

Reducing Damage from Localized Flooding

A Guide for Communities

FEMA 511 / June 2005





Reducing Damage from Localized Flooding

A Guide for Communities

FEMA 511 / June 2005



Table of Contents

	Acknowledgem	nents	v
	Terminology		vii
Part I. Int	roduction		
	Chapter 1. Back	ground	1-1
		The NFIP's Interest	1-2
		About This Guide	1-3
		How to Use the Guide	1-4
	Chapter 2. Loca	llized Flooding	2-1
		The Problem	2-1
		What Can Be Done	2-5
		Where to Get Help	2-9
Part II. Co	ommunity-Level	Tools and Techniques	
	Chapter 3. Com	nmunity-Level Activities	3-1
		The Strategy	3-1
		A Community Plan	3-2
		Building Capabilities	3-5
		Where to Get Help	3-8
	Chapter 4. Regi	ulatory Tools	4-1
		A Regulatory Floodplain Map	4-1
		Land Use Regulations	4-7
		Standards for Subdivisions	4-10
		Floodplain Regulations	4-14
		Site Drainage	4-17
		Where to Get Help	4-20

Chapte	er 5. Public Information and Awareness	5-1
	Answer Questions	5-1
	Provide Resources for the Public	5-3
	Deliver Flood Information	5-4
	Educate to Build Community Capability	5-6
	Where to Get Help	5-8
Chapte	er 6. Warning and Emergency Services	6-1
	Recognizing the Threat	6-1
	Issuing the Warning	6-3
	Responding to the Threat	6-4
	Informing the Public	6-6
	StormReady Program	6-7
	After the Flood	6-8
	Where to Get Help	6-11
Part III. Neighbor	hood-Level Tools and Techniques	
Chapte	er 7. Area Analysis	7-1
	The "Area"	7-1
	Conducting the Analysis	7-2
	Follow-Up Activities	7-8
	Funding	7-9
	Where to Get Help	7-12
Chapte	er 8. Drainage Improvements	8-1
	The Drainage System	8-1
	Modifying the Drainage System	8-6
	Maintaining the Drainage System	8-13
	Where to Get Help	8-16
Chapte	er 9. Redevelopment	9-1
	Redevelopment Objectives	9-1
	Clearing the Area	9-7
	Reuse of the Area	9-11
	Where to Get Help	9-16

Part IV. Site-Specific Tools and Techniques

	Chapter 10. Retrofitting		10-1
		Introduction	10-1
		Retrofitting Techniques	10-1
		Precautions and Parameters	10-13
		Community Support	10-19
		Where to Get Help	10-21
	Chapter 11. F	lood Insurance	11-1
		NFIP Flood Insurance	11-1
		The Community's Role	11-6
		Where to Get Help	11-10
References	S		R-1
Appendix .	A. Sources of As	sistance	A-1
	Organization	S	A-3
	State and Loc	al Entities	A-4
Appendix	B. Reference Wo	orks and Recommended Reading	B-1
	Community-	Level Approaches	B-1
	Regulatory To	ools	B-2
	Public Inform	nation and Awareness	В-3
	Warnings and	l Emergency Services	B-3
	Area Analysis		B-4
	Drainage Imp	provements	B-4
	Redevelopme	nt	B-4
	Retrofitting		B-5

Index

Acknowledgements

This guide was produced with the assistance and expert advice of numerous specialists throughout the United States. Thanks are extended to the technical reviewers, and to the local, State, and Federal officials who provided valuable input through interviews with project staff.

Mike Buchert, City of Tulsa, Oklahoma, Public Works

Dave Canaan, Director of Charlotte/Mecklenburg County, North Carolina, Stormwater Services

Dr. Mow-Soung Cheng, Department of Environmental Resources, Prince George's County, Maryland

Jack DeCicco, State Farm Insurance Company

Ted DeBaene, Owen and White, Inc., Baton Rouge, Louisiana

Trudi Johnson, CRS Coordinator, Hilton Head Island, South Carolina

Ward Miller, Lake County, Illinois, Stormwater Management Commission

Doug Plasencia, AMEC Earth & Environmental, Inc., Phoenix, Arizona

Andy Reese, AMEC Earth & Environmental, Inc., Nashville, Tennessee

Joe Tram, Maricopa County Flood Control District, Arizona

Kevin Stewart, Urban Drainage and Flood Control District, Denver, Colorado

Tom Donaldson, National Weather Service, Silver Spring, Maryland

Daisy Sweeny, Regional Repetitive Loss Coordinator, FEMA Region I

Pat Griggs, Regional Repetitive Loss Coordinator, FEMA Region II

Dave Thomas, Regional Repetitive Loss Coordinator, FEMA Region III

Bob Durrin, Regional Repetitive Loss Coordinator, FEMA Region IV

Anna Pudlo, Regional Repetitive Loss Coordinator, FEMA Region V

Greg Solovey, Regional Repetitive Loss Coordinator, FEMA Region VI

Georgia Wright, Regional Repetitive Loss Coordinator, FEMA Region VII

Bonnie Heddin, Regional Repetitive Loss Coordinator, FEMA Region VIII

Gregor Blackburn, Regional Repetitive Loss Coordinator, FEMA Region IX

Denise Atkinson, Regional Repetitive Loss Coordinator, FEMA Region X

Dave Carlton, Civil Engineer, FEMA Region X

Clifford E. Oliver, Branch Chief, Risk Assessment, FEMA HQ

Michael Grimm, Community Assistance Section Chief, Risk Assessment, FEMA HQ

Cynthia Pollnow, Project Manager, Risk Assessment, FEMA HQ

Errol Garren, Project Monitor, Risk Assessment, FEMA HQ

Mike Robinson, Risk Assessment, FEMA HQ

Bill Lesser, Risk Assessment, FEMA HQ

Don Beaton, Risk Insurance, FEMA HQ

Mary Chang, Risk Insurance, FEMA HQ

Sheila Donohoe, Risk Reduction, FEMA HQ

Kathleen Wissman, Risk Reduction, FEMA HQ

This guide was prepared by URS Corporation, French & Associates, Ltd., and JLM Associates, Inc. under Task Order 269 of the FEMA Hazard Mitigation Technical Assistance Program.

Terminology

Throughout this guide, the following terms are used.

A Zone is defined as the Special Flood Hazard Area shown on a community's Flood Insurance Rate Map. The A Zone is the area subject to inundation during a 100-year flood, which is the flood elevation that has a 1-percent chance of being equaled or exceeded each year. There are several categories of A Zones, including AO (shallow sheet flow or ponding; average flood depths are shown); AH Zones (shallow flooding; base flood elevations are shown); numbered A and AE Zones (base flood elevations are shown); and unnumbered A Zones (no base flood elevations are provided because detailed hydraulic analyses were not performed).

B Zone is defined as an area of moderate flood hazard, usually depicted on Flood Insurance Rate Maps as between the limits of the base flood and 500-year flood of the primary source of flooding. B Zones may have local, shallow flooding problems. B Zones are also used to designate areas protected by levees and base floodplains of little hazard, such as those with average flood depths of less than 1 foot.

BFE is the base flood elevation. The base flood is the flood having a 1-percent chance of being equaled or exceeded in any given year. (It is also known as the 100-year flood.) The BFE has been adopted by the National Flood Insurance Program as the basis for mapping, insurance rating, and regulating new construction.

C Zone is defined as an area of minimal flood hazard, usually depicted on the Flood Insurance Rate Map as above the 500-year flood level of the primary source of flooding. C Zones tend to have local, shallow flooding problems. B and C Zones may have flooding that does not meet the criteria to be mapped as a Special Flood Hazard Area, especially ponding, localized drainage problems, and streams that drain smaller watersheds.

CRS is the abbreviation for Community Rating System, a voluntary program for National Flood Insurance Program-participating communities. The goals of the CRS are to reduce flood losses, facilitate accurate insurance rating, and promote the awareness of flood insurance. The CRS was developed to provide incentives for communities to go beyond the minimum floodplain management requirements to

develop extra measures to protect them from flooding. The incentives are in the form of premium discounts.

Community means any city, village, town, county, or other local government with authority to enact floodplain management measures.

DFE is the acronym for design flood elevation, the specified level to which a structure will be protected from floods when it is built or retrofitted.

FEMA is the Federal Emergency Management Agency, the Emergency Preparedness and Response Directorate within the U.S. Department of Homeland Security.

FIRM is the acronym for the Flood Insurance Rate Map, an official map approved by the Federal Emergency Management Agency and adopted by the community that delineates the Special Flood Hazard Area subject to the community's floodplain management regulations and the insurance risk premium zones.

Floodplain is used in a general sense to mean the area most prone to flooding, mapped or not. The floodplain for a localized flood problem may not be mapped as Special Flood Hazard Area on the Flood Insurance Rate Map.

Floodway means the stream channel and that portion of the adjacent floodplain that must remain open to permit passage of the base flood. The floodway is delineated on the Flood Insurance Rate Map or an accompanying Floodway Map and is subject to special development restrictions.

Localized flooding refers to smaller scale flooding that can occur anywhere in a community. This can include flooding in B, C, and X Zones as depicted on the Flood Insurance Rate Map. The term is also used to refer to shallow flooding that occurs in low-lying areas after a heavy rain, flooding in small watersheds, ponding, and localized stormwater and drainage problems anywhere in the community. In this guide, "local flooding" and "localized flooding" are used interchangeably.

NFIP is the National Flood Insurance Program.

Repetitive loss refers to an NFIP-insured property where two or more claim payments of more than \$1,000 have been paid within a 10-year period since 1978. About 20 to 25 percent of repetitive loss properties are rated as being in B, C, or X Zones.

SFHA is the Special Flood Hazard Area, or the A and V Zones as depicted on the Flood Insurance Rate Map. B, C, and X Zones are outside of the SFHA.

Watershed means an area of any size that drains into a lake, stream, or other body of water; also known as "basin" or "catchment area."

X Zone relates to newer Flood Insurance Rate Maps, which show B and C Zones (see above) as X Zone. The shaded X Zone corresponds to a B Zone and the unshaded X Zone corresponds to a C Zone.

RETURN TO TABLE OF CONTENTS ADVANCE