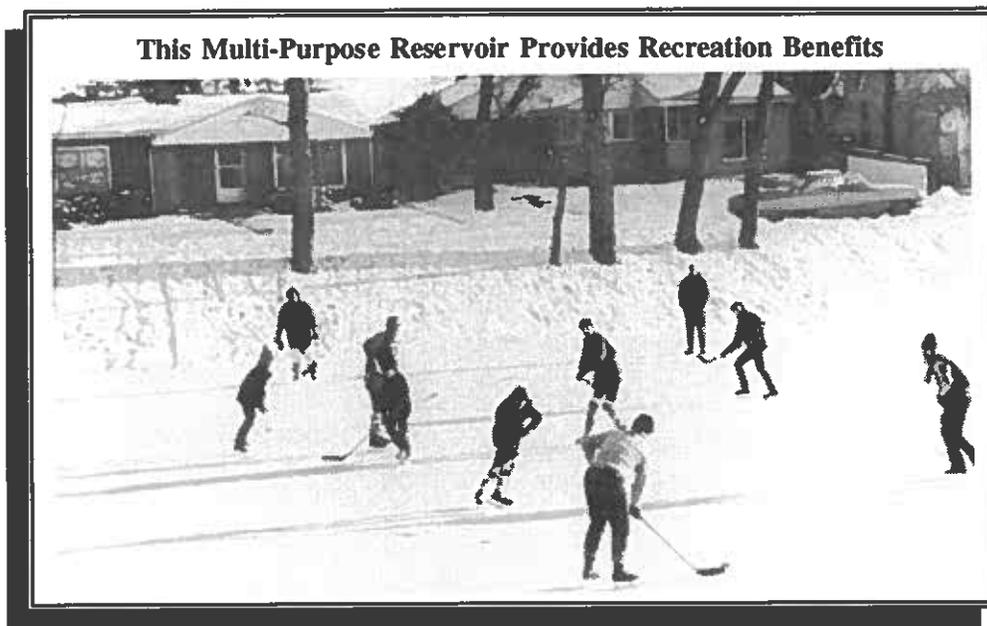
2.4.1 Reservoirs

Reservoirs control flooding by holding high flows behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate that the river can handle downstream.

The lake created may provide recreational benefits. Wet or dry basins can serve multiple uses by doubling as parks or other open space uses.

In northeastern Illinois, many reservoirs are simply man-made holes dug to provide enough room to store floodwaters. In some areas, costs have been reduced by using abandoned quarries.

Where appropriate: Reservoirs are suitable for protecting existing development. They may be the only flood control measure that can protect development close to a watercourse.



Reservoirs are most efficient in deeper valleys where there is more room to store water, or on smaller rivers where there is less water to store.

Building a reservoir in flat areas and on large rivers may not be cost-effective because large areas of land have to be purchased.

Limitations: As with other structural flood control projects, reservoirs:

- Are expensive
- Occupy a lot of land
- Require periodic maintenance
- May fail to prevent damage from floods that exceed their design levels
- May eliminate the natural and beneficial functions of the floodplain

For more information: Agencies with expertise in reservoir design and construction include the US Army Corps of Engineers, the Natural Resources Conservation Service, the Office of Water Resources, and the Metropolitan Water Reclamation District (*see Sections A.3.4, A.3.5, A.2.1 and A.1.3 in Appendix A*).

2.4.2 Levees and floodwalls

Probably the best known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected.

Levees and walls must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

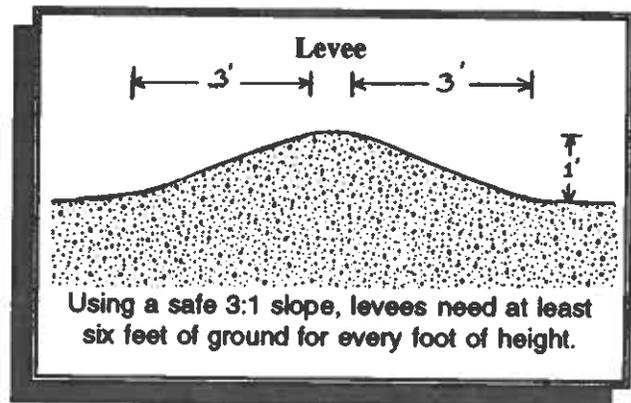
They should be set back out of the floodway so they will not push floodwater onto other properties. Their design also should compensate for the flood storage that they will displace.

Where appropriate: Levees are effective in protecting existing development.

Levees need considerable room to fit between the river and the area to be protected. If space is a constraint, more expensive floodwalls are used.

Limitations: Levees or floodwalls can be overtopped, flooding people who thought they were protected.

If one fails, the sudden rush of flood water can endanger lives and may cause greater damage than having no flood barrier at all.



Levees and floodwalls can be barriers to access, views, and local drainage.

There are continued operation and maintenance costs to ensure the pumps work and that the levees do not slump or develop holes caused by animals or vegetation.

Larger levees or floodwalls usually cost so much that they cannot be built without state or federal aid. Flood control agencies require that the benefits of a major project exceed the cost. Thus, protecting major concentrations of property in urban areas often can be justified.

However, where development is scattered or aligned in narrow strips along a river, the cost often exceeds the benefits of protecting a smaller number of properties.

For more information: The US Army Corps of Engineers can provide information on levee construction criteria (*see Section A.3.4 in Appendix A*).

2.4.3 Diversions

A diversion is simply a new channel that sends floodwater to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels.

During normal flows, the water stays in the old channel. During flood flows, the stream spills over to the diversion channel or tunnel which carries the excess water to a lake or another river.

Where appropriate: Diversions are limited by topography; they won't work everywhere. Unless the receiving water body is relatively close to the floodprone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive.

Where topography and land use are not favorable, a more expensive tunnel is needed.

Limitations: Care must be taken to ensure that the diversion does not cause a new flood problem.

Even the appearance of transferring the flood to someone else greatly complicates — and often halts — a diversion project. Diversion channels may be blocked by residents who don't understand, or don't agree with, their purpose.

For more information: Agencies that can help with technical advice include the US Army Corps of Engineers and the Office of Water Resources (*see Sections A.3.4 and A.2.1 in Appendix A*).

2.4.4 Conveyance improvements

By improving channel conveyance, more water is carried away. Improvements include making a channel wider, deeper, smoother or straighter. Some smaller channels can be lined with concrete or even put in underground pipes.

Dredging is one form of conveyance improvement. Dredging is often cost prohibitive because the dredged material must be disposed of somewhere and the stream will usually fill back in with sediment in a few years. Dredging is usually undertaken on larger rivers only to maintain a navigation channel.

Where channel modification is the only practical flood control solution, it should be performed in an environmentally sensitive manner. Mitigation of natural habitat and water quality functions should be incorporated. If there is enough room, properly sloped and planted channel banks can prove cheaper to maintain than concrete ditches.



Where appropriate: Conveyance improvements are recommended for smaller streams and ditches in developed areas, particularly if there is no room for a levee.

Limitations: The cost of modifying a channel and then maintaining it can be expensive.

Channel projects can damage or destroy wildlife habitats and create new erosion problems.

Straightening a stream is a temporary measure because it tries to eliminate meanders and other features that nature will continually work to recreate.

Improving a channel so that water travels through it faster may aggravate a flood problem downstream.

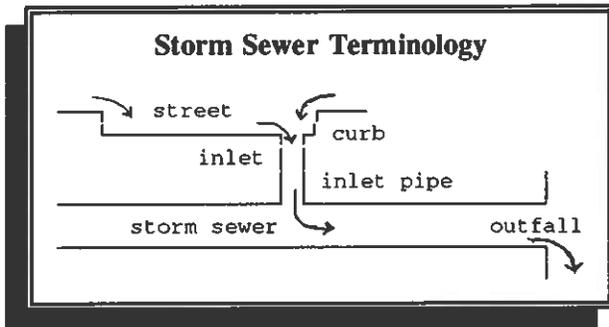
For more information: Agencies that can help include the US Army Corps of Engineers, the Natural Resources Conservation Service, and the Office of Water Resources (*see Sections A.3.4, A.3.5 and A.2.1 in Appendix A*).

2.4.5 Drainage and storm sewer improvements

Man-made ditches and storm sewers help drain areas where the surface drainage system is inadequate or where underground drainageways may be safer or more attractive.

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.

Storm sewer improvements include installing new sewers, enlarging small pipes, and preventing back flow.



Streets in many developments are used as part of the drainage system, to carry or hold water from larger, less frequent storms. They collect runoff and convey it to a receiving sewer, ditch or stream.

Allowing water to stand in the streets and then draining them slowly can be a more effective and less expensive drainage measure than building bigger sewers and ditches.

Where appropriate: Drainage and storm sewer improvements should be considered wherever storm sewers are overloaded and local ponding from heavy storms damage property.

Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving body of water can absorb the increased flows without increased flooding.

Limitations: Local drainage improvements can adversely affect wetlands and increase flooding on downstream properties.

Storm sewers and concrete ditches have limited flow capacities and do not allow for filtering stormwater to improve water quality or for recharging aquifers.

Debris can sometimes get caught in flap gates and valves, preventing them from closing, thereby making them useless. This can be prevented with proper monitoring and maintenance and use of designs that are less prone to obstructions.

For more information: Public works departments and engineers are the best sources of information on local sewer improvements and maintenance.

Chapter 3.

Pre-Flood Mitigation Planning

Chapter 3. Pre-Flood Mitigation Planning

General Eisenhower said it all: The plan you create is not as important as the planning process you used to produce the document.

*"Plans are worthless.
Planning is essential."*

- Dwight D. Eisenhower

Anyone can prepare a plan — a report with recommendations on what the community should do. But only by following a proper planning process can a community determine what is best for it, and then agree on what to do.

Pre- vs. post-flood planning

This chapter covers pre-flood planning while Chapter 4 discusses planning after a flood. The planning process undertaken before a flood differs from the post-flood process in that there is more time to examine the flood problem and review the variety of mitigation measures and programs.

After a flood, planners and other officials must make major decisions on repair, reconstruction and redevelopment of the flooded area in a short period of time. Their attention tends to be focused on the area that was just flooded — which may not encompass all of the community's flood problems — and often does not address protecting the natural and beneficial floodplain functions.

Communities should not wait for a disaster. Pre-flood planning is always preferred, as it allows for a more careful review of the flood problem and the options for mitigating it as well as opportunities for use and reuse of the floodplain.

The process

Flood hazard mitigation planning is a process similar to other community development planning efforts. Most planners and engineers are familiar with the basic process which follows a step by step procedure to define the problem, determine goals and objectives, review alternatives, and select those activities appropriate for the community.

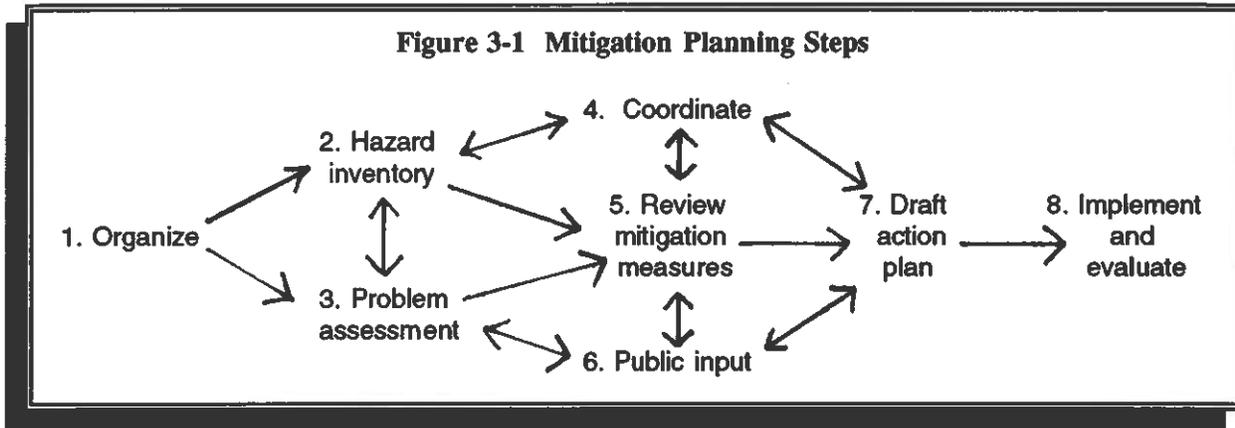
While mitigation planning follows the same general format as other planning projects, there are several ways to define the specific steps of the process. This guidebook is based on the one recognized by the Community Rating System (CRS) which is administered by FEMA's National Flood Insurance Program (*see Appendix H*). At this time, the CRS process is being used as a model for the planning requirements of other FEMA programs.

Tips for Pre-flood Planning

- Identify all the problems
- Evaluate all possible measures
- Coordinate with others
- Involve the public
- Plan for the long run
- Do what is best for the community
- Prepare for the next flood

The mitigation planning process has eight steps which coincide with the eight sections of this chapter. They are displayed graphically in Figure 3-1.

The eight steps are not all conducted in sequence. For example, steps 2 and 3 can be done at the same time. Two steps - coordination and obtaining public input - should be done throughout the process.



Planning phases

The planning procedures detailed in this chapter are intended for use by any community seeking to develop a detailed mitigation plan for each of its flood problem areas. The plan can include recommendations for each property if the property protection scoring system explained in Appendix C is used.

This approach may be too detailed for counties, large communities, or watershed planning efforts. Mitigation planning for large areas may need to be done in phases.

In the first phase, the planners prepare a broad mitigation plan that recommends activities that are appropriate everywhere and identifies flood problem areas. In the second phase, the planners tackle each problem area in priority order.

For example, the recommendations from the first phase of a county's planning effort might include public information and regulatory activities that would affect all properties. These would be implemented as soon as practicable.

The first phase also would identify a number of flood problem areas and prioritize them. During the second phase (which may last several more years), the planning staff would address each area and develop site specific mitigation plans that identify properties to be acquired, buildings to be floodproofed, etc.

Similarly, a planning effort for a watershed might identify basin-wide measures during the first phase. In the second phase, individual communities or agencies would address target areas.

Local mitigation planning should supplement and complement regional or watershed planning. Flood control measures in particular should be addressed at both the community and regional levels, although larger projects will be implemented at the regional or watershed level.

The rest of this chapter describes the recommended methodology for developing a detailed community-based flood hazard mitigation plan.

3.1 Organize

The planning process will succeed only if the right people and agencies are involved, at the right time. Two groups of people are important: technical staff and the public.

3.1.1 Staff resources

The planner

In this guidebook, the person in charge of the planning process is called "the planner." Selecting that person is the crucial first step in the planning process.

The appointed planner must be officially designated as having the authority to develop the plan. He or she would be responsible for completing the plan in a reasonable amount of time, ensuring its adoption, and monitoring its implementation.

In many communities, this role could be filled by someone in the planning department. In smaller communities, it could be the emergency manager, a council member, or the chair of the citizens' planning committee.

While a consultant may provide valuable guidance, the person in charge should be a local employee or resident.

Whoever is put in charge must have an open mind about the variety of possible mitigation measures. Different professionals will bring their own preferences to the process.

For example, planning implemented by engineers often favor structural flood control measures, while plans prepared by emergency managers may be biased toward flood preparedness activities. Similarly, land use planners may orient a mitigation plan toward regulatory or land use measures.

Other staff

Staff who likely will be responsible for helping to implement the plan should be involved in the planning process, as they need to understand what is expected of them and be willing to work toward implementation. Also, the planner will need technical support from engineers and other staff professionals who are more familiar with some of the flood mitigation measures.

Figure 3-2 Local staff to be Included in Mitigation Planning

- Planning/community development (planning direction, coordination with other plans, programs to help residents and businesses)
- Engineer (flood data, flood control measures)
- Emergency manager (emergency services measures)
- Public safety, police and fire (emergency services measures)
- Public works/streets/highways (flood control measures, channel maintenance)
- Building/zoning/code enforcement (regulations, building and property protection)
- Public information/community relations (property protection measures, public involvement)
- Parks and forest preserve (acquisition, protection of natural areas)
- Governing board or manager's office (political acceptance and adoption)

Therefore, key staff from all affected departments should participate in the planning process. Which staff to involve depends on the community's organization and the mitigation measures that will likely be reviewed and/or selected during the planning process. *(Figure 3-2 suggests offices that should be involved.)*

3.1.2 Public involvement

Drawing all affected groups into the planning process helps to ensure that the plan's recommendations reflect the community's needs and preferences, and increases the likelihood they will be implemented.

"All affected groups" include local staff, representatives of floodplain residents, community organizations, and businesses.

"All affected groups" also must include people who may oppose certain projects. By involving them in the planning process, they can be educated and, possibly, persuaded to support projects they might otherwise oppose.

If they are not included, they will have reason to claim later that their concerns were not considered.

Public involvement can include meetings with neighborhood leaders, special interest groups (such as developers or builders associations), and other government agencies which themselves represent the public. This approach is

more appropriate for large areas, such as during the first phase of a two-phase planning effort.

A more effective way to involve the public is with a planning committee as discussed in the next section.

3.1.3 Planning committee

This guidebook recommends creating a planning committee of 10 to 15 people representing "all affected groups." This structure has proven to be very helpful in providing information on the needs and concerns of the groups, and in keeping the community up to date on how the plan is progressing.

A planning committee can:

- Be an effective forum for matching the technical requirements of a program to the community's situation,
- Give the participants a feeling of "ownership" of the plan and its recommendations, which helps build public support for it, and
- Form a constituency that will have a stake in ensuring that the plan is implemented.

A resident is the preferred choice to head the planning committee, usually chosen for his or her ability to get people to work together and get things done. The planner or other staff member provides administrative support, such as taking minutes and sending out meeting notices.

Determining who has a vote usually is not necessary, as most often issues are decided by consensus.

Meetings

At the first committee meeting, the planner and the committee should establish a planning timetable. Depending on deadlines, time constraints, and staff time available, committee meetings can be held once or twice a month.

Scheduling meetings should be done so as to include as many people as often as possible. It can be hard for some members to make more frequent meetings, and the planner should not prepare the draft without their input.

One key threat to the planning process is that it starts to drag and become a bore. Nine months of monthly meetings with nothing to show but a draft piece of paper can discourage many committee members.

Field trips can serve to break up the monotony. Destinations may include flood-proofing sites, reservoirs, emergency operating centers, restored wetlands, and similar locations to give the members a first-hand view of how mitigation works. Such field trips often change the minds of those skeptical about some of the potential mitigation measures.

Typical Planning Committee Meeting Schedule

- 1st meeting: organize, orientation to the planning process, review of flood data
- 2nd meeting: hazard area inventory
- 3rd meeting: needs and goals
- 4th meeting: prevention strategies/measures
- 5th meeting: property protection strategies
- 6th meeting: emergency services strategies
- 7th meeting: flood control strategies
- 8th meeting: review of draft plan
- 9th meeting: public meeting on draft plan, formal recommendation to the governing board

Later duties

The planning committee's work is not done when the plan is adopted by the governing board. The plan should give the committee assignments, such as developing some recommendations in more detail, helping on the design and implementation of some projects, and monitoring the community's progress in implementing the action plan.

For CRS credit, a written progress report must be prepared each year, a duty for which the planning committee is well suited, as committee members wrote the plan and have a stake in seeing it implemented. (*See section 3.8.3 for a discussion of progress reports.*)

3.1.4 Technical assistance

Most experienced planners can navigate through the planning process. However, many technical issues arise when addressing flooding and flood hazard mitigation. When this happens, communities in northeastern Illinois have many excellent sources of technical assistance to turn to.

Appendix A lists agencies that can help with floodplain management questions. Figures 3-4 and 3-7 lists these agencies in matrices that identify the type of assistance they provide.

Assistance in the planning process can be provided by some of the agencies listed in Appendix A. The Northeastern Illinois Planning Commission, the county stormwater agencies, the Office of Water Resources and the Federal Emergency Management Agency have planners on staff who can advise and assist in organizing a local planning effort (*see Appendix A, Sections A.1.1, A.1.2, A.2.1, and A.3.1*).

The National Park Service also may be able to provide planning assistance. Its staff can help during planning and public input workshops (*see Appendix A, Section A.3.9*).

Another source of assistance is a private consultant. Planning and engineering firms usually have personnel skilled in the various mitigation measures and the planning process.

3.2 Hazard Inventory

Defining the flood hazard is the planning committee's first task. This requires collection of all available information to ensure that the planners have a complete picture of the location and types of flooding that occurs in the community.

Generally, this means the more data, the better. Most of what is needed to develop a community mitigation plan is available in existing studies, so the planner should not need to conduct studies to develop new flood maps or data.

How much time and effort is spent on collecting data depends on the time and resources available. However, the planning process should not be delayed while waiting for more data in order to develop a highly detailed problem description.

3.2.1 Flood hazard areas

Identifying areas affected by flooding is the first step in the hazard inventory.

Most flood hazard mitigation plans focus on the 100-year or "base" floodplain because the data are readily available and because state and NFIP regulations are based on the 100-year flood.

The term "base" flood is used because many people misunderstand the term "100-year" or "1% chance" flood. The three terms are synonymous for the flood that has a statistical likelihood of occurring, on average, once every 100 years.

The plan should address historical floods, especially those that were larger than the base flood.

The planning process also should address areas affected by smaller, repetitive flooding, because such areas often account for a disproportionate amount of damage and heightened concern by residents.

Planning maps

The easiest way to display flood hazard areas is on a map. Most communities have a Flood Insurance Rate Map (FIRM) which was prepared by the Federal Emergency Management Agency. The FIRM shows the base floodplain and, sometimes, the 500-year floodplain.

However, communities should be aware that most FIRMs are out of date and may under-represent the actual extent of flooding in some areas. They also cover only those floodplains from streams that drain more than one square mile (ten square miles in rural areas). Therefore, FIRMs do not usually show small, localized flooding, drainage problems and depressional areas.

The FIRM for large communities may have several panels and be too big to enable committee members to visualize the whole flood problem.

For planning purposes, the staff may want to use street maps on 8½" x 11" paper. These are handy to copy, review, mark up, and include in the final plan's text.

Displaying floodplain boundaries accurately is not as important as illustrating the community's problem. Figure 3-3 is an example of such a map for the fictitious community of McLake.

What are the Odds of a 100-year Flood?

The use of the term "100-year flood" has caused many complications with those not familiar with statistics. One alternative has been to use the odds of a 100-year flood during the life of a 30-year mortgage (26% chance).

Chance of Flooding over a Period of Years

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

The numbers do not convey the true 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 there will be a ten-year flood. Compare these numbers to the 5% chance that the house will catch fire during that 30-year mortgage.

Source: *IAFSM News*, Spring, 1992

Unmapped flooding

"Flood hazard" may include more than just the usual overbank flooding from local streams and lakes. If people get wet, they consider it flooding and expect the community to address it.

Therefore, the hazard inventory should include a discussion of overbank flooding from small ditches, flooding in depressional areas, and sanitary or storm sewer backup.

These other "flood hazards" are not usually mapped by available studies. They can be identified on a street map without a detailed study, based on staff knowledge, complaint records, or other historical data.

Sometimes floods occur throughout the community, as in the case of sewer backup and drainage problems that result when a resident regrades a yard or fills a ditch. In these cases, a map may not be needed; the plan can describe the problem without showing all the known or possible locations.

3.2.2 Flood hazard data

Not only does the planner need to know where it floods, he or she should also identify the severity of flooding.

The hazard inventory should include a summary of these flood data:

Source of water

There are three generally accepted causes of flooding in northeastern Illinois:

- *Overbank flooding* from rivers, ditches or lakes,
- *Local drainage problems* caused by stormwater runoff and ponding during heavy storms, and
- *Sewer backup* from overloaded sewers.

The sources of floodwaters should be identified and, where feasible, shown on the planning map.

Depth of flooding

No floodplain is considered "safe." Floodwaters of one to two feet can float a car; flooding over three feet is more hazardous.

Areas subject to deep flooding should be identified by comparing the base flood elevations with ground elevations.

Velocities

A recommended rule of thumb states that anywhere the velocity exceeds 5 feet per second should be considered hazardous for buildings.

In areas with lower velocities, the product of depth times velocity identifies areas that are hazardous for people. Several studies have concluded that a product of 3 is the upper limit of safety. Thus, a person should not walk in water 3 feet deep with a velocity of 1 foot per second, or in water 1 foot deep with a velocity of 3 feet per second.

The flood insurance study text lists average floodway velocities during the base flood. This probably understates the velocity in the channel and overstates it in the overbank areas, especially in the floodplain fringe. However, it is usually the only information available.

Warning time

Warning time is both a safety consideration and a factor in implementing property protection measures that depend on human intervention.

As little as 30 minutes can be enough to take steps such as issuing a flood warning, barricading roads that will flood, and installing closures on floodwalls. A major flood response effort that includes sandbagging will need several hours or more.

The inventory should identify areas where warning times of 30 minutes and three hours are provided. If the community has experience with flood response activities, the inventory should reflect the warning time needed based on past experience.

Warning times may be available from local or county emergency managers.

Repetitive loss areas

Residents who suffer repeated flood damage brought about by frequent, shallow flooding may demand more attention than areas subject to more hazardous but less frequent flooding. Because repetitive flooding accounts for a third of all flood insurance claims, several FEMA programs require that such areas be given special attention in a mitigation plan.

Repetitive loss areas can be identified based on local experience and historical records.

FEMA can provide a list of properties that have had repetitive flood insurance claims. Addressing these areas is a prerequisite for credit under the National Flood Insurance Program's Community Rating System.

Data sources

The planners should not need to conduct studies to develop new flood data. Much valuable data on the flood hazard can be found in the text of the Flood Insurance Study and studies performed by other agencies. Figure 3-4 lists where to obtain data on flood hazards and flood history.

Figure 3-4 Flood Hazard Data and Damage Information Sources

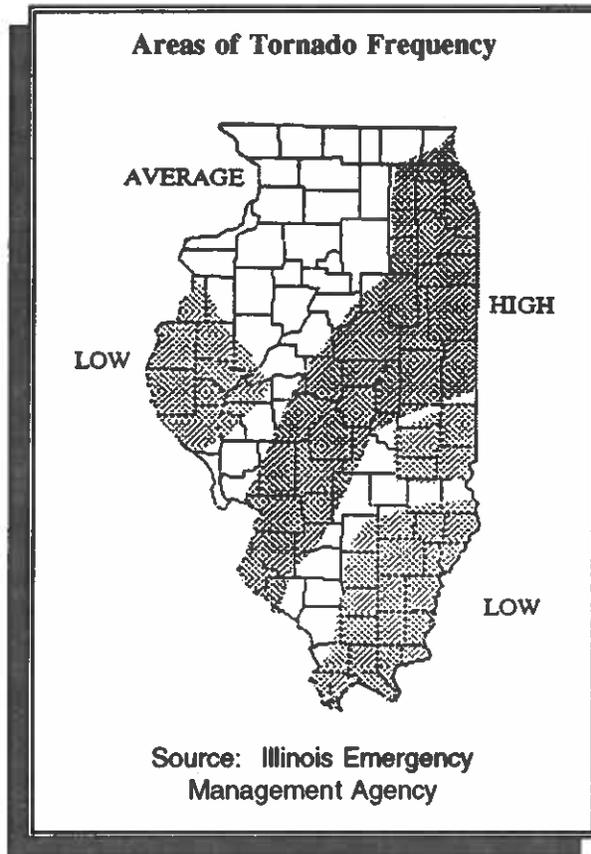
Flood Hazard Data		Damage	
<u>Historical</u>	<u>Predicted</u>	<u>Info</u>	
Local Sources			
H	P	D	Community flood and drainage studies
H		D	Emergency manager's records and after action reports
H		D	Newspaper files
		D	Township/county assessor: requests for tax relief
Interviews with and records from:			
H		D	Emergency management/public safety staff
H	P	D	Local or consulting engineer or planner
H		D	Public works/street/highway/sewer staff
H		D	Neighborhood organizations
H		D	Drainage district staff
H			A.1.1 Northeastern Illinois Planning Commission Hydrologic Investigations Atlas
H	P	D	A.1.2 County stormwater studies
H	P	D	A.1.3 Metropolitan Water Reclamation District records
H	P	D	A.1.4 Soil and Water Conservation District files
State and Federal Sources			
H		D	A.2.1 Office of Water Resources 1974 Governor's Task Force survey
H	P	D	Reconnaissance and planning reports
H			High water mark records
	P		A.2.2 State Water Survey
H	P	D	IDOT-Division of Highways bridge records/permits
H	P	D	A.3.1 FEMA, Mitigation Division Flood Insurance Rate Map and Floodway Map
	P	D	Flood insurance study text, section 2.3
		D	Flood insurance claims records
H		D	A.3.2 FEMA Response and Recovery Division Disaster assistance application records
		D	A.3.12 Small Business Administration

[The numbers refer to the section in Appendix A that describes the agency]

3.2.3 Other hazards

A good mitigation plan should integrate consideration of other hazards besides flooding.

Northeastern Illinois faces other natural and man-made hazards, such as tornados, blizzards, ice storms, drought, fire, and "technological" hazards, such as releases from nuclear power plants and hazardous materials spills.



Most of these hazards are not site specific. However, some technological hazard sites may be in the floodplain. When they are flooded, the danger and damage caused by a flood is greatly increased.

These other hazards should be kept in mind when the flood mitigation strategies and measures are reviewed. For example, if the plan recommends revising the building code to better account for flooding or sewer backup, it should be reviewed to see if it has the latest provisions for high winds and fire hazards.

The most pertinent strategies are those that are useful for any hazard. In particular, public information activities need to be cover all the hazards. For example, residents should have all the information on emergency warning signals in one handout.

The county emergency manager and the Illinois Emergency Management Agency have more information about the extent and threats posed by other hazards (*see Appendix A, Section A.2.4*).

3.3 Problem Assessment

A systematic inventory of what is located in the flood hazard area is needed to ensure that the plan addresses all potential problems.

This work should look at areas in *or near* the mapped floodplain boundaries as well as other areas identified in the flood hazard inventory. The maps' boundaries should not be considered exact, as they are subject to mapping inaccuracies and the flood hazard may increase over time as more development occurs.

3.3.1 Land use and buildings

The inventory should show how floodprone areas have been developed and how many buildings are affected. The land use map from a recent comprehensive plan may already show current land uses (which should not be confused with a land use *plan* for the future).

Buildings affected

A count of the number of buildings affected by each type of flooding is useful to have. Not only does it inform planners of the magnitude of the problem, but programs like the National Flood Insurance Program need to know the number.

The building count should be done by use or type of building because flooding affects different types differently. For example, a commercial or industrial building is likely to suffer more dollar damage than a house and have a bigger impact on the community if it has to close because of flooding or flood damage.

Similarly, a building with a basement will be hit harder by shallow flooding and sewer backup than will a building on a crawlspace. An historic site or local landmark may deserve more attention than other properties because of its special value to the community.

The number and types of buildings affected can be obtained by a review of aerial photos or a windshield survey.

The amount of time and resources available dictate how much data can be collected. At a minimum, the planner should obtain a total count of the residential and nonresidential structures affected by each type of flooding.

An estimated count can be sufficient for larger communities that may find it difficult and time consuming to locate every floodprone building.

Building damage

An assessment of predicted or actual building damage is another useful type of information. It may be readily available from the following sources:

- Flood control studies often obtained the elevations of buildings and developed estimates of their average annual dollar damage.
- Post-flood, after action, or damage assessment reports may include damage data.
- Disaster assistance agencies and flood insurance claims records will have data on damage to buildings that applied for financial assistance.

Figure 3-4 identifies agencies that may have predicted and/or historical damage data.

3.3.2 Property protection scoring system

Large-scale, community-wide maps and general information are usually sufficient for a community mitigation plan. However, if time and resources permit, the planner should consider collecting data *on each lot* to determine appropriate property protection measures.

This information is particularly valuable if a large acquisition or flood control project has been judged not feasible.

Communities with smaller flood problems may be able work on both community-wide issues and individual property measures at the same time. *(See Appendix C for details on information to collect when planning on a building-by-building basis. This information is used in the property protection scoring system discussed at the end of Appendix C.)*

3.3.3 Critical facilities

Any building or site that, if flooded, would have a major impact on the community's safety or ability to function can be considered a critical facility.

FEMA Definition of Critical Facilities

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, radioactive and/or water-reactive materials;
- Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a flood;
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for flood response activities before, during, and after a flood; and
- Public and private utility facilities that are vital to maintaining or restoring normal services to flooded areas before, during, and after a flood.

-- *Community Rating System Coordinator's Manual, 1994, page 130-2*

There are two types:

1. Facilities vital to the flood fighting effort, such as the emergency operations center
2. Facilities that will increase the hazard if flooded, such as a hazardous materials storage site

The planners may use their own judgement in determining if a facility is "critical." For example, if little flood warning time is expected, a floodprone school can be listed as a critical facility. Or, a community may identify a bridge or road as critical if floodwaters would prevent emergency vehicles from reaching a neighborhood.

Critical facilities should be identified in the mitigation plan and their locations should be mapped. The planning effort needs to give special attention to those facilities located in high hazard areas, such as areas with deep or high velocity flooding.

3.3.4 Natural areas

Although most attention usually is focused on protecting existing buildings, floodprone areas — especially undeveloped areas and wetlands — often provide what are called "natural and beneficial functions."

These functions include storing floodwaters, filtering and cleansing of floodwaters, recharging groundwater and providing habitats for many different kinds of flora and fauna (*see Figure 3-6 on the next page*).

Because many of these natural areas are irreplaceable, preserving them and/or protecting their natural and beneficial functions pays off in the long run. They are amenities that benefit the community or nearby neighborhoods, so not developing them can actually increase property values.

More information on natural areas and the natural and beneficial functions of floodplains can be obtained from local park and forest preserve districts, as well as conservation organizations. Groups such as the Audubon Society, the Nature Conservancy, and the Sierra Club often are listed in the Yellow Pages under "Environmental organizations." (*See Figure 3-5 for a list of government agencies that can help.*)

Figure 3-5 Agencies with Data On Natural Areas and Functions

- A.1.1 Northeastern Illinois Planning Commission
- A.1.4 Soil and Water Conservation Districts
- A.2.3 Department of Natural Resources
- A.3.5 Natural Resources Conservation Service
- A.3.10 Fish and Wildlife Service

[The numbers refer to the section in Appendix A that describes the agency]

3.3.5 Future development

Not only must the plan look at conditions today, it also must account for expected changes in the floodprone areas, especially the development potential of vacant land.

Development often follows transportation routes, particularly highways. In some communities, there may be little remaining flood-free vacant land so pressure increases to develop in the floodplain.

In other communities, the floodplain may have been built up years ago and now repetitive flooding is causing deterioration and blight.

While a floodprone area may be ripe for development, three things will deter unbridled construction of damage-prone properties: physical constraints, ownership and regulations.

Physical constraints

In some areas of the country, the threat of flood damage has been severe enough that hazardous areas are avoided voluntarily. This has not been the case in most of northeastern Illinois in recent years.

Figure 3-6 Natural and Beneficial Floodplain Functions

Water Resources: resources and functions that are part of or provide a benefit to the hydrologic cycles on the earth's surface and below ground

Natural Flood and Erosion Control

- Provide flood storage and conveyance
- Reduce flood velocities
- Reduce flood peaks
- Reduce sedimentation

Water Quality Protection

- Filter nutrients and impurities from runoff
- Process organic wastes
- Moderate temperature fluctuations

Groundwater Recharge/Discharge

- Promote infiltration and aquifer recharge
- Help to maintain natural base flows instream

Biological Resources: resources and functions that benefit plants and animals

Biological Productivity

- Support high rate of plant growth
- Maintain biodiversity
- Maintain integrity of ecosystem

Fish and Wildlife Habitats

- Provide breeding and feeding grounds
- Create and enhance waterfowl habitat
- Protect habitats for rare/endangered species

Societal Resources: resources and functions that directly benefit human society

Harvest of wild and cultivated products

- Enhance agricultural lands
- Provide sites for aquaculture
- Restore and enhance forest lands

Recreational Opportunities

- Provide areas for active and passive uses
- Provide open space
- Provide aesthetic pleasure

Areas for Scientific Study and Outdoor Education

- Contain cultural resources (historic and archaeological sites)
- Provide opportunities for environmental and other studies

Source: Derived from Appendix A of *A Unified National Program for Floodplain Management*, 1994, Federal Interagency Floodplain Management Task Force, FEMA - 248.

However, the area is subject to one physical constraint that often coincides with floodplains: poor soils. Coincidentally, many floodprone areas are classified as wetlands.

The local soil and water conservation district (*see Appendix A, Section A.1.4*) can provide information on soil types and wetland designations. District staff can identify those areas that are so inappropriate for buildings that builders should avoid them.

On the other hand, builders often simply pay more to develop the land by incorporating subsurface drainage, special foundations and other measures to overcome soil problems.

Therefore, physical constraints to future development may be viewed by developers as obstacles that can be overcome by using more expensive construction techniques. They may slow, but probably won't stop, development.

Ownership

The planner should check on ownership of larger parcels of vacant, floodprone land in and adjacent to the community.

Land held by a park district or conservation organization is not likely to be developed. But farm land held as an investment or owned by a farmer who wants to retire may be prime for conversion to an intensive (and damage prone) use.

Regulations

Zoning laws, subdivision regulations and building codes probably will have the greatest impact on development trends (*See Sections 2.1.2 - 2.1.6*). They should ensure that certain minimum protection standards will be met when an area is developed.

Caution: Regulations based solely on state and federal requirements do not prevent development of vacant land or decide whether an area should be developed. If the likelihood is high that vacant lands will be wanted for development, the planning process needs to devote more attention to the preventive mitigation measures.

Every community needs to consider whether its current regulations are adequate to prohibit damage-prone uses. For example, communities are encouraged to impose limitations on uses in the floodway that are more stringent than the state's (i.e., prohibiting state-allowed uses, such as new garages and sheds, treatment plants, parking lots and roadways).

3.3.6 Problem statement

The hazard inventory and problem assessment are used to produce a written problem statement.

Similar to the risk assessment and vulnerability statement that emergency managers prepare for their emergency plans, this statement is not just a summary of the hazard, it is an explanation of the *impact* of the hazard on the community.

The statement summarizes the hazard and identifies the most hazardous areas. The written problem statement should include a map of the floodplain with hazard data, such as the floodway boundaries and non-floodplain depressional areas. The problem statement and map should detail which buildings, critical facilities, natural areas and other sites are of concern.

Areas facing the greatest threat should be identified. These may be areas with the greatest depths and velocities, critical facilities, residential neighborhoods that are most frequently flooded, sites downstream of hazardous materials, or valuable natural areas that are a high priority for protection.

As most communities will not be able to tackle all the problems listed in the statement, it should prioritize the areas or issues that should be addressed first.

An example problem statement appears on the next page.

Example Problem Statement for McLake

1. The base flood on Crows Branch affects 150 homes and 12 businesses. This is the area mapped as "Zone A." There is approximately two hours of warning time on Crows Branch at the upstream Village limits.
 2. The Crows Branch floodway downstream of the railroad is subject to average flood velocities greater than five feet per second and is considered a high hazard area. There are seven houses in this area that are deteriorating. Some are vacant.
 3. Repetitive flooding of Tributary A of Crows Branch affects 12 homes in the Thomas Subdivision. This area faces the greatest and most frequent damage from flooding and is designated priority area #1.
 4. The Montrose shopping center was built in a depression and floods on the average once every other year during heavy rains, resulting in damage to inventories and parked cars, lost business, and a threat to public health. It is designated as priority area #2.
 5. The Rescue Squad office, the wastewater treatment plant, and the Baltimore and Second Street bridges are floodprone critical facilities.
 6. While only flooded once in the last 40 years, the impact of flooding on the wastewater treatment plant is so great that it is designated as priority area #3.
 7. Sewer backup and poor local drainage is a problem for buildings with basements and split level homes throughout town.
 8. Gorman Woods is a unique asset with recreational and educational benefits that should be preserved and protected.
 9. Flooding and stormwater problems can be expected to worsen if current watershed development practices continue.
- Note: This example coincides with the map of McLake in Figure 3-3.*

3.4 Coordinate

Flood hazard mitigation planning should not be conducted in a vacuum.

The planner needs to know what others are doing — both within and outside the community — and what residents and officials want to see done. Throughout the planning process, the planner should stay in touch with key groups, such as the floodplain residents and other agencies with flood mitigation responsibilities.

Coordination is especially important while conducting the hazard inventory, during the review of the mitigation measures, and when the action plan is prepared. As noted in Figure 3-1, coordination is central to mitigation planning.

3.4.1 Why coordinate

The floodplain is not just a place that gets flooded — and flooding is not the only concern of the community or even of the floodplain residents.

Experience has shown that the mitigation plans that get implemented are those that coordinate flood concerns with other community needs and goals and other agencies' programs. There are at least five reasons for this.

Prevent conflicts

Coordination with others will help to ensure that mitigation activities do not conflict with others' plans for an area.

For example, community development and hazard mitigation goals may be mutually supportive or they may conflict. If the community wants more recreational opportunities, then clearing out flooded properties to provide a scenic waterfront park would be most appropriate.

Conversely, if the floodplain includes the community's business district and the elected officials are solidly behind economic development, a mitigation plan should consider mitigation measures other than clearing out the community's economic base.

Regional/watershed plans

Comprehensive watershed planning is being conducted in some areas of northeastern Illinois by agencies such as county stormwater planning committees, the Corps of Engineers, and the Office of Water Resources. Communities need to coordinate with these programs and take advantage of expertise not usually available at the local level.

While watershed planning initiatives may not address all local mitigation measures, they likely will thoroughly evaluate flood control alternatives and county-wide stormwater and floodplain regulations, saving local planners a lot of work.

Share resources

Through coordination, limited funds and resources may be shared to accomplish flood mitigation goals.

For example, there are programs that help fund park acquisition and development. Such programs can pick up some of the cost of acquiring and clearing floodprone buildings, which will help dollars budgeted for flood mitigation go farther.

Maintain interest

Implementing a mitigation plan takes a long time, but interest in flood protection often wanes over time, especially if there is a dry spell. On the other hand, interest in other community concerns, such as economic development, historic preservation, education and recreation, may be more enduring. People will want to complete an economic development project long after they forget about the last flood, so if such a project is linked to a flood mitigation plan, both can go forward.

Meet funding requirements

Several funding programs encourage applicants to coordinate their programs with other agencies. Some require applicants to have exhausted other sources of funding or to involve others in cost-sharing. These prerequisites can be met by contacting and/or meeting with the appropriate agencies.

3.4.2 Community needs and goals

A flood hazard mitigation plan must be consistent with, and even supported by, other plans for the community. By tying the mitigation plan to other concerns, the planner will have allies in implementing the plan in years to come.

Most communities already have a comprehensive plan or similar document that includes much of the background data and materials needed to develop a flood hazard mitigation plan.

Community goals and objectives and other potentially controversial issues may have been resolved in previous planning work. If not, they need to be identified, clarified, and related to flood mitigation issues early in the planning process, such as during the flood hazard inventory.

Mitigation planning should be integrated into existing planning efforts so that the planning staff will incorporate flood issues as part of their regular duties.

3.4.3 Other agencies

Outside agencies can affect the future of the flood problem area. These include highway and transportation departments, park and forest preserve districts, stormwater and sanitary agencies, and regional planning commissions. County planning offices and NIPC can provide guidance on where to start (*see Appendix A, Sections A.1.2 and A.1.1*).

The planner needs to identify such agencies and contact them to learn whether they have information that can help the planning effort, if they want to be involved, and what plans they have that may affect the community.

Coordination with other agencies also can yield technical assistance. For example, during the discussions on emergency services, the National Weather Service can advise the planners about flood warning and establishing a warning system. At the same time, the planner can apprise the Weather Service about the local flood situation and see if there are any plans for installing warning gauges in the area.

See Figure 3-7 for a matrix that matches agencies with the mitigation strategies with which they can help a community.

Figure 3-7 Matrix of Agencies by Strategy

Section *	Agency	Strategy **			
		Prev.	Prot.	Emer.	Cntrl.
A.1	Local agencies				
A.1.1	Northeastern Illinois Planning Commission	T			T
A.1.2	County agencies	TR	TR	T	TF
A.1.3	Metropolitan Water Reclamation District	R			F
A.1.4	Soil and Water Conservation Districts	T			
A.1.5	Other local governments	F		TF	F
A.2	State agencies				
A.2.1	DNR, Office of Water Resources	TR	TF	T	TFR
A.2.2	DNR, State Water Survey	T			
A.2.3	DNR, Office of Capital Development	F			
A.2.4	Illinois Emergency Management Agency		F	TFR	
A.2.5	Illinois Department of Public Health	TR		TR	
A.3	Federal agencies				
A.3.1	FEMA, Mitigation Division	TR	TFR		
A.3.2	FEMA, Response and Recovery Division		F	T	F
A.3.3	FEMA, National Flood Insurance Program		F		
A.3.4	US Army Corps of Engineers	TR	T	TS	TFR
A.3.5	USDA, Natural Resources Conservation Service	T	T	T	TF
A.3.6	USDA, Rural Economic and Community Development				F
A.3.7	USDA, Consolidated Farm Service Agency	F			
A.3.8	Department of Commerce, National Weather Service			TS	
A.3.9	Department of the Interior, National Park Service	T			
A.3.10	Department of the Interior, Fish and Wildlife Service	TFR			
A.3.11	Department of Housing and Urban Development		F		
A.3.12	Small Business Administration		F		
A.3.13	Urban Resources Partnership	F			F
A.3.14	AmeriCorps	S			
A.4	Private agencies				
A.4.1	Openlands Project	TF			
A.4.2	Illinois Assoc. for Floodplain and Stormwater Mgmt.	T	T		
A.4.3	Floodplain Management Resource Center	T	T		
A.4.4	Volunteer organizations			S	
A.4.5	Flood relief funds		F		

* The numbers refer to the section in Appendix A that describes the agency.

** The four strategies are *Prevention, Property Protection, Emergency Services, and Flood Control*. They are discussed in Chapter 2.

F Agency provides financial assistance

R Agency regulates or sets regulatory standards

S Agency performs service directly with own staff

T Agency provides technical assistance, information, or reference materials

3.5 Review Mitigation Measures

A whole host of strategies and measures can be brought to bear on the flood problem. Many of them are inexpensive and easy to implement. A community uses the planning process to ensure that all of these activities are examined.

3.5.1 Thorough review

No potential mitigation activity should be discarded until the planner and the planning committee members are sure they understand what is involved.

Therefore, the planner and planning committee should review all of the flood hazard mitigation strategies and measures available. The section headings in Chapter 2 can be used as a checklist to ensure that everything is considered; each of the four strategies can be the topic of a meeting (*see Section 3.1.3*).

The mitigation measures should be evaluated for each site or area affected. While some of them may be quickly eliminated as inappropriate, most deserve careful consideration, especially to ensure full understanding of their costs and benefits.

Questions about technical aspects or agency programs should be directed to experts from federal or state agencies (*see Figure 3-7*).

As noted previously, flood mitigation planning may already be underway in some watersheds. In these areas, the community may not need to independently assess flood control options, but should certainly participate in the watershed planning process.

3.5.2 Balanced program

The planning process ensures balance in tackling flood problems. It should not be considered an excuse to justify someone's favorite project. Nor should a community put all its eggs in one basket, such as a major flood control project, and then wait years for it to be built. The odds are good that the area will be flooded before the project is completed.

Although most attention is usually focused on existing development, dealing with future development and preserving natural areas pays off in the long run and prevents small problems from becoming bigger ones.

A balanced program with measures from each of the four mitigation strategies will help to protect existing development, manage new development, and protect natural and beneficial floodplain functions.

A community's first priority should be to develop a plan that meets its needs, not one designed just to obtain funds or meet the requirements of only one agency. This can be difficult, as some programs, like the NFIP's Community Rating System (CRS) and state and federal grants, encourage communities to implement certain measures.

For example, the CRS provides insurance premium credits for many flood protection activities, but not for structural flood control projects. However, a community planning effort should not be limited to a single objective of receiving CRS credit, thereby ignoring flood control projects that may be appropriate.

Another common problem arises when communities develop a mitigation plan because one is required to receive acquisition funding. With only one goal in mind, such plans tend to focus on acquiring the worst hit areas to the detriment of addressing other flood problems and opportunities.

3.6 Public Input

The planner may see the need for another park, but the site's neighbors may object to having children playing so close to their homes. An acquisition project may threaten to dismantle a neighborhood. A plan to convert grassy back yards into effective but ugly concrete ditches may bring protests by the score.

Getting public input in the planning process can reduce conflict situations and build support for the plan's recommendations.

There are four ways to incorporate the public's concerns in the planning process, listed here in order of preference. The best approach is to use a combination of all four.

1. Include residents in the planning process from the start. This guidebook recommends a planning committee with a strong resident representation (*see Sections 3.1.2 and 3.1.3*).
2. Begin the process with a public input workshop (*see Section 3.6.1*).
3. Meet with neighborhood organizations, such as a homeowners association, in the same manner as coordinating with other agencies (*see Section 3.4.3*).
4. Hold public meetings to review the draft plan and receive comments on it. This is a minimum requirement of the Community Rating System (*see Section 3.6.2*).

3.6.1 Public input workshop

Some communities have recently tried a "bottom-up partnership" approach to floodplain planning. As many as 50 people — representing residents, businesses, public interest groups, and local and regional government agencies — are invited to a facilitated workshop that may last as long as 5 days.

The agenda includes both identification of the flood problem and assembling ideas for solving it. In the process, other community needs and goals are discussed and incorporated.

The National Park Service has provided facilitators for such workshops. The Park Service notes that:

This classic planning technique is sometimes called a "charette" — an intense effort to solve problems in a limited amount of time. The idea is to have a brainstorming session with many people and representatives from groups and agencies from within and outside of the planning area to come up with many ideas to solve many problems and make other improvements in the quality of life — all at the same time. Citizens are on hand to be sure that real issues and feasible solutions are identified. Technical experts stand by to answer questions about state or federal funding, regulatory requirements, etc.

-- *A Multi-Objective Planning Process for Mitigating Natural Hazards*, p. 6.

For more information on this "bottom-up" approach, check with the National Park Service's Rivers, Trails and Conservation Assistance Program (*see Appendix A, Section A.3.9*).

3.6.2 Public meeting(s)

A good faith effort must be made to notify those people who will be affected by a flood mitigation plan, especially as it may recommend relocating them or altering their homes.

Few of the affected residents will be able to participate on a planning committee, so it is important to let everyone have a chance to review and comment on the draft plan. The best forum for this is a public meeting.

A public *meeting* is not the same as a public *hearing*. State law requires a public hearing when a community is considering adopting or amending a land use plan or zoning ordinance. There are specific legal requirements for notifying the public and conducting such a hearing.

These legal requirements need not be met for flood hazard mitigation and CRS planning purposes.

In preparing for a public meeting, adequate notice of the date and time must be given, and information about the plan should be distributed well in advance. A legal notice announcing the meeting hidden in the back of a newspaper's classified ads does not present an image that the community cares about public input.

The best notice is a flyer, brochure, or other announcement with a summary of the plan delivered to all properties that may be affected. The notice should tell people where they can obtain a copy of the draft plan for review before the meeting.

The Community Rating System requires at least one meeting to obtain public input on the draft plan to be held at least two weeks before the plan is submitted to the community's governing body.

The community must attempt to notify floodplain residents of the meeting, and explain the plan in the notification. Simply discussing the plan at a regular public meeting of the governing body, just before it is voted on, is not sufficient public input for CRS credit.

3.7 Draft Action Plan

After assessing the problem and reviewing all the possible solutions, the planner can begin selecting the most appropriate actions to be recommended.

This effort culminates in the action plan — a series of recommendations detailing what will be done, by whom, and when.

3.7.1 Selecting the appropriate measures

Some measures will "fall out" during the planning process as being obviously inappropriate.

The planner should systematically review each possible measure, discarding it only after these questions are answered in the negative:

- Is the measure technically appropriate for the hazard?
- Is the measure appropriate for the community's needs and goals?
- Is the measure affordable?
- Do the measure's benefits equal or exceed its cost?
- Will the measure comply with all local, state, and federal regulations?
- Does the measure have a beneficial or neutral impact on the environment?

In some cases, answers will not be readily available — especially when a large flood control project is being considered.

Questions about affordability and the value of benefits gain significance as the cost goes up. In these cases, the plan can recommend an additional, more detailed analysis before a decision is made on implementation. The plan could also recommend obtaining funding as an intermediate step to implementing a project.

Two references on comparing benefits and costs are *Flood Proofing - How to Evaluate Your Options* and the computer software *Benefit/Cost Analysis of Hazard Mitigation Projects*. The latter is not only helpful, but FEMA uses it to determine if a project should be funded under several of its programs.

3.7.2 Drafting the plan

The plan can be in most any format but it must describe how it was prepared, list recommendations for action, and detail a budget.

Example Plan Organization

1. Introduction
2. Flood hazard inventory
3. Flood problem assessment
4. Preventive mitigation measures
5. Property protection measures
6. Emergency services measures
7. Flood control measures
8. Post-flood measures
9. Action plan (*see Figure 3-8*)
10. Monitoring and evaluating

Planning process

Describing how the plan was prepared is needed to earn FEMA recognition of the plan. It also helps readers understand the background and rationale for the plan, and notes how public input was obtained.

This description needs to include a discussion on how and when the eight steps used in this chapter were followed. This is usually put in the introduction.

Recommendations for action

When selecting the measures, the planner needs to determine what will be done, by whom, by when, and how it will be financed.

The result will be a list of projects and project assignments — the more specific, the better.

For credit under the Community Rating System, the recommendations should have objectives that are easy to measure when accomplished. A schedule must be included for each subsequent year. (*See Figure 3-8 for examples of action plan recommendations.*)

3.7.3 Budgeting

The plan should explain how its recommendations will be financed.

The process used to select the measures should have weighed the financial feasibility of the proposed projects and rejected anything that is not affordable.

The CRS requires that the action plan include a budget, and that it identify sources of money for activities not financed from normal operating funds.

Recommended projects generally will be financed in one or more of four ways: operating funds, line item appropriations, bond issue, and outside funding. Usually only the last three need to be noted in a budget that is included with the action plan. (*See page G-12 in Appendix G for a sample budget.*)

Operating funds

In-house staff likely will be able to perform many of the recommended tasks during normal working hours. These include drafting ordinance revisions, preparing public information programs, providing advice to floodplain residents, developing a flood warning system, and purchasing low-cost items, such as plastic rain gauges for a warning system.

Figure 3-8 Example Action Plan Recommendations

Recommendation 1. Floodplain regulations

What: Draft amendments to the floodplain ordinance to require new buildings and substantial improvements to be protected to an elevation of two feet above the 1993 flood wherever it is higher than the base flood.

Who: Code Enforcement Officer

When: Submit to the Village Board of Trustees by September 1.

Supporting agencies: Office of Water Resources, FEMA

Budget: Operating funds

Recommendation 2. Acquisition

What: Acquire the 7 deteriorating homes in the high hazard area downstream of the railroad tracks.

Who: Planning Department

When: The application for financial assistance is due by November 30.

Approval of the funding is expected by February 28.

Offers should be made by May 30.

Sales should be closed by August 31.

Supporting agencies: County Stormwater Management Commission, Office of Water Resources, FEMA.

Budget: Application to be prepared using operating funds.

\$300,000 from FEMA mitigation grant.

\$150,000 from park acquisition bond fund.

Recommendation 3. Flood warning

What: Prepare a flood threat recognition system on Crows Branch in cooperation with upstream and downstream communities and the National Weather Service.

Who: Emergency manager

When: Host organizational meeting by July 31

...

Line item appropriation

The plan must estimate the cost of each project it recommends. Larger projects may need a separate appropriation from the community's general fund or other funding source. These will include public works projects, such as channel work or enlarging a bridge. Work on roads, bridges, culverts and roadside drainage can often be funded from the community's Motor Fuel Tax fund.

Bond issue

Very large improvement projects may have to be funded by the sale of bonds. Most communities' annual budgets are not able to pay for a major flood control reservoir, extensive property acquisition or restoration of large areas. Sometimes a special assessment may be imposed, or special service district created, so that only the immediate beneficiaries contribute to paying off the bonds.

Outside funding

Funds for major projects may be obtained from state, federal and other outside programs. The action plan's budget needs to note when such outside funding is not guaranteed, and may take several years to obtain. Often the recommendation for the first year is to apply for the funds, not to implement the project.

(The "For More Information" sections in Chapter 2 and Figure 3-7 note agencies that can provide financial support for various mitigation strategies and measures.)

It should be noted that outside funding should be used primarily for one-time only projects. Ongoing expenditures, such as for maintenance or staff, should be funded by local sources that can be depended on through the years.

3.7.4 Post-flood activities

A pre-flood plan should include a section about post-flood operations that details who is responsible for post-flood mitigation activities and identifies post-flood mitigation opportunities.

Before preparing it, the planner should discuss post-disaster procedures with emergency management, code enforcement, IEMA and FEMA staff (*See Chapter 4*).

Responsibilities

Various community staff members will have numerous activities to implement. A pre-flood plan should designate who will be responsible for these activities.

The following assignments should be made (*the numbers refer to sections in Chapter 4 that address these duties*):

- Who is in charge of disaster response? (4.1.1) This is normally the emergency manager, who should also be responsible for:
 - Initial and preliminary damage assessments (4.1.2)

- Coordination of disaster assistance activities (4.1.3)
- Who is the mitigation coordinator? That person should also be responsible for:
 - Participation on state and federal mitigation planning teams (4.1.4)
 - Publicizing the mitigation message (4.4)
 - The post-flood mitigation plan (4.5)
- Who will record high water marks? (4.1.5)
- Who is in charge of regulating reconstruction? That person should also be responsible for:
 - Building condition assessment (4.3.2)
 - Regulating reconstruction (4.3.3 - 4.3.4)
 - Contractor quality control (4.3.5)
 - Coordination with public information programs (4.4)
- Who is responsible for public information? (4.4)

The post-flood section should recommend that the designated people obtain reference materials and attend training on their responsibilities (*See Section 4.2.4*).

The code enforcement staff in particular should be trained in assessing building damage. They should have procedures decided in advance and forms ready for use (*See Appendix E*).

Post-flood mitigation opportunities

The plan should identify areas that will be hardest hit by a flood. In the hectic days after a disaster, staff can concentrate their efforts on those pre-identified areas to quickly confirm whether post-flood mitigation opportunities exist.

For example, a pre-flood plan's problem statement should identify areas subject to the deepest and highest velocity flooding. If floodwaters in those areas are greater than three feet over the buildings' first floors, substantial damage is likely.

The code enforcement staff can visit those areas first to confirm the level of damage. If enforcement procedures, forms, and public information materials were prepared in advance, the initial recovery and code enforcement work would be made much easier. The staff would be able to move quickly to advise property owners about their reconstruction and mitigation opportunities.

3.7.5 Circulating the draft

A wealth of people should be invited to comment on the draft action plan.

The draft should be made available for review by the residents and businesses who will be affected, appropriate community departments, state and federal agencies, and

neighboring communities. (In larger communities, written concurrence of department heads should be sought.)

After people have had several weeks to digest the plan, a public meeting should be held (*See Section 3.6.2*). The public meeting is a requirement for CRS credit.

After the meeting, the planning committee should make changes as appropriate, then submit the plan to the governing board for adoption.

3.8 Implement and Evaluate

Writing the plan is only the first goal of the flood hazard mitigation process. Much more work must be done to get the plan accepted by those who are responsible for carrying out the recommendations.

3.8.1 Adoption

Because the recommendations will involve more than one department in the community, the action plan needs to be adopted by the body that has authority over all the offices: the city council, the village board of trustees, or the county board. This entity should pass one or more resolutions directing those designated as responsible for implementing their portions.

If the community wants recognition by the Community Rating System, the plan must be an official plan of the community, not an internal staff proposal. Therefore, the governing board must officially adopt it.

The resolution to adopt the plan should include these items:

- Official adoption of the plan and its recommendations,
- Designation of someone responsible for seeing that the plan is implemented,
- Designation of any recommendations that deserve priority attention, and
- Provision for reporting on the progress of implementation.

(See Appendix D for an example resolution to adopt a plan.)

3.8.2 Implementation

One person with overall responsibility for implementing the program should be designated in the adopting resolution.

However, the key to successful implementation is that all the other people responsible for the various recommendations understand what is expected of them and are willing to work toward their implementation. Thus, it is helpful to have people likely to be involved in implementation — such as representatives of local departments and other agencies — participate in the planning process.

It is also helpful to coordinate the action plan's recommendations with other community plans and activities, such as the capital improvements program. People responsible for specific recommendations could have the duties included in their job descriptions or annual performance plans.

It is recommended that the community quickly implement some inexpensive but very visible local projects to reassure the public that the community is doing something. Examples are locally funded projects (because they typically get done the quickest), such as stream cleaning and distribution of public information materials.

Such actions also serve to encourage the residents who spent so much time and effort on preparing the plan. They will soon see the fruits of their labors.

3.8.3 Monitoring and evaluation

No plan is perfect.

As implementation proceeds, flaws will be discovered and changes will be needed. Most communities find it very helpful to have a formal process to measure progress, assess how things are proceeding, and recommend needed changes.

Monitoring

Those responsible for implementing the various recommendations probably have many other jobs to do. A monitoring system helps ensure that they don't forget their assignments or fall behind in working on them.

Monitoring can be in the form of a checklist maintained by the person designated as responsible for the plan, or a more formal reporting system to a higher authority, such as the governing board or an oversight committee.

The Community Rating System acts as an outside monitor of the community's program. If future governing boards consider reducing the community's regulatory requirements or eliminating a flood program that is credited by the CRS, it could affect its CRS status. This may give them second thoughts about decreasing the community's flood mitigation efforts.

A similar system used in fire insurance rating has been proven to have a strong impact on the level of support local governments give their fire protection programs. In other words, the CRS encourages communities to keep their flood programs going during times of drought and reduced interest.

Evaluation

Even with full implementation, the plan should be evaluated in light of progress and changed conditions. Recommendations for revisions should be submitted to the governing board.

CRS Progress Report Format

- A review of the original plan.
- A review of any floods that occurred during the year.
- A review of each element or objective of the original plan, including how much was accomplished during the previous year.
- A discussion of why any objectives were not reached or why implementation is behind schedule.
- Recommendations for new projects or revised objectives.

One way to handle the ongoing monitoring and revision process is to make the planning committee a permanent panel with responsibility for oversight of the plan. This is done in the sample plan adoption resolution in Appendix D.

After annual or semi-annual meetings, the person responsible for the plan would submit a written progress report to the committee which would in turn forward it, with the committee's recommendations, to the governing board.

Under the Community Rating System, a progress report must be submitted with the community's annual CRS recertification. The document must be distributed to local media and the community's governing board, and be made readily available to the public.

3.8.4 Responding to opportunities

While long-range planning will usually produce the best and most efficient program, a community should be ready to act fast to take advantage of opportunities provided by disasters, extra end-of-the-year money, or heightened public interest due to flooding elsewhere.

A good example of this occurred in 1990, when a tornado struck Plainfield, destroying 20 buildings in the village's floodway. Disaster assistance and Office of Water Resources funds were made available to buy the properties and convert the damaged floodway lands into open space.

Responding to opportunities that arise from a flood is a central theme of the next chapter.

Chapter 4.

Post-Flood Recovery and Mitigation

Chapter 4. Post-Flood Recovery and Mitigation

After a flood, a window of opportunity opens for hazard mitigation.

It can be an excellent time to tap into the public's high level of interest in recovery and call upon the technical and financial assistance programs that can become available to design and implement mitigation measures.

Once the immediate response efforts and damage assessments are completed, the community should prepare a post-flood plan that addresses clearing, redeveloping, and/or rebuilding the flooded area. There are five reasons why this period can be so productive:

1. *Resources* — A flood can bring experts from various federal, state, and regional agencies and fields together to focus their attention on the community and its flood problems.
2. *Involvement* — The residents and elected officials will be more willing to spend time on the community's flood problems — and to try some new solutions.
3. *Protection* — Incorporating some property protection measures is easier during repairs and reconstruction.
4. *Acquisition* — It may be relatively easy to acquire and clear heavily damaged structures and start anew.
5. *Money* — If a major disaster declaration is made, several sources will make money available to protect or buy properties.

This section reviews the procedures that should be followed by the community and the opportunities that can arise following a flood. It covers the post-disaster scene, disaster assistance programs and procedures, reconstruction responsibilities, and how to take advantage of mitigation opportunities.

This section can help the pre-flood planner prepare for post-flood activities.

Post-flood operations will go more smoothly if the community has made advance preparations, such as designating who will be responsible for various duties and identifying potential mitigation opportunities (*see Section 3.7.4*).

Note: most of the activities in this chapter are appropriate following any type of disaster that affects the community's floodplain.

Terminology

Chapter 3 uses the terms "mitigation planning" and "planner." In this chapter the terms "mitigation coordination" and "coordinator" are used to describe the job and person responsible for managing the community's mitigation duties.

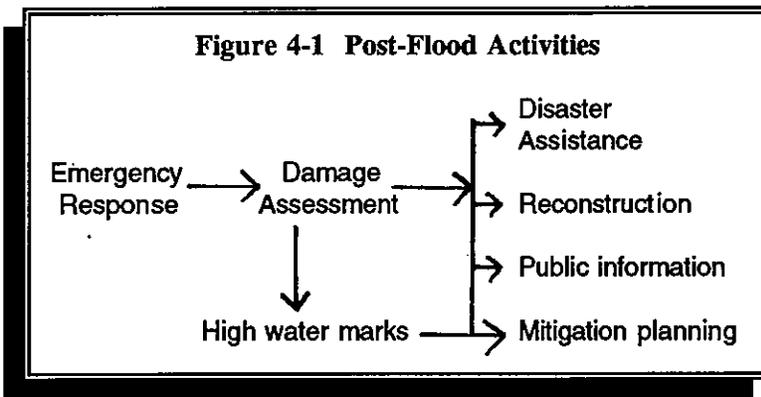
4.1 The Post-Flood Setting

Returning to normal will be the community's highest priority after a flood. A number of things will impede this effort:

- The community's expenses will be increasing while its income may fall off sharply.
- Implementing emergency plans under county, state and federal rules will require participation in many unfamiliar activities. This will leave little time to assess the situation and make decisions.
- The public, and elected officials, may seek to waive building permit procedures and regulations in order to help people return to normal as fast as possible.
- Community officials will be hard-pressed to take care of their own personal needs, do their regular jobs, and at the same time assume disaster recovery and mitigation responsibilities.

In short, stress will be high, patience low, the working environment unfamiliar — and there won't be enough time or money to meet everyone's expectations.

With these limitations in mind, this section covers the activities that a community should implement immediately after a flood or other disaster in the floodplain.



This is only an overview of the post-flood setting. The emergency manager should know the details of emergency response, damage assessment and disaster assistance activities. The mitigation coordinator should become familiar with the reconstruction, public information, and mitigation planning aspects of the post-flood scene.

4.1.1 Emergency response procedures

Being closest to the problem, local government is responsible for responding to floods and other emergencies.

Most communities have emergency response plans designed to cope with a variety of disasters. Any community without such a plan should set out now to prepare a flood response plan to guide activities before, during, and immediately after high water strikes.

At the local level, the American Red Cross can provide vital assistance in setting up emergency shelters and assessing damage. Mutual aid agreements with surrounding communities can supply additional police, fire or code enforcement support.

In most situations, immediate disaster response needs are met by the community, the county, and the state — in that order. Help in responding to a disaster escalates only after each level of government declares that handling the emergency is beyond its capabilities. When coping with the disaster exceeds the community's abilities and resources, it may request county and then state assistance through emergency management channels.

If appropriate, the Illinois Emergency Management Agency (IEMA) will ask the governor to declare a state of emergency, enabling support by state resources such as the National Guard and the Department of Transportation.

Only in extreme cases will the federal government be called upon for help. For example, the US Army Corps of Engineers may be called in to coordinate a flood fight or debris removal operation in order to provide emergency access into the disaster area. Often, floodwaters have receded before many federal agencies can respond.

4.1.2 Damage assessments

As soon as emergency response activities are underway, community, Red Cross and county personnel should conduct an initial damage assessment. This information is critical in obtaining additional levels of assistance.

Small floods require a detailed damage assessment in order to help state and federal officials determine whether supplemental assistance is required.

In large and catastrophic floods, like the 1993 flood on the Mississippi River, it is obvious that local and state capabilities will be exceeded. In such cases, many of the emergency response and damage assessment activities will be undertaken jointly by staff from the community, the county, IEMA and FEMA.

Initial assessments

The initial damage assessment is usually a windshield survey done by police, fire, and emergency management personnel to determine just how bad the situation is. The survey should answer these questions:

- Is there significant damage? If so, is it widespread?
- Where are the problem areas?
- Is there access?
- Are lives in danger?
- Should a state of emergency be declared?
- Do we need help? If so, what kind?

Once emergency response activities are completed, a more detailed damage assessment takes place to determine what types of resources will be needed to complete the recovery. These questions must be answered:

- How many people are out of their homes and businesses?
- Is damage to buildings sufficient to require a long-term recovery effort?
- Does the community have enough people and equipment to address the problems at hand (road closures, medical support, debris clearance, etc.)?
- Should we ask for a state or federal disaster declaration?

Preliminary damage assessment

If the initial assessment results in a request for state or federal help, IEMA or FEMA will request a "Preliminary Damage Assessment" or "PDA." This is a more formal assessment to determine whether the federal government should augment the resources of the community, county and state governments to meet recovery needs.

The PDA is usually conducted by a joint FEMA-IEMA team. A person familiar with community problems and mitigation possibilities should be the local participant on the PDA. This will help the community capture any mitigation opportunities available through Public/Infrastructure Assistance.

Building condition assessment

Concurrently with the PDA, a more detailed assessment of the damage to buildings should be made.

Initial assessments are designed to help get recovery under way. For example, the Red Cross gathers information to decide whether it is necessary to establish shelters and provide meals for disaster victims. Its assessment is not intended to be accurate enough to determine the extent of structural damage or needed repairs.

The building condition assessment is not required for emergency management or disaster assistance purposes. It should be conducted to help determine mitigation needs and opportunities (*see Section 4.3.2*).

4.1.3 Disaster assistance

If damage is severe enough, the governor will issue a disaster declaration and may request a similar declaration from the President. The request is sent through emergency management channels to FEMA. (*See Figure 4-1 for a disaster declaration and assistance activities timetable.*)

Several state and federal agencies provide disaster assistance, but the major ones are implemented by FEMA as authorized by the Stafford Act. The state cooperates in the administration of the programs and shares the costs of some of them.

The current statute authorizing FEMA's disaster assistance programs is the Stafford Act. Several of the programs are known by their section numbers in the Act:

- 404 Hazard mitigation grants
- 406 Public/infrastructure assistance
- 409 Hazard mitigation planning requirements

Figure 4-2 State and Federal Disaster Declaration and Assistance Timetable

<u>Activity</u>	<u>Agencies</u>
Pre-disaster planning	IEMA, FEMA, Office of Water Resources (OWR)
Disaster warning	IEMA, National Weather Service, OWR
Disaster response	IEMA, FEMA, OWR, Corps of Engineers
Immediate recovery (1-10 days after disaster)	IEMA, Corps of Engineers, Red Cross, and as many as 15 other agencies under the Federal Response Plan
Preliminary damage assessment (1-10 days after disaster)	IEMA, FEMA, OWR, Small Business Administration (SBA), agencies with technical expertise (Corps, Dept. of Education, Federal Highway Administration, etc.),
Disaster declaration (1-21 days after disaster)	IEMA, FEMA, SBA, Dept. of Agriculture. A Presidential disaster declaration can involve all federal agencies.
Disaster assistance and preparation of Damage Survey Reports (DSRs) (w/in 4 days of declaration)	Public/infrastructure assistance: FEMA, Dept. of Education, Federal Highway Administration, Corps of Engineers Human services: FEMA, SBA, Farmers Home Administration, Internal Revenue Service, Dept. of Labor, Red Cross, Illinois Department of Public Aid
Federal mitigation planning (w/in 15 days of declaration)	Interagency Hazard Mitigation Team, IEMA, OWR
Hazard Mitigation Grant Program (404) letter of intent (w/in 60 days of declaration)	IEMA, FEMA
State mitigation planning (w/in 180 days of declaration)	IEMA (State 409 plan), OWR
404 grant project proposal (w/in 90 days of 409 plan approval)	IEMA, FEMA
Redevelopment	Economic Development Administration, HUD
Pre-disaster planning	IEMA, FEMA, OWR

FEMA will widely publicize the assistance programs that are made available after a disaster declaration. Three main types of assistance are available:

1. *Public/infrastructure assistance* provides technical and financial assistance to public agencies and certain private nonprofit organizations for the repair or replacement of damaged facilities. (This was formerly known as the Public Assistance Program.)
2. *Human services programs* provide resources to assist residents and business owners, such as temporary housing, unemployment aid, food stamps, grants and loans. (Many of these were formerly called the Individual Assistance Program.)
3. *Hazard mitigation programs* provide technical and financial resources to help reduce susceptibility to damage from a future disaster.

Each of these programs can fund mitigation measures, so the mitigation coordinator should be sure to obtain the latest information from IEMA or FEMA staff on what is covered, who is eligible, and how funds are disbursed.

4.1.4 State and federal post-flood mitigation activities

The following mitigation activities are initiated by state or federal agencies, but the community should be aware of them and be involved in them where appropriate. The Illinois Emergency Management Agency's Regional Coordinator will know which ones will be implemented (*see Appendix A, Section A.2.4*).

Disaster Service Center mitigation tables

After a disaster declaration, the federal government may establish a Disaster Service Center (DSC) where people can file initial requests for aid.

In the DSC, state and federal officials may set up "mitigation tables" where property owners can sit down with mitigation experts (such as floodplain managers or code officials) to review how the flood affected their property and what they can do about it (*see Section 4.4.2*). If a DSC mitigation table is set up, the building department should either staff the table or provide materials about the community's building code requirements and permit procedures.

Disaster Service Centers will not be established after every disaster. Applications for assistance may be handled through telephone hotlines or other methods. The community should determine if the method selected can be used to communicate mitigation information to residents.

Interagency Hazard Mitigation Team

If the President issues a disaster declaration, FEMA will form an Interagency Hazard Mitigation Team within a few days of the flood. Its mission is to prepare a mitigation report within 15 days.

Team members are drawn from state and federal agencies that have mitigation programs or can provide guidance on recovery and reconstruction. The community should ask to be represented in order to keep abreast of mitigation funding opportunities and to help ensure that the 15-day report reflects local needs.

409 planning

After a Presidential disaster declaration has been issued, the state must update its hazard mitigation plan as a condition for receiving federal disaster aid, immediately and in the future.

This document often is referred to as the "409" plan, after the section in the Stafford Act that requires it.

The plan evaluates the hazard that caused the disaster, and identifies strategies for reducing the impact of a similar future event. As with the Interagency Hazard Mitigation Team, the community should ask to be represented in the planning process.

Post-disaster mitigation projects will not be eligible for funding unless they are in conformance with this plan. Also, future federal disaster assistance may be limited if the intent of the planning requirement is not met.

Public/Infrastructure Assistance Program

Under Section 406 of the Stafford Act, FEMA provides 75 percent of the cost of repairing or restoring facilities owned by public agencies and certain private nonprofit organizations.

If an applicant prefers to relocate a facility out of the floodplain rather than replace it, FEMA will still provide funds, but at a reduced share.

FEMA takes the first step in obtaining Public/Infrastructure Assistance funding by completing a Damage Survey Report (DSR) for each facility. The community should have a representative on each DSR team to provide local input into the repair or replacement design for damaged facilities.

The local DSR representative should be aware that this program provides an opportunity to incorporate hazard mitigation features while replacing some damaged property. FEMA can provide funding above and beyond the cost of repairing or replacing a public facility, if it can be demonstrated that the proposed mitigation measure is technically feasible, cost-effective, and required by a state or local regulation.

Example: a flood washes out a culvert that used to back up every time there was a 1-inch rain. FEMA and the state will estimate the cost to repair or replace it as it was. If someone points out that a larger culvert can save more money than it costs by reducing flood damage to other properties and floodplain regulations prohibit obstructions in the floodway, then FEMA may share the expense of replacing the lost culvert with a larger one.

Similarly, damaged water and sewer lines can be protected or relocated, pumping stations can be floodproofed, and bridges can be replaced with clear spans with funds from this program.

Individual and Family Grants

FEMA and the Illinois Department of Public Aid jointly administer this program. It is designed to help disaster victims pay for "unmet needs," i.e., needs that are not funded by other programs. It is a grant to individuals, usually those who cannot qualify for a loan or cannot get a loan to cover all of their expenses.

Sometimes Individual and Family Grants (IFG) can be used to fund minor property protection projects, such as elevating a furnace, water heater, washer or electrical service box above the flood level. These grants can be especially useful in areas with lower income or fixed income families that are subject to shallow or basement flooding.

Post-Disaster Hazard Mitigation Grant Program

Section 404 of the Stafford Act makes money available to assist eligible applicants after a Presidential disaster declaration. Section 404's Hazard Mitigation Grant Program will pay for 75 percent of the cost of such mitigation projects.

To be eligible, the projects should be consistent with the recommendations of the Interagency Hazard Mitigation Team's report and the state's 409 plan. Such projects must be shown to be cost-effective, and they may mitigate hazards other than the one that caused the disaster.

If the community applies for funds to support projects on private properties, the property owner can help pay the local cost-share.

4.1.5 Local responsibilities

Most emergency response plans do not include mitigation activities.

Therefore, while the community's emergency manager will be responsible for the "normal" post-disaster operations, such as restoring services and debris removal, the mitigation coordinator should be aware of the following post-disaster responsibilities of the community.

High water marks

High water marks should be marked and recorded throughout the flooded area.

Setting high water marks can be as simple as spray-painting lines on telephone poles or as involved as recording exact elevations.

The community should check with the Office of Water Resources' Division of Planning and the county stormwater agency before initiating this work, as they often send teams out to record high water marks (*see Appendix A, Sections A.2.1 and A.1.2 for telephone numbers*).

The water depth data can be used to improve floodplain mapping, to relate the flood to the base flood (*see box*), and to correlate the flood with an expected return frequency.

Determining the return frequency of the flood — in other words, was it a 10-year flood or a 25-year flood? — is needed to evaluate the performance of existing flood control facilities and to help justify future flood mitigation measures. The agencies listed in Figure 3-4 can help estimate the return frequency.

The return frequency can be linked to the dollar value of the damage. That information, when compared to the cost of a proposed mitigation measure, will help determine the benefit/cost relationship of a proposed mitigation project.

High Water Mark Records

The National Flood Insurance Program's floodplain regulations require substantially damaged residential buildings to be elevated above the base flood level and nonresidential buildings to be elevated or floodproofed above the base flood. Local regulations may be more stringent.

A good high water mark record will help property owners understand the regulatory requirements. For example, it is more helpful to tell people that they need to elevate their homes 1.5 feet above the high water mark than to say they have to go to an elevation of 613 feet above sea level.

Reconstruction regulations

Not only is enforcing reconstruction regulations important to the immediate safety of the building occupants, it is an effective method of reducing future flood damage.

A community in the National Flood Insurance Program must enforce its floodplain regulations in order to maintain its eligibility in the NFIP. The permit office must ensure that substantially damaged buildings are treated as new buildings and must be elevated or otherwise protected from damage by the base flood (*see Section 4.3*).

Support of disaster assistance activities

The community may be asked to provide a site for a Disaster Service Center, and/or staff to help prepare Damage Survey Reports. Community staff should participate on the Interagency Hazard Mitigation Team and help with the 409 plan.

If the community is not participating on the team, it should at least invite the team to visit its damaged areas and review ideas for mitigation projects.

Time and expense records

Community staff should make a concerted effort to document all activities and expenses related to disaster response and recovery, regardless of the degree of damage.

Departments should maintain records that account for staff assignments (by location and task description), staff time and overtime, equipment use, expenses, and any damaged or destroyed public property.

This level of documentation is required for reimbursement should federal assistance become available.

Flood insurance

Flood insurance is always preferable to disaster assistance as a way to be reimbursed for damage to a public building. Financial help is available for all floods, regardless whether a disaster declaration is made.

Under the Stafford Act, a local government's eligible disaster assistance is reduced by a dollar amount equal to the value of the building or the maximum amount of flood insurance available (\$500,000 for a nonresidential building), whichever is larger. For example, if a fire station or public works garage was flooded and suffered \$300,000 in damage, it may not be eligible for any disaster assistance because the community should have had up to \$500,000 in flood insurance coverage.

This approach is followed whether or not the community actually carried insurance. Accordingly, it behooves a community to review its own facilities in identified flood hazard areas and determine if flood insurance policies are warranted. An inventory of such facilities will also help catalog the community's vulnerability to flood damage.

4.2 Organizing for Post-Flood Mitigation

After a flood, three mitigation tasks must be undertaken simultaneously:

1. *Monitor and regulate reconstruction* to gather information on building conditions, ensure that the community's ordinances are being enforced and buildings are safe to reoccupy, and incorporate mitigation measures in reconstruction projects.
2. *Inform the public* about recovery matters and mitigation opportunities.
3. *Prepare a mitigation plan* to coordinate mitigation efforts and identify needs for post-disaster funding.

4.2.1 Staff resources

As with pre-flood planning, the first step is to make one person responsible for coordinating all mitigation activities.

Ideally, a mitigation coordinator is appointed before a disaster, allowing the person time to attend training sessions and otherwise prepare for the job. The emergency manager is not a good candidate for this job, as that person will have his or her hands full coordinating the overall recovery effort.

The coordinator should do just what the name says: coordinate. He or she can provide advice, guidance, materials, and other support to others who will be busy doing their jobs. For example, the coordinator should not issue news releases, but he or she can prepare drafts for the emergency manager or public information officer to release.

The job requires interpersonal skills and clear support from above. When the mitigation coordinator is appointed, the announcement should specifically state that other offices are to cooperate with his or her efforts. This can be in the form of a memo from the chief executive officer (*see Figure 4-3*) or a resolution by the governing board.

The best choice for the job is the person who prepared the pre-flood mitigation plan. If there is no plan, the next best choice would be someone from the planning or building departments who is familiar with reconstruction regulations, public information and/or planning.

As with pre-flood mitigation planning, the second step is involving the right staff, agencies and the public. Unlike the pre-flood situation, it will be difficult to get staff — and especially the public — to participate, as they will be preoccupied with their own clean-up and recovery concerns.

Support from above will help ensure that the coordinator gets the help needed from other community offices, especially the code enforcement, engineering and public information staff.

Outside assistance to the busy community staff can come from consulting engineers and planners. Other communities may be able to loan code enforcement staff to help with the heavy reconstruction permit workload.

4.2.2 Public involvement

Involving the public in mitigation activities after a disaster is difficult, but very important.

While residents of the affected area will be busy cleaning up, they will also be very interested in knowing what will happen next. Rumors will fly: They will hear that they may not be allowed to rebuild, that they may have to elevate their homes, or that the government wants to buy them out. Floodplain residents have been known to confuse statements like "raise their homes" with "raze their homes."

Accordingly, frequent public information releases are needed just to keep residents abreast of what is happening. These are covered in more depth in Section 4.4.

Figure 4-3 Example Memo Appointing a Mitigation Coordinator

[Date]

TO: ALL DEPARTMENT HEADS

FROM: Thea Bauss, Village Manager

SUBJECT: Flood Hazard Mitigation

Fonda Planz of the Planning Department is hereby appointed as the hazard mitigation coordinator for the Village. She is responsible for coordinating the regulation of reconstruction, advising the public about recovery matters and mitigation opportunities, and preparing the Village's mitigation plan.

She is to have a draft plan ready for submission to the Village Board in three weeks. The plan will guide the rest of our efforts and be used in applications for mitigation funding.

Please give Ms. Planz your department's full cooperation.

Residents also need to be involved in mitigation planning. As with pre-flood planning, a committee is a key element of the planning process.

Resident membership is especially important following a disaster that destroyed homes or caused substantial damage. Because in such cases it is likely the mitigation plan will recommend acquisition or elevation of properties, activities that are potentially disruptive to people and neighborhoods, it is vital that residents have input in planning and decision-making.

4.2.3 Technical assistance

The same agencies that provide technical assistance for pre-flood planning can help on post-flood mitigation planning. They are listed in Figure 3-7. These agencies are most helpful on specific mitigation measures, not the overall mitigation coordination and planning effort.

Additional help on post-disaster aspects and disaster assistance programs should be available from FEMA's Mitigation Division and IEMA's Mitigation Coordinator (*see Appendix A, Sections A.3.1 and A.2.4*). Sometimes federal financial assistance is made available to fund regional planning commission or other staff to help the community's mitigation planning effort.

Other sources of counsel include mitigation coordinators from other communities that have been flooded in recent years, and private consultants who are experienced in post-disaster operations and mitigation programs.

4.2.4 Training

Training is available for a mitigation coordinator who is appointed before a flood.

FEMA's Emergency Management Institute conducts a week-long course, "Natural Hazards Mitigation and Recovery." Tuition for the course is free and travel stipends are available.

Basic Post-flood Mitigation References

*Flood Hazard Mitigation in
Northeastern Illinois, NIPC*

*Repairing Your Flooded Home,
FEMA and the American Red Cross*

*Flood Hazard Mitigation, Division
of Water Resources*

*Post-Disaster Hazard Mitigation
Planning Guidance for State and
Local Governments, FEMA*

FEMA may also conduct a two or three-day version of the course in Illinois or the Midwest.

Sometimes short workshops are set up quickly after a disaster. For more information on these courses, contact your emergency manager, IEMA, or the FEMA Regional Office's Mitigation Division.

If there is no time to attend a training course, the mitigation coordinator should read the basic references and check for additional ones that are appropriate for the local situation (*see Appendix I*). He or she should also contact IEMA and FEMA mitigation coordinators to ask their suggestions on training and recently published materials.

4.3 Reconstruction

Reconstruction activities need to pursue twin goals:

1. Get people back into their homes quickly, thus reducing the need to operate shelters or provide temporary housing assistance, and
2. At the same time, make sure that buildings are safe, sanitary and secure from future flood damage.

Enforcing reconstruction regulations is important to the immediate safety of the building's occupants, a highly effective way to reduce future flood damage, and a requirement of the community's participation in the National Flood Insurance Program.

4.3.1 Reconstruction requirements

Under its agreement with FEMA, the community is required to enforce its floodplain regulations in order to maintain its eligibility in the National Flood Insurance Program.

FEMA can be expected to closely watch the community's enforcement of its regulations, especially its enforcement of the substantial damage requirement, to ensure that the community is upholding its agreement with the NFIP. Failure to enforce the rules can result in increases in flood insurance premiums for the community's residents, suspension from the NFIP, loss of flood insurance coverage, and/or loss of eligibility for disaster assistance and mitigation funds.

To maintain eligibility in the NFIP, the community's code enforcement office must require permits prior to the start of construction for any development in the floodplain, review applications for permits to ensure the development will meet code, and issue permits where appropriate. The regulatory program is explained in Section 2.1.4.

What needs a permit

All development needs a permit. "Development" includes any man-made change to the land, including new buildings, improvements to buildings, filling, grading, mining, dredging, etc.

After a flood, property owners must be reminded that permits are required for reconstruction, repairs, alterations, modifications or demolition of existing buildings. A permit is needed for each building that will be repaired with new or replacement drywall, flooring, foundation walls, furnace, water heater, cabinets, or any significant system or portion of the structure.

Waiving requirements

After a disaster, there is often pressure to waive the permit and code requirements to help people "return to normal" as fast as possible. Such an action would violate the agreement between the community and FEMA; the regulations must be enforced. However, fees may be waived or reduced to lessen the burden on people who have suffered losses.

4.3.2 Building condition assessment

Soon after the initial damage assessments confirm that an area can be visited safely, the code enforcement office should survey the flooded buildings to assess their damage. There are two objectives to this assessment:

1. Determine if any building is in so dangerous a condition that it should not be reentered without a careful inspection.
2. Determine what buildings need a floodplain development permit before they can be repaired or reoccupied.

The building condition assessment is conducted from outside the building, usually from a vehicle. The damage assessor conducts a "triage" by designating each building as one of three types:

1. *Apparently safe:* No exterior signs of damage. People can be allowed back in but they will still need building permits for structural work.
2. *Obviously destroyed or substantially damaged:* The flood swept the building away, it has collapsed, or it is missing one or more walls. The building cannot be reoccupied. The owner can rebuild only by meeting all current code requirements as explained in Section 2.1.4.
3. *Possibly substantially damaged:* The building may be substantially damaged, but it is not obvious. Guidance for determining substantial damage is provided in Section 4.3.4. If the building is confirmed to be substantially damaged, it should not be reoccupied. The owner can rebuild only by meeting all current code requirements as explained in Section 2.1.4.

The code enforcer should record the address of any building where these conditions are visible. While this may be done on any locally made form, the Building Officials and Code Administrators International (BOCA) has developed a useful "Disaster Damage Inspection Report."

Notice to owners

Many people assume that they can repair their homes or businesses without a building permit. They often think that permits are needed only for new construction, not for repairing or replacing elements of an older building.

Accordingly, after the building condition assessment identifies properties that will need permits, the code enforcement staff needs to advise owners of the requirement. This should be done both through the media and by direct notice.

The notice can be mailed or posted on the property. An example is in Figure 4-4.

Figure 4-4 Sample Notice to Owners of Flood Damaged Property

OFFICIAL NOTICE

[Date]

To the owner of the building located at [address], [community], Illinois:

A review of your building from the outside indicates that the structure was damaged from the recent flood. Here are three things you should know:

1. Repairs to the structure require a permit from the Village's Building Department. Repairs that include removal, alteration, or replacement of the roof, siding, wallboard, plaster, panelling, flooring, electrical system, plumbing, heating, or air conditioning must meet the Village's building code. Before you undertake any of these actions, you must obtain a building permit.

Apply for a permit at the Building Department office in Village Hall, [address]. *[Add the following if the building appears substantially damaged: Bring a detailed estimate of the work needed to restore your building to its pre-flood condition, signed by a contractor licensed to do business in this Village. You do not have to have a contractor do all of the work, but we need a professional's estimate of the value of all of the repairs needed.]*

2. Some day in the future, your area will flood again. There are things you can do during repair and reconstruction to reduce your damage from the next flood. Many of these are discussed in the attached book, *Repairing Your Flooded Home*.

We'll be glad to talk to you about protecting your property from future flooding. If we receive a disaster declaration, there may be some financial assistance to help pay for making your property safer than it was before. In the meantime, read Step 8 in *Repairing Your Flooded Home* for some ideas.

3. In order to screen out possible opportunists from taking advantage of the current situation, any contracted work must be done by a firm licensed to work in the Village. Furthermore, residents are cautioned and warned *not* to sign blank contracts, agree to have work performed without first seeing the contractor's registration card, or allow work or alterations not authorized by the Village Building Department.

For further information, please contact the Building Department at [phone].

4.3.3 Regulatory procedures

After the building condition assessment is completed and property owners are advised of the need to obtain a permit, enforcement of the regulations should follow the community's normal procedures for administering its building permit requirements.

This section identifies those steps that are peculiar to the post-flood situation that should be taken.

Assistance may be available from other code enforcement officials who have been through disasters. Other communities may be able to loan code enforcement staff for a short period after the disaster when the workload is heaviest.

Check the rules

The code enforcement office should contact FEMA or the Office of Water Resources' Division of Resource Management to obtain the latest update on the substantial damage requirement. New explanatory materials may be available.

Emergency repairs

The community may allow temporary emergency repairs to be done without a permit. These would include patching holes in roofs or walls and covering windows to prevent the weather from inflicting further damage.

However, owners of potentially substantially damaged buildings should be advised against making major emergency repairs, such as shoring up the foundation, unless the building presents a safety hazard. The buildings may be purchased and/or demolished.

Public information

A property owner who may have just lost all of his or her possessions and suffered building damage may feel that the substantial damage requirement is the last straw, so a careful information program is needed.

The mitigation coordinator should work with the code enforcement and public information offices to develop public information materials on the requirements for permits and the substantial damage rule (*see Section 4.4*).

Property protection opportunities

If a building was not substantially damaged, the building permit plan reviewer should examine the damage and reconstruction plans to identify property protection opportunities. Property protection is discussed in Section 2.2. Additional opportunities are covered in Section 4.5.2.

If any property protection opportunities are found, the reviewer should explain them to the applicant and urge that they be implemented.

For example, if a basement was flooded and the owner intends to replace the furnace and water heater, the permit reviewer should advise the owner to consider relocating them to a floor above the flood level.

If there was a Presidential disaster declaration, the owner should be advised that there may be financial assistance for a mitigation project, such as through the minimization program of FEMA's Individual and Family Grants.

If a building was substantially damaged, the permit office must enforce the code requirement that the building either be elevated, floodproofed, or relocated out of the floodplain. The owner should be told that this is a mitigation measure intended to prevent future flood damage.

The office should advise the owner about possible sources of financial assistance and whether the community is interested in acquisition of damaged properties.

Reconstruction moratorium

In an area where there is a concentration of destroyed or substantially damaged buildings, the community should consider a moratorium on repair permits. A moratorium would give mitigation planners time to consider whether the area should be purchased and cleared — in which case, all reconstruction should be prohibited.

The mitigation coordinator must alert the code enforcement office if a moratorium is possible. The reconstruction moratorium is discussed in more detail in Section 4.5.3.

4.3.4 Substantially damaged buildings

The code enforcement office must determine if flooded buildings were substantially damaged. This is an important part of the community's obligation to enforce the NFIP regulatory requirements.

This also can have a significant impact on the property. Owners will view it either as a mitigation opportunity or a major obstacle to getting back to normal.

It is therefore very important that the code enforcement office know the requirements, enforce them, and work closely with the property owners to minimize the adverse impacts and maximize mitigation opportunities and financial assistance.

The requirement

If a building has been damaged so that the actual cost of repairing it equals or exceeds 50% of the building's pre-flood market value, then it is substantially damaged.

Substantial damage is a form of substantial improvement. "Substantial improvement" is defined in the definitions section of the community's ordinance (*see box*). The community's ordinance (and federal regulations) treat a substantially damaged building or a substantial improvement the same as construction of a new building.

Substantial Improvement Definition

"Substantial improvement: Any repair, reconstruction or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either, (a) before the improvement or repair is started, or (b) if the structure has been damaged, and is being restored, before the damage occurred...."

[Section 300.49 of the IDOT-NIPC Model Flood Plain Ordinance for Communities Within Northeastern Illinois]

Regulatory impact

If a building is judged to be substantially damaged, then:

- A substantially damaged residential building must be elevated above the flood protection elevation or relocated out of the floodplain.
- A substantially damaged nonresidential building must be elevated, relocated out of the floodplain, or dry floodproofed.
- These regulations affect community-owned buildings as well as private property, even if community construction projects do not normally apply for building permits.

- Officially designated historic structures can be exempted from this requirement, although some mitigation measures may still be required.

Many communities have requirements that are more restrictive than these minimums. For example, some allow only demolition or relocation of substantially damaged buildings in the floodway.

FIRM Terms

Pre-FIRM: A building built *before* the date of the community's original Flood Insurance Rate Map (FIRM). Pre-FIRM buildings usually are not protected from flooding.

Post-FIRM: A building built *after* the date of its FIRM. Post-FIRM buildings were required by the community's codes to be protected from damage by the base flood.

Flood insurance impact

Most buildings in northeastern Illinois' floodplains are "pre-FIRM," that is, they were constructed before the mid-1970's when most Flood Insurance Rate Maps were published.

Therefore, most floodprone buildings are benefitting from the federally-backed pre-FIRM flood insurance rates. These are the rates used for the example premiums in Figure 2-3.

New, or "post-FIRM," buildings must be constructed in accordance with the NFIP flood protection requirements. They are subject to actuarial flood insurance rates that are based on the exposure to flood damage. Post-FIRM rates for buildings protected from flood damage are actually lower than pre-FIRM rates.

A substantially damaged building is treated as a new building for flood insurance rating purposes. Its flood insurance premium is therefore based on post-FIRM rates. If the building is elevated, the premium will be lower than for a pre-FIRM building.

If a substantially damaged building is not elevated, the actuarial post-FIRM premium can be *several thousand dollars per year*. Therefore, it is to the owner's financial benefit to meet the substantial damage reconstruction requirements of the community's ordinance.

Identifying possible substantial damage

The building condition assessment discussed in Section 4.3.2 identified whether a building is obviously or possible substantially damaged. The last category — "possibly substantially damaged" — is the hardest one to deal with, especially in northeastern Illinois where slow-moving floodwaters can leave many buildings in this condition.

Three guidelines can be followed to identify buildings that may be substantially damaged:

1. Structural damage, such as a collapsed basement wall or signs that the structure has shifted on its foundation,
2. Signs of concurrent damage, such as that from a fire, or
3. A high water line more than 3 feet over the first floor.

Determining substantial damage

The windshield survey or building condition assessment provides only an indication of the potential for substantial damage. Declaring a building substantially damaged is the job of the code enforcement office.

Only after the cost of repairs has been compared with the pre-flood market value of the building can such a declaration be made. A simple formula explains the relation:

$$\text{Substantial damage: } \frac{\text{cost of repairs}}{\text{market value}} \geq 0.5$$

The code enforcement office must divide the cost of repairs and by the building's pre-flood market value. If the result is greater than or equal to 0.5, then the building has been substantially damaged.

Obtaining accurate values for these two variables is very important. It is also the most difficult part of regulating reconstruction in the floodplain after a disaster.

Cost of repairs

The cost of repairs must be the "true cost" of returning the building to its pre-damage condition, based on prevailing construction wages for the area.

Because the requirement is based on this true cost, the rules must be met irrespective of the eventual actual cost to the owner.

A licensed contractor should provide a repair estimate, even if the owner or someone else will do much of the work. Care should be taken to ensure that the contractor is not providing an estimate below the true cost in order to get the job. The estimate should be checked against published or locally available construction costs.

The cost of repairs does not need to include architectural fees or estimating; clean up or debris removal; repairs to carpeting (unless over an unfinished floor), plug-in appliances, and other items not part of the building's structure; and repairs to detached structures, fences, sidewalks, and swimming pools.

Market value

The market value is the value of the building in its pre-flood condition. The value of the lot, landscaping, swimming pools, other site improvements, and detached buildings are not included.

There are three common sources for the pre-flood market value of a damaged building:

1. The tax assessor's office will have a record of the building's market value.
2. The code enforcement office may estimate the market value, if the staff is qualified and agrees to make the determination.
3. A professional appraiser can make an independent appraisal.

The most common approach is to use tax records. The applicant may contest the tax appraiser's valuation, or figures supplied by the community, by submitting an appraisal prepared by a professional appraiser.

Records

The code enforcement office should develop permit application forms that record the full cost of repairs and the market value. (See Appendix E for forms FEMA developed after the 1993 floods in Illinois).

These forms are permit records and should be kept in the permanent file for the permit. They should not be confused with damage survey forms or building condition assessment notes which are not part of a permit's legal record.

Historic buildings

NFIP regulations (and therefore most ordinances) allow communities to issue variances to exempt certain historic structures from the substantial improvement/substantial damage requirement.

Most ordinances quote the NFIP regulations which limit the exemption to buildings on the National Register of Historic Places or a "State Inventory of Historic Places." Local historic organizations and the Illinois Historic Preservation Agency (*Chicago phone: 312/814-1409*) can provide more guidance on a state inventory.

This exemption is limited to the substantial damage requirement. Each building must be evaluated individually. A variance may only be granted if it proves necessary. It must be limited to the minimum exception needed to maintain the historical integrity of the building.

The exemption does not relieve the property from meeting other floodplain regulations, nor does it mean that owners of historic buildings should ignore the opportunity to implement property protection measures during repair and reconstruction after a flood. The community should still require mitigation measures that will not affect the historical integrity of the structure.

For more information

Details on determining substantial damage and enforcing the requirement are spelled out in FEMA's *Answers to Questions About Substantially Damaged Buildings*.

The most recent guidance and latest sample forms may be available from FEMA and the Office of Water Resources (*see Appendix A, sections A.3.1 and A.2.1*).

4.3.5 Contractor quality control

The community must try to protect its citizens against unscrupulous people after a flood.

Disasters often attract out-of-town or "fly-by-night" contractors, who bring with them shoddy workmanship and price gouging.

Some projects, such as fixing sewer backup problems, are hard to check for proper installation. Often the owner does not find out the job was done improperly, or not at all, until the next flood.

Educating residents can help prevent this. FEMA and the Red Cross have published a handbook for residents to turn to after a flood. It covers basic clean up and repair, so the reader will better understand how much work is needed, and it has a section on how to deal with contractors. *Repairing Your Flooded Home* (ARC 4477) is available in large quantities from local Red Cross chapters.

Help with Bad Contractors

Assistance on dealing with contractors can be obtained from the Illinois Attorney General's Consumer Protection Division, 312/814-3580. The county state's attorney may also help.

The community also can license contractors and then issue permits only if the work will be done by a locally licensed contractor. While this will not be a guarantee of quality work, it will deter the con artists.

4.4 Public Information

Owners will perform much of the recovery and mitigation work themselves. The community may assist them by having a well-organized public information program that informs property owners, residents and businesses about recovery and mitigation.

The mitigation coordinator should take responsibility for alerting residents about the "mitigation message:" what they should be doing and where to get help. He or she can disseminate the message in several ways.

4.4.1 The mitigation message

The public information program needs to cover six topics:

What's happening

The recovery period will be confusing to most people. Residents who are coping with flood losses need to know that they are not alone, and that things are being done to help them. This information should be publicized in coordination with the emergency manager.

The Mitigation Message

- What's happening during recovery
- Reconstruction regulations
- Repair and reconstruction guidance
- Why people should mitigate
- Mitigation measures
- Where to get help

Residents must be kept informed about what public and private agencies are doing in the way of making repairs, organizing for reconstruction, and providing disaster assistance.

This information should include such things as:

- Whether the water is safe to drink,
- How to get utilities turned back on,

- When and where public meetings will be held, and
- How to apply for disaster assistance.

Reconstruction regulations

The public information program should advise property owners about the need for a permit for any structural repairs or alterations, what work requires licensed contractors, and the substantial damage rule.

It also should clarify that permits are not needed for emergency repairs or for cosmetic projects like cleaning and repainting.

(See Section 4.3 for more information on reconstruction regulations.)

Repair and reconstruction guidance

People who have never been in a flood will not know what to do. They will not know about proper safety and health precautions, how to clean up or repair flood-damaged property, or what to preserve, clean, or throw away.

Therefore, the public information program should include the information provided in steps 2, 3 and 4 in *Repairing Your Flooded Home*, such as how to drain a basement without breaking the walls.

It is particularly important to publicize health and safety precautions to take during repairing and reconstructing. Flood waters are not clean. *Repairing Your Flooded Home* has several pages of excellent recommendations to prevent injury or infection.

Why mitigate

Owners of damaged property need to know that they have an opportunity to include property protection measures as part of repairing their homes or businesses. They need to recognize that "returning to normal" means returning to a building that is subject to another flood.

By incorporating floodproofing into their repairs, property owners will ensure that the next flood will be easier on them — and their wallets.

As explained in "Step 8" in *Repairing Your Flooded Home*, many measures are quite simple, cost effective, and easy to put in place.

Mitigation measures

Property owners need to know more than just how to rebuild their way back to normal.

The public information program needs to promote hazard mitigation measures appropriate to the local situation. These may include selling substantially damaged buildings to the community, purchasing flood insurance, preparing a family flood response plan, and incorporating floodproofing measures during reconstruction (*see also Section 2.2*).

Where to get help

Each message should prominently direct property owners as to where they can get more information or assistance.

Sources of help will vary by topic. For reconstruction and mitigation information, people should contact the building department or mitigation coordinator.

For financial assistance, people can be referred to the Disaster Service Center, FEMA hotline, or other source publicized by FEMA.

4.4.2 Getting the message out

Each category of information has a preferred method of distribution.

Information about some things must be disseminated quickly. For example, before people go back to their homes, they need to be told of safety and health precautions.

Press releases

Press releases get the message out fast and are inexpensive. A common format is acceptable to radio, television, or print media.

They are most appropriate for the first topic of the mitigation message: keeping people posted with the latest information on what's happening.

Press briefings

Some messages are better disseminated if the press is more familiar with the topic and has the opportunity to ask questions or gather illustrative material.

Briefings are more appropriate for technical topics, particularly repairs, reconstruction and mitigation.

If possible, the briefing should include visual aids that provide for a more interesting newspaper article or television story. "Visuals" can include a demonstration of how a standpipe works or a walk-through of a flooded house that advises people how to spot safety and health hazards.

Cable TV

Community access channels are ideal for introducing viewers to such things as flood repair and flood hazard mitigation.

A community may make its own video, or air those prepared by other agencies. Show times should be rotated, so that each video is shown several times a day. The broadcast schedule can be promoted through a press release.

Cable TV Cooperation

Following the 1987 flood, the Village of Mount Prospect prepared a half-hour video on how to prevent sewer backup. The Village's building inspector displayed standpipes, plugs, backup valves, and other tools. The show was taped and played by the local cable TV company.

Two suggested videos are available from FEMA. "Best Build II" and "Best Build III" explain riverine floodplain construction techniques and property protection measures, respectively. The latter includes examples from northeastern Illinois.

Community newsletter

A special flood recovery newsletter gives the community control over what is printed, and can be published well after the public media tires of articles and news stories about the flood.

A newsletter could be as simple as a one-page information sheet that is distributed by newspaper carriers, included in utility bills, distributed door to door, handed out by the Red Cross (which often sends vehicles with coffee and food through damaged areas), or left in public places, such as Red Cross facilities, schools, and grocery stores.

Handbook

FEMA and the Red Cross have published a handbook for flooded residents. *Repairing Your Flooded Home* (ARC 4477) is available in large quantities from local Red Cross chapters.

The handbook covers basic clean-up and repair, and introduces property owners to the idea of floodproofing during repairs. People will need this handbook most during the first few hours after floodwaters have receded.

If enough copies are not readily available, it is made to be easily reproduced with a regular photocopying machine.

Mitigation advisors

Knowledgeable staff can be located in the flooded area to answer questions and provide guidance on reconstruction and mitigation. Mitigation advisors can set up at the code enforcement office, the Disaster Service Center, open houses, or hardware or home-improvement stores.

After major disasters, FEMA may establish a Reconstruction Information Center or "RIC." The RIC houses FEMA and local staff knowledgeable in floodproofing, regulatory requirements, financial assistance, and related topics. Depending on the local interest and staff available, a RIC can be set up for one day or several weeks.

Open houses

Open houses are community-sponsored assemblies devoted to any and all reconstruction and mitigation topics.

At an open house, handouts may be distributed; a slide show or video may be shown to provide an overview of flood protection measures or mitigation procedures; contractors and government staff may display their products, services, or programs; and the community may staff a mitigation advisor table.

Even though they rely on contractors, open houses can provide a "non-hostile, non-sales" environment where people can ask questions about flood insurance, building permits, protective measures, flood mapping, sump-pumps, drain-plugs, elevating homes, etc. (*For more information, see How to Conduct a Floodproofing Open House.*)

One-on-one assistance

The most intensive public information approach is to provide one-on-one counseling to individual property owners.

This can take the form of telephone conversations, complementary critiques of the owner's plans or ideas, or visits to the building.

A more intensive effort is a "flood audit," which provides the owner with a written description of the flood hazard at the site and specific recommendations on how to protect the building.

Although one-on-one assistance is the most expensive way to inform the public about flood hazard mitigation, it does provide property owners with the greatest amount of guidance and information tailored to their situations.

4.5 Post-Flood Mitigation Planning

The first task after a flood is to ensure that the flooded area, and the buildings in it, are safe to enter.

Repairs and reconstruction can begin after the needed permits are obtained, property protection measures are explained and encouraged, and substantially damaged buildings are tentatively identified for acquisition.

Once these immediate concerns are satisfied, the community can devote time to longer range mitigation activities.

At this point, the mitigation coordinator can begin to undertake the job's third responsibility: prepare a mitigation plan to coordinate future efforts and identify needs for post-disaster funding.

Tips for Post-flood Planning

- Identify all the problems
- Evaluate all possible measures
- Coordinate with others
- Involve the public
- Capitalize on immediate opportunities
- Do what is best for the community
- Prepare for the next flood
- Do it all quickly, people are waiting

4.5.1 The planning process

The local mitigation planning effort should be coordinated with FEMA, IEMA, and the Office of Water Resources.

A week or two after a Presidential disaster declaration, an Interagency Hazard Mitigation Team or the state 409 planners may visit the community to assess mitigation opportunities (*see Section 4.1.4*). The mitigation coordinator should volunteer to participate on these teams or at least to host a tour of the community's flooded areas.

In the best situation, the community already will have prepared a pre-flood mitigation plan with a post-flood section (*see Section 3.7.4*). If the mitigation coordinator has proposals ready when state and federal people come to town, they should be able to advise the coordinator as to how feasible the ideas are, and whether funds or assistance are likely to be provided under their programs.

As the coordinator is getting a sense of the amount of state and federal interest and support, he or she should begin to prepare a post-flood mitigation plan. The planning process is similar to the pre-flood process, with three exceptions:

Area flooded

Attention will likely focus on the flooded area, which may not include all of the community's floodplains and therefore may not encompass all of the potential sources of flooding.

For this reason, the planners need to be careful that the recommended measures are not limited to protecting property only to the level of the last flood unless it was found to be greater than the base (100-year) flood.

Funding support

Attention will likely focus on mitigation measures eligible for funding support from FEMA or other outside sources.

The big ticket item attracting the most interest may be an acquisition program funded by a hazard mitigation grant. However, a good plan should still address all feasible mitigation measures, particularly those that would help properties not in the acquisition area.

Time constraints

A post-flood mitigation plan needs to be prepared quickly in order to take advantage of the window of opportunity that the flood has presented and to settle any uncertainties residents may have about their future (e.g., should they repair or sell and leave?).

Some preliminary ideas should be ready in time for presentation to the Interagency Hazard Mitigation Team and state mitigation planning staff.

The plan itself should be drafted within two to three weeks. Here are a few ideas to help meet this tight deadline:

- Dedicate a person to work on it full time.
- Have frequent planning committee meetings that involve residents, such as twice a week.

- Do not delay the planning effort in order to obtain detailed data; an adequate plan can be based on generalized information.
- Enact a temporary moratorium on reconstruction in areas most likely to be acquired.
- Design the plan to address overall issues and make general recommendations. For example, it might recommend that additional studies be conducted before finalizing some projects.

An example of this last suggestion is a recommendation that the community apply for a Hazard Mitigation Grant to help finance elevating or acquiring substantially damaged buildings. While a benefit/cost analysis will be needed as part of the funding application, the plan can recommend the project and that an analysis be conducted, rather than wait until after the analysis is completed.

4.5.2 Mitigation opportunities

Planners must view mitigation in the broadest sense; it is not limited to private buildings or city-owned facilities.

There are three kinds of opportunities that may arise:

1. Acquiring and clearing destroyed or substantially damaged buildings,
2. Incorporating property protection measures during repairs and reconstruction, and
3. Implementing mitigation measures after reconstruction.

Acquisition sites

The building condition assessment should provide an early indication of whether damage was severe enough to warrant clearing out an area (*see Section 4.3.2*).

Places to consider for acquisition are:

- High damage areas, such as floodways,
- Pre-FIRM structures (buildings not built to flood protection standards),
- Non-conforming uses that the community wants eliminated, and
- Sites contiguous to parks and open space that are appropriate for expansion of public property.

Where possible, the community should have such sites already identified in its pre-flood plan. Or, it may want to designate a potential acquisition area in its comprehensive plan.

The community could purchase properties as they come up for sale, rather than wait for a flood to cause damage and suffering to the occupants.

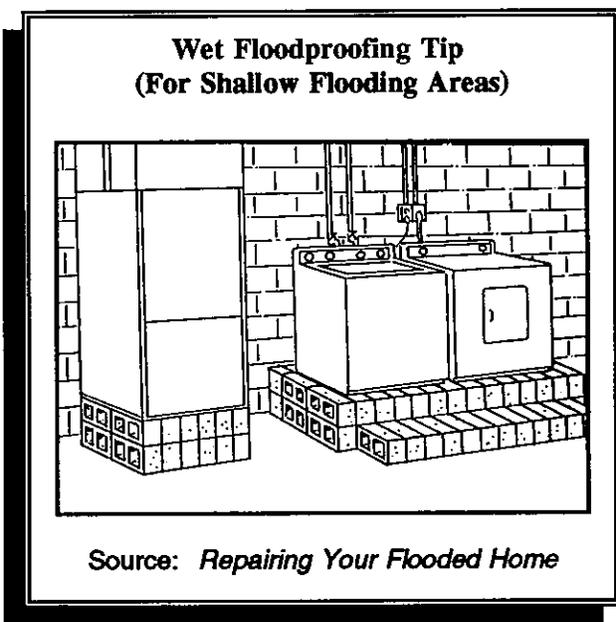
Because acquisition and relocation has such a major impact on the targeted residents, they should be involved in the deliberations, or at least kept fully informed of them. One of the best ways to do this is through the mitigation planning committee.

A decision needs to be reached quickly so people aren't kept in temporary housing for months while they wait to find out whether they can keep their homes.

Reconstruction opportunities

Property protection measures should be implemented in buildings not slated to be acquired.

For example, a substantially damaged house will still have to be elevated. If the foundation was damaged, it may have to be lifted up anyway to make repairs.



Wet floodproofing is another measure to incorporate during reconstruction. *Repairing Your Flooded Home* has a section on rebuilding tips that recommends numerous minor alterations that will reduce flood damage in the future.

These include measures as simple as relocating the breaker or fuse box to a higher level and using the right kind of pressure treated wood in floodable areas.

The code enforcement office and the mitigation coordinator should become familiar with those approaches that are appropriate for the community's building types and publicize them as part of the "mitigation message" (see Section 4.4.1).

After reconstruction

Many voluntary mitigation measures can be implemented at any time.

For example, constructing barriers and installing some dry floodproofing measures (other than those required by code) can be done after the building is rebuilt.

Major public facilities, such as bridges, will take a long time to rebuild. Before their plans are finalized, the post-flood planning effort should identify appropriate mitigation measures. Such projects could be eligible for funding by disaster assistance.

4.5.3 Reconstruction moratorium

If damage is widespread, and many buildings are likely to be declared substantially damaged, then the opportunities for mitigation projects (and the building officials' workloads) increase.

Rather than deal with each building individually, the community may want to clear out one or more blocks of damaged buildings. Because this will involve preparation of a mitigation plan, a reconstruction moratorium may be needed.

A moratorium would stop all repairs in a designated area whose borders would be delineated based on the findings of the building condition assessment.

The moratorium must be enacted by the governing board. The moratorium should not be in effect for long — perhaps only for a few weeks. It should state when it will expire. (*For an example of a moratorium resolution, see Appendix F.*)

The moratorium can be lifted when the mitigation plan concludes that reconstruction can proceed. To shorten it, the community could prepare an interim mitigation plan that focuses only on the issue of reconstruction in the affected area. When the community concludes what is best for the future of the area, the moratorium can be lifted or (if the plan concludes that the area should be acquired) extended.

Once the moratorium is lifted, property owners would still need to apply for building permits. Since the area was considered to be substantially damaged, each permit applicant would have to provide the information needed to determine if his or her building was substantially damaged.

4.5.4 Coordination

One of the benefits of the flood-opened window of opportunity is that many agencies will be in town wanting to help with technical and financial assistance. The Interagency Hazard Mitigation Team is a good starting point to identify these agencies and learn about how they can help.

The post-flood assessments, reconstruction regulations, public information activities, and mitigation planning are all interrelated. The mitigation coordinator needs to follow them all and make sure each takes advantage of the information and assistance provided by the other. (*See also Section 3.4 on coordination.*)

4.5.5 Adoption and implementation

The post-flood plan document should look the same as a pre-flood plan, unless the community wants to separate immediate concerns from long-range projects.

Because a post-flood mitigation plan will be in effect as long as a pre-flood plan, the same care and procedures should be followed in getting it adopted and implemented (*see Section 3.8*).

Figure 4-5 Sample Post-flood Mitigation Plan Format

1. Background
 - a. Flood description
 - b. Reason for plan
 - c. Planning procedures
2. Problem description
 - a. Areas affected
 - b. Damage
 - c. Hazard threats
3. Recommended solutions
 - a. Short term projects
 - b. Long term projects
4. Action Plan
(*see example in Figure 3-8*)
5. Monitoring and evaluation

In the pre-flood setting, several weeks could be dedicated to writing and reviewing the plan. But time is of the essence after the disaster, so much less time will be available for public review of the draft plan.

The community will have to use its judgement and make a good faith effort to let people review and comment on the plan without taking too much time. The local officials may opt to send a copy of the draft to all affected residents 3 to 4 days before it is due to be voted on.

The sample plan adoption resolution in Appendix D would also be appropriate for a post-flood mitigation plan.

Two post-flood mitigation examples

Residence in the flood fringe

Mr. Jones' home is found to be substantially damaged, so it must be elevated or relocated. It will cost up to \$25,000 to elevate and \$100,000 to acquire.

Rather than order Mr. Jones to meet a regulatory requirement, the community presents it as a mitigation opportunity. Mr. Jones does not want to go through another flood, so he is interested.

The mitigation coordinator helps him obtain a loan from the Small Business Administration that covers the cost of repairs and elevation and refinances the mortgage so his monthly payments are not much more than before the flood.

This scenario requires a building condition assessment to locate such properties, a good public information program to explain the regulations and the protection measures, a plan to confirm that the area will not be bought and cleared, and, perhaps, a moratorium to buy the time needed to complete the plan and locate the funding source.

Business in a residential neighborhood

A car repair shop is the subject of many neighborhood complaints because of the noise and old cars that sit around. It is severely affected by the flood and considers relocating to another community.

The mitigation coordinator advises the owner that the community has a suitable flood-free site in the industrial park. The coordinator obtains FEMA mitigation assistance and local economic development funds to purchase the building and lot. She obtains another grant to help redevelop the site as a park.

The shop uses the funds from the sale to build a new and better building on the new site.

Flood damage is reduced, the business is strengthened, a nonconforming use is moved out of a residential neighborhood, and the residents get a new park. Both the business and the neighborhood are better off than they were before because they did not want to return to "normal."

Appendices

Appendix A.

Mitigation Agencies

Appendix A. Mitigation Agencies

A variety of local, state, federal, and private agencies can provide assistance to a community in planning and implementing a mitigation program. Some agencies provide advice and guidance, some can help fund the program, and some provide both technical and financial assistance.

Chapter 2 identified which agencies can help on specific mitigation measures. This appendix provides a brief summary of the agencies' programs and notes where to contact the agency.

A.1 Local agencies

A.1.1 Northeastern Illinois Planning Commission

The Northeastern Illinois Planning Commission (NIPC) serves the local governments in northeastern Illinois' six counties: Cook, DuPage, Kane, Lake, McHenry, and Will. It is a public agency governed by a Commission composed of representatives from cities, counties, regional agencies and the private sector.

Types of assistance:

- Reference material and advice on developing a plan
- Review and comment on plans to determine if they are consistent with other plans for the region
- Model ordinances and related technical assistance
- Sales of Hydrologic Atlas and Flood Insurance Rate Maps
- Policy planning on flood prevention and protection
- Hydrologic analysis and modeling

Northeastern Illinois Planning Commission
222 South Riverside Plaza
Suite 1800
Chicago, IL 60606
312/454-0400
Fax: 312/454-0411

A.1.2 County agencies

Cook, DuPage, Kane, Lake and McHenry counties have created stormwater management planning committees pursuant to a law enacted after the 1987 flood.

Currently, the DuPage and Lake County committees are coordinating stormwater and floodplain management activities and have set minimum regulatory standards for the municipal and county governments. They also have full time staff to advise and assist local governments.

In Cook County, the staff support is provided by the three suburban councils of government. Cook County is also served by the Metropolitan Water Reclamation District of Greater Chicago (*see Section A.1.3*) and the Cook County Department of Planning & Development.

Kane and McHenry County communities can receive assistance from their development departments.

Types of assistance:

- Technical assistance and regulatory guidance on floodplain and stormwater management issues
- The DuPage and Lake County programs set minimum standards for local regulatory programs

DuPage County Department of Environmental Concerns
421 North County Farm Road
Wheaton, IL 60187
708/682-7130
Fax: 708/682-6948

Kane County Development Department
719 South Batavia Avenue
Geneva, IL 60134
708/232-3497
Fax: 708/208-2189

Lake County Stormwater Management Commission
333-B Peterson Road
Libertyville, IL 60048
708/918-5260
Fax: 708/918-9826

McHenry County Planning & Development
2200 N. Seminary Ave.
Woodstock, IL 60098
815/334-4215
Fax: 815/337-3720

Cook County Department of
Planning & Development
118 North Clark Street, Room 824
Chicago, IL 60602
312/443-6525
Fax: 312/443-4479

Cook County Dept. of Highways
County Building
118 North Clark Street, Room 1122
Chicago, IL 60602
312/443-7701
Fax: 312/443-7888

South Suburban Mayors and Managers Association
14200 Chicago Road, Suite 201
Dolton, IL 60419
708/206-1155
Fax: 708/206-1133

West Central Municipal Conference
1127 S. Mannheim Road, Suite 102
Westchester, IL 60154
708/450-0100
Fax: 708/450-0655

Northwest Municipal Conference
1616 E. Golf Road
Des Plaines, IL 60016
708/296-9200
Fax: 708/296-9207

A.1.3 Metropolitan Water Reclamation District of Greater Chicago

Created as the Metropolitan Sanitary District in 1889, MWRD operates seven wastewater treatment plants which serve most of Cook County. It has constructed and operates a 70 mile long canal system which diverts drainage away from Lake Michigan.

MWRD is constructing and operating the Tunnel and Reservoir Plan ("TARP") and has constructed 547 miles of intercepting sewers and 32 flood control reservoirs throughout the region.

The District requires on-site detention for new construction for all separate sewer areas within its jurisdiction.

Types of assistance: Cost sharing on regional flood control projects which meet specific criteria.

Metropolitan Water Reclamation District of Greater Chicago
Attn: Flood Control Section
100 East Erie Street
Chicago, IL 60610
312/751-3240
Fax: 312/751-7957

A.1.4 Soil and Water Conservation Districts

While governed by a locally appointed board, these districts work closely with the Natural Resources Conservation Service (*see Section A.3.5*) to advise farmers, community officials, and land developers.

Communities can enter into agreements with their district to review requests for rezoning and subdivisions and report on their impact on the area's natural resources.

Types of assistance: information on land use planning, conservation planning, resource development, soils, wildlife, geology, water management, and flood prevention.

Lake County Soil and Water Conservation District
100 North Atkinson
Suite 102A
Grayslake, IL 60030
708/223-1056
Fax: 708/223-1127

Kane-DuPage Soil and Water Conservation District
545 South Randall Road
St. Charles, IL 60174
708/584-7961
Fax: 708/584-9534

McHenry County Soil and Water Conservation District
1143 North Seminary Ave.
Box 168
Woodstock, IL 60098
815/338-0099
Fax: 815/338-7731

North Cook Soil and Water Conservation District
675 North Court, Suite 120
Palatine, IL 60067-8106
708/991-4330
Fax: 708/991-1642

Will-South Cook Soil and Water Conservation District
100 Manhattan Road
Joliet, IL 60433
815/723-5078
Fax: 815/723-2723

A.1.5 Other local governments

Other local governments are often agreeable to cooperative efforts where a flood mitigation project can further their objectives.

In addition to neighboring cities and villages, these local governments include county forest preserve and municipal park districts which are interested in purchasing and preserving waterfront properties such as floodplains, lakes, ponds, and wetlands. (Many flood control reservoirs in northeastern Illinois are in forest preserve or park district recreation facilities.)

In addition to their primary concerns, river conservancy districts and drainage districts can construct drainage or flood control improvements.

School districts initiate cooperative education and public information programs.

Cities, villages and fire districts often enter into mutual aid agreements to support each other during emergencies. These agreements can include loaning building officials and other staff to help with heavy workloads during recovery.

Types of assistance:

- Cost sharing on the acquisition and management of floodprone land
- Mutual aid during and after emergencies

A.2 State agencies

A.2.1 Department of Natural Resources, Office of Water Resources

Formerly, the Illinois Department of Transportation's Division of Water Resources, OWR is the State's lead agency on flood control and flood damage reduction. Three divisions can assist local flood mitigation efforts.

The Division of Resource Management administers the floodplain management program which regulates channel and floodplain construction, coordinates the National Flood Insurance Program, and advises local permit officials. The Division also operates a dam safety program which inspects dams throughout the State and has the authority to order repairs to an unsafe dam. The Division provides help on mitigation planning, funding, and stormwater management.

Types of assistance: Advice and assistance on floodplain regulations, state floodplain permit requirements, and local responsibilities under the National Flood Insurance Program.

Department of Natural Resources
Office of Water Resources
Division of Resource Management
201 W. Center Court
Schaumburg, IL 60196-1096
708/705-4341
Fax: 708/705-4548

Types of assistance: Advice and assistance on flood hazard mitigation planning and stormwater management.

Department of Natural Resources
Office of Water Resources
Division of Resource Management
310 South Michigan Ave, Room 1606
Chicago, IL 60604
312/793-3123
Fax: 312/793-5968

The Division of Planning makes initial surveys and recommendations to local officials on local flood problems. Should a flood control or acquisition project be appropriate, this Division coordinates planning and funding.

The Division has a small projects program that helps fund projects that are cost effective and that cost less than \$75,000.

Types of assistance:

- Guidance on flood control project planning
- Financial assistance on flood control and acquisition projects

Department of Natural Resources
Office of Water Resources
Division of Planning
3215 Executive Park Drive
Springfield, IL 62794
217/782-4636
Fax: 217/785-5014

The Division of Project Implementation provides advice and assistance on stream and channel maintenance.

Department of Natural Resources
Office of Water Resources
Division of Project Implementation
201 W. Center Court
Schaumburg, IL 60196-1096
708/705-4331
Fax: 708/705-4548

A.2.2 Department of Natural Resources, State Water Survey

The Water Survey carries out data collection and research on the quality and quantity of water in the state. It maintains the Illinois Floodplain Information Repository, a master library of engineering studies on rivers and lakes. A fee may be charged for some services.

Types of assistance:

- Provision of data from floodplain studies and maps
- Review of flood studies to ensure consistency with regulatory data
- Calculation of base flood elevations in rural areas

Department of Natural Resources
State Water Survey
2204 Griffith Drive
Champaign, IL 61820-7495
217/333-0447
Fax: 217/333-6540

A.2.3 Department of Natural Resources, Office of Capital Development

The Department of Natural Resources includes several offices that were formerly part of the Department of Conservation. These offices are concerned with public lands and the preservation of natural and recreational values in the State's floodplains. They advise Federal and State agencies responsible for administering permits on the effects of such development on the State's natural and recreational resources.

The Office of Capital Development, Division of Grant Administration, seeks out and acquires property for public use, particularly in floodprone areas. It provides 50% grants to communities to purchase lands for open space and recreational purposes.

The Office of Natural Resource Management, Division of Natural Heritage works with communities on natural areas inventories and endangered species concerns.

The Office of Realty and Environmental Planning, Division of Planning, provides assistance in stream corridor and greenway management.

All of these offices can be reached at the same address:

Department of Natural Resources
524 South Second Street
Springfield, Illinois 62701-1787

A.2.4 Illinois Emergency Management Agency

IEMA coordinates the State's flood and other disaster planning, preparedness, response and mitigation activities. Most of its work with communities is coordinated through regional coordinators, county and municipal emergency services and disaster agencies.

Types of assistance:

- Training programs for local officials on flood preparedness, disaster assistance, and mitigation
- Review of local plans for consistency with state guidelines
- Advice and assistance on emergency preparedness for other natural and technological hazards
- Operational support and coordination of state assets during an emergency
- 75% grants to help finance post-disaster mitigation projects that are shown to be cost-effective (IEMA administers FEMA's Section 404 Hazard Mitigation Grant Program which is available only after a Presidential disaster declaration)

Regional Coordinator
Illinois Emergency Management Agency
1015 North LaSalle
Ottawa, IL 61350
815/433-3297
Fax: 815/433-3299

A.2.5 Illinois Department of Public Health

The Department has regulatory or licensing authority over mobile home parks, campgrounds, swimming pools, hospitals, nursing homes, and other public health facilities. Construction or expansion of such facilities needs a department permit to ensure that the facility will not be subject to flood damage.

Similar types of assistance may also be provided by local health departments.

Types of assistance:

- Assistance to communities and health facilities on emergency planning
- Regulatory authority over location and construction of new facilities
- Some regulatory authority over facilities during a flood
- Post-disaster water sampling to ensure the safety of wells and water systems
- Emergency water supply and well disinfection
- Clean up and food safety advice

Department of Public Health
525 West Jefferson, 3rd Floor
Springfield, Illinois 62761
217/782-4977
Fax: 217/785-0253

A.3 Federal agencies

A.3.1 Federal Emergency Management Agency, Mitigation Division

This office is responsible for local activities in relation to the National Flood Insurance Program and the Community Rating System. It coordinates the preparation, review and revision of flood insurance studies and maps. Division staff help communities draft and enforce their floodplain management ordinances.

The office also has programs and expertise in other natural hazards, particularly earthquakes, and in technological hazards, such as nuclear power plant accidents.

The Division has two programs that provide funding for mitigation programs initiated before a flood and one that is available after a Presidential disaster declaration.

The *Hazard Mitigation Assistance Program* provides funds for preparing a hazard mitigation plan. A limited amount of funds are available each year and an applicant must compete with other applicants.

The *Flood Mitigation Assistance Program* was created by the National Flood Insurance Reform Act which was enacted in September 1994. It provides 75% grants for mitigation planning and mitigation projects implemented pursuant to a plan.

The *Hazard Mitigation Grant Program*, also known as the Section 404 program, provides 75% grants for mitigation projects in areas affected by a declared disaster. It has traditionally funded acquisition and building elevation projects.

Types of assistance:

- Provision and revision of flood insurance maps and studies
- Guidance on enforcement of floodplain regulations
- Assistance in applying for flood insurance premium rate reductions through the Community Rating System
- Financial assistance for planning and/or implementing mitigation programs

Federal Emergency Management Agency
Region 5
Mitigation Division
175 West Jackson, 4th Floor
Chicago, IL 60604-2698
312/408-5500
Fax: 312/408-5551

A.3.2 Federal Emergency Management Agency, Response and Recovery Division

If a flood or other disaster occurs that affects enough properties, the area may receive a disaster declaration by the President (*see Section 4.1.3*). A Disaster Service Center, an information hotline, or both are established to handle applications for assistance to people and families.

Public agencies and private nonprofit organizations can apply for assistance to repair and rebuild under other programs. Additional information about FEMA's programs are widely distributed after the declaration.

Types of assistance:

- 100% grants for limited home repairs to allow people to move back in quickly
- 100% grants for temporary housing (when more than limited repairs are needed) for up to 18 months, something that is very helpful for people who live in homes slated for acquisition
- 100% grants for "unmet needs," i.e., needs not helped by other assistance programs
- 100% "minimization" grants under the Individual and Family Grant Program for small mitigation projects, such as moving utilities out of basements
- 75% grants to help rebuild damaged public and private nonprofit facilities
- 75% grants for mitigation projects to protect public and private nonprofit facilities from future damage or to relocate a damaged facility out of the floodplain

Federal Emergency Management Agency
Region 5
Response and Recovery Division
175 West Jackson, 4th Floor
Chicago, IL 60604-2698
312/408-5500
Fax: 312/408-5599

A.3.3 Federal Emergency Management Agency, National Flood Insurance Program

The NFIP is administered by insurance companies and overseen by FEMA. Research has shown that people with insurance coverage are better off financially after a flood and more likely to implement post-flood mitigation projects on their buildings. (*See also Section 2.2.8*).

Types of assistance: Insurance coverage for properties subject to surface water flooding

NFIP Regional Office
2443 Warrenville Road
Suite 600
Lisle, IL 60532
708/955-4550
Fax: 708/955-4561

A.3.4 US Army Corps of Engineers

The Corps is the Federal government's lead flood control and flood fighting agency. It actively monitors flood events and provides technical assistance as necessary during emergencies.

Its Floodplain Management Services Program provides technical and planning assistance.

Under Section 404 of the Clean Water Act, the Corps has regulatory authority over construction projects that affect wetlands. Filling a wetland area requires a "404" permit from the Corps' Regulatory Functions Branch.

Types of assistance:

- Information and advice on flood control projects, flood warning, emergency preparedness, evacuation, and floodproofing
- Cost sharing on flood control projects
- Regulatory authority over wetland development
- Stream clearing and snagging projects
- Emergency flood response and flood fighting services

U.S. Army Corps of Engineers
Chicago District
111 North Canal Street
Chicago, IL 60606
312/353-7515
Fax: 312/886-2891

A.3.5 Department of Agriculture, Natural Resources Conservation Service

The NRCS was formerly known as the Soil Conservation Service. It has recently expanded its community assistance efforts with the creation of the Chicago Metro Urban and Community Assistance Office.

The Service provides assistance to individual land owners, groups of land owners, and communities, and staff support to the soil and water conservation districts.

Types of assistance:

- Technical assistance on land use planning, conservation planning, resource development, stormwater management, flood prevention, erosion control and sediment reduction
- Detailed soil surveys
- Watershed/river basin planning
- Cost sharing on projects to improve water quality and reduce flood damage in small watersheds
- Recreation, fish, and wildlife management and similar water management or development projects

Chicago Metro Urban and Community Assistance Office

USDA - Natural Resources Conservation Service
675 North Court, Suite 120
Palatine, IL 60067-8106
708/991-6217
Fax: 708/991-1642

Kane and DuPage Counties:

USDA - Natural Resources Conservation Service
St. Charles Field Office
545 South Randall Road
St. Charles, IL 60174
708/584-7961
Fax: 708/584-9534

McHenry and Lake Counties:

USDA - Natural Resources Conservation Service
Woodstock Field Office
1143 North Seminary Ave., Box 168
Woodstock, IL 60098
815/338-0099
Fax: 815/338-7731

North Cook County:

USDA - Natural Resources Conservation Service
Palatine Field Office
675 North Court, Suite 120
Palatine, IL 60067-8106
708/991-1189
Fax: 708/991-1642

Will and South Cook Counties:

USDA - Natural Resources Conservation Service
Joliet Field Office
100 Manhattan Road
Joliet, IL 60433
815/723-5078
Fax: 815/723-2723

A.3.6 Department of Agriculture, Rural Economic and Community Development

This office was renamed in 1994 from the former Farmers Home Administration. It serves rural areas and smaller communities in rural areas.

Types of assistance:

- Technical guidance on financing public works projects
- Purchase of local bond issues to help obtain a lower interest rate

USDA, Rural Economic and Community Development
1802 North Division, Suite 218
P.O. Box 779
Morris, IL 60450
815/942-9390
Fax: 815/942-9394

A.3.7 Department of Agriculture, Consolidated Farm Service Agency

This office was known as the Agricultural Conservation and Stabilization Service (ASCS) before the 1994 reorganization. It runs the farm land set aside and Wetland Reserve programs.

Types of assistance:

- Purchase of easements on wetland properties
- Cost sharing (up to 75%) on wetland restoration

Illinois State Consolidated Farm Service Agency
P.O. Box 19273
Springfield, IL 62794
217/492-4670
Fax: 217/492-4508

A.3.8 Department of Commerce, National Weather Service

The National Weather Service is the Federal agency responsible for the preparation and issuance of flood and severe weather warnings.

The Weather Service Forecast Office has a staff hydrologist who works with communities on flood warning issues.

Types of assistance:

- Assistance in preparing flood warning plans
- Brochures and audio visuals covering flood warning programs and local flood warning systems

National Weather Service
Weather Service Forecast Office
333 W. University Drive
Romeoville, IL 60441
815/834-0600
Fax: 815/834-0645

A.3.9 Department of the Interior, National Park Service

The Park Service's Rivers and Trails Conservation Assistance Program provides help on planning and open space preservation efforts.

Park Service staff help facilitate meetings and help in identifying non-structural options for floodplain redevelopment.

Types of assistance: Advice and facilitation for a local planning effort

National Park Service
310 W. Wisconsin Ave., Room 500
Milwaukee, WI 53203
414/297-3617
Fax: 414/297-3127

A.3.10 Department of the Interior, Fish and Wildlife Service

Under the North American Wetland Conservation Fund and the Partners for Wildlife programs, the Fish and Wildlife Service helps private landowners restore wetlands and riparian habitats. The owners enter into binding agreements to restore and protect the site for at least 25 years.

Types of assistance: Financial and technical assistance to restore wetlands and riparian habitats

U.S. Fish and Wildlife Service
Chicago Field Office
1000 Hart Road, Suite 180
Barrington, IL 60010
708/381-2253
Fax: 708/381-2285

A.3.11 Department of Housing and Urban Development

Each of the six northeastern Illinois counties receives Community Development Block Grant (CDBG) funds from the U.S. Department of Housing and Urban Development (HUD). Additional funding is provided directly to cities with populations of more than 50,000 on a formula basis. Smaller communities must apply to their counties for a grant.

One objective of the program is to improve housing conditions for low- and moderate-income families. This can include acquiring floodprone homes or protecting them from flood damage.

HUD also provides the counties funds for new construction and rehabilitation of housing for low-income families under the HOME Program.

Types of assistance:

- 100% grants to improve housing for low- and moderate-income families
- CDBG funds can be used as a local match for other funding programs

For more information contact the county planning or development department.

A.3.12 Small Business Administration

If a flood or other natural disaster affects enough properties, the state may request a disaster declaration by the Administrator of the SBA. The program helps homeowners, renters, and businesses. Additional information about the program is widely distributed after a declaration.

Types of assistance:

- Low interest long-term loans to repair or replace disaster related damage
- Loans to refinance an existing mortgage on a damaged property (depending on the borrower's financial condition)
- Additional loan funds to install mitigation measures (limited to 20% over the amount of the main loan)
- Loans to finance the costs of bringing a damaged property up to state or local code requirements

Small Business Administration
Area 2 - Disaster Assistance
1 Baltimore Place, Suite 300
Atlanta, GA 30308
800/359-2227 (helpline)
404/347-3771
Fax: 404/347-4183

A.3.13 Urban Resources Partnership

This is an interagency coordinating group for six cooperating federal agencies: Fish and Wildlife Service, National Park Service, Environmental Protection Agency, Cooperative Extension Service, Forest Service, and Natural Resources Conservation Service. The partnership can mobilize and coordinate the programs of these agencies to help communities improve resource planning and management.

Types of assistance: Grants to help locally driven projects, such as planting trees, establishing trails, wetland and prairie restoration, and improving streambanks and riparian areas.

Chicago Urban Resources Partnership
320 North Clark Street
Room 600A
Chicago, IL 60610
312/744-5959
Fax: 312/744-6451

A.3.14 AmeriCorps

This is the recently initiated national community service organization.

Types of assistance: Teams of workers that can help on landscaping type projects, such as surveying, tree planting, restoration, construction and environmental education

AmeriCorps
U.S. Department of Agriculture
4434 South Lake Park
Chicago, IL 60653
312/373-9956
Fax: 312/373-9960

A.4 Private organizations

A.4.1 Openlands Project

Openlands Project is a nonprofit organization that serves northeastern Illinois. The agency undertakes education, advocacy, technical assistance, and land acquisition activities to preserve open space.

Corlands is an affiliate that provides financing to help local governments purchase property. It also helps secure easements and donations.

Types of assistance:

- Technical assistance on acquiring and otherwise preserving open land
- Financial assistance to acquire or preserve land

Openlands Project
220 South State, Suite 1880
Chicago, IL 60604-2103
312/427-4256
Fax: 312/427-6251

A.4.2 Illinois Association for Floodplain and Stormwater Management

The IAFSM is a nonprofit association with a membership of over 250 local, state, and federal officials and private consultants. IAFSM is a chapter of the Association of State Floodplain Managers and can provide information on their publications, conferences and training programs.

The two associations' officers and committees provide advice to state and federal staff on how their programs can better respond to local needs.

Types of assistance:

- Keep members up to date with a quarterly newsletter and publications
- Conference and training seminars

Illinois Association for Floodplain
and Stormwater Management
153 Nanti Street
Park Forest, IL 60466
708/747-5273
Fax: 708/747-5279

A.4.3 Floodplain Management Resource Center

The Resource Center is a library and referral service for floodplain management publications. It is located at the Natural Hazards Research and Applications Information Center in Boulder, Colorado.

Over 400 floodplain publications in the Center's library have been entered into a computer data base which has been coded with key words to facilitate quick searches. Most inquiries are handled over the telephone Monday - Friday, 10:00 a.m. - 5:00 p.m. (Central time).

Types of assistance: Advice on publications appropriate for the inquirer's concerns

Natural Hazards Center
IBS #6
Campus Box 482
Boulder, CO 80309-0482
303/492-6818
Fax: 303/492-2151

A.4.4 Volunteer organizations

Volunteer organizations — the American Red Cross, the Salvation Army, Habitat for Humanity, the Mennonite Disaster Service — as well as private businesses and service organizations, such as the Lions, Elks, and VFW are often available after a disaster.

No government disaster declaration is needed.

Types of assistance:

- Donations of food, shelter, clothing, labor, money, etc.
- The Red Cross has flood clean up kits and handbooks on clean up.
- Habitat for Humanity and the Mennonite Disaster Service provide skilled labor to help rebuild damaged buildings incorporating mitigation or floodproofing concepts.

The offices of individual programs can be contacted directly. FEMA Response and Recovery Division maintains contact with many of them (*see Section A.3.2*).

A.4.5 Flood relief funds

After a disaster, local businesses, residents and out of town groups often donate money to local relief funds. They may be managed by the local government, one or more local churches, or an ad hoc committee.

No government disaster declaration is needed. Local officials should recommend that the funds be held until an applicant exhausts all government sources of disaster assistance. That would allow the funds to be used for mitigation and other projects that cannot be funded elsewhere.

Types of assistance: gifts, donations of food, money, etc.

[This page intentionally blank.]

Appendix B.

Acronyms

Appendix B. Acronyms

It is important that mitigation planners and coordinators be able to communicate with the other agencies that are involved in flooding, mitigation, and post-disaster operations. These are the more common acronyms. More information about the organization or program can be found in the sections noted.

- ASCS Agricultural Stabilization and Conservation Service, the old name for the US Department of Agriculture's Consolidated Farm Service Agency (*Appendix A, Section A.3.7*)
- ASFPM Association of State Floodplain Managers
- BFE Base flood elevation, the elevation of the 100-year flood in relation to mean sea level (*Section 3.2.1*)
- BMP Best management practice (*Section 2.1.6*)
- BOCA Building Officials and Code Administrators, International, the primary model building code used in northeastern Illinois
- CDBG Community Development Block Grant (*Appendix A, Section A.3.11*)
- CRS Community Rating System of the NFIP (*Appendix H*)
- DNR Illinois Department of Natural Resources (*Appendix A, Sections A.2.1*)
- DSC Disaster Service Center, established after a federal disaster declaration (*Section 4.1.4*)
- DSR Damage Survey Report, used to determine eligibility for public/infrastructure disaster assistance (*Section 4.1.4*)
- DWR Division of Water Resources (*Appendix A, Section A.2.1*)
- EDA US Department of Commerce, Economic Development Administration
- ESDA Emergency Services and Disaster Agency, the former name for IEMA, but still used as the name for many communities' emergency management offices
- FEMA Federal Emergency Management Agency (*Appendix A, A.3.1 - A.3.3*)
- FIRM Flood Insurance Rate Map (*Section 2.1.4, Figure 2-1*)
- HMAP Hazard Mitigation Assistance Program (*Appendix A, Section A.3.1*)
- HMGP Hazard Mitigation Grant Program (*Section 4.1.4, Appendix A, Section A.2.4*)
- HUD US Department of Housing and Urban Development (*Appendix A, A.3.11*)
- IAFSM Illinois Association for Floodplain and Stormwater Management (*Appendix A, Section A.4.2*)
- IDOT Illinois Department of Transportation
- IEMA Illinois Emergency Management Agency (formerly the Illinois Emergency Services and Disaster Agency or ESDA) (*Appendix A, Section A.2.4*)

Flood Hazard Mitigation

IFG	Individual and Family Grants (<i>Section 4.1.4</i>)
IHMT	Federal Interagency Hazard Mitigation Team (<i>Section 4.1.4</i>)
MWRD	Metropolitan Water Reclamation District of Greater Chicago (<i>Appendix A, Section A.1.3</i>)
NFIP	National Flood Insurance Program (<i>Sections 2.2.8 and Appendix A, A.3.3</i>)
NIPC	Northeastern Illinois Planning Commission (<i>Appendix A, Section A.1.1</i>)
NOAA	National Oceanic and Atmospheric Administration, the parent agency of the National Weather Service
NRCS	US Department of Agriculture, Natural Resources Conservation Service (<i>Appendix A, Section A.3.5</i>)
NWS	National Weather Service (<i>Appendix A, Section A.3.8</i>)
OWR	Illinois Department of Natural Resources, Office of Water Resources (<i>Appendix A, Section A.2.1</i>)
PDA	Preliminary Damage Assessment, conducted to determine if there should be a federal disaster declaration (<i>Section 4.1.2</i>)
Post-FIRM	Constructed after the date of the community's Flood Insurance Rate Map (<i>Section 4.3.4</i>)
Pre-FIRM	Constructed before the date of the community's Flood Insurance Rate Map (<i>Section 4.3.4</i>)
RIC	Reconstruction Information Center (<i>Section 4.4.2</i>)
SBA	US Small Business Administration (<i>Appendix A, Section A.3.12</i>)
SCS	Soil Conservation Service, the old name for the US Department of Agriculture's Natural Resources Conservation Service (<i>Appendix A, Section A.3.5</i>)
TARP	Tunnel and Reservoir Plan of the Metropolitan Water Reclamation District (<i>Section 1.3</i>)
TDR	Transfer of development rights (<i>Section 2.1.3</i>)
USACE	US Army Corps of Engineers (<i>Appendix A, Section A.3.4</i>)
USGS	US Geological Survey
404	FEMA's Hazard Mitigation Grant Program, authorized by Section 404 of the Stafford Act (<i>Section 4.1.4</i>). Also the Section 404 wetlands protection program administered by the US Army Corps of Engineers (<i>Section 2.1.5</i>).
406	FEMA's Public/Infrastructure Assistance Grants, authorized by Section 406 of the Stafford Act (<i>Section 4.1.4</i>)
409	Hazard mitigation planning requirements in Section 409 of the Stafford Act (<i>Section 4.1.4</i>)

Appendix C.

Property Protection Scoring System

Appendix C. Property Protection Scoring System

Section 2.2 discusses property protection measures such as acquisition, elevation, and floodproofing. As noted in that section, the planner must know the building type, condition, and flood hazard to determine which, if any, of these measures are appropriate. If the time and resources are available, the planner should seriously consider collecting data on each lot to determine the appropriate protection measures for each property.

This appendix reviews the types of information to collect and how to process the data to identify the most appropriate nonstructural measures to protect a building from surface flooding. While some of the items may repeat the topics in Section 3.3 Problem Assessment, the information noted here is collected for each property, not for community-wide totals.

This scoring system is based on the premise that the best protection measure is to acquire the property and demolish the building or move it out of the floodplain. Only sound buildings in low hazard areas are recommended for elevation or floodproofing.

Points are given for various criteria that represent flood damage potential, cost-effectiveness, and other factors that determine whether a property should be acquired. When there are not enough funds to buy all properties that qualify, the points can be used as a ranking system to prioritize properties for acquisition. The user may want to revise the point system to better match local goals, objectives, and priorities.

The point scoring and calculations can be done by hand, a job that is made easier by worksheets that list the data for each property and the accompanying scores. An example of such a worksheet is in Figure C-2.

Where there are large numbers of buildings, a data base management program should be developed to store and process the information. The software should be compatible with or, preferably, have access to other property data bases in the community, such as tax assessment files.

Step 1. Collect data on each property.

The data needed are either in existing data bases or can be obtained by conducting a windshield survey. Except where noted, the information collected is for the primary building on the property. A property location base map is a very helpful tool in this process. An example is in Figure C-1.

1.1 Building foundation. Identify whether the foundation is a crawlspace, slab, or basement. Source: windshield survey. A basement is considered any floor that is below grade, including split level and bi-level homes and garden apartments.

1.2 Building walls. If the building is on a slab foundation, note whether it has masonry walls on all four sides. This includes brick facing on a wood frame wall. Source: windshield survey.

1.3 Building condition. Determine whether the building is well maintained or dilapidated. Source: windshield survey.

1.4 Soil stability. Check the soil survey published by the Natural Resources Conservation Service (*see Appendix A, section A.3.5*) to identify areas where the windshield survey should concentrate on looking for signs of unsuitable soils. The windshield survey should see if there is evidence of cracked walls, settling, unstable soil or other sign of stress.

1.5 Lowest floor elevation. For buildings with basements, the lowest floor elevation is the basement floor level. Source: high water marks or first floor elevation surveys that may have been prepared as part of a flood control project. Rough elevations can be extrapolated from orthophoto maps, although they will only be good to within 1-2 feet. In some cases, the planner may want to survey in accurate elevations.

1.6 Personal data. Collect pertinent information about the occupants if known (e.g., handicaps, disabilities, willingness to sell, etc.). Source: personal contacts with the owners. The relatively small weight given to this factor will probably not warrant the expense to collect the data on every property under consideration. However the planner may want to mail a survey to residents to obtain data such as their personal concerns, support for other community objectives, and income levels (to determine qualifications for financial assistance programs).

Step 2. Obtain flood hazard data.

All of the data are available in the community's flood insurance study for those areas studied in detail (AE and A numbered zones). The Office of Water Resources, the State Water Survey, FEMA, or the Corps of Engineers can provide guidance on estimating the data in areas not studied in detail (*see Appendix A, Sections A.2.1, A.2.2, A.3.1, and A.3.4*).

2.1 Base flood elevation. Source: flood insurance study or Flood Insurance Rate Map.

2.2 10-year flood elevation. Source: flood insurance study.

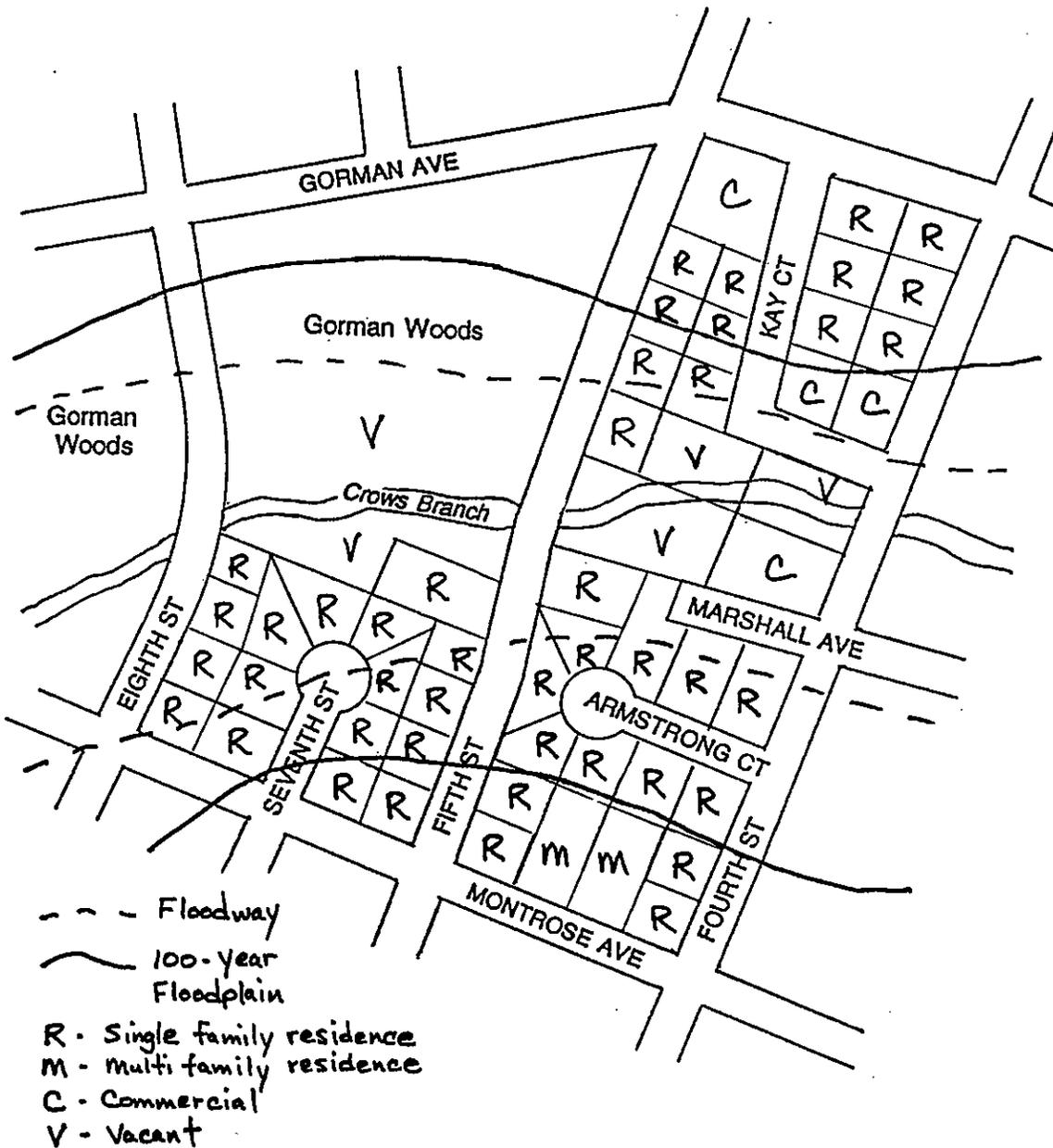
2.3 Building in floodway. Source: floodway map.

2.4 Average floodway velocity. This is in feet per second. Source: floodway data table in the flood insurance study. In areas not studied by FEMA, the average floodway velocity can be extrapolated from streams with similar slopes and topography.

2.5 Base flood depth. Subtract the lowest floor elevation from the base flood elevation. The resulting figure is the base flood depth. If the lowest floor is higher than the base flood elevation, this will be a negative number.

2.6 Ten-year flood depth. Subtract the lowest floor elevation from the 10-year flood elevation. The resulting figure is the ten-year flood depth. It will also be a negative number where the lowest floor is higher than the 10-year flood elevation.

Figure C-1 Example Property Location Base Map



The base map can be any map that shows parcels or property lines. It should show the floodway and floodplain boundaries and current land uses. This example shows a four block section of the Crow's Branch floodplain in the Village of McLake (see Figure 3-3).

Step 3. Obtain other data on the area.

Factors other than building condition and water hazard should be considered. This section identifies these other factors.

3.1 Sources of toxics. Determine whether the site is near or less than a mile downstream of a source of pollution by toxic or hazardous materials. Also note if the site itself contains such materials that could be carried away by floodwaters. Source: local emergency manager and windshield survey.

3.2 Planned flood control. Determine whether the property is scheduled to be protected by a flood control project. If so, identify when and to what flood protection level. Source: local planning or engineering office.

3.3 Site needed for or adjacent to a community facility. Note yes or no. Source: flood control project plans, park development plans, and similar community plans.

Step 4. Obtain data on financing.

One of the most important determinants of flood hazard mitigation is affordability. This step checks for the amount of funds available and the acquisition costs.

4.1 Outside financial assistance. The local cost share helps determine which measure is most affordable from the owner's or the community's perspective. This figure will range from 0 to 1.0 (i.e., from no local cost share to 100% of the cost paid by the community). Source: Federal programs and data on whether buildings or owners qualify.

4.2 Market value. The dollar value of the property (buildings and land) is needed. Source: tax assessor's files. The assessor can advise how to adjust the figure to coincide with current market value.

Step 5. Calculate the protection feasibility score.

This step determines whether it is feasible for the building to be protected by a method other than acquisition.

5.1 Flood control project. Determine the appropriate number of points for the property based on the information in step 3.2:

- a. Site to be protected by a project that is funded and underway: 0 points.
- Site to be protected by a project planned for the next five years: 1 point.
- Site to be protected by a project planned for the next ten years: 2 points.

- b. Double the score if the site will be protected to less than the base or 100-year flood.

- c. If there is no project planned or a project is more than ten years away: 5 points.

5.2 Floodproofing. Determine the feasibility score for elevation or floodproofing based on the type of building (maximum possible points: 10):

a. Building dilapidated, abandoned or otherwise in bad condition (step 1.3): 10 points. Generally, the building is not worth protecting and should be acquired.

b. Building with basement (step 1.1)

Subject to surface flooding, base flood depth > 3 feet (step 2.5): 10 points.

Subject to surface flooding, base flood depth \leq 3 feet (step 2.5): 5 points.

Consider barriers as the most appropriate property protection measure short of acquisition.

Subject to surface flooding, base flood depth < first floor (step 2.5): 3 points.

Consider barriers and wet floodproofing as the most appropriate property protection measure short of acquisition.

Subject to sewer backup flooding: 0 points. Consider sewer backup protection measures.

Subject to subsurface seepage: 0 points. Consider dry floodproofing measures.

c. Building on crawlspace (step 1.1)

Base flood depth > 6 feet (step 2.5): 10 points.

Base flood depth 3 - 6 feet (step 2.5): 5 points. Consider elevation as the most appropriate property protection measure short of acquisition.

Base flood depth < 3 feet (step 2.5): 3 points. Consider elevation and barriers as the most appropriate property protection measures short of acquisition.

d. Building on slab (step 1.1)

Base flood depth > 3 feet (step 2.5): 10 points.

Base flood depth \leq 3 feet (step 2.5), masonry walls (step 1.2): 3 points. Consider a barrier and dry floodproofing as the most appropriate property protection measures short of acquisition.

Base flood depth \leq 3 feet (step 2.5), non-masonry walls (step 1.2): 3 points.

Consider a barrier as the most appropriate property protection measure short of acquisition.

5.3 Subtotal. Add the points from step 5.1 to the points from step 5.2. The result measures the feasibility of an alternative to acquisition. The range is 1 to 15. The higher the score, the more appropriate it is to acquire the property because the other methods of flood protection are not feasible or won't be available for a long time. The community may want to use this step to eliminate properties from further consideration for acquisition, e.g., all properties that receive a score less than 3.

Step 6. Calculate the damage potential score.

This step measures the damage potential of each building. It is the sum of the following factors:

6.1 Base flood depth. One point is given for each foot of base flood depth (step 2.5). Maximum possible points: 10.

6.2 Flood velocity. Subtract 5 from the average floodway velocity (step 2.4). If the site is in the floodway (step 2.3), use the result. If the site is not in the floodway, divide the result by 2. The minimum value is 0 and the maximum possible is 5.

6.3 Soil stability. If there is evidence of settling or unstable soil (step 1.4): 1 point.

6.4 Toxics. If the site is near or less than a mile downstream of a source of pollution by toxic or hazardous materials (step 3.1): 3 points. If the site itself contains such materials that could be carried away by floodwaters: 6 points. Both of these situations may apply to a site, so the scores are added together. Maximum possible points: 9.

6.5 Subtotal. Add the points from 6.1 through 6.4. The result measures the hazard the building is exposed to. The score can range from a negative (where the flood depth is a negative number) to 25. The higher the score, the more damage the property is likely to incur.

Step 7. Calculate the economics score.

This step incorporates economic data into the ranking system. It is the sum of the following factors:

7.1 Economic feasibility. If the building has a basement (step 1.1) and the ten-year flood depth is greater than four feet (step 2.6): 4 points. If the building does not have a basement and the ten-year flood depth is greater than zero: 4 points. These situations are mutually exclusive. Maximum possible points: 4.

7.2 Relative local cost. Multiply the local cost share (step 4.1) times the market value (step 4.2). The result is the relative cost to the community. The following points score the relative cost to the community:

Example: A property is eligible for a grant which covers 75% of the cost of acquisition. The local cost share is 0.25. The property is valued at \$80,000. $0.25 \times \$80,000 = \$20,000$. The property receives 4 points.

0 - \$10,000	5 points
\$10,001 - \$25,000	4 points
\$25,001 - \$50,000	3 points
\$50,001 - \$75,000	2 points
\$75,001 - \$100,000	1 points
\$100,000 +	0 points

7.3 Reuse. If the site is needed for right of way for a planned flood control project, a park or other public open space (step 3.3): 6 points. If the site is adjacent to existing open space or a site that will be acquired in the near future: 3 points.

7.4 Subtotal. Add the points from 7.1 through 7.3. The result measures the cost-effectiveness of acquiring the property based on the relative cost to the community. The range is from 0 to 15.

Step 8. Incorporate personal factors.

This step incorporates personal factors not directly related to flood damage to the property. The information was collected in step 1.6.

8.1 Handicap. If the property is an owner-occupied permanent residence (not a commercial, seasonal or rental property), one point for each of the building's occupants who is handicapped or of limited mobility. Maximum possible points: 3.

8.2 Willing seller. If the owner has voiced an interest in selling: 1 point.

8.3 Repetitive flooding. If the building has been flooded more than once in recent years: 1 point.

8.4 Neighborhood attitude. If there is strong neighborhood support for acquisition: 1 point.

8.5 Subtotal. Add the points from 8.1 through 8.4. The result incorporates factors not directly related to flood damage. The user may want to omit step 8, especially if the data are hard to obtain. The range is 0 to 6.

Step 9. Calculate the property acquisition score.

This last step totals the points for each property. The weights given to each of the four major factors are shown below. A community may want to revise the weights and scores to better reflect local conditions, needs, goals, and objectives.

<u>Factor</u>	<u>Score</u>	<u>Weight</u>
Step 5. Feasibility of protection by other methods	10	18%
Step 6. Flood damage potential	25	45%
Step 7. Economics	15	27%
Step 8. Personal factors	<u>6</u>	<u>10%</u>
	56	100%

For example, a community may feel that the only factor that counts is damage potential. It can eliminate economics and personal factors from the ranking system. The points can be adjusted accordingly to make steps 5 and 6 each worth 50% of the total possible score.

An example worksheet with completed calculations appears in Figure C-2.

Figure C-2 Property Protection Worksheet

Address: 401 Armstrong Ct. ID #: BIK 115, lot 2-008

Owner: John Jones

Type: single family multi family, commercial, industrial, public, vacant (circle one)

- 1.1 Building foundation: crawlspace slab, or basement (circle one)
- 1.2 Building walls: masonry walls on all four sides? yes or no
- 1.3 Building condition: well maintained or dilapidated?
- 1.4 Soil stability: evidence of unstable soil? yes or no
- 1.5 Lowest floor elevation: 609
- 1.6 Personal data: Flooded in '86, '93, likes neighborhood

- 2.1 Base (100-year) flood elevation: 612
- 2.2 10-year flood elevation: 610
- 2.3 Building in floodway: yes or no
- 2.4 Average floodway velocity: 1.6 feet per second
- 2.5 Base flood depth: 3'
- 2.6 Ten-year flood depth: 1'

- 3.1 Sources of toxics: Across stream from paint + lacquer storage
- 3.2 Planned flood control: None
- 3.3 Site needed for or adjacent to: N/A

- 4.1 Outside financial assistance/local cost share: 0.5
- 4.2 Market value: \$ 125,000

- 5.1 Flood control project score: 5
- 5.2 Feasible protection measure: Elevation
- Acquisition appropriateness score: 5
- 5.3 Add the points from 5.1 and 5.2. Feasibility of protection score: 10

- 6.1 Base flood depth score: 2
- 6.2 Flood velocity score: 0
- 6.3 Soil stability score: 0
- 6.4 Toxics score: 3
- 6.5 Add the points from 6.1 through 6.4. Flood damage potential score: 5

- 7.1 Economic feasibility score: 0
- 7.2 Relative cost to the community score: 2
- 7.3 Reuse score: 0
- 7.4 Add the points from 7.1 through 7.3. Economics score: 2

- 8.1 Limited mobility score: 0
- 8.2 Interest in selling score: 0
- 8.3 Recent flooding score: 1
- 8.4 Neighborhood concern score: 0
- 8.5 Add the points from 8.1 through 8.4. Personal factors score: 1
- 9. Add the points from 5.3, 6.5, 7.4 and 8.5. Property acquisition score: 18

Step 10. Plot the results.

The results for each property should be plotted on the property location base map. The results would be both the property protection measure shown in item 5.2 and the total score for each property.

Plotting these will show where neighboring buildings have viable elevation or floodproofing recommendations. Where elevation and floodproofing are not viable, the higher scores should delineate areas that should be acquired.

Example

An example of a property protection recommendation map is shown in Figure C-3.

The properties with buildings in the floodway on Seventh and Eighth Streets are subject to deep flooding. Step 5 found that due to their foundations and flood hazard, acquisition is the best flood protection measure for these buildings. They are also adjacent to Gorman Woods, a public preserve. The lots and their utilities can be used for parking and facilities to support Gorman Woods.

Armstrong Court is a newer subdivision built on higher ground, most of it out of the floodway. The buildings are on crawlspaces. As with John Jones' house (*see Figure C-2*) the property protection scoring system concluded that these buildings can be elevated. Because there are not sufficient funds to buy all of the properties in the floodplain and Armstrong Court residents don't want to leave, these properties are recommended for elevation.

The buildings between Marshall Ave and Kay Court are the oldest in this area. They have been allowed to run down and would be relatively inexpensive to purchase. The commercial property on the northwest corner of Marshall and Fourth was found to store toxic materials. It rated highest on the scoring system and the Village intends to purchase and clear it as soon as possible.

Properties on higher ground are subject to less of a flood hazard. The more expensive ones that are in sound condition are recommended for elevation, dry floodproofing, or correction of basement seepage or sewer backup problems.

Figure C-4 is a floodplain reuse map. It shows how these four blocks could look in the future. Such a map provides the planners with a vision for a multi-objective plan: one that provides flood loss reduction, increased safety, clearance of blighted properties, and improved recreation facilities.

A multi-objective plan will generate support from more people. It is therefore more likely to succeed than a single-objective plan that addresses only flooding.

Figure C-3 Property Protection Recommendation Map

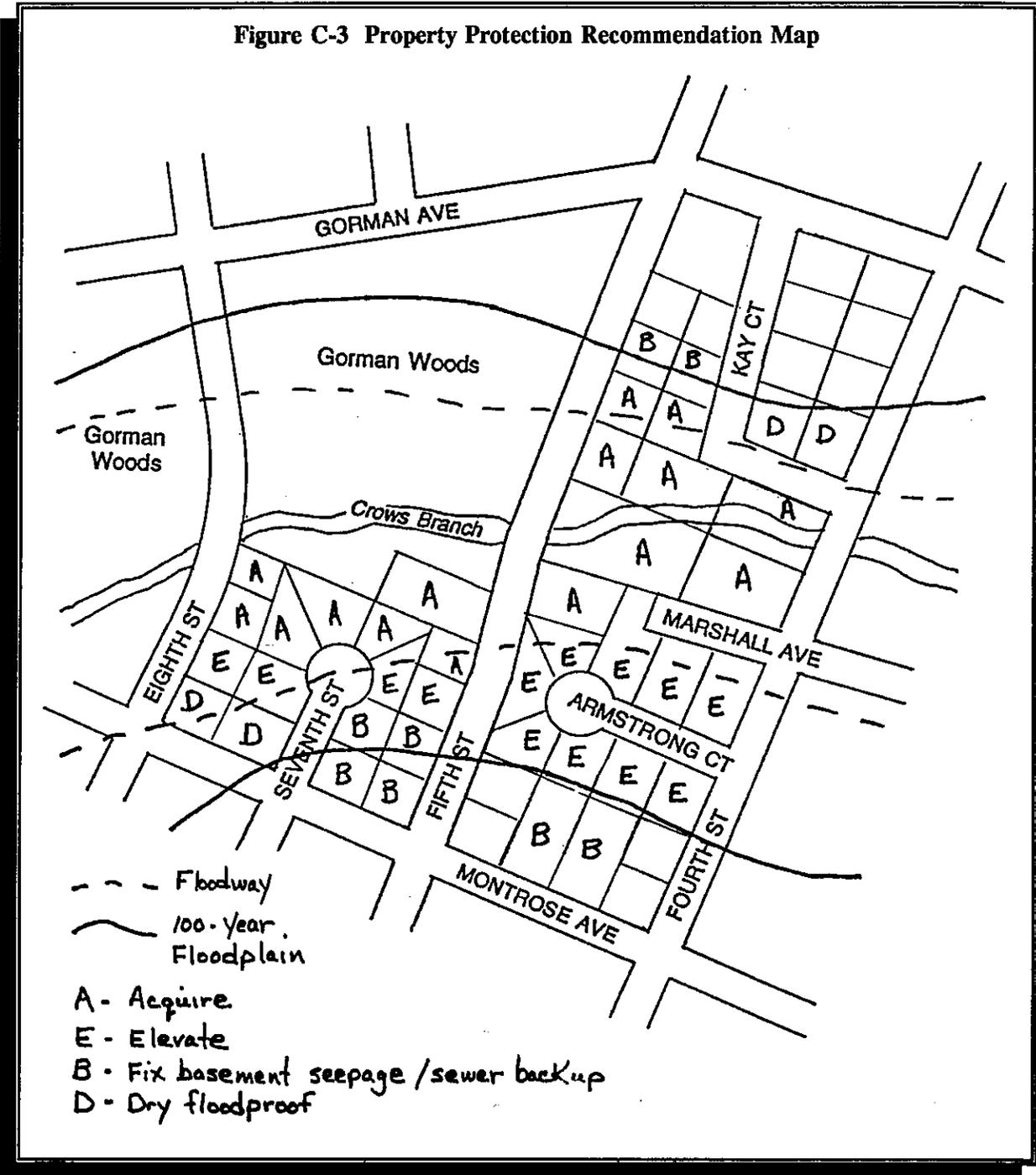
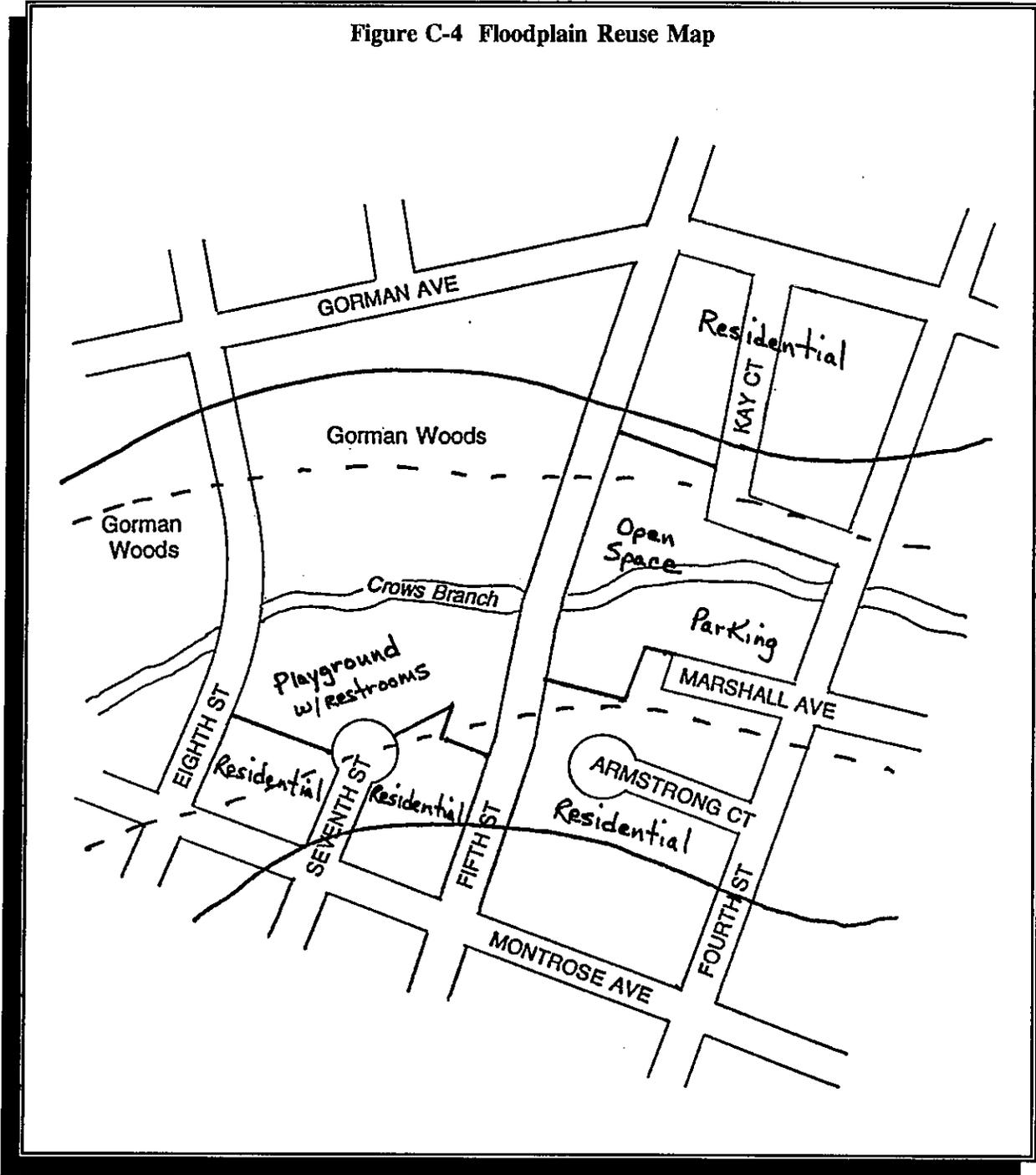


Figure C-4 Floodplain Reuse Map



[This page intentionally blank]

Appendix D.

Sample Plan Adoption Resolution

Appendix D. Sample Plan Adoption Resolution

Note: As with any legal document, this resolution should be reviewed by the community's attorney or counsel before submittal for passage.

Resolution No. _____

Whereas the Village of [name] has been faced with flooding and drainage problems over the years that have [flooded buildings/closed streets/damaged bridges and culverts/eroded channels/deposited sediment in the channels/disrupted traffic/ presented a general public health and safety hazard]; and

Whereas the Village's Flood Hazard Mitigation Planning Committee has prepared a recommended *Flood Hazard Mitigation Plan* that reviews the Village's options to reduce damage from flooding and drainage problems; and

Whereas the recommended *Flood Hazard Mitigation Plan* has been widely circulated for review by the Village's residents, neighboring communities and federal, state and regional agencies and has been supported by those reviewers;

Now, therefore, be it resolved that:

1. The *Flood Hazard Mitigation Plan* is hereby adopted as an official plan of the Village of [name], Illinois.
2. The Flood Hazard Mitigation Planning Committee is hereby established as a permanent advisory body. Its members shall be designated by the Village President, subject to the approval of this Board of Trustees. They shall serve one year terms. The Committee's duties shall be as designated in the *Flood Hazard Mitigation Plan*.
3. The Village Manager is charged with supervising the implementation of the plan's recommendations within the funding limitations as provided by the Village Board or other sources.
4. The Village Manager shall give priority attention to the following action items recommended by the *Flood Hazard Mitigation Plan*:
 - a. ...
 - b. ...
 - ...
5. The Village Manager shall provide periodic progress reports to the Flood Hazard Mitigation Planning Committee.

6. The Flood Hazard Mitigation Planning Committee shall monitor implementation of the plan and shall submit a written progress report to this Board by [date] each year. The report shall include the following:

- A review of the original plan.
- A review of any floods that occurred during the previous calendar year.
- A review of the action items in the original plan, including how much was accomplished during the previous year.
- A discussion of why any action items were not completed or why implementation is behind schedule.
- Recommendations for new projects or revised action items. Such recommendations shall be subject to approval by this Board as amendments to the adopted plan.

Passed this ___ day of _____ [month], 199_.

Appendix E.

Substantial Damage Worksheets

9. Description of Damage: (Answer yes or no to the following)
- (A) Plumbing: (1) Is it exposed? ___ (2) Needs to be repaired? ___
 - (B) HVAC/Electrical:
 - (1) Submerged? ___ (2) Damaged? ___
 - (A) Water Depth ___ ft.
 - (3) Repairable? ___ (4) Replace? ___
 - (C) Foundation ___ (D) Exterior walls ___ (E) Interior Walls ___
 - (F) Roof ___

- (Use corresponding number(s) to match the above C-F)
- 1. settlement/cracked
 - 2. partially missing
 - 3. sagging
 - 4. dislodged/destroyed
 - 5. submerged
 - 6. include all above
 - 7. other: Explain

10. Duration of Flooding: (A) ___ hours (B) ___ days

11. High Water Mark: (Specify depth of water)

- (A) Exterior Walls ___ ft.
- (B) Interior Walls ___ ft.

12. DESCRIPTION OF STRUCTURE: MANUFACTURED/MOBILE HOME

Dimensions: (A) single wide ___ size ___ X ___ Elevated to BFE (Y/N) ___

(B) double wide ___ size ___ X ___ Elevated to BFE (Y/N) ___

Roof: (A) metal/corrugated or ribbed ___

(B) composition shingles ___

Plumbing: (A) number of bathrooms ___ Fireplace: (A) yes/no

Foundation: (A) post/pier/piles

(B) continuous concrete

(C) treated window system

(D) conventional installation/dry-stack block

(E) metal or vinyl

(F) horizontal lap

Heating/Cooling: (A) forced air (C) wall furnace

(B) warm & Cooled (D) heat pump

Skirting: (A) metal or vinyl (C) simulated stone/brick

(B) horizontal l p (D) lattice

Appliances (built-in only): (A) LIST: _____

Carport: (A) attached (B) detached

Garage: (A) attached (B) detached

ESTIMATED COST OF REPAIR/RECONSTRUCTION

Worksheet Application # _____ Owner (s) Name _____
 Contractor's Signature: _____ Telephone: _____
 Address: _____

ITEMS AND COSTS TO BE INCLUDED FOR CALCULATING SUBSTANTIAL DAMAGE

ITEMS	LABOR	MATERIALS	For Official Use LABOR	MATERIALS
Foundation				
Walls'				
Roof				
Flooring				
Plumbing				
Electrical				
Furnace/HVAC Equipment				
Insulation				
Exterior Wall Finish (i.e. vinyl or wood siding				
Interior Wall Finish				
Bathroom Fixtures				
Cabinets (built-in only)				
Windows				
Doors				
Flooring (i.e. carpeting over sub-flooring or linoleum)				
Appliances (built-in only)				
Interior Finish Carpentry				
Paneling & Decorative Finishes				
Paint				
Light Fixtures & Ceiling Fans				
Attached Items Subtotal				
TOTAL				

TOTAL (LABOR & MATERIALS): _____ (FOR OFFICIAL USE)

CONTRACTOR
RECONSTRUCTION/IMPROVEMENT AFFIDAVIT

Folio #: _____ - _____ - _____ Contractor Name: _____

Address: _____ License #: _____

Property Address: _____ Phone: _____

I hereby attest to the fact that I, or a member of my staff, personally inspected the above mentioned property and produced the attached itemized list of repairs, reconstruction and/or remodeling list which are hereby submitted for a **Substantial Damage/Improvement Review**. These damages/improvements are **ALL OF THE DAMAGES/IMPROVEMENTS** sustained by this structure, and that all additions, improvements, or repairs proposed on the subject building are included in this estimate.

I understand that I am subject to enforcement and penalties for violation action and/or fines if the inspection of the property reveals that I have made repairs or improvements **NOT INCLUDED ON THE ATTACHED LIST OF REPAIRS/IMPROVEMENT** to THIS STRUCTURE or any non-conforming or illegal structures/additions, or repairs is included to the existing structure without having presented plans for such additions. I understand that any permit issued by (Community) pursuant to this affidavit does not authorize the reconstruction, repair or maintenance of any illegal additions, fences, sheds or non-conforming uses or structures on the subject property.

See Attached Itemized list

Total Labor & Materials \$ _____
Overhead & Profit \$ _____
Total Cost \$ _____

STATE OF _____
COUNTY OF _____

Affidavit

Before me this day personally appeared _____ who, being duly sworn deposes and says that he has read, understands, and agrees to comply with all of the aforementioned conditions.

Contractor's Signature

Date: _____

Sworn to an subscribed before me this _____ day of _____ A.D., 19____.

Notary Public State of _____

My commission expires _____

DETERMINATION OF SUBSTANTIALL DAMAGE

Percent Damage = $\frac{\text{Cost of Repair}}{\text{Value of Building}}$ = _____

In the event ghat the "Percent Damage is equal to or greater than 50%, the building is substantially damaged.

_____ This building is substantially damaged and therefore must be elevated so that the lowest floor is at or above the elevation of the base flood.

_____ This building is not substantially damaged. This building can be repaired without having to be elevated.

_____ This is a properly elevated structure and may be reconstructed at its existing elevation.

Reviewed by: _____ Date: _____

Approved by: _____ Date: _____

[This page intentionally blank]

Appendix F.

Sample Moratorium Resolution

Appendix F. Sample Moratorium Resolution

Note: As with any legal document, this resolution should be reviewed by the community's attorney or counsel before submittal for passage.

Resolution No. _____

WHEREAS, properties along [name of flooded streams] of the Village of [name] have been severely flooded, are currently uninhabitable, and according to the best available information, most, if not all, are substantially damaged;

WHEREAS, the floodplain ordinance of the Village requires substantially damaged residences to be either elevated or demolished and either option can place a hardship upon the owners;

WHEREAS, the Village Board has discussed various alternative ways to redevelop the area but none has yet been reviewed in depth and none has been based on full knowledge of the condition of the buildings or the desires or financial conditions of the owners; and

WHEREAS, several of the redevelopment alternatives reviewed to date may conflict with each other, may jeopardize the availability of flood insurance to residents, and/or may not be in the long-term best interests of the residents or the community.

NOW, THEREFORE, BE IT RESOLVED by the Village Board of the Village of [name] that:

1. It is the policy of the Village of [name] to:
 - a. Keep the Village in good standing in the National Flood Insurance Program to ensure that all residents can obtain insurance to protect their properties from flood damage;
 - b. Not allow any reconstruction or reoccupation of buildings or homes in the affected area, i.e., the area bounded by [names of streets and/or streams] , until the Village Board has adopted an interim mitigation plan for the area;
 - c. Carefully develop an interim mitigation plan for the affected area after a review of *all* options (including flood control, reconstruction, elevation, floodproofing and relocation) based on building conditions, the desires of the property owners, and funding sources that are available to assist the property owners; and
 - d. Assist residents with information on relocation and other flood protection measures and help them obtain financial assistance.

2. To implement this policy the Village Board will:
 - a. Create a mitigation planning committee composed of residents and Village staff;
 - b. Provide technical and professional staff support to the planning committee;
 - c. Collect data on building conditions, the desires of the property owners, and funding sources for the plan;
 - d. Prepare an interim plan for redevelopment of the affected area by [date] ;
 - e. Adopt a moratorium to prohibit reconstruction of buildings in the affected area until the interim plan is adopted;
 - f. Prepare a flood hazard mitigation plan by [date] to guide the long-term redevelopment of the affected area and identify projects that will reduce or prevent flood damage in [name] .
 - g. Not amend the floodplain ordinance until the interim plan is adopted and the moratorium is lifted;
 - h. Identify criteria needed for contractors' estimates of damage and reconstruction costs necessary for review of applications for building permits; and
3. Owners of property in the affected area are encouraged to:
 - a. Attend public meetings to review the Village's policy and planning work;
 - b. Assist in the preparation of the interim plan by providing information on the condition of their buildings and whether they are interested in relocating to a flood-free location; and
 - c. Provide contractor's estimates of the damage and cost of reconstruction of their houses in accordance with the criteria set by the Village.

Passed this ____ day of _____ [month], 199_.

Appendix G.

Excerpts from a Local Mitigation Plan

Appendix G. Excerpts from a Local Mitigation Plan

A flood mitigation plan can be in most any format and be given most any name. At a minimum, three items should be included: a description of how the plan was prepared, recommendations and a budget. More information on these minimum needs are in section 3.7.2.

The following pages are taken from the *Flood Protection Plan* adopted by the Village of Orland Hills, Illinois. This community of 5,000 people was not hit by a major flood that warranted acquisition of destroyed or substantially damaged buildings. However, it had been subject to enough repetitive and nuisance flooding, that the Village leaders wanted to develop an organized approach that looked at all possible ways to reduce its flooding and drainage problems.

Included are the plan's table of contents, parts of Section 1. Introduction, and Section 7. Action Plan. It also includes the planning map from Section 2. The eight steps of the planning process are as follows:

<u>Planning steps</u>	<u>Plan section</u>
1. Organize	Section 1
2. Hazard inventory	Section 2
3. Problem assessment	Section 2
4. Coordination	Section 1.2
5. Review mitigation measures	Sections 3-6
6. Public input	Sections 1.2, 1.3
7. Action plan	Section 7
8. Implement and evaluate	To be done

At the end of Sections 2 - 6 are conclusions and recommendations on measures that are most appropriate for Orland Hills. The text is not included here because the conclusions and recommendations are summarized in Section 7, Action Plan. The Action Plan includes a timetable and budget for the recommendations.

The Orland Hills' *Flood Protection Plan* has been reviewed and confirmed that it meets the credit criteria of the Community Rating System. These excerpts are reprinted courtesy of the Village of Orland Hills.

Village of Orland Hills

Flood Protection Plan

Contents

1. Introduction1-1

 1.1 Background1-1

 1.2 Planning Approach1-1

 1.3 The Next Steps1-3

2. Problem Description2-1

 2.1 Orland Hills' Drainage System2-1

 2.2 Tinley Creek2-2

 2.3 Midlothian Creek Headwaters2-10

 2.4 Storm Sewers2-10

 2.5 Yard Drainage2-11

 2.6 Natural and Beneficial Floodplain Functions2-14

 2.7 Flood Impact Summary2-15

 2.8 Conclusions and Planning Considerations2-17

 2.9 References2-18

3. Flood Control3-1

 3.1 Levees and Floodwalls3-1

 3.2 Detention3-2

 3.3 Diversions3-5

 3.4 Channel Improvements3-6

 3.5 Channel Maintenance3-9

 3.6 Storm Sewer Improvements3-10

 3.7 Runoff Controls3-11

 3.8 Conclusions and Recommendations3-12

 3.9 References3-14

4. Property Protection4-1

 4.1 Relocation4-1

 4.2 Acquisition4-2

 4.3 Elevation4-3

 4.4 Barriers4-5

 4.5 Dry Floodproofing4-7

 4.6 Wet Floodproofing4-9

 4.7 Insurance4-11

4. Property Protection (continued)

4.8 General Information Assistance 4-12
 4.9 Site Specific Information 4-14
 4.10 Financial Assistance 4-16
 4.11 Funding Arrangements 4-18
 4.12 Conclusions and Recommendations 4-21
 4.13 References 4-22

5. Emergency Services 5-1

5.1 Flood Threat Recognition 5-1
 5.2 Flood Warning 5-2
 5.3 Village Flood Response Activities 5-4
 5.4 Critical Facilities 5-5
 5.5 Conclusions and Recommendations 5-6
 5.6 References 5-6

6. Development Regulations 6-1

6.1 Planning and Zoning 6-1
 6.2 Floodplain Regulations 6-4
 6.3 Stormwater Management Regulations 6-8
 6.4 Erosion and Sedimentation Control 6-10
 6.5 Stream Dumping 6-10
 6.6 Disclosure Regulations 6-11
 6.7 Conclusions and Recommendations 6-12
 6.8 References 6-13

7. Action Plan 7-1

7.1 Summary of Conclusions 7-1
 7.2 Action Items 7-3
 7.3 Timetable and Budget 7-5
 7.4 Community Rating System 7-8

Section 1. Introduction

1.1 Background

The Village of Orland Hills, Illinois, has a varied and widespread flooding and drainage problem that affects buildings, yards and streets throughout town. Heavy rains cause water problems several times each year. The worst problem in recent history was caused by a severe storm in November 1990 that flooded many south Cook County communities.

The Village has studied different ways to reduce flooding. It has implemented several projects to correct localized problems. However, large scale projects, particularly on Tinley Creek, have been shelved due to their cost and many drainage problems that affect only one property have not been addressed by the Village government.

Because many residents remain exposed to flooding, the Village wanted to be sure that it has explored all possible ways to protect properties. In addition to major flood control projects that store or divert water, flood damage can be reduced or prevented through stream maintenance, floodproofing, flood insurance, flood warning, emergency preparedness, and regulation of new development.

The best way to explore flood protection alternatives is to prepare a comprehensive flood protection plan. The process of preparing the plan involves reviewing all possible solutions, discussing them with other offices and agencies that can help, reviewing the alternatives with flood-prone residents, and selecting the best mix of projects that are effective and affordable. The plan would recommend projects to the Village Board of Trustees that are most appropriate for Orland Hills.

1.2 Planning Approach

Simply stated, a plan is the product of a rational thinking process that reviews alternatives and selects and designs the ones that will work best for the community. It is the opposite of making quick decisions based on inadequate information. Plans are vital to ensuring that public funds are well spent.

This plan was prepared using a standard planning process that had three key ingredients:

1. *Technical expertise:* The process involved input from the Village's code enforcement, public works, recreation and parks, ... emergency services staff [and consultants]...
2. *Resident involvement:* Many of the activities, particularly floodproofing and drainage maintenance, require the cooperation of residents to be effective. Because residents are important to the solution, they were involved in the planning of the solution.

Resident involvement was provided in two ways. A flood protection planning committee composed of residents and Village staff from offices involved in flood related activities was formed. It included:

- Don Bigos, Village Trustee and Chair of the Public Works Committee
- Ross Andrews, resident
- Maryann Galvanauskas, resident
- Larry Hudzinski, resident
- John Ghilardi, resident
- Earl Hermansen, Director, Building Department
- Mike Worley, Director, Public Works Department
- Glenn Bilina, Director, Recreation and Parks Department
- Bradley Brink, Village Engineer, Robinson Engineering, Ltd.

The Village issued several news releases updating the progress of the Committee and asking for residents to attend and participate in the meetings. Several joined in response to these notices.

The second form of resident involvement was to publicize that the draft of this plan was available for review. Residents were invited to a public meeting to provide their comments on the draft. The meeting was held on February 16, 1995. Approximately 15 people attended and commented.

3. *Comprehensive review:* Everything that could affect flood damage in Orland Hills was considered. The technical experts ensured that time was not wasted on irrelevant activities, but the process was not limited to just a few alternatives such as ditch improvements or detention basins....

During the planning process, contacts were made with the following agencies to determine how their programs affect or could support the Village's flood protection efforts:

- Illinois Department of Transportation, Division of Water Resources
- Will-South Cook Soil and Water Conservation District....

1.3 The Next Steps

This Flood Protection Plan is a draft that has been prepared under the guidance of the Orland Hills planning committee. Adoption and implementation should proceed according to the following steps:

1. The availability of the draft should be announced to the public and floodplain residents in particular.
2. Copies of the draft should be sent to neighboring communities and state and federal agencies that are referenced in the recommendations.
3. A public meeting should be held to review the plan and receive comments from the public and other organizations and agencies.

...

Section 7. Action Plan

This Section summarizes the conclusions and recommendations made at the end of Sections 2-6. In Section 7.1, the conclusions are organized by subject matter. In Sections 7.2 and 7.3, the recommendations are organized by the office responsible for implementing them.

7.1 Summary of Conclusions

7.1.1 Problem Description: Orland Hills is subject to flooding from four different sources: Tinley Creek, Midlothian Creek headwaters, storm sewers and yard drainage. The impact of this flooding includes:

- flooded yards throughout the community,
- flooded streets and disruption of traffic,
- damage to public property, such as streets and culverts,
- flooding of the lower areas of some tri-level homes,
- erosion of channel banks and sedimentation in channel bottoms, and
- a potential threat to the Village Hall and Police Station.

While flooding affects areas throughout the Village, the most affected are those homes on Reach 3 of Tinley Creek, between Hobart and 167th Streets. Therefore, a flood protection program should put those properties as a high priority.

A flood protection program should also address the following:

- protecting properties affected by overbank flooding to the 100-year flood level,
- short and long term impacts on health and mental health,
- preserving and improving the appearance of the creeks and the drainage system
- preserving and improving water quality,
- informing people on how to prepare for the threat to life and health,
- informing people on how negligence and development can aggravate the problem, and
- measures to keep new construction from increasing flood problems.

7.1.2 Goals and policies:

- a. Reduce or eliminate the threat of flood and erosion damage to buildings along Tinley Creek.
- b. Correct all flood problems that cause a threat to public safety due to a threat to a critical facility, deep or high velocity flooding, or where access for emergency equipment is blocked.
- c. Prevent new development from aggravating flood, drainage and erosion problems or overloading the existing drainage system.
- d. Implement major construction projects only if they are worth the expense. The Village should not pay to protect public or private properties if the benefits (both tangible and intangible) do not justify the cost of the project.

- e. Protect and restore the appearance and the natural benefits of the creeks, Lake Lorin, detention basins, and other parts of the Village's drainage system.
- f. Maximize the education and involvement of residents. All residents are either victims of or contributors to the Village's flood and drainage problems.

7.1.3 Flood Control: Detention basins are in use throughout the Village. They can affect the quantity and quality of stormwater runoff. More basins can be expected as the watershed continues to develop. A watershed stormwater management plan would be a more effective and efficient approach.

Rather than make major channel improvements to Tinley Creek, it may be cheaper and as effective to make minor modifications to the channel and only repair or replace the culverts. The modifications could result in a more natural appearance and be eligible for outside funding. A drainage system maintenance program can have an impact on smaller, more frequent floods without large capital construction costs.

Other flood control measures that should be investigated are storm sewer improvements to relieve flooding in the depression on 93rd Avenue and runoff controls implemented in cooperation with watershed land owners.

7.1.4 Property Protection: There are a variety of flood protection measures that can be implemented to protect individual buildings from surface flooding and sewer backup. Many of them can be installed by the owner or by a contractor for less than \$5,000.

There are a variety of ways the Village can help property owners implement protection measures, ranging from providing references to preparing detailed plans to cost sharing to fully funding the design and construction. Many types of projects can be funded at a low cost, so a relatively small amount of financial assistance could help protect many properties.

7.1.5 Emergency Services: Orland Hills must rely on flash flood watches, warnings, and advisories from the National Weather Service. Given the type of flooding and low hazard to life and safety, this is a cost-effective approach to a flood threat recognition system.

The Village does not have a formal flood warning system to advise residents of the impending hazard. The Village's "Flood Response and Possibility Profile" is a framework for flood response, but does not identify site specific actions to be taken.

7.1.6 Regulations: Orland Hills' 1980 comprehensive plan has not kept up with development. Only two of four recommended implementation tools have been adopted. The Village has adequate legal authority to regulate obstructions in easements, construction of fences, stream dumping, new construction in the floodplain, and erosion, sedimentation and stormwater runoff from new developments in the watershed.

Regulatory standards could be improved for stormwater management standards, and disclosure of whether a property is subject to flooding. The regulations need to be properly administered and fairly enforced to be effective. Inadequate enforcement of the floodplain regulations means increased drainage and flooding problems and can affect the availability and cost of flood insurance.

7.2 Action Items

The Action Plan is a series of recommended action items. Most are taken from the recommendations at the end of Sections 3-7. The rest are related to adoption and implementation of this plan to implement a flood protection program for the Village. The action items are organized according to the office responsible for implementing them.

7.2.1 Village Board of Trustees:

- a. Adopt this Flood Protection Plan or an amended version of it to guide Village activities related to flooding and drainage.
- b. Establish the Flood Protection Planning Committee as a permanent advisory body. It should meet periodically and report to the Board at least annually on implementation of this plan.
- c. Sign the memorandum of understanding with the U.S. Natural Resources Conservation Service and the Will South Cook Soil and Water Conservation District to receive technical assistance in plan review and site inspection of development projects.

7.2.2 Village Administrator:

- a. Assume overall responsibility for implementation of this Flood Protection Plan.
- b. Apply for participation in the Community Rating System. (Recommendation 7-1)

7.2.3 Flood Protection Planning Committee:

- a. Continue to follow flood programs and provide information and recommendations to the Village Board, staff and residents.
- b. Monitor the implementation of this plan and prepare a written progress report to the Village Board at least once each year.
- c. Provide flood protection information to residents through a variety of means, including:
 - flood protection references maintained at the Public Library,
 - annual outreach projects, such as articles in the Village's quarterly newsletter,
 - a handbook or flyer on how to protect a house from flooding tailored to Orland Hills' building and flooding conditions, and
 - an open house conducted at least every two years (or within a few months of a flood) in conjunction with neighboring communities.

(Recommendation 4-1) This work should be coordinated with the implementation of Recommendation 5-2 (action item 7.2.7.b).

- d. Prepare a watershed management plan that addresses detention, erosion, runoff controls, and natural resource protection in cooperation with neighboring communities and the Will-South Cook Soil and Water Conservation District. (Recommendations 3-5 and 6-5)

7.2.4 Director of Public Works:

- a. Implement small scale projects to correct localized flooding problems where the benefits justify the cost of protecting public safety and buildings. (Recommendation 3-3)
- b. Develop a formal drainage system maintenance program with written procedures in accordance with Recommendation 3-4.

7.2.5 Village Engineer:

- a. Conduct an engineering analysis of the entire length of Tinley Creek to develop an affordable improvement plan in accordance with the guidelines of Recommendation 3-1. This analysis should consider:
 - updating the data and findings from the earlier studies,
 - installing a high flow restrictor on the basin at 169th Place,
 - replacing or improving the culverts at the worst restrictions,
 - minor regrading and planting to make the ditch more efficient and more of a natural waterway,
 - investigating funding and technical guidance from the Illinois Environmental Protection Agency,
 - clearing the sediment out of the storm sewers that drain into Lake Lorin, and
 - modifying the control gates and culverts at the Lake Lorin dam and protecting them from vandalism.
- b. Complete the analysis on the storm sewer that drains 93rd Avenue south of 167th Street in accordance with Recommendation 3-2.
- c. Work with the IDOT-Division of Water Resources' Midlothian Creek strategic planning study to ensure that it includes Orland Hills' floodplain in the creek's headwaters. (Recommendation 3-6)
- d. Provide technical support to the Flood Protection Planning Committee and the Plan Commission on their projects pursuant to this plan.

7.2.6 Building Commissioner:

- a. Enforce the regulations related to easements, construction of fences, and stream dumping and pursue violators aggressively. (Recommendation 6-3)
- b. Review procedures to enforce the floodplain regulations with FEMA and the Illinois Division of Water Resources and keep appropriate records. (Recommendation 6-4)
- c. Provide site specific information assistance to inquirers, including map information, flood protection advice, and information on selecting and dealing with contractors. (Recommendation 4-2)

- d. If the Village's information programs show that there is interest in property protection, investigate the requirements for financial assistance through the Community Development Block Grant and/or the new mitigation grant program. (Recommendation 4-3)

7.2.7 ESDA Coordinator:

- a. Investigate a system to disseminate flood watches and warnings to the general public in accordance with Recommendation 5-1.
- b. Prepare public information materials that explain what flood watches and warnings mean and what safety precautions residents should take when watches and warnings are issued. (Recommendation 5-2). This should be coordinated with the implementation of Recommendation 4-1 (action item 7.2.3.d).
- c. Review and revise the "Flood Response and Possibility Profile" in accordance with Recommendation 5-3.

7.2.8 Village Plan Commission:

- a. Investigate whether the Village should prepare a new or revised comprehensive plan and a capital improvements program. (Recommendation 6-1).
- b. Review the recommended provisions of the latest NIPC model stormwater management ordinance to determine if they should be adopted (Recommendation 6-5). This should be coordinated with implementation of the watershed management plan proposed in action item 7.2.3.d.

7.3 Timetable and Budget

Figure 7-1 provides a schedule for implementing the action items recommended by this plan. Month 1 is the first month after the plan is adopted by the Village Board of Trustees.

At the end of the first year, the Flood Protection Planning Committee should review overall progress and set new action items with a new timetable and budget for the next year. The Board of Trustees should then adopt an updated plan. For example, Recommendation 7.2.5.a calls for an analysis of ways to reduce flooding on Tinley Creek. Once the study is complete, the Planning Committee would recommend to the Board whether to fund all or part of the study's recommendations.

Figure 7-2 is the budget for implementing the action items recommended by this plan. In most cases, the actions can be undertaken without a large financial outlay. Action items noted with "S" mean that they can be implemented by Village staff, plan commission members, or flood protection committee members during normal working hours or at evening meetings.

Action Item	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
7.2.1 Village Board of Trustees:												
a. Adopt flood protection plan	X											
b. Establish the Flood Committee	X											
c. Sign memorandum	X											
7.2.2 Village Administrator:												
a. Implement this Plan	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
b. Apply to the CRS	-----	-----	-----	-----	-----	X	-----	-----	-----	-----	-----	-----
7.2.3 Flood Protection Committee:												
a. Advise on flood issues	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
b. Monitor plan implementation	-----	-----	R									
c. Inform residents	-----	-----	-----	X	-----	-----	-----	-----	-----	-----	-----	-----
d. Watershed management plan	-----	-----	-----	-----	-----	R	-----	-----	-----	-----	-----	R
7.2.4 Director of Public Works:												
a. Implement small projects	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
b. Drainage maintenance program	-----	R	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
7.2.5 Village Engineer:												
a. Tinley Creek analysis	-----	-----	-----	-----	-----	R	-----	-----	-----	-----	-----	X
b. 93rd Ave storm sewer analysis	-----	X	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
c. Midlothian Creek strategic plan	-----	-----	-----	-----	-----	R	-----	-----	-----	-----	-----	R
d. Support planning groups	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
7.2.6 Building Commissioner:												
a. Enforce regulations	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
b. Regulations procedures	-----	X	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
c. Information assistance	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
d. Financial assistance	-----	-----	-----	-----	-----	R	-----	-----	-----	-----	R	-----
7.2.7 ESDA Coordinator:												
a. Public flood warnings	-----	-----	R	-----	-----	-----	-----	-----	-----	-----	-----	-----
b. Public information materials	-----	-----	-----	-----	X	-----	-----	-----	-----	-----	-----	-----
c. Review the "Profile"	-----	-----	-----	R	-----	-----	-----	-----	-----	-----	-----	-----
7.2.8 Village Plan Commission:												
a. Investigate comprehensive plan	-----	-----	-----	-----	-----	-----	-----	-----	R	-----	-----	-----
b. Review stormwater ordinance	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	R	-----

"---" Ongoing work "R" Progress report or draft out for review "X" Project completed

Figure 7-1 Action Plan Timetable

<u>Action Item</u>	<u>First Year Budget</u>	<u>Future Budgets</u>
7.2.1 Village Board of Trustees:		
a. Adopt flood protection plan	S	n/a
b. Establish the Flood Committee	S	n/a
c. Sign memorandum	S	n/a
7.2.2 Village Administrator:		
a. Implement this Plan	S	S
b. Apply to the CRS	\$1,000	S
7.2.3 Flood Protection Committee:		
a. Advise on flood issues	S	S
b. Monitor plan implementation	S	S
c. Inform residents	\$3,000	\$1,000
d. Watershed management plan	\$2,000	S
7.2.4 Director of Public Works:		
a. Implement small projects	S	S
b. Drainage maintenance program	\$7,800	\$1,000
7.2.5 Village Engineer:		
a. Tinley Creek analysis	\$50,000	n/a
b. 93rd Ave storm sewer analysis	\$5,000	n/a
c. Midlothian Creek strategic plan	\$1,000	S
d. Support planning groups	\$1,000	S
7.2.6 Building Commissioner:		
a. Enforce regulations	S	S
b. Regulations procedures	S	S
c. Information assistance	S	S
d. Financial assistance	S	S
7.2.7 ESDA Coordinator:		
a. Public flood warnings	S	S
b. Public information materials	S	S
c. Review the "Profile"	S	S
7.2.8 Village Plan Commission:		
a. Investigate comprehensive plan	S	n/a
b. Review stormwater ordinance	\$1,000	n/a
"S"	Action item can be implemented by Village staff, committee members, or the Village Engineer under current funding levels.	

Figure 7-2 Action Plan Budget

Appendix H.

The Community Rating System

Appendix H. The Community Rating System

The Community Rating System (CRS) provides a flood insurance premium rate reduction for communities that implement activities above and beyond the minimum requirements of the National Flood Insurance Program. The CRS provides credits for a variety of community flood protection activities.

To receive a 5% or 10% CRS flood insurance premium reduction, a community must apply to the Federal Emergency Management Agency. This involves application worksheets and presentation of appropriate documentation. A CRS Specialist would visit the community and verify that the activities are being implemented as described in the application. The CRS Specialist is kept abreast of any changes in the community's program and conducts periodic visits to verify continued implementation.

There are some nonfinancial benefits to the CRS. First, the community's flood program would receive recognition from a national evaluation program. Second, and perhaps most important, there would be an outside monitor of the community's program.

If future governing boards consider eliminating a flood program, such as drainage system maintenance, or reduce the regulatory requirements for new developments, it could affect the community's CRS status. This may give them second thoughts about reducing the community's flood protection efforts.

A similar system used in fire insurance rating has been proven to have a strong impact on the level of support local governments give their fire protection programs. In other words, the CRS encourages communities to keep their flood programs going during times of drought and lack of interest.

The *CRS Coordinator's Manual* describes the 18 floodplain management activities credited by the Community Rating System and the documentation required to receive credit for each activity. The credits and formulae used to calculate credit are also included. These activities are divided into four categories or series. The activities' credit points can be increased if they are part of a comprehensive floodplain management plan.

Many communities can qualify for "uniform minimum credit" whereby a state or regional agency can apply for a CRS activity that it is implementing on behalf of its communities. For example, all Illinois communities can receive credit under Activity 340 (Flood Hazard Disclosure) for the Recorder's Act requirement that final subdivision plats show floodplains (*Illinois Compiled Statutes, Chapter 55, Section 5/3-5029*).

Public Information (Series 300)

This series credits programs that advise people about the flood hazard, flood insurance, and ways to reduce flood damage. These activities also provide data needed by insurance agents for accurate flood insurance rating.

310 (Elevation Certificates) Maintain FEMA elevation certificates for new construction in the floodplain. Keeping certificates after the date of CRS application is a minimum requirement for any CRS credit.

320 (Map Determinations) Respond to inquiries to determine what FIRM zone a property is in and publicize this service.

330 (Outreach Projects) Send information about the flood hazard, flood insurance, and flood protection measures to floodprone residents or all residents of the community.

340 (Hazard Disclosure) Real estate agents advise potential purchasers of floodprone property about the flood hazard; or regulations require a notice of the flood hazard.

350 (Flood Protection Library) The public library maintains references on flood insurance and flood protection.

360 (Flood Protection Assistance) Give inquiring property owners technical advice on how to protect their buildings from flooding and publicize this service.

Mapping and Regulations (Series 400)

This series credits programs that provide increased protection to new development. These activities include mapping areas not shown on the Flood Insurance Rate Map (FIRM), preserving open space, enforcing higher regulatory standards, and managing stormwater. The credit points for the activities in this series are increased for growing communities.

410 (Additional Flood Data) Develop new flood elevations, floodway delineations, wave heights, or other regulatory flood hazard data for an area that was not mapped in detail by the flood insurance study; or have the flood insurance study's hydrology or allowable floodway surcharge based on a higher state or local standard.

420 (Open Space Preservation) Guarantee that currently vacant floodplain will be kept free from development; additional credit is given for areas still in, or restored to, their natural state.

430 (Higher Regulatory Standards) Require freeboard; require soil tests or engineered foundations; require compensatory storage; zone the floodplain for minimum lot sizes of one acre or larger; or have regulations tailored to protect critical facilities or areas subject to special flood hazards (e.g., ice jams).

440 (Flood Data Maintenance) Keep flood and property data on computer records; use better base maps; or maintain elevation reference marks.

450 (Stormwater Management) Regulate new development throughout the watershed to ensure that post-development runoff is no worse than pre-development runoff.

Flood Damage Reduction (Series 500)

This series credits programs for areas in which existing development is at risk. Credit is provided for addressing repetitive loss problems, relocating or retrofitting floodprone structures, and maintaining drainage systems. There is no CRS credit for new structural measures that modify flooding. This is because greater flood insurance rate reductions are provided through the FIRM revision process.

510 (Repetitive Loss Projects) This is a minimum requirement for all repetitive loss communities (i.e., those with two or more flood insurance claim payments since 1978 on the same property for more than \$1,000 each).

520 (Acquisition and Relocation) Acquire and/or relocate floodprone buildings so that they are out of the floodplain.

530 (Retrofitting) Document floodproofed or elevated pre-FIRM buildings.

540 (Drainage System Maintenance) Conduct periodic inspections of all channels and retention basins and remove debris as needed.

Flood Preparedness (Series 600)

610 (Flood Warning Program) Provide early flood warnings to the public and have a detailed flood response plan keyed to flood crest predictions.

620 (Levee Safety) Maintain levees that are not credited with providing base flood protection.

630 (Dam Safety) All communities in a state with an approved dam safety program receive credit (California's is approved).

Publications on the CRS are available at no cost from:

Flood Publications
NFIP/CRS
P.O. Box 501016
Indianapolis, IN 46250-1016
(317) 848-2898

[This page intentionally blank.]

Appendix I.

References

Appendix I. References

The following references can be ordered from the authoring agency. Unless otherwise noted, the agency's address and telephone number can be found in Appendix A.

Additional publications on special topics can be located through the Floodplain Management Resource Center (*see Appendix A, section A.4.3*).

A Multi-Objective Planning Process for Mitigating Natural Hazards, National Park Service, 1994

Answers to Questions about Substantially Damaged Buildings, Federal Emergency Management Agency, FEMA - 213, 1991

Benefit/Cost Analysis of Hazard Mitigation Projects, computer software, Federal Emergency Management Agency, 1995

Best Build II - Construction in a Riverine Floodplain, 24 minute video, Federal Emergency Management Agency, 1988

Best Build III - Protecting a Flood-Prone Home, 30 minute video, Federal Emergency Management Agency, 1990

Building Department Guide to Disaster Mitigation, International Conference of Building Officials, 1991 (Order from ICBO, 5360 South Workman Mill Road, Whittier CA 90601, 213/699-0541)

CRS Credit for Outreach Projects, National Flood Insurance Program/ Community Rating System, 1994 (Order by calling 317/848-2898)

CRS Credit for Drainage System Maintenance, National Flood Insurance Program/ Community Rating System, 1994 (Order by calling 317/848-2898)

CRS Credit for Flood Warning Programs, National Flood Insurance Program/ Community Rating System, 1994 (Order by calling 317/848-2898)

Design Manual for Retrofitting Flood-prone Residential Structures, Federal Emergency Management Agency, FEMA-114, September 1986.

DuPage County Stream Maintenance Program Report, DuPage County Stormwater Management Committee, 1991 (\$20, Order from the DuPage County Environmental Concerns Department, Stormwater Management Division, 421 North County Farm Road, Wheaton, IL 60187)

Elevating or Relocating a House to Reduce Flood Damage, Local Assistance Series 3C, Division of Water Resources, 1986

Elevating Flood-Prone Buildings: A Contractor's Guide, Local Assistance Series 3D, Division of Water Resources, 1985

Environmental Considerations in Comprehensive Planning, Northeastern Illinois Planning Commission, 1994

Erosion and Sediment Control - Procedures and Practices for Construction Sites, Northeastern Illinois Planning Commission, 1993 (\$10.50, 18 minute video)

Example Plans, National Flood Insurance Program/Community Rating System, 1994 (Order by calling 317/848-2898)

Flood Hazard Mitigation, Division of Water Resources, 1988

Flood Fighting, Division of Water Resources and the Illinois Emergency Services and Disaster Agency, 1985

Flood Proofing: How to Evaluate Your Options, US Army Corps of Engineers, 1993

Flood Proofing Techniques, Programs and References, US Army Corps of Engineers, February 1991.

Flooded Basements: A Homeowner's Guide, Division of Water Resources, 1985

Floodplain Compliance, Floodplain Management Series 2D, Division of Water Resources, 1991

Floodplain Regulations, Division of Water Resources, 1987

How to Conduct a Floodproofing Open House, Illinois Association for Floodplain and Stormwater Management, 1993 (\$7, Order from IAFSM by calling 708/747-5273)

Local Flood Proofing Programs, US Army Corps of Engineers, 1994

Mandatory Purchase of Flood Insurance Guidelines, Federal Emergency Management Agency, FEMA 186, 1989

Model Stormwater Drainage and Detention Ordinance, Northeastern Illinois Planning Commission, 1990

Model Stream and Wetland Protection Ordinance, Northeastern Illinois Planning Commission, 1988

Model Soil Erosion and Sediment Control Ordinance, Northeastern Illinois Planning Commission, 1991

Model Flood Plain Ordinance for Communities Within Northeastern Illinois, Northeastern Illinois Planning Commission and Division of Water Resources, 1989

Northeastern Illinois Regional Greenways Plan, Northeastern Illinois Planning Commission and Openlands Project, 1992

Our Community and Flooding - A Report on the Status of Floodwater Management in the Chicago Metropolitan Area, June 1991, Resource Coordination Policy Committee (Order from the Metropolitan Water Reclamation District of Greater Chicago)

Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments, Federal Emergency Management Agency, DAP-12, 1990

Procedures and Standards for Urban Soil Erosion and Sedimentation Control in Illinois, (the "Green Book"), The Urban Committee of the Association of Illinois Soil and Water Conservation Districts, 1988 (Order from the local soil and water conservation district)

Protect Your Home from Flood Damage, Local Assistance Series 3B, Division of Water Resources, 1985

Repairing Your Flooded Home, Federal Emergency Management Agency and the American Red Cross, 1992 (Order FEMA 234 or ARC 4477)

River Stages in Illinois: Flood and Damage Data, Division of Water Resources, 1994

Stream Preservation Handbook, Division of Water Resources, 1981

Surveying Buildings for Flood Hazard Mitigation, Division of Water Resources, 1988

A Unified National Program for Floodplain Management, Federal Interagency Floodplain Management Task Force, 1994, (Order FEMA 248)

[This page intentionally blank.]