

# City of Milwaukee All Hazard Mitigation Plan Update: Local Planning Team Meeting May 9, 2019



Joseph E. Boxhorn, Ph.D., Principal Planner

Jeffrey Cross, Engineering Assistant

Southeastern Wisconsin Regional Planning Commission

 **SEWRPC**

Serving the counties of  
Kenosha, Milwaukee,  
Ozaukee, Racine, Walworth,  
Washington, and Waukesha

# 2448185

# Chapter V

## Hazard Mitigation Strategies



# Chapter V Overview

- Presents alternative and recommended mitigation strategies for the hazards profiled in Chapter III
- Presents a comparison of relative risks associated with each hazard based on normalized impacts for use in prioritization
- Estimates costs and benefits of recommended measures

# Mitigation Strategy Sections

- Most sections follow a similar format
  - Identification of alternative mitigation strategies
  - Review of current programs
    - Federal and State
    - Local
  - Evaluation of alternatives
  - Recommended priority mitigation measures

Table V-1

COMPONENTS AND COSTS OF FLOODPLAIN MANAGEMENT PLAN FOR THE KINNICKINNIC RIVER WATERSHED

Stream	Plan Components	Estimated Capital Cost <sup>a</sup>
Kinnickinnic River	1. Channel and Floodplain Improvements	
	a. Stabilize and enhance 500 feet of channel upstream of S. 43rd Street	\$ 1,158,000
	b. Relocate and reconstruct 2,800 feet of channel through Jackson Park with relocated drop structure	\$ 6,482,000
	c. Remove 4,350 feet of concrete lining and expand overbank storage between Jackson Park and S. 27th Street	\$ 7,168,000
	d. Remove 10,900 feet of concrete lining, naturalize channel, and expand overbank storage from S. 27th Street to S. 6th Street	\$ 71,567,000
	2. Bridge and Culvert Improvements	
	a. S. 43rd Street – Increase capacity to 58-foot bridge span or equivalent flow area (from existing 22-foot bridge span)	\$ 1,477,000
	b. Remove 700 feet of culvert that enclose waterway in Jackson Park	\$ 384,000
	c. Kinnickinnic River Parkway bridge by S. 29th Street – increase capacity with expanded channel capacity and raised bridge deck	\$ 3,3038,000
	d. Remove abandoned railroad abutments by S. 16th Street	\$ 45,000
	e. W. Cleveland Avenue – Increase channel capacity below existing bridge deck to provide an additional 230 square feet of hydraulic opening area	\$ 752,000
	f. Pulaski Park pedestrian bridge – Increase span from existing 56 feet to 130 feet	\$ 984,000
	g. S. 16th Street – Increase bridge span from existing 62 feet to 135 feet for a 90 percent increase in hydraulic opening or equivalent capacity	\$ 4,256,000
	h. S. 15th Street pedestrian bridge – Increase span from existing 62 feet to 140 feet to accommodate the wider channel	\$ 693,000
i. S. 13th Street – Increase span from existing 62 feet to 122 feet for an 140 percent increase in hydraulic opening or equivalent capacity	\$ 3,657,000	
j. S. 11th Street pedestrian bridge– Increase span from existing 62 feet to 115 feet to accommodate the wider channel	\$ 723,000	

Table V-6a

**STORMWATER MANAGEMENT PROJECTS COMPLETED IN THE CITY OF  
MILWAUKEE SINCE THE ADOPTION OF THE INITIAL ALL HAZARD MITIGATION PLAN IN 2005**

Year Completed	Project	Location	Project Description
2003-2007	Menomonee Valley Industrial Center and Community Park	Menomonee Valley	Development at this site created 60 acres of developable land and 40 acres of greenspace. The greenspace includes the stormwater treatment train which accepts water from the adjacent businesses for treatment before it flows into the Menomonee River.
2005	MSOE Pervious Pavement Parking Lot	N. Milwaukee Street between E. State Street and E. Juneau Avenue	Permeable pavement project
2005	Walnut Way	2240 N. 17th Street	Green roof, bioretention, and cistern project
2006	Canal Street Extension	Canal Street from S. 26th Street to Selig Drive	The project extended Canal Street from S. 26th Street west to Selig Drive. The extension includes a stormwater bio-retention pond at S. 26th Street and a stormwater treatment train at S. 35th Street. Both of these features manage stormwater from W. Canal Street.
2006	Josey Heights and Walnut Way Green Pavement-Phase 1	2024 N. 13th Street	Permeable pavement project
2006	Urban Ecology Center Riverside Parking Lot Project	1500 E. Park Place	Permeable pavement and bio-infiltration project
2007	Broadway Building Green Roof	809 N. Broadway	Green roof project
2007	Brown Street Academy Stormwater Park	N. 20th Street and W. Brown Street	Rain garden project
2007	Lincoln Center for the Arts Stormwater Learning Lab	820 E. Knapp Street	Permeable pavement and native landscaping project
2007	Milwaukee School of Engineering Grohmann Museum	1000 N. Broadway	Green roof project
2008	Bradford Beach End of Pipe Smart Sponge	2272 N. Lincoln Memorial Drive	Bioswale project
2008	Sandburg Hall Green Roof	University of Wisconsin-Milwaukee	Green roof project
2008	N. 27th Street Green Street Project	N. 27th Street from W. Capitol Drive to W. Roosevelt Avenue	Bio-infiltration project
2009	Fix Development LLC	255 W. Bruce Street	Green roof project
2009	Growing Power Rainwater Harvesting System	5500 W. Silver Spring Drive	Cistern project
2009	Miller Brewery Green Roof Project	4251 W. State Street	Green roof project

Table V-7

**PRIORITY RANKING OF NATURAL AND OTHER HAZARDS AFFECTING THE CITY OF MILWAUKEE BASED UPON MORTALITY AND INJURY**

Order Based on Steering Committee Perception <sup>a</sup>	Natural and Other Hazards	Period of Record	Number of Incidents per Year (average)	Average Number of Mortalities per Year	Average Number of Injuries per Year	Sum of Average Mortalities and Injuries per Year	Priority Ranking Based on Analysis
8	Medical/health risks (infectious diseases and parasites)	2005-2014	--	202.30	--	202.30	1
4	Temperature extremes	1994-2016	3.61	5.43	10.70	16.13	2
5	Major fire and Emergency incidents	2000-2015	997 (fires) 55,207	8.90 (fires) --	-- --	8.90 --	3
3	Hazardous materials incidents	1971-2016	38.04 <sup>c</sup>	0.06 <sup>b</sup>	3.20 <sup>b</sup>	3.26 <sup>b</sup>	4
9	Tornadoes	1958-2016	0.24	0.00	2.98	2.98	5
2	Winter storms	1987-2016	5.00	0.97	0.30	1.27	6
7	Thunderstorms, high wind, hail, and lightning	1993-2016	12.00	0.13	0.36	0.49	7
1	Flooding	1996-2016	1.95	0.05	0.05	0.10	8
10	Coastal erosion	1975-1995	Less than one foot per year	0.00	0.00	0.00	9
11	Contamination or loss of water supply	1993-2016	<0.10	-- <sup>c</sup>	-- <sup>c</sup>	-- <sup>c</sup>	--
9	Terrorism incident	2000-2016	<0.10	--	--	--	--

<sup>a</sup>These numbers reflect the ranked order of the hazards assigned by the City of Milwaukee Hazard Mitigation Local Planning Team. For more details see Hazard Identification section and Table III-3 in Chapter III in this report.

<sup>b</sup>Refers to gas and liquid hazardous materials pipeline and transportation incidents within the City of Milwaukee 1971 to 2016.

<sup>c</sup>Information on mortalities and injuries is based on one event in 1993 related to a parasitic contamination of the water supply. According to the Wisconsin Division of Health, the estimated number of mortalities was about 69, and approximately 4,400 people were hospitalized. As the water treatment facilities have been upgraded to avoid such contamination, the number of mortalities and injuries are not being considered in the current ranking.

Source: National Climatic Data Center; U.S. Department of Transportation, Office of Pipeline Safety; National Consortium for the Study of Terrorism; Wisconsin Department of Health Services; Milwaukee Fire Department; Milwaukee Police Department; City of Milwaukee Hazard Mitigation Local Planning Team;

Table V-8

**PRIORITY RANKING OF NATURAL AND OTHER HAZARDS AFFECTING THE CITY OF MILWAUKEE BASED UPON PROPERTY DAMAGE**

Order Based on Steering Committee Perception <sup>a</sup>	Natural and Other Hazards	Period of Record	Number of Incidents per Year (average)	Total Property Damage per Year (average) <sup>b</sup>	Priority Ranking Based on Analysis
5	Major fire and emergency incidents	2000-2015	997 (fires) 55,207	\$21,862,500 (fires) --	1
1	Flooding	1996-2016	1.95	\$13,835,935	2
7	Thunderstorms, high wind, hail, and lightning	1993-2016	12.00	\$ 2,370,723	3
3	Hazardous materials incidents	1971-2016	38.04 <sup>c</sup>	\$ 473,400	4
9	Tornadoes	1958-2016	0.24	\$ 310,853	5
2	Winter storms	1987-2016	5.00	\$ 40,835	6
4	Temperature extremes	1994-2016	3.61	\$ 1,007	7
10	Coastal erosion	1975-1995	Less than one foot per year	-- <sup>d</sup>	--
6	Terrorism incident	2000-2016	<0.10	-- <sup>d</sup>	--
11	Contamination or loss of water supply	1993-2016	<0.10	--	--
8	Medical/health risks	2005-2014	--	--	--

<sup>a</sup>These numbers reflect the ranked order of the hazards assigned by the City of Milwaukee Hazard Mitigation Local Planning Team. For more details see Hazard Identification section and Table III-3 in Chapter III in this report.

<sup>b</sup>Dollar values are adjusted to year 2016 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.

<sup>c</sup>Refers to gas and liquid hazardous materials pipeline and transportation incidents within the City of Milwaukee 1971 to 2009.

<sup>d</sup>Data are not known.

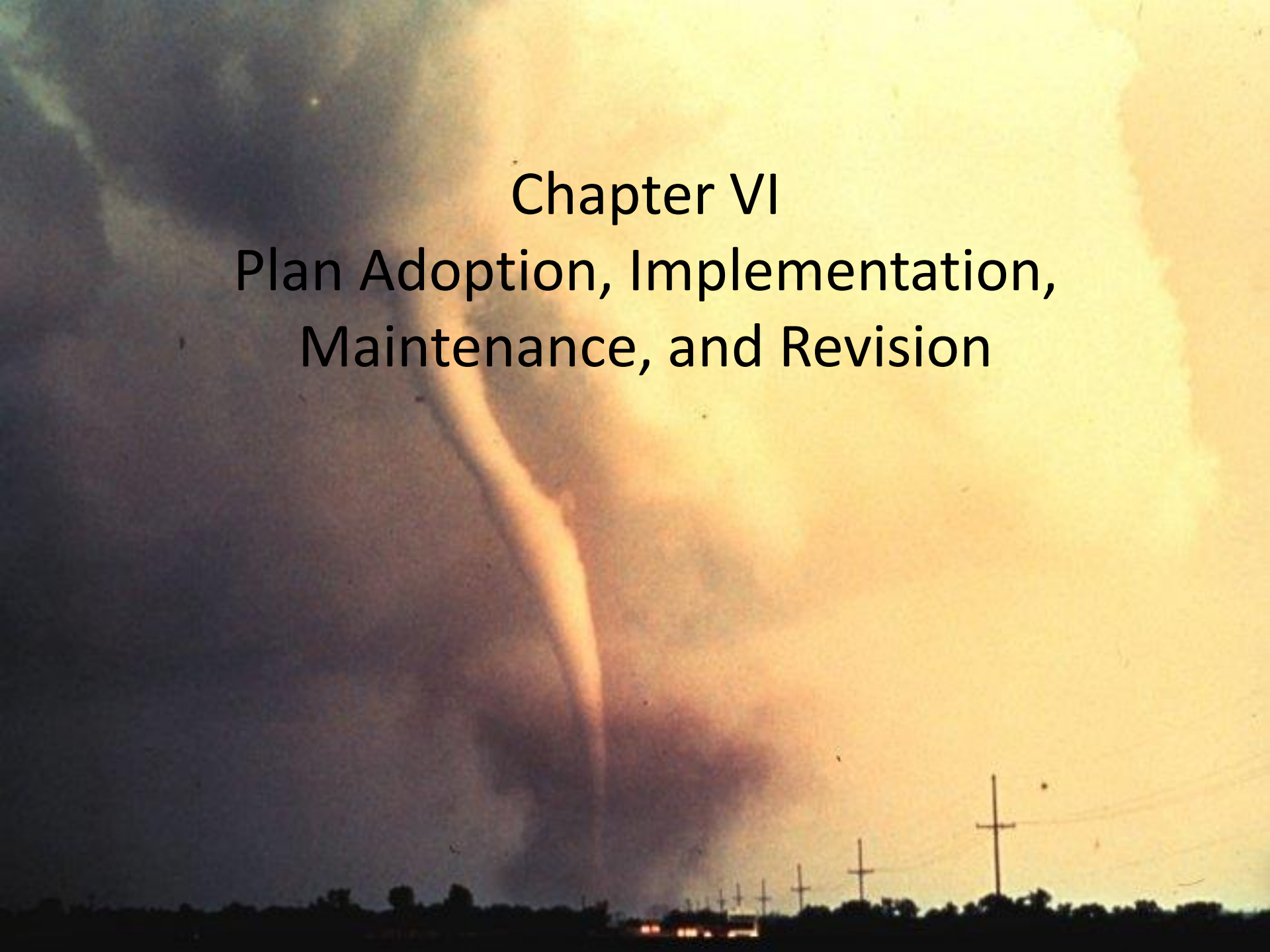
Source: National Climatic Data Center; U.S. Department of Transportation, Office of Pipeline Safety; National Consortium for the Study of Terrorism; Wisconsin Department of Health Services; Milwaukee Fire Department; Milwaukee Police Department; City of Milwaukee Hazard Mitigation Local Planning Team; and SEWRPC.



Table V-9

COST BENEFIT ANALYSIS SUMMARY OF MEASURES INCLUDED IN THE CITY OF MILWAUKEE ALL-HAZARDS MITIGATION PLAN

Hazard	Mitigation Measures	Cost of Implementation <sup>a,b</sup>			Benefits						
		Estimated Costs in Dollars (thousands)	Low	Medium	High	Estimated Benefits for a 1 Percent Annual Probability Flood Event <sup>c</sup> (thousands)	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Indirect Benefits <sup>d</sup>
Flooding and Related Stormwater Drainage Problems	Floodplain and Environmentally Sensitive Land Preservation Element										
	Floodplain zoning <sup>e</sup>	-- <sup>f</sup>	X	--	--	--	X	X	X	X	5
	Environmentally sensitive area and open space area preservation	-- <sup>f</sup>	X	--	--	--	X	X	--	--	4
	Floodplain Management Plan Element										
	Kinnickinnic River Watershed <sup>g</sup>										
	Kinnickinnic River	\$161,047 <sup>h</sup>	--	--	X	\$ 1,376 <sup>i</sup>	X	X	--	--	3,4
	Lyons Park Creek	14,825 <sup>h</sup>	--	--	X	198 <sup>i</sup>	X	X	--	--	3,4
	Villa Mann Creek	5,574 <sup>h</sup>	--	--	X	9 <sup>i</sup>	X	X	--	--	3,4
	Wilson Park Creek	93,723 <sup>h</sup>	--	--	X	325 <sup>i</sup>	X	X	--	--	3,4
	43rd Street Ditch	7,948 <sup>h</sup>	--	--	X	26 <sup>i</sup>	X	X	--	--	3,4
	Total	\$283,117 <sup>h</sup>	--	--	X	\$ 2,164 <sup>i</sup>	X	X	--	--	
	Menomonee River Watershed <sup>j</sup>										
	Menomonee River	\$42,490 <sup>k</sup>	--	--	X	\$ 19,126 <sup>k</sup>	X	X	X	X	3,4,5
	Grantosa Creek	-- <sup>l</sup>	--	--	--	-- <sup>l</sup>	X	X	--	--	3
	Little Menomonee River	-- <sup>l</sup>	--	--	--	-- <sup>l</sup>	X	X	X	X	--
	Total	\$42,490	--	--	X	\$ 19,126 <sup>m</sup>	--	--	--	--	
	Milwaukee River Watershed <sup>n</sup>										
	Milwaukee River	\$ 60	--	X	--	\$ 60	--	X	--	--	2,3
	Lincoln Creek	-- <sup>l</sup>	--	--	--	-- <sup>l</sup>	X	X	--	--	3,4
	Southbranch Creek	-- <sup>l</sup>	--	--	--	-- <sup>l</sup>	X	X	--	--	3
Oak Creek Watershed <sup>o</sup>											
North Branch of Oak Creek subtotal	\$ 2,339 <sup>p</sup>	--	--	X	\$ 597 <sup>p</sup>	X	X	--	--	3	



Chapter VI  
Plan Adoption, Implementation,  
Maintenance, and Revision

# Chapter VI Overview

- Plan refinement, review, and adoption
- Plan implementation strategies
- Funding sources
- Plan monitoring and reevaluation strategies
  - Annual review
  - Post-disaster review

Table VI-1

## CITY OF MILWAUKEE ALL-HAZARDS MITIGATION PLAN SUMMARY AND IMPLEMENTATION PLAN

Hazard	Mitigation Measures	Cost of Implementation <sup>a</sup> (thousands)	Estimated Benefits for a 1 Percent Annual Probability Flood Event <sup>b</sup> (thousands)	Managing Agency	Plan Implementation Schedule	Implementation Status Notes	Potential Funding Programs (see Appendix F)
Flooding and Related Stormwater Drainage Problems	Floodplain and Environmentally Sensitive Land Preservation Element						
	Floodplain zoning	--c	--	CMDCD	In place and ongoing	--d	1, 2, 5, 17, 45, 49, 51, 58
	Environmentally sensitive area and open space area preservation	--c	--	CMDCD, MC, CO, MMSD with involvement of WDNR	In place and ongoing	--e	1, 2, 5, 21, 23, 24, 27, 39, 42, 43, 46, 47, 48, 49, 51, 59, 60, 61
	Floodplain Management Plan Element <sup>f</sup> Kinnickinnic River Watershed						
	Kinnickinnic River	\$161,047	\$ 1,376 <sup>g</sup>	CMDPW, MMSD	Ongoing	Partially implemented	1, 2, 3, 5, 15, 16, 23, 25, 29, 33, 42, 47, 48
	Lyons Park Creek	14,825	198 <sup>g</sup>	CMDPW, MMSD	Ongoing	Partially implemented	
	Villa Mann Creek	5,574	9 <sup>g</sup>	CMDPW, MMSD	Ongoing	Partially implemented	
	Wilson Park Creek	93,723	325 <sup>g</sup>	CMDPW, MMSD, CMDCD	Ongoing	Partially implemented	
	43rd Street Ditch	7,948	26 <sup>g</sup>		Ongoing	Partially Implemented	
	Total	\$283,117	\$ 2,164	--	--	--	
	Menomonee River Watershed						
	Menomonee River	\$42,490	\$ 19,126	CMDPW, MC, MMSD, LU	Ongoing	Partially implemented	1, 2, 3, 5, 23, 29, 42, 51
	Grantosa Creek	--h	--h	CMDPW, MC, MMSD	2000	Implemented	
	Little Menomonee River	--h	--h	CMDPW, MC, MMSD	2006	Implemented	
	Total	\$42,490	\$ 19,126	--	--	--	
Milwaukee River Watershed							
Milwaukee River	\$ 60	\$ 60	MMSD, CMDPW, CMDCD	Ongoing	Partially implemented	1, 2, 16, 42	
Lincoln Creek	--h	--h	CMDPW, MC, MMSD	2002	Implemented		
Southbranch Creek	--h	--h	CMDPW, MC, MMSD, LU	2001	Implemented		
Total	\$ 60	\$ 60	--	--	--	--	

PRELIMINARY DRAFT

Table VI-2

**ELIGIBLE ACTIVITIES UNDER FEDERAL HAZARD MITIGATION GRANT PROGRAMS**

Eligible Activity	Hazard Mitigation Grant Program	Flood Mitigation Assistance Program	Pre-Disaster Mitigation Programs
Mitigation Projects	Y	Y	Y
Property Acquisition and Structure Demolition	Y	Y	Y
Property Acquisition and Structure Relocation	Y	Y	Y
Structure Elevation	Y	Y	Y
Mitigation Reconstruction	Y	Y	Y
Dry Floodproofing of Historic Residential Structures	Y	Y	Y
Dry Floodproofing of Non-residential Structures	Y	Y	Y
Generators	Y	--	Y
Localized Flood Risk Reduction Projects	Y	Y	Y
Non-localized Flood Risk Reduction Projects	Y	--	Y
Structural Retrofitting of Existing Buildings and Facilities	Y	Y	Y
Non-structural Retrofitting of Existing Buildings and Facilities	Y	Y	Y
Safe Room Construction	Y	--	Y
Wind Retrofit for One- and Two Family Residences	Y	--	Y
Infrastructure Retrofit	Y	Y	Y
Soil Stabilization	Y	Y	Y
Wildfire Mitigation	Y	--	Y
Post-Disaster Code Enforcement	Y	--	--
Advance Assistance	Y	--	--
5 Percent Initiative Projects	Y	--	--
Miscellaneous/Other <sup>a</sup>	Y	Y	Y
Hazard Mitigation Planning	Y	Y	Y
Planning Related Activities	Y	--	--
Technical Assistance	--	Y	--
Management Cost	Y	Y	Y

<sup>a</sup>Miscellaneous/Other indicates that any proposed action will be evaluated on its own merit against program requirements. Eligible projects may be approved provided funding is available.

Source: Federal Emergency Management Agency.

Table F-1

FUNDING PROGRAM DESCRIPTIONS

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
1	U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA)	Hazard Mitigation Grant Program	State agencies and participating National Flood Insurance Program (NFIP) communities; federally-recognized tribes, tribal agencies, private nonprofits, and local government/communities	<ol style="list-style-type: none"> <li>1. Floodproofing</li> <li>2. Relocation of structures</li> <li>3. Elevation of structures</li> <li>4. Property acquisition</li> <li>5. Conformity with approved state and local mitigation plan</li> </ol>	75 percent Federal cost-share assistance; 12.5 percent State match and 12.5 percent local match required <sup>a</sup>	Following a Presidential disaster declaration; letter of intent must be submitted within 30 days of declaration
2	FEMA	Flood Mitigation Assistance Grant Program	State agencies and participating NFIP communities; federally-recognized tribes, tribal agencies, local governments/communities	<ol style="list-style-type: none"> <li>1. Elevation, relocation, or demolition of insured structures</li> <li>2. Acquisition</li> <li>3. Dry floodproofing</li> <li>4. Minor structural projects</li> <li>5. Beach nourishment activities</li> <li>6. Projects must be consistent with the goals and objectives identified in the State, tribal, or local mitigation plans</li> </ol>	\$160 million available nationally; <sup>b</sup> 75 percent Federal cost-share assistance; 25 percent local match required; two types of grants: Planning grant and project grant <sup>c</sup>	November 14
3	FEMA	Public Assistance Grant Program	State, tribal, territorial, and local governments; certain types of private nonprofit organizations	<ol style="list-style-type: none"> <li>1. Rebuilding infrastructure damaged during a flood</li> <li>2. Building infrastructure for portions of a community that are to be relocated outside of floodplains</li> <li>3. Limited assistance with structural elevation and relocation</li> </ol>	75 percent Federal cost-share assistance; the State determines the local match	Within 30 days of a Presidential disaster declaration
4	FEMA	National Training and Education Division	State and local first responders; private sector and tribal entities	<ol style="list-style-type: none"> <li>1. Provides preparedness training and exercise support to first responders in the event of a manmade or natural catastrophic event</li> <li>2. Provides educational services in 18 professional disciplines</li> </ol>	Provides over 150 training courses for first responders	Varies

PRELIMINARY DRAFT

## Appendix G

# FUNDING PROGRAMS CONTACT INFORMATION<sup>a</sup>

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA)	Hazard Mitigation Grant Program Pre-Disaster Mitigation Program Flood Mitigation Assistance Program	Federal Emergency Management Agency Region V 536 S. Clark Street, 6th Floor Chicago, IL 60605	(312) 408-5500	<a href="https://www.fema.gov/hazard-mitigation-assistance">https://www.fema.gov/hazard-mitigation-assistance</a>
FEMA	Public Assistance Program	U.S. Department of Homeland Security Federal Emergency Management Agency Public Assistance Division 500 C Street, SW Washington, DC 20472	(202) 646-3834	<a href="https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit">https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit</a>
FEMA	National Training and Education Division	U.S. Department of Homeland Security Federal Emergency Management Agency National Training and Education Division 400 C Street SW, 7th Floor South Washington, DC 20472-3600	(800) 234-1116	<a href="https://www.firstrespondertraining.gov/frt/content.do">https://www.firstrespondertraining.gov/frt/content.do</a>
FEMA	Homeland Security Preparedness Technical Assistance Program	U.S. Department of Homeland Security Federal Emergency Management Agency Office of Preparedness Integration 500 C Street, 7th Floor Washington, DC 20472-3100	(202) 786-0849	<a href="http://www.fema.gov">http://www.fema.gov</a>
FEMA	Assistance to Firefighters Grants Program Staffing for Adequate Fire and Emergency Response Grants Fire Prevention and Safety Grants Fire Management Assistance Grants	U.S. Department of Homeland Security Federal Emergency Management Agency Grant Programs Directorate, Assistance to Firefighters Grant Program 400 C Street S.W., 3N Washington, DC 20472-3635	(866) 274-0960	<a href="https://www.fema.gov/welcome-assistance-firefighters-grant-program">https://www.fema.gov/welcome-assistance-firefighters-grant-program</a>

PRELIMINARY DRAFT

# Public Meeting on Hazard Mitigation Plan

- May 23, 2019
  - 4:00 pm
  - City of Milwaukee Department of Public Works Field Headquarters – 3850 N. 35th Street
- Review the plan update
- Seek public input
  - Answer questions
  - Mitigation measures and projects
  - Comments on draft plan



# Remaining Effort on Plan Update

- Public Meeting
- Review by the Wisconsin Division of Emergency Management
  - Any necessary revisions
- Review by the Federal Emergency Management Agency
  - Any necessary revisions
- Formal adoption by the Common Council

# Project Web Site

- <http://www.sewrpc.org/HMP>
  - Agendas and other meeting materials
  - Summary notes from meetings
  - Presentations
  - Draft chapters
  - Comment screen
  - Other ways to send a comment
- Email to [jboxhorn@sewrpc.org](mailto:jboxhorn@sewrpc.org)