Resilience Report

Lower Wisconsin Watershed, 07070005

For Columbia, Crawford, Dane, Grant, Iowa, Richland and Sauk Counties, including the communities of Arena, Arlington, Avoca, Barneveld, Black Earth, Blue Mounds, Blue River, Boaz, Boscobel, Cambria, Cross Plains, Dane, Dodgeville, Fennimore, Friesland, Highland, Lime Ridge, Lodi, Lone Rock, Madison, Mazomanie, Merrimac, Middleton, Montfort, Mount Horeb, Muscoda, Pardeeville, Plain, Poynette, Prairie du Chien, Prairie du Sac, Richland Center, Ridgeway, Rio, Sauk City, Spring Green, Wauzeka, Woodman, Wyocena and Yuba in Wisconsin.

March 2014

FEMA

RiskMAP
Increasing Resilience Together

Preface

The Department of Homeland Security (DHS), Federal Emergency Management Agency's (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program provides states, tribes, and local communities with flood risk information and tools that they can use to increase their resilience to flooding and better protect their citizens. By pairing accurate floodplain maps with risk assessment tools and planning and outreach support, Risk MAP has transformed traditional flood mapping efforts into an integrated process of identifying, assessing, communicating, planning for, and mitigating flood-related risks.

This Resilience Report provides information to help local or tribal officials, floodplain managers, planners, emergency managers, and others better understand their risk, take steps to mitigate those risks, and communicate those risks to their citizens and local businesses.

This Resilience Report is intended to provide the community a reference for management and mitigation of flood and other risks.

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1. Introduction

1.1 Risk MAP Introduction

Risk Mapping, Assessment, and Planning (Risk MAP) is a Federal Emergency Management Agency (FEMA) program that provides communities with flood information and tools they can use to enhance their mitigation plans and better protect their citizens. Through more accurate flood maps, risk assessment tools, and outreach support, such as Resilience, Risk MAP builds on Map Modernization and strengthens local ability to make informed decisions about reducing risk.

Through collaboration with State, Local, and Tribal entities, Risk Map will deliver quality data that increases public awareness and leads to action that reduces risk to life and property. The intention of FEMA is to collaborate with Federal, State, and local stakeholders to achieve the following goals:

- Address gaps in flood hazard data to form a solid foundation for risk assessment, floodplain management.
- Ensure that a measurable increase of the public's awareness and understanding of risk results in a measurable reduction of current and future vulnerability.
- Lead and support States, local, and Tribal communities to effectively engage in risk-based mitigation planning resulting in sustainable actions that reduce or eliminate risks to life and property from natural hazards.
- Provide an enhanced digital platform that improves management of Risk MAP, stewards information produced by Risk MAP, and improves communication and sharing of risk data and related products to all levels of government and the public.
- Align Risk Analysis programs and develop synergies to enhance decision-making capabilities through effective risk communication and management.

1.2 About Flood Risk

Floods are naturally occurring phenomena that can and do happen almost anywhere. In its most basic form, a flood is an accumulation of water over normally dry areas. Floods become hazardous to people and property when they inundate an area where development has occurred, causing losses. Mild flood losses may have little impact on people or property, such as damage to landscaping or the generation of unwanted debris. Severe flooding can destroy buildings, ruin crops, and cause critical injuries or death.

Which picture below shows more flood risk?

Even if you assume that the flood in both pictures was the same probability—let's say a 10-percent-annual-chance flood—the consequences in terms of property damage and potential injury as a result of the flood in the bottom picture are much more severe. Therefore, the flood risk in the area shown in the bottom picture is higher.

Whether or not an area might flood is one consideration. The extent to which it might flood adds a necessary dimension to that understanding.

Calculating Flood Risk

It is not enough to simply identify where flooding may occur. Just because one knows where a flood occurs does not mean they know the **risk** of flooding. The most common method for determining flood risk, also referred to as vulnerability, is to identify the probability of flooding and the consequences of flooding. In other words:

> **Flood Risk** (or Vulnerability) **= Probability x Consequences**; where
> **Probability** = the likelihood of occurrence
> **Consequences** = the estimated impacts associated with the occurrence

The probability of a flood is the likelihood that a flood will occur. The probability of flooding can change based on physical, environmental, and/or engineering factors. Factors affecting the probability that a flood will impact an area range from changing weather patterns to the existence of mitigation projects. The ability to assess the probability of a flood and the level of accuracy for that assessment are also influenced by modeling methodology advancements, better knowledge, and longer periods of record for the water body in question.

The consequences of a flood are the estimated impacts associated with the flood occurrence. Consequences relate to humans activities within an area and how a flood impacts the natural and built environments.

1.3 Uses of this Report

The goal of this report is to help inform and enable communities and tribes to take action to reduce flood risk. Possible users of this report include:

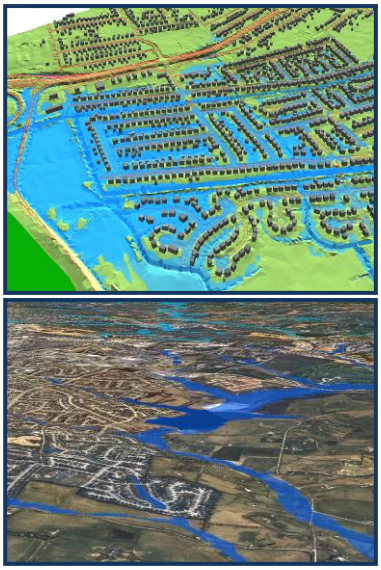
- Local elected officials
- Floodplain managers
- Community planners
- Emergency managers
- Public works officials
- Other special interests (e.g., watershed conservation groups, environmental awareness organizations, etc.)

State, local, and tribal officials can use the summary information provided in this report to:

- **Update local hazard mitigation plans.** As required by the 2000 Federal Stafford Act, local hazard mitigation plans must be updated at least every five years. Summary information presented in Section 8 of this report can be used to identify areas that may need additional focus when updating the risk assessment section of a local hazard mitigation plan. Information found in Section 5 pertains to the different mitigation techniques and programs and can be used to inform decisions related to the mitigation strategy of local plans.

Vulnerability of infrastructure is another important consideration.

Flooding along the Wabash River in Clark County, Illinois, contributed to a federal disaster declaration on June 24, 2008.

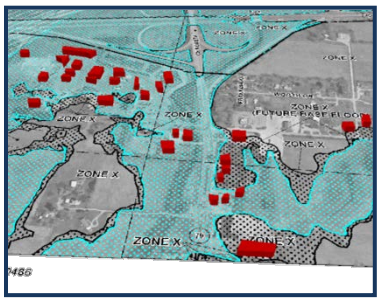


- **Update community comprehensive plans.** Planners can use flood risk information in the development and/or update of comprehensive plans, future land use maps, and zoning regulations. For example, zoning codes may be changed to better provide for appropriate land uses in high-hazard areas.
- **Update emergency operations and response plans.** Emergency managers can identify low-risk areas for potential evacuation and sheltering and can help first responders avoid areas of high-depth flood water. Risk assessment results may reveal vulnerable areas, facilities, and infrastructure for which planning for continuity of operations plans (COOP), continuity of government (COG) plans, and emergency operations plans (EOP) would be essential.
- **Develop hazard mitigation projects.** Local officials (e.g., planners and public works officials) can use flood risk information to re-evaluate and prioritize mitigation actions in local hazard mitigation plans.
- **Communicate flood risk.** Local officials can use the information in this report to communicate with property owners, business owners, and other citizens about flood risks, changes since the last FIRM, and areas of mitigation interest. The report layout allows community information to be extracted into a fact sheet format (see Section 8 for information about each community).
- **Inform the modification of development standards.** Floodplain managers, planners, and public works officials can use information in this report to support the adjustment of development standards for certain locations. For example, heavily developed areas tend to increase floodwater runoff because paved surfaces cannot absorb water, indicating a need to adopt or revise standards that provide for appropriate stormwater retention.

1.4 Related Resources

For a more comprehensive picture of a community's flood risk, FEMA recommends state and local officials use the information provided in this report in conjunction with other sources of flood risk data, such as those listed below.

- **FIRM and FIS.** The information in these regulatory products indicate areas with specific flood hazards by identifying the limit and extent of the 1-percent-annual-chance floodplain and the 0.2-percent-annual-chance floodplain. Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FISs) do not identify all floodplains in a flood risk project. The FIS includes summary information regarding other frequencies of flooding, as well as flood profiles for riverine sources of flooding. In rural areas and areas for which flood hazard data are not available, the 1-percent-annual-chance floodplain may not be identified. In addition, the 1-percent-annual-chance floodplain may not be identified for flooding sources with very small drainage areas (less than



Examples of how FEMA data can be leveraged to identify and measure vulnerability.

1 square mile). To obtain FIRM and FIS materials, visit the following web sites:

  - FEMA Map Service Center: http://msc.fema.gov

- **Flood or multi-hazard mitigation plans.** Local hazard mitigation plans include risk assessments that contain flood risk information and mitigation strategies that identify community priorities and actions to reduce flood risk. This report was informed by existing mitigation plans.
- **Other risk assessment reports.** Hazus, a free risk assessment software application from FEMA, is the most widely used flood risk assessment tool available. Hazus can run different scenario floods (riverine and coastal) to determine how much damage might occur; help community officials to evaluate flood damage that can occur based on new/proposed mitigation projects or future development patterns and practices; and create specialized risk assessments, such as what happens when a dam or levee fails. Flood risk assessment tools are available through other agencies as well, including the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Army Corps of Engineers (USACE). Other existing watershed reports may have a different focus, such as water quality, but may also contain flood risk and risk assessment information. See Section 10 for additional resources.
- **State Resources.** State agencies maintain useful information that is relevant to the risks present in their respective communities:
  - http://dnr.wi.gov/topic/floodplains/riskmap.html

Flooding impacts non-populated areas too, such as agricultural lands and wildlife habitats.

HAZUS MH
EARTHQUAKE • WIND • FLOOD

For more information about Hazus and data inputs, visit http://www.fema.gov/plan/prevent/hazus/index.shtm or enter keywords "fema hazus" into an internet search engine.

2. Risk Analysis

2.1 Overview

Flood hazard identification uses FIRMs and FISs to identify where flooding can occur along with the probability and depth of that flooding. Flood risk assessment is the systematic approach to identifying how flooding impacts the environment. In hazard mitigation planning, flood risk assessments serve as the basis for mitigation strategies and actions by defining the hazard and enabling informed decision making. Fully assessing flood risk requires the following:

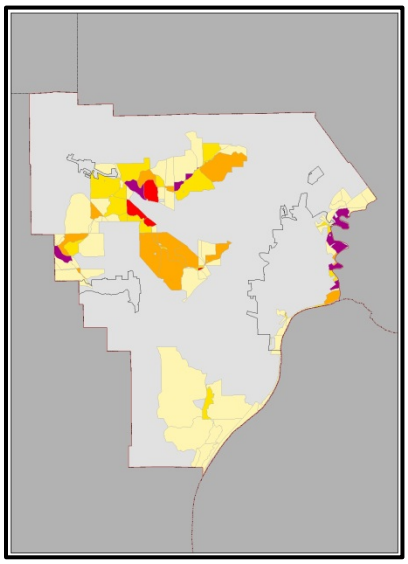
- Identifying the flooding source and determining the flood hazard occurrence probability
- Developing a complete profile of the flood hazard including historical occurrence and previous impacts
- Inventorying assets located in the identified flood hazard area
- Estimating potential future flood losses caused by exposure to the flood hazard area

Flood risk analyses are different methods used in flood risk assessment to help quantify and communicate flood risk. Flood risk analysis can be performed on a large scale (state, community) level and on a very small scale (parcel, census block). Advantages of large-scale flood risk analysis, especially at the watershed level, include identifying how actions and development in one community can affect areas up- and downstream. On the parcel or census block level, flood risk analysis can provide actionable data to individual property owners so they can take appropriate mitigation steps.

2.2 Hazus and Resilience

There are a variety of methods for estimating flood loss. FEMA's methodology for estimating loss uses the risk assessment tool, Hazus. Originally developed for earthquake risk assessment, Hazus has evolved into a multi-hazard tool developed and distributed by FEMA that can provide risk assessment information for floods, earthquakes, and hurricane winds. Hazus is a nationally accepted, consistent flood risk assessment tool to assist individuals and communities to create a more accurate picture of flood risk. Organizations can improve the results of Hazus analysis through input of local GIS data layers.

FEMA performed a Hazus Average Annualized Flood Loss (AAL) analysis for the nation. This initial national flood loss analysis covers the continental United States, covering 48 states and the District of Columbia. The summary results of the total annualized flood losses were released for each county at the census block level. Additionally, a Refined Analysis was run by the WIDNR for this project using depth grids from the five different storm return period losses, which were then used to calculate the AAL. The summary results of the total annualized flood losses were released for use in the Resilience meetings. This Composite data of FEMA's initial AAL analysis, in conjunction of the Refined Analysis, is used to show relative flood losses by Census Block. The Hazus



Sample Hazus Map

analysis uses an area weighted method that averages values of the census block evenly across the area of the block. This can at times incorrectly represent the losses if the structures are not evenly located across the census block. Therefore, the AAL data should be used as an initial indicator for possible risk. Communities are encouraged to perform more detailed level Hazus analysis by using their building information and updated floodplain information.

A starting point for the Resilience Map is the Composite AAL Hazus data, showing where flood risk varies by geographic location. For emergency management, this map is a tool that can help identify losses based on predicted events so that resources can be assigned accordingly. Loss information can support floodplain management efforts, providing scientific support for higher regulatory standards. Awareness of exposed essential facilities and infrastructure can help local planners to identify mitigation actions that could protect citizens from service disruption in disaster events.

2.3 Loss Estimation Information

Loss estimate methodologies using the best available data will result in an approximation of risk. Such estimates should be used to understand relative risk from flood and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, demographics, or economic parameters).

Flood loss estimates may result in useful information about :

- **Residential Asset Loss** includes direct building losses (estimated costs to repair or replace the damage caused to the building) for all classes of residential structures including single family, multi-family, manufactured housing, group housing, and nursing homes; as well as content losses.
- **Commercial Asset Loss** includes direct building losses for all classes of commercial buildings including retail, wholesale, repair, professional services, banks, hospitals, entertainment, and parking facilities. This also includes content and inventory losses.
- **Other Asset Loss** includes losses for facilities categorized as industrial, agricultural, religious, government, and educational. This also includes content and inventory losses.
- **Essential Facility Losses** considers facilities which provide services to the community and should be functional after a flood, including schools, police stations, fire stations, medical facilities, and emergency operation centers. These facilities are typically considered critical facilities for mitigation planning purposes.
- **Infrastructure.** For analysis of infrastructure, consider transportation systems and lifeline utility systems. Transportation systems include

highways, railways, light railways, busses, ports and harbors, ferries, and airport systems. Utility systems include potable water systems, wastewater, oil, natural gas, electric power, and communication systems.

- **Business Disruption** includes the losses associated with the inability to operate a business due to the damage sustained during the flood. Losses include inventory, income, rental income, wage, and direct output losses, as well as relocation costs.
- **Annualized Losses** can be calculated by taking losses from multiple events over different frequencies and expressing the long-term average by year. This factors in historic patterns of frequent smaller floods with infrequent but larger events to provide a balanced presentation of flood damage.
- **Loss Ratio.** A loss ratio expresses the scenario losses divided by the total building value for a local jurisdiction and can be a gage to determine overall community resilience as a result of a scenario event. For example, a loss ratio of 5 percent for a given scenario would indicate that a local jurisdiction would be more resilient and recover more easily from a given event, versus a loss ratio of 75 percent which would indicate widespread losses. An annualized loss ratio uses the annualized loss data as a basis for computing the ratio. Loss ratios are not computed for business disruption.
- **Hazus Flood Risk Value.** On the Resilience Map, flood risk is expressed in the following five categories for census blocks that have flood risk: very low, low, medium, high, and very high. It is based on the 1-percent-annual-chance total asset loss by census block.

2.4 Community Risk Assessment Data

Information is available for all communities within the Lower Wisconsin Watershed on the potential and historical risk associated with them. These factors include percent of the community in the Special Flood Hazard Area (SFHA), Insurance Claims, Repetitive Loss Properties, Public and Individual Assistance and number of federally declared disasters. Together these factors can assist the county and communities in their potential risk assessment. Please see the Flood Risk Report for this detailed information.

3. Lower Wisconsin River Watershed Resilience Meeting

3.1 Community Resilience

Resilience is the ability to recover from or adjust easily to misfortune. In this case, resilience is how quickly or easily your community can return to normal after a flood event.

3.2 Resilience Meeting

The planning, data delivery, and development of the Resilience Meeting was a collaborative effort between FEMA and the following partners: the Wisconsin Department of Natural Resources (WIDNR) and Wisconsin Emergency Management (WEM). Prior to the meeting, the Planning team collaborated to establish project specific priorities, identify unique issues, determine data availability and requirements, document each community's flood history, and review Multi-Hazard Mitigation Plans for status, expiration, and specifically identified mitigation actions. The Planning team also developed an invitation list consisting of state, county and community stakeholders.

3.2.1 Overview

The objective of the Resilience Meeting is to increase the understanding and awareness in communities of their flood risk by discussing local flood-related issues, identifying potential strategies or actions to reduce flood risk, and providing communities with information regarding potential resources or programs designed to support the mitigation of flood risk. By participating in the Resilience Meeting communities are able to identify actions to reduce their constituents' vulnerability to flood-related issues. The aim of the Resilience Meeting is to encourage communities to take the lead in protecting their constituents through mitigation activities.

Some examples of possible topics of discussion during the meeting include:

- Developing or enhancing a hazard mitigation plan;
- Local efforts taken on to document flood and/or other hazards;
- Possible mitigation activities and actions;
- Mitigation grants to support mitigation activities;
- Understanding their flood risk;
- Reducing flood risk;
- Discussing available resources;
- Communication about flood risk and the next steps.

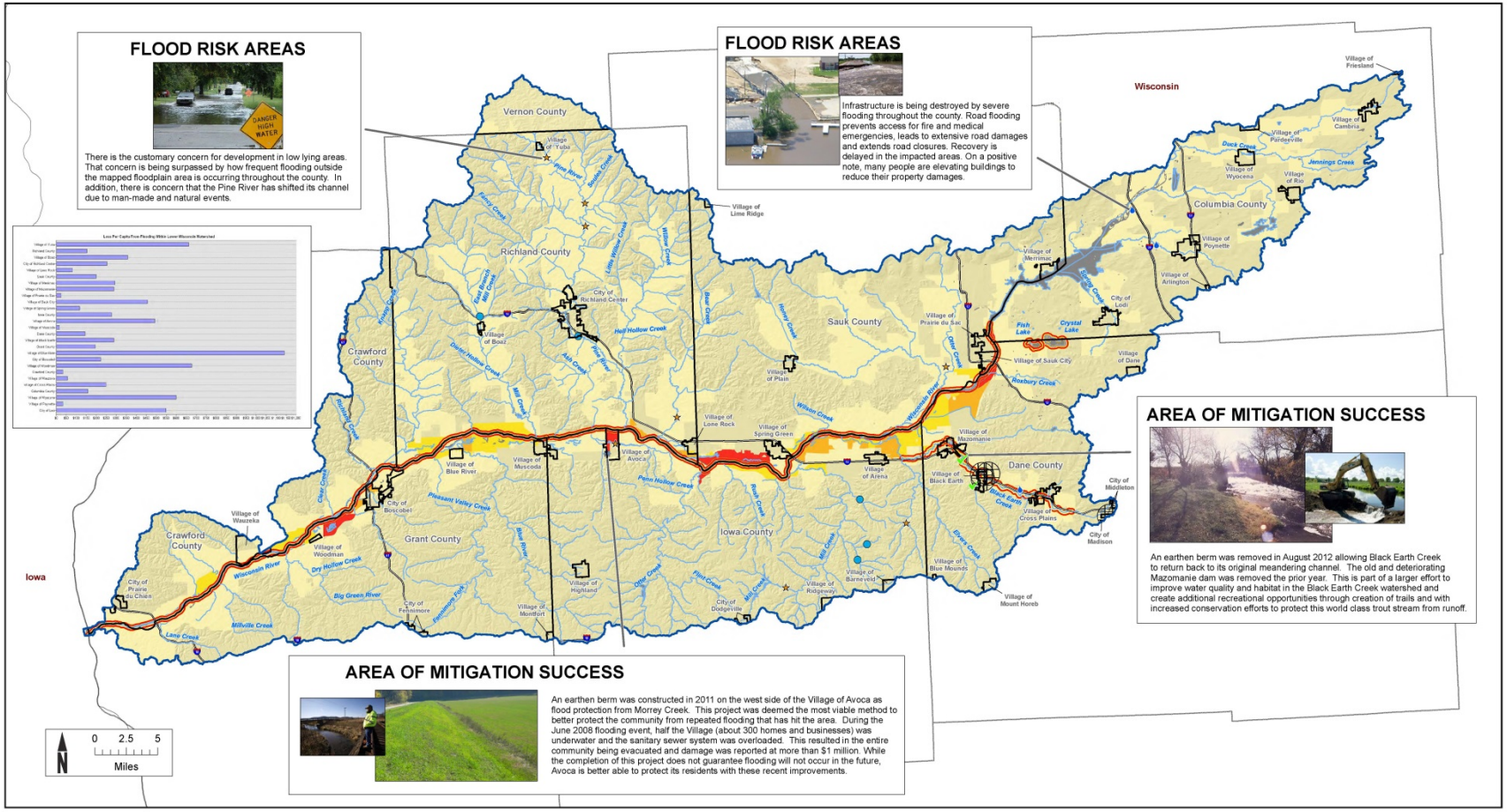
Prior to the Resilience Meeting, Hazard Mitigation Plans and a variety of data layers were examined to gain an understanding of the hazards in each community. All seven counties (Columbia, Crawford, Dane, Grant, Iowa, Richland and Sauk) have current Hazard Mitigation Plans.

Resilience Map Data

Data Types	Source
Base Map	WIDNR
Hydrography	WIDNR
Transportation	WIDNR
Community Data	WIDNR
Census blocks	2000 Census Data from HAZUS
Changes Since Last Firm (CSLF)	Prelim Floodplain, Effective FIRMs
LOMCs (LOMAs, LOMR-Fs)	WIDNR
Hazus – Composite AAL	WIDNR & FEMA
Coordinated Needs Management Strategy (CNMS)	FEMA
Critical Facilities	WIDNR
Dams	WIDNR
Areas of Mitigation Interest	Community-identified in plans, by regional engingineers or meeting

The data layers referenced above were used to produce a Resilience Map, which presents a general overview of features related to hazards and hazard mitigation in the Lower Wisconsin River Watershed. The map was presented at the March 6, 2014 Resilience Meeting to engage participating stakeholders in discussion about solutions to the hazards in their communities. The map is shown on the following page of this report.

Flood Risk Map: *Lower Wisconsin Watershed, 07070005*



MAP SYMBOLOGY

Base Data
- Corporate Limits
- Major Roads
- Interstates
- Watershed Boundary
- State Boundary

Flood Data
- Rivers and Streams
- Restudy Area

Flood Risk
- Very Low
- Low
- Medium
- High
- Very High

Areas of Mitigation Interest
- Areas of Mitigation Success
- Other
- Dams
- Non-Levee Embankments
- Other Flood Risk Areas
- Significant Land Use Change

WATERSHED LOCATOR

Risk Mapping, Assessment, and Planning (Risk MAP)

FRM FLOOD RISK MAP

Lower Wisconsin Watershed, USA

FEMA

HUC-8 Code 07070005

For more information of data used for this non-regulatory map, please consult the Lower Wisconsin Watershed, USA Flood Risk Database and Flood Risk Report.

RELEASE DATE 3/6/2014

3.2.2 Meeting Location Information

The two meetings were held for the Lower Wisconsin River Watershed on March 6, 2014 in Boscobel and Sauk City, Wisconsin. We held a meeting in the morning and again in the afternoon to allow communities an opportunity to pick whatever was the most convenient for them. The meeting times and locations were:

Lower Wisconsin Watershed Resilience Meeting
10:30am – 12pm
Hildebrand Memorial Library
1033 Wisconsin Avenue
Boscobel, WI 53805

Lower Wisconsin Watershed Resilience Meeting
2:30pm – 4:00pm
Sauk City Public Library
515 Water Street
Sauk City, WI 53583

The participants discussed local flood-related issues, identified potential strategies or actions to reduce flood risk, and obtained information regarding potential resources or programs designed to support communities in the mitigation of flood risk. The table below lists the meeting participants.

3.2.3 Meeting Attendees

Affiliation	Title	First Name	Last Name
Boscobel, City of	City Engineer, D.P.W.	Mike	Reynolds
Boscobel, City of	Mayor	Steve	Wetter
Cazenovia, Village	Village President	Denny	Adelman
Cazenovia, Village	Trustee	Steve	Bauer
Columbia County	GIS Specialist	Brian	Zirbes
Columbia County	Land Use Specialist	Renee	Pulver
Dane County	Director, Emergency Management	Dave	Janda
Grant County	Director, Emergency Management	Steve	Braun
Grant County	Deputy Director, Emergency Management	Tonya	White
Grant County	Administration	Lynda	Schweikert

(Unincorporated Areas)	Conservation, Sanitation and Zoning Dept. (CSZD)		
Grant County	Zoning/Sanitation Tech,	Jeff	Krueger
(Unincorporated Areas)	Conservation, Sanitation and Zoning Dept. (CSZD)		
Iowa County	Director, Emergency Management	Keith	Hurlbert
Iowa County	Planning Director	Scott	Godfrey
(Unincorporated Areas)			
Madison, City of	Engineer	Lauren	Seabury
Merrimac, Village of	Administration	Ronald	Senger
Poynette, Village of	Village President	David	Hutchinson
Richland County	LIO	Lynn	Newkirk
(Unincorporated Areas)			
Richland County	Deputy Director, Emergency Management	John	Heinen
Richland County	Director, Emergency Management Director	Darin	Gudgeon
Sauk County	Deputy Director, CP2	Brian	Cunningham
Woodman, Village of	Trustee	Todd	Miller
WDNR	GIS Project Lead	Colleen	Hermans
WDNR	Engineer Project Lead	Christopher	Olds
WDNR	NFIP Coordinator	Gary	Heinrichs
WDNR	Regional Engineer	Jordan	Thole
WDNR	Regional Engineer	Tanya	Lourigan
WEM	Disaster Response and Recovery Planner	Katie	Sommers
WEM	Disaster Response and Recovery Planner	Kimberly	Berginis

3.2.4 Meeting Highlights

DNR employees were pleased with the high level of attendance at the two meetings, particularly given the rural nature of the area. Attendees were asked to sign up upon entry to the meeting and take a CD with all the non-regulatory products on it. Several hand outs were also available, such as the HAZUS and Risk Map FAQ sheets, Action Tracker, useful internet links and Project Schedules. Attendees were informed that a follow up email was going to be sent with more information on resources, receiving the Risk MAP flood risk products, and a copy of the powerpoint resentation.

Introduction and Project Status

Colleen Hermans started the presentation by introducing colleagues in the DNR and WEM. She then went on to provided a quick summary of the projects. Hand-outs were available for more detailed information on scheduling for each community.

Meeting Objectives

The opening presenter discussed the meeting objectives, which were:

- To clarify the extent and types of local flood risk
- Show the tools available through RiskMAP
- To discuss strategies to reduce that risk and improve local resilience to floods
- To provide information about the resources available to help implement those strategies
- To relay the importance of and opportunities for communicating about flood risk

Risk MAP Products

Since one of the main focuses of this Resilience Meeting was to discuss levels of risk and how to use the Non-Regulatory Products as tools to communicate risk, Colleen Hermans discussed what the Non-Regulatory products are and went over some suggestions for how they can be used by the local officials. These products are the Flood Risk Map, Flood Risk Report, the flood risk geodatabase, Changes Since Last FIRM, depth grids, analysis grids and HAZUS results. We want to switch the discussion from whether someone is in or out of the floodplain to what level of risk an area has and how that can be measured – by monetary loss to depth of flooding. As always, it was emphasized that just because someone is outside the mapped floodplain a risk always remains.

HAZUS loss estimates by census blocks along the Wisconsin River were used as examples of how much it could cost communities if an area floods. Colleen presented on Average Annualized Loss (AAL) and then showed examples of the 10% chance risk, 4% chance risk, 2% chance risk, 1% chance risk and 0.2% chance risk. Colleen showed how using the Hazus data in conjuction with the depth grids can be a useful tool to identify areas of mitigation interest. She explained how the Hazus data is presented in the Flood Risk Report in table format, as well as in the Flood Risk Database.

Chris Olds highlighted a mitigation best practice we recently encountered. He presented an area in a local community that FEMA products showed would have flooding. Previously, this area had not been mapped on FEMA's digital flood insurance rate maps, but with the recent watershed update, it now was. Flooding had previously been documented in the community by local officials. Chris explained how the community mitigated the problem to reduce flooding in the neighborhood.

Mitigation Action Forms were emailed out to all invitees prior to the Resilience Meeting. Chris explained why this form was necessary, and encouraged attendees to complete the form and turn it in the WIDNR. WIDNR will input the data into FEMA's Mitigation Action Tracker and share this information with Wisconsin Emergency Management. Wisconsin Emergency Management staff will make sure that county officials know of eachpotential mitigation action project within the county and add it to their mitigation plan if needed. The Mitigation Forms gathered as of January 29, 2014 are attached in the Appendix.

Katie Sommers, of Wisconsin Emergency Management, went on to present about mitigation. Topics discussed were various strategies to reduce flood risk, including prevention, property protection, public education and awareness, natural resource protection, emergency services protection, and structural projects. Also provided was an overview of FEMA mitigation programs and assistance, as well as additional resources that are available to help communities reduce their flood risk, including FEMA grants, HUD and other Federal agency grants, online resources, and technical assistance from Federal agencies and professional associations.

Gary Heinrichs presented the section about communication of flood risk. He discussed the resources that can be used, how best to target your audience and where efforts need to go next in the project. He discussed how flood risk awareness leads to action, increases community resilience, and builds support for implementing a local mitigation plan. He explained that residents look to their local officials, the media, and mailings for information about flood risk, even while local officials rely on FEMA to educate a community's residents. To address this, as part of Risk MAP, FEMA is creating additional support and resources for floodplain administrators and other community representatives that will allow them to more easily provide information about map updates and changes, as well as related flood risk education.

Discussion

After the formal presentation, all of the staff remained to answer any questions or discuss any topics attendees had. This was also a very good time for the attendees themselves to discuss their own best practices or get direct information from others who have worked through mitigation projects. Most people seemed excited to look at the data and then follow up with DNR staff at a later time. Attendess also expressed interest in filling out the Mitigiation Action Tracker form with their mitigation ideas. There is a strong desire from these communities to mitigate in advance of flooding and are hopeful to receive grant funding in order to implement some of their ideas.

4. Identifying Areas of Mitigation Interest (AoMIs)

Dams vary in size and shape, the amount of water they impound, and their assigned hazard classification.

Many factors contribute to flooding and flood losses; some are natural, some are manmade, and others are a combination. In response to these risks, there has been a focus by the federal government, state agencies, and local jurisdictions to mitigate properties, structures, and infrastructure against the impacts of flood hazards so that future losses and impacts can be reduced. AoMIs are important to defining a more comprehensive picture of flood risk and mitigation activity in a watershed, identifying target areas and potential projects for flood hazard mitigation, encouraging local collaboration, and communicating how various mitigation activities can successfully reduce flood risk.

The Resilience Report and Resilience Map focus on identifying AoMIs that may be contributing (positively or negatively) to flooding and flood losses in the flood risk project. AoMIs are identified through revised hydrologic and hydraulic and/or coastal analyses, other studies, or previous flood studies; community supplied data from mitigation plans, floodplain management plans, and local surveys; and the mining of federal government databases (e.g., flood claims, disaster grants, and data from other agencies). Below is a list of the types of AoMIs that may be located in the project area.

Dams

This dam failure caused flooding that damaged several homes and vehicles.

A dam is a barrier built across a waterway for impounding water. Dams vary from impoundments that are hundreds of feet tall and contain thousands of acre-feet of water (e.g. Hoover Dam) to small dams that are a few feet high and contain only a few acre-feet of water (e.g. small residential pond). “Dry dams,” which are designed to contain water only during floods and do not impound water except for the purposes of flood control, include otherwise dry land behind the dam.

While most modern, large dams are highly engineered structures with components such as impervious cores and emergency spillways, most smaller and older dams are not. State dam safety programs emerged in the 1960s, and the first Federal Guidelines for Dam Safety were not prepared until 1979. By this time, the vast majority of dams in the United States had already been constructed.

Why is a dam an AoMI?

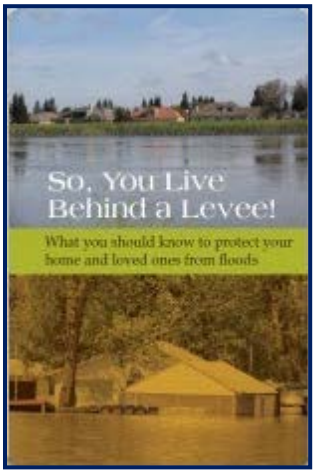
- Many older dams were not built to any particular standard and thus may not withstand extreme rainfall events. Older dams in some parts of the country were made out of an assortment of materials. These structures may not have any capacity to release water and could be overtopped, which could result in catastrophic failure.

- Even dams that follow current dam safety programs may not be regulated, as downstream risk may have changed since the dam was constructed. Years after a dam is built, a house, subdivision, or other development may be constructed in the area downstream of the dam. Thus, a subsequent dam failure could result in damage. Since these dams are not regulated, it is impossible to predict how safe they are.
- A significant dam failure risk is structural deficiencies associated with older dams that are not being adequately addressed today through needed inspection/maintenance practices.
- For larger dams that were constructed in the past, a flood easement may have been obtained on a property; however, since that time the construction of buildings, though not allowed, was completed anyway. These buildings were usually constructed in violation of the flood easement.
- When a new dam is constructed, the placement of such a large volume of material in a floodplain area (if that is the dam location) will displace flood waters and can alter how the watercourse flows. This can result in flooding upstream, downstream, or both.
- For many dams, the dam failure inundation zone is not known. This is the area that would be flooded if the dam failed and the impoundment behind the dam drained. Not having knowledge of these risk areas could lead to unprotected development in these zones. Also, larger federal dams that do have inundation mapping are frequently restricted to "For Official Use Only" and are not made available to the public due to terrorism concerns.

Levees and Significant Levee-Like Structures (Embankments)

FEMA defines a levee as "a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding." Levees are sometimes referred to as dikes. Soil used to construct a levee is compacted to make the levee as strong and stable as possible. To protect against erosion and scouring, levees can be covered with everything from grass and gravel to harder surfaces like stone (riprap), asphalt, or concrete.

Similar to dams, many levees have been built with minimal design standards. Many older levees were constructed in a variety of ways, from a farmer piling dirt along a stream to prevent nuisance flooding to levees made out of old mining spoil material. As engineered structures, levees are designed to a certain height and river water elevation. These structures can be overtopped or fail if a flood event is greater than the engineering design anticipated.



For more information about the risks associated with living behind levees, consult the publication "So You Live Behind a Levee!" published by the American Society of Civil Engineers at http://content.asce.org/ASCELeeGuide.html

A floodwall is a vertical wall that is built to provide protection from a flood in a similar manner as a levee. Typically made of concrete or steel, floodwalls often are erected in urban locations where there is not enough room for a levee. Floodwalls are sometimes constructed on a levee crown to increase the levee's height.

Most new dams and levees are engineered to a certain design standard. If that design is exceeded, they could be overtopped or fail catastrophically, causing more damage than if the levee was not there in the first place. Many levees in the nation are built to the 1-percent-annual-chance flood protection rating, and the areas behind them are still at some risk for flooding. This threat is called residual risk. In some states, residual risk areas can extend up to 15 miles from a riverbank. Although the probability of flooding may be lower because a levee exists, risk is nonetheless still present. The American Society of Civil Engineers' publication "So You Live Behind a Levee!" provides an in-depth explanation of levee and residual risk.

Major embankments, on the other hand, are rarely designed with any flood protection level in mind. Railroads, road abutments, and canals—especially in the Western United States—are not considered levees or dams and have issues such as unknown construction materials/methods. These embankments are not regulated from a flood risk standpoint.

How can levees and major embankments contribute to flooding and flood losses?

- Like dams, many levees in the United States were constructed using unknown techniques and materials or may have been poorly maintained over time. These levees have a higher failure rate than those that have been designed to today's standards and have an active maintenance program.
- A levee might not provide the flood risk reduction it once did as a result of flood risk changes over time. Flood risk can change due to a number of factors, including increased flood levels due to climate change or better estimates of flooding, development in the watershed increasing flood levels and settlement of the levee or floodwall, and sedimentation in the levee channel. Increased flood levels mean decreased flood protection. The lack of adequate maintenance over time will also reduce the capability of a levee to contain the flood levels for which it was originally designed.
- Given enough time, any levee will eventually be overtopped or damaged by a flood that exceeds the levee's capacity. Still, a widespread public perception of levees is that they will always provide protection. This perception may lead to not taking mitigation actions such as purchasing flood insurance.

Canal levee breaches as a result of Hurricane Katrina in New Orleans in 2005. Note damages can be more extensive due to high velocity flood flows than if the levee was not there.

- A levee is a system that can fail due to its weakest point, and therefore maintenance is critical. Many levees in the United States have been poorly maintained or not maintained at all. Maintenance also includes maintaining the drainage systems behind the levees so they can keep the protected area dry.

If the pinch point is a bridge or culvert, it can get washed out causing an area to become isolated and potentially more difficult to evacuate.

Stream Flow Pinch Points

A flow pinch point occurs when a human-made structure, such as a culvert or bridge, constricts the flow of a river or stream. The results of this constriction can be increased damage potential to the structure, an increase in velocity of flow through the structure, and the creation of significant ponding or backwater upstream of the structure. Regulatory standards regarding the proper opening size for a structure spanning a river or stream are not consistent and may be non-existent. Some local regulations require structures to pass a volume of water that corresponds to a certain size rain event; however, under sizing, these openings can result in flood damage to the structure itself. After a large flood event, it is not uncommon to have numerous bridges and culverts "washed out."

How can stream flow pinch points contribute to flooding and flood losses?

- Flow pinch points can back water up on property upstream of the structure if not designed properly.
- These structures can accelerate the flow through the structure causing downstream erosion if not properly mitigated. This erosion can affect the structure itself, causing undermining and failure.
- If the pinch point is a bridge or culvert, it can get washed out causing an area to become isolated and potentially more difficult to evacuate.
- Washed-out culverts and associated debris can wash downstream and cause the next pinch point to fail.

When a facility such as a hospital is flooded, it can result in a significant hardship on the community.

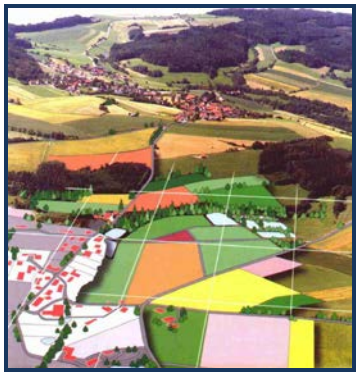
High-Risk Essential Facilities

Essential facilities, sometimes called "critical facilities," are those whose impairment during a flood could cause significant problems to individuals or communities. For example, when a community's wastewater treatment is flooded and shut down, not only do contaminants escape and flow into the floodwaters, but backflows of sewage can contaminate basements or other areas of the community. Similarly, when a facility such as a hospital is flooded, it can result in a significant hardship on the community not only during the event but long afterwards as well.

How can high-risk essential facilities contribute to flooding and flood losses?

- Costly and specialized equipment may be damaged and need to be replaced.

Clusters of past flood insurance claims can show where there is a repetitive flood problem.



Rooftops, pavements, patios, and driveways contribute to the impervious area in a watershed.

- Impairments to facilities such as fire stations may result in lengthy delays in responding and a focus on evacuating the facility itself.
- Critical records and information stored at these facilities may be lost.

Past Flood Insurance Claims and Individual Assistance/Public Assistance Hotspots

Assistance provided after flood events (flood insurance in any event and Individual Assistance [IA] or Public Assistance [PA] after declared disasters) occurs in flood affected areas. Understanding geographically where this assistance is being provided may indicate unique flood problems.

Flood insurance claims are not always equally distributed in a community. Although estimates indicate that 20 to 50 percent of structures in identified flood hazard areas have flood insurance, clusters of past claims may indicate where there is a flood problem. However, clusters of past claims and/or areas where there are high payments under FEMA's IA or PA Programs may indicate areas of significant flood hazard.

Why are past claim hot spots AoMIs?

- A past claim hotspot may reflect an area of recent construction (large numbers of flood insurance policies as a result of a large number of mortgages) and an area where the as-built construction is not in accordance with local floodplain management regulations.
- Sometimes clusters of past claims occur in subdivisions that were constructed before flood protection standards were in place, places with inadequate stormwater management systems, or in areas that may not have been identified as SFHAs.
- Clusters of IA or PA claims may indicate areas where high flood insurance coverage or other mitigation actions are needed.

Significant Land Use Changes

Recent or proposed development in SFHAs must be carefully evaluated to ensure that no adverse impacts occur as a result. Development, whether it is a 100-lot subdivision or a single lot big box commercial outlet, can result in large amounts of fill and other material being deposited in flood storage areas. Development in flood hazard areas is only protected to a certain standard; floods that exceed those standards will damage the developed areas. Development also includes all necessary infrastructure and services to maintain that development over time.

One of the factors that contributes to flooding in a watershed is the amount of ground that is available to absorb water. When development occurs, hard surfaces such as rooftops, pavements, patios, and driveways do not allow water to absorb into the ground, and more of the rainwater becomes runoff flowing directly into streams and drainage ways. As a result, the "peak flow" in a stream or drainage way after a storm event will be higher and occur faster. Without careful planning, major land use changes can affect the impervious area of a site and result in a significant increase in flood risk.

Sometimes a major land use change may be for planning purposes only. For example, a land use change that rezones land from a classification such as floodplain that restricts development to a zone such as industrial or high density residential could result in significant new infrastructure and structures in high flood risk areas.

How can past or planned major land use changes in SFHAs contribute to flooding and flood losses?

- Development in areas mapped SFHA reduces flood storage areas, which can make flooding worse at the development site and downstream of it.
- Impervious surfaces speed up the water flowing in the streams, which can increase erosion and the danger that fast-flowing floodwaters pose to people and buildings.
- Rezoning flood-prone areas to high densities and/or higher intensity uses can result in more people and property at risk of flooding and flood damage.

Key Emergency Routes Overtopped During Frequent Flooding Events

Roads are not always designed to flood protection levels. In fact, many major roadways including interstate highways, U.S. highways, and state routes are chronically flooded. When an alternative route is available, inconvenience is avoided and minor losses result. However, when no or lengthy alternate routes are available, when the road being overtopped conveys more traffic than alternate routes, or there is a large economic driver (i.e., industrial park), overtopping can result in significant economic losses as well as impact public safety.

Why are overtopped roads AoMIs?

- Such areas, when identified, can be accounted for and incorporated into evacuation and other operational plans.
- Overtopped roads can sometimes be elevated or reinforced to reduce the overtopping.

When large highways close due to flooding, traffic is detoured causing inconvenience and economic loss.

Drainage or Stormwater-Based Flood Hazard Areas, or Areas Not Identified as Floodprone on the FIRM But Known to Be Inundated

Flood hazard areas exist everywhere. While FEMA maps many of these, others are not identified. Many of these areas may be located in communities with existing, older, and often inadequate stormwater management systems or in very rural areas. Other similar areas could be a result of complex or unique drainage characteristics. Even though they are not mapped, awareness of these areas is important so adequate planning and mitigation actions can be performed.

Why are drainage or stormwater-based flood hazard areas or unidentified floodprone locations AoMIs?

- So further investigation of such areas can occur and, based on scientific data, appropriate mitigation actions can result (i.e., land use and building standards).
- To create viable mitigation project applications in order to reduce flood losses.

Areas of Mitigation Success

Flood mitigation projects are powerful tools to communicate the concepts of mitigation and result in more resilient communities. Multiple agencies have undertaken flood hazard mitigation actions for decades. Both structural measures—those that result in flood control structures—and non-structural measures have been implemented in thousands of communities. An extensive list of mitigation actions can be found in Section 5.

Why are areas of mitigation success AoMIs?

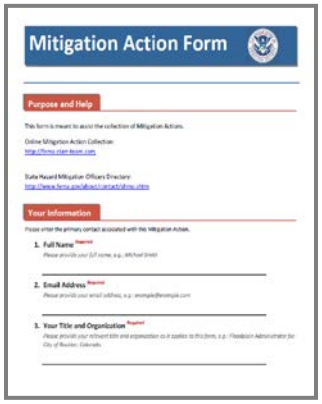
- Mitigation successes identify those areas within the community that have experienced a reduction or elimination of flood risk.
- Such areas are essential in demonstrating successful loss reduction measures and in educating citizens and officials on available flood hazard mitigation techniques.
- Avoided losses can be calculated and shown.

The Action Tracker is a valuable communication tool between FEMA, the State, and local officials to help organize, prioritize, and continually update and add mitigation actions and activities. For communities the Action Tracker is a valuable tool for identifying local areas of risk as they arise, updating Hazard Mitigation Plans, identifying projects for Capital Improvement Projects, and/or mitigation grants as they may arise.

Before Mitigation and After Mitigation

Communities will need to prioritize projects as part of the planning process. FEMA can then help route federal mitigation dollars to fund these projects.

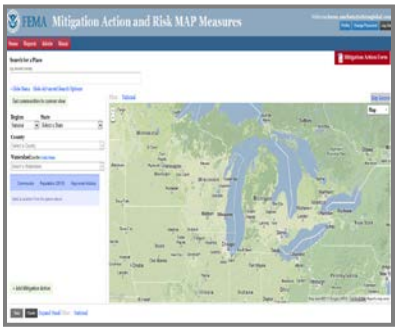
5. Actions to Reduce Flood Risk



5.1 The Mitigation Action Form and Action Tracker

The Mitigation Action Form and Action Tracker http://fema.starr-team.com or http://dnr.wi.gov/topic/floodplains/riskmap.html are new Risk MAP tools designed to supplement existing mitigation planning processes. The Action Form, which aligns with questions on the Action Tracker website, can be completed by anyone that has identified a potential AoMI. Once in the Action Tracker, an AoMI can be tracked by a variety of entities, such as the community, the State of Wisconsin, and FEMA, for different uses such as:

- To identify all AoMIs in a community, State, or Region,
- To document AoMIs in between mitigation plan updates,
- To track progress on mitigation activities,
- To assess the ability of the Risk MAP program to encourage communities to take action to reduce risk.

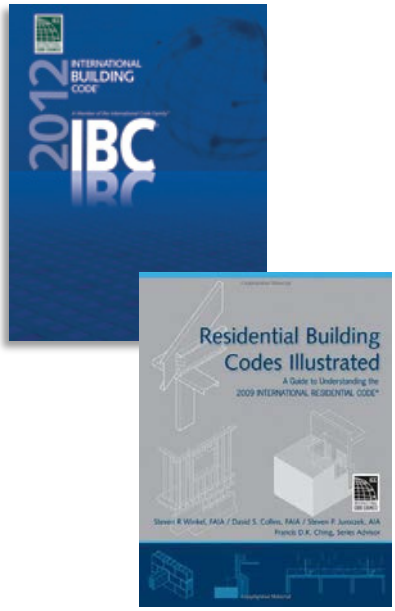


FEMA uses the Action Form and Action Tracker website to document and track local mitigation needs and actions.

5.2 Types of Mitigation Actions

Mitigation provides a critical foundation on which to reduce loss of life and property by avoiding or lessening the impact of hazard events. This creates safer communities and facilitates resilience by enabling communities to return to normal function as quickly as possible after a hazard event. Once local officials understand risk from flooding and other hazards, the community is in a better position to identify potential mitigation actions that can reduce that risk to its people and property. FEMA mitigation plan requirements encourage communities to understand their vulnerability to hazards and take actions to minimize vulnerability and promote resilience.

There are 3 general categories of mitigation actions: Local Plans and Regulations, Community Identified Programs, and Structure and Infrastructure Projects. The FEMA Mitigation Action Form requests the identification of potential mitigation actions in one of these 3 categories. The outline presented below lists the types of the actions within each category:



Local Plans and Regulations

- **Building Codes.** The use and enforcement of building codes and development standards can ensure structures are able to withstand flooding. Potential actions include:
  - Adopt the International Building Codes.
  - Adopt ASCE 24.
  - Add or increase "freeboard" requirements (feet above BFE) in flood damage ordinance.
  - Extend freeboard requirement passed mapped floodplain to include equivalent land elevation.
  - Prohibit any fill within floodplain areas.

- Prohibit all first floor enclosures below BFE for all structures in flood hazard areas.
- Use subdivision design standards to require elevation data collection during platting and to have buildable space on lots above the base flood elevation.
- Consider orientation of new development during design (e.g., subdivisions, buildings, infrastructure, etc.).
- Set the design flood elevation at or above the historical high water mark if it is above the mapped BFE.
- Require standard tie-downs of propone tanks.

- **Planning and Land Use Regulations** can mitigate flooding by influencing development. Consider updating and aligning Comprehensive and Master Plans, as well as other local plans to ensure that risk is considered at all levels of community planning. Strategies include:
  - Develop a floodplain management plan and update it regularly.
  - Adopt a post-disaster recovery ordinance based on a plan to regulate repair activity, generally depending on property location.
  - Establish a "green infrastructure" program to link, manage, and expand existing parks, preserves, greenways, etc.
  - Determine and enforce acceptable land uses to alleviate the risk of damage by limiting exposure in such hazard areas. Floodplain and coastal zone management can be included in comprehensive planning.
  - Consider hazards during infrastructure planning. For example, decisions to extend roads or utilities to an area may increase exposure to flood hazards.
  - Limit the percentage of allowable impervious surface within developed parcels.
  - Ensure the zoning ordinance encourages higher densities only outside of known hazards areas.
  - Prohibit or limit floodplain development through regulatory and/or incentive-based measures.
  - Require that floodplains be kept as open space.
  - Regularly calculate/document the amount of flood-prone property preserved as open space.
  - Limit the density of developments in the floodplain.
  - Pass and enforce an ordinance that regulates dumping in streams and ditches.
  - Consider obtaining easements for planned and regulated public use of privately owned land for temporary water retention and drainage.
  - Establish setback requirements and use large setbacks near erosion prone areas.
  - Protect public and private cemeteries with grassy berms and fences to prevent contents from floating away during flooding.

- **Stormwater Management.** Rainwater and snowmelt can cause flooding and erosion in developed areas. Stormwater management practices to prevent this includes:
    - Prepare and adopt a community-wide stormwater management master plan.
    - Complete a stormwater drainage study/plan for known problem areas.
    - Use stream restoration/channelization to ensure adequate drainage/diversion of stormwater.
    - Regulate development in upland areas in order to reduce stormwater run-off through a stormwater ordinance.
    - Link flood hazard mitigation objectives with EPA Stormwater Phase II initiatives.
    - Install, re-route, or increase the capacity of a storm drainage system.
    - Increase drainage or absorption capacities with detention and retention basins, relief drains, spillways, drain widening/dredging or rerouting, logjam and debris removal, extra culverts, bridge modification, dike setbacks, flood gates and pumps, or channel redirection.
    - Increase capacity of stormwater detention/retention basins.
    - Increase dimensions of drainage culverts in troublesome areas.
    - Design a "natural runoff" or "zero discharge" policy for stormwater in subdivision design.
    - Require more trees be preserved/planted in landscape designs to reduce the amount of stormwater runoff.
    - Require developers to plan for on-site sediment retention.
    - excessive stormwater/firefighting water source.
    - Encourage use of porous pavement, vegetative buffers, and islands in large parking areas and conforming pavement to land contours so as not to provide easier avenues for stormwater.
    - Encourage the use of permeable driveways and surfaces to reduce runoff and encourage groundwater recharge.
    - Provide grassy swales along roadside.
    - Adopt erosion and sedimentation control regulations for construction and farming.
- **Floodplain Management.** The National Flood Insurance Program (NFIP) enables property owners in participating communities to purchase insurance protection against flood losses. Actions to achieve eligibility in the program, maintain compliance, and ensure a successful local floodplain management program include:
    - Participate in the National Flood Insurance Program (NFIP).
    - Participate in the NFIP Community Rating System (CRS) or increase CRS rating.
    - Incorporate the ASFPM's "No Adverse Impact" policy into local floodplain management plans/programs.

- Designate a Local Floodplain Manager/CRS Coordinator who achieves CFM certification.
- Adopt ordinances that meet minimum Federal and state requirements to comply with the NFIP.
- Revise the floodplain ordinance to incorporate cumulative substantial damage/improvement requirements.
- Adopt a "no-rise" in BFE clause for the flood damage prevention ordinance.
- Include requirements in the local floodplain ordinance for homeowners to sign non-conversion agreements for areas below BFE. Revise and update regulatory floodplain maps.
- Incorporate the procedures for tracking high water marks following a flood into emergency response plans.
- Complete and maintain FEMA elevation certificates for pre-FIRM and/or post-FIRM buildings.
- Require and maintain FEMA elevation certificates for all new/improved buildings located in floodplains.
- Establish and publicize a user-friendly, publically-accessible repository for inquirers to obtain FIRM maps.
- Develop an educational flyer targeting NFIP policyholders on ICC during post-flood damage assessments.
- Annually notify the owners of repetitive loss properties of FMA funding.
- Conduct NFIP Community Workshops to provide information and incentives for property owners to acquire flood insurance.
- Consider offering Incentives for building above required freeboard minimum (code plus).

Community Identified Program

- **Develop Funding Mechanisms for Local Risk Reduction**, such as:
  - Use taxes to support a regulatory system.
  - Use impact fees to help fund public hazard mitigation projects related to land development (e.g., increased runoff).
  - Levy taxes to finance maintenance of drainage systems or to construct reservoirs.
- **Incentives for Local Risk Reduction.** Studies have shown that many people are willing to take actions to reduce their risk IF they believe they are actually AT risk. Improve flood awareness through outreach activities such as:
  - Encourage homeowners to purchase flood insurance.
  - Annually distribute flood protection/safety pamphlets/brochures to the owners of flood-prone property.
  - Encourage homeowners to install backflow valves to prevent reverse-flow flood damages.
  - Encourage residents in flood-prone areas to consider elevating homes.

- Encourage the public to help with debris control by securing debris, yard items, or stored objects that may otherwise be swept away, damaged, or pose a hazard if floodwaters would pick them up and carry them away.
- Encourage residents to keep storm drains clear of debris during storms (not to rely solely on Public Works).
- Educate citizens about safety during flood conditions, including the dangers of driving on flooded roads.
- Use outreach programs to: 1) advise homeowners of risks to life, health, and safety; 2) facilitate technical assistance programs that address measures that citizens can take; or 3) facilitate funding for mitigation measures.

- **Maintenance Program.** Regular maintenance will help drainage systems and flood control structures to continue to function properly. Some ideas include:
  - Perform regular drainage system maintenance, such as sediment and debris clearance, as well as detection and prevention/discouragement of discharges into stormwater/sewer systems from home footing drains, downspouts, or sewer pumps.
  - Implement an inspection, maintenance, and enforcement program to help ensure continued structural integrity of dams and levees.
  - Routinely clean debris from support bracing underneath low-lying bridges.
  - Routinely clean and repair stormwater drains.
  - Regularly clear sediment build-up on riverbanks near aerial lines.
  - Incorporate ice jam prevention techniques as appropriate


NM Energy, Minerals, and Natural Resources

Structure and Infrastructure Projects

- **Structure Protection.** There are many ways to protect residential and non-residential structures from flood damage, including:
  - Acquire or relocate structures and preserve lands subject to repetitive flooding from voluntary property owners.
  - Elevate structures so that the lowest floor, including the basement, is raised above the base flood elevation. Utilities or other mechanical devices should also be raised above expected flood levels.
  - Manufactured homes should be elevated above the base flood elevation and anchored or, more preferably, kept out of the floodplain.
  - Relocate utilities and water heaters above BFE and consider the use of tankless water heaters if there are space limitations.

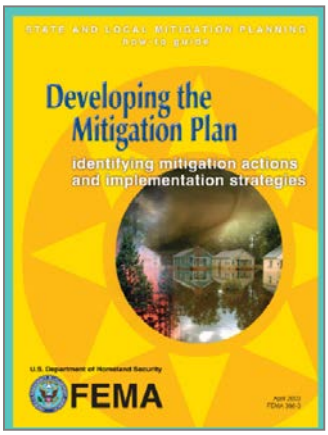
- In a basement, wet-floodproofing may be preferable to attempting to keep water out completely because it allows for controlled flooding to balance exterior and interior wall forces and discourages structural collapse. Use water resistant paints or other materials to allow for easy cleanup after floodwater exposure in accessory structures or in a garage area below an elevated residential structure.
- Encourage wet floodproofing of areas above BFE.
- Dry floodproof non-residential structures by strengthening walls, sealing openings, or using waterproof compounds or plastic sheeting on walls to keep water out.

- **Infrastructure and Critical Facility Protection.** Techniques can be used to protect infrastructure and critical facilities from flood events, such as:
  - Require all critical facilities meet requirements of Executive Order 11988 and be built 1 foot above the 500-year flood elevation.
  - Elevate roads above the base flood elevation to maintain dry access. In situations where flood waters tend to wash roads out, construction, reconstruction, or repair can include not only attention to drainage, but also stabilization or armoring of vulnerable shoulders or embankments.
  - Raise low-lying bridges.
  - Consider back-up generators for pumping and lift stations in sanitary sewer systems along with other measures (e.g., alarms, meters, remote controls, and switchgear upgrades).
  - Raise electrical components of sewage lift stations above BFE.
  - Install flood telemetry system in sewage lift stations.
  - Floodproof sewage treatment plants located in flood hazard areas.
  - Build earthen dike around flood-threatened critical facilities.
  - Install/upgrade stormwater pumping stations.
  - Raise manhole openings using concrete pillars.
  - Install watertight covers or inflow guards on sewer manholes.
  - Depending on its infrastructure capabilities, encourage the use of check valves, sump pumps, and backflow prevention devices in homes and buildings.
- **Flood Control Structures** can be built to prevent flood damage. Examples include:
  - Use structural flood control measures (e.g., levees, dams, or floodwalls) to channel water away from people and property.
  - Use minor structural projects that are smaller and more localized (e.g., levees, floodwalls, dams) in areas that cannot be mitigated through non-structural activities or where structural activities are not feasible due to low densities.
  - Consider dikes, levees, floodwalls, and berms to minimize the impacts of flooding.

- Use revetments (hardened materials placed atop existing riverbanks or slopes) to protect against floods.

- **Natural Systems** provide floodplain protection, riparian buffers, and other ecosystem services that mitigate flooding. It is important to preserve such functionality with the following:
  - Use vegetative management, such as vegetative buffers, around streams and water sources.
  - Retain natural vegetative bed in stormwater channels.
  - Protect/enhance landforms that serve as natural mitigation features (i.e., riverbanks, wetlands, dunes, etc.).
  - Protect and preserve wetlands to help prevent flooding in other areas.
  - Retain thick vegetative cover on public lands flanking rivers.
  - Establish and manage riparian buffers along rivers and streams.
  - Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.
  - Develop a land banking program for the preservation of the natural and beneficial functions of flood hazard areas.
  - Compensate an owner for partial rights, such as easement or development rights, to prevent a property from being developed.
  - Use transfer of development rights to allow a developer to increase densities on another parcel that is not at risk in return for keeping floodplain areas vacant.

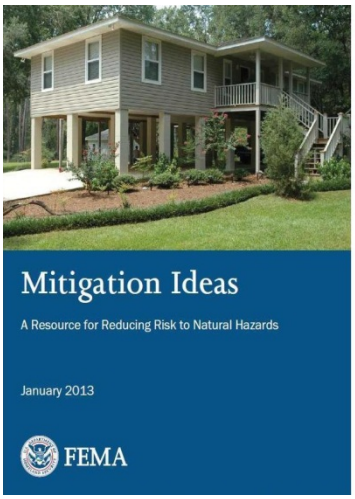
- **Soil Stabilization or Erosion Control.** To stabilize slopes that may be susceptible to erosion, consider options such as:
  - Prevent erosion with proper bank stabilization, sloping or grading techniques, planting vegetation on slopes, terracing hillsides, or installing riprap boulders or geotextile fabric.
  - Plant mature trees in the coastal riparian zone to assist in dissipation of the wind force in the breaking wave zone.
  - Stabilize cliffs with terracing or plantings of grasses or other plants to hold soil together.
  - Use a hybrid of hard/soft engineering techniques (i.e., combine low-profile rock, rubble, oyster reefs, or wood structures with vegetative planting or other soft stabilization techniques).
  - Implement marine riparian habitat reinstatement/revegetation.
  - Use a rock splash pad to direct runoff and minimize the potential for erosion.



Refer to FEMA Mitigation Planning How To Guide #3 (FEMA 386-3) "Developing the Mitigation Plan - Identifying Mitigation Actions and Implementation Strategies" for more information on how to identify specific mitigation actions to address hazard risk in your community.

As many mitigation actions are possible to lessen the impact of floods, how can a community decide which ones are appropriate to implement? There are many ways to identify specific actions most appropriate for a community. Some factors to consider may include the following:

- **Site characteristics.** Does the site present unique challenges (e.g., significant slopes or erosion potential)?
- **Flood characteristics.** Are the flood waters affecting the site fast or slow moving? Is there debris associated with the flow? How deep is the flooding?
- **Social acceptance.** Will the mitigation action be acceptable to the community?
- **Technical feasibility.** Is the mitigation action technically feasible (e.g., making a building watertight to a reasonable depth)?
- **Administrative feasibility.** Is there administrative capability to implement the mitigation action?
- **Legal.** Does the mitigation action meet all applicable codes, regulations, and laws? Public officials may have a legal responsibility to act and inform citizens if a known hazard has been identified.
- **Economic.** Is the mitigation action affordable? Is it eligible under grant or other funding programs? Can it be completed within existing budgets?
- **Environmental.** Does the mitigation action cause adverse impacts on the environment or can they be mitigated? Is it the most appropriate action among the possible alternatives?



The purpose of this document is to provide a resource that communities can use to identify and evaluate a range of potential mitigation actions for reducing risk to natural hazards and disasters. For more information go to www.planning.org. or http://www.fema.gov/library.

6. Hazard Mitigation Planning

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. Mitigation activities may be implemented prior to, during, or after an incident. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs. Hazard mitigation planning helps communities develop strategies to reduce their risk to natural hazard events.

Mitigation Plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters.

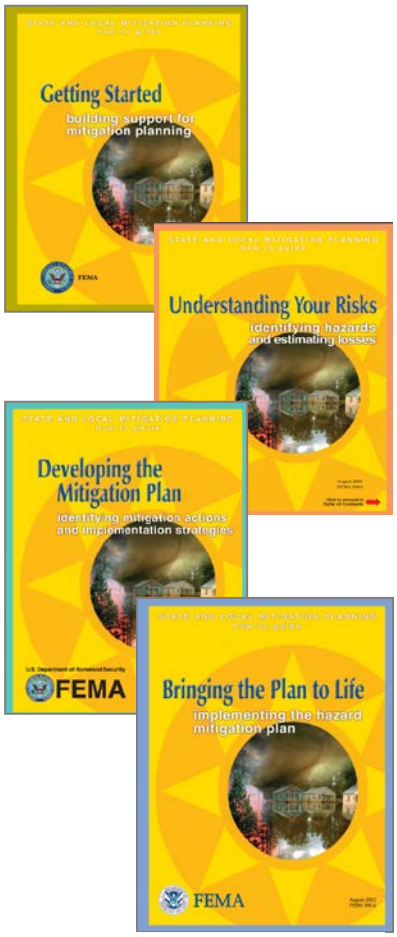
6.1 Getting Started

An important first step in developing a single or multi-jurisdictional plan is to identify and gather local resources to help plan development. There are a variety of resources to consider.

- Technical resources include local universities, regional planning agencies, program staff and professional associations.
- Financial resources may be available from a number of FEMA grant programs or by splitting up the cost collaboratively amongst plan stakeholders.
- Written resources include existing planning documents such as Comprehensive Plans, Land Use Plans, Capital Improvement Plans, Community Budgets, Emergency Operations Plans, Flood Insurance Studies, Risk MAP products, Floodplain management Ordinances, Landslide Studies, etc.
- Human resources are those dedicated and interested individuals identified to be on the planning team.

Planning team members can come from a variety of groups, organizations or boards.

- Individuals such as local planning or emergency management staff, leaders of previous hazard mitigation planning efforts, local residents, business owners, elected officials.
- Regional, Tribal, State or Federal agencies.
- Academic institutions.
- Professional organizations.
- Local and regional agencies involved in hazard mitigation activities.
- Agencies with the authority to regulate development and neighboring communities.



FEMA has developed a series of guidance on developing local hazard mitigation plans.

6.2 Understanding Community Risk

The second step in hazard mitigation planning is to assess the local risk. Risk assessment provides the factual basis for mitigation activities proposed in the plan. There are four steps to perform a risk assessment:

- Hazard identification is the process of determining those hazards that threaten a given area.
- After hazards are identified, profile the hazard to determine the impact, extent and probability.
- Inventory of assets involves identification of critical facilities that are vulnerable to hazards. Examples of critical facilities include essential facilities like hospitals, schools, or police and fire stations. Other critical facilities may include transportation systems, utility systems, high potential loss facilities like nuclear power plants or dams, and hazardous material facilities.
- Finally, estimate the potential losses from a natural hazard event.

The results of hazard identification include a list of all hazards that threaten the community, a list of sources of this information (plans, reports, web sites, articles), a list of hazards to be investigated further, and a list of hazards that will not be considered further in the plan, including an explanation why ruled out.

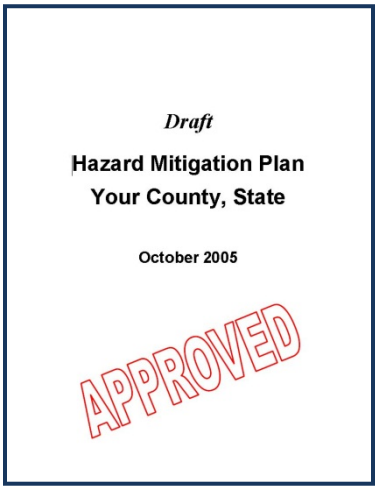
6.3 Developing the Mitigation Plan

The third step of mitigation planning is to develop the plan. A mitigation plan should include mitigation goals and objectives that are long-term, measurable and connected to potential future mitigation actions. The risk assessment should be used to develop problem statements for each hazard that clearly define the hazard, frequency, timing, and level of impact. An example of a problem statement is "Tornadoes and high winds occur at least once every three years and cause loss of life and structural damage. The high school has been hit several times." These problem statements should be used to develop goals. The goal for the high school could be, "Protect existing critical facilities from tornadoes and high winds."

6.4 Plan Adoption and Review

Individual communities are responsible for developing and adopting the hazard mitigation plan, and then submitting the plan to the state for review. The State Hazard Mitigation Officer (SHMO) is responsible for developing a state-wide plan and supporting local and tribal efforts. The SHMO also conducts a preliminary review of local and tribal plans, checking the plan for completeness and for state and federal requirements. If the state does not approve the plan, it may return it to the community rather than sending it on to FEMA.

FEMA has ten Regional Offices tasked with reviewing and approving state, tribal and local hazard mitigation plans. FEMA adds its comments to the state's review comments and discusses areas of diverging opinion with the state reviewer. FEMA ensures that the comments are precise and specifies any required and recommended revisions. Then FEMA transmits its findings to the local community through the SHMO. FEMA Regional Offices also provide technical assistance to states and tribes.



6.5 Implementation

Once approved by the state and FEMA, local officials commit to the mitigation goals and actions by adopting the mitigation plan. To begin implementation, stakeholder responsibilities should be reviewed and clarified to confirm that individuals and agencies understand their roles and responsibilities, such as:

- The planning team can oversee implementation.
- Local officials can provide direction, visibility and budget.
- State agencies can provide technical assistance and funding.
- Nonprofit and private sectors, academia and citizens can provide time, money and knowledge.

It is important that communities publicize adoption of the plan, including that it was approved by FEMA. Public support can be encouraged by beginning a mitigation action immediately and publicizing the initiation and ongoing progress.

6.6 Plan Maintenance

The mitigation plan is a living document that guides action over time. As conditions change, new information becomes available, or actions progress over the life of the plan, plan adjustments may be necessary to maintain its relevance.

Plan maintenance is the process of tracking the plan's implementation progress and to improve the plan update. The plan must include a description of the method and schedule for monitoring, evaluating, and updating it within a 5-year established in the previously approved plan worked and revise them as needed.

- Ensure that the mitigation strategy is implemented according to the plan.
- Provide the foundation for an ongoing mitigation program in your community.
- Standardize long-term monitoring of hazard-related activities.
- Integrate mitigation principles into community officials' daily job responsibilities and department roles.
- Maintain momentum through continued engagement and accountability in the plan's progress.

Plan updates provide the opportunity to consider how well the procedures established in the previously approved plan worked and revise them as needed.

7. Mitigation Programs and Assistance

Not all mitigation activities require funding, and those that do are not limited to outside funding sources. For those mitigation actions that require assistance through funding or technical expertise, several state and federal agencies have flood hazard mitigation grant programs and offer technical assistance. These programs may be funded at different levels over time or may be activated under special circumstances such as after a presidential disaster declaration.

Communities can link hazard mitigation plans and actions to the right FEMA grant programs to fund flood risk reduction. More information about FEMA HMA programs can be found at http://www.fema.gov/government/grant/hma/index.shtm.

FEMA awards many mitigation grants each year to states and communities to undertake mitigation projects to prevent future loss of life and property resulting from hazard impacts, including flooding. The FEMA Hazard Mitigation Assistance (HMA) programs provide grants for mitigation through the programs listed below.

FEMA Hazard Mitigation Assistance Programs

Mitigation Grant Program	Authorization	Purpose
Hazard Mitigation Grant Program (HMGP)	Robert T. Stafford Disaster Relief and Emergency Assistance Act	Activated after a presidential disaster declaration; provides funds on a sliding scale formula based on a percentage of the total federal assistance for a disaster for long-term mitigation measures to reduce vulnerability to natural hazards
Flood Mitigation Assistance (FMA)	National Flood Insurance Reform Act	Reduce or eliminate claims against the NFIP
Pre-Disaster Mitigation (PDM)	Disaster Mitigation Act	National competitive program focused on mitigation project and planning activities that address multiple natural hazards (program under review)
Repetitive Flood Claims (RFC)	Bunning-Bereuter-Blumenauer Flood Insurance Reform Act	Reduce flood claims against the NFIP through flood mitigation; properties must be currently NFIP insured and have had at least one NFIP claim
Severe Repetitive Loss (SRL)	Bunning-Bereuter-Blumenauer Flood Insurance Reform Act	Reduce or eliminate the long-term risk of flood damage to SRL residential structures currently insured under the NFIP

The HMGP and PDM programs offer funding for mitigation planning and project activities that address multiple natural hazard events. The FMA, RFC, and SRL programs focus funding efforts on reducing claims against the NFIP. Funding under the HMA programs is subject to availability of annual appropriations, and HMGP funding is also subject to the amount of FEMA disaster recovery assistance provided under a presidential major disaster declaration.

FEMA's HMA grants are awarded to eligible states, tribes, and territories (applicant) that, in turn, provide subgrants to local governments and communities (subapplicant). The applicant selects and prioritizes subapplications developed and submitted to them by subapplicants and submits

them to FEMA for funding consideration. Prospective subapplicants should consult the office designated as their applicant for further information regarding specific program and application requirements. Contact information for the FEMA Regional Offices and State Hazard Mitigation Officers (SHMO) is available on the FEMA website (www.fema.gov).

Individual Assistance (IA) is money or direct assistance to individuals, families and businesses in an area whose property has been damaged or destroyed and whose losses are not covered by insurance. It is meant to help with critical expenses that cannot be covered in other ways. This assistance is not intended to restore a damaged property to its condition before the disaster. Assistance includes:

- **Temporary Housing** can include money made available to rent a different place to live or a government provided housing unit when rental properties are not available.
- **Repair or Replacement**. Money is available to homeowners to repair damage to, or replace, a primary residence damaged in a disaster that is not covered by insurance. The goal is to make the damaged home safe, sanitary, and functional.
- **Permanent Housing Construction** is direct assistance or money for the construction of a home. This type of help occurs only in insular areas or remote locations specified by FEMA, where no other type of housing assistance is possible.
- **Other** than housing needs, money is available for necessary expenses and serious needs caused by the disaster, including disaster-related medical and dental costs, funeral and burial cost, clothing, household items, tools or educational materials required for a job or school, fuel for primary heat source , clean-up items, disaster-damaged vehicle, moving and storage expenses related to the disaster, other necessary expenses or serious needs as determined by FEMA, and other expenses that are authorized by law.

Public Assistance (PA)

The mission of the Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Grant Program is to provide assistance to state, Tribal and local governments, and certain types of Private Non-Profit (PNP) organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President.

Through the PA Program, FEMA provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain PNP organizations. The PA Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process.

The Federal share of assistance is not less than 75% of the eligible cost for emergency measures and permanent restoration. The grantee (usually the State) determines how the non-Federal share (up to 25%) is split with the subgrantees.

Several additional agencies including USACE, Natural Resource Conservation Service (NRCS), U.S. Geological Survey (USGS), and others have specialists on staff and can offer further information on flood hazard mitigation. The State NFIP Coordinator and SHMO are state-level sources of information and assistance, which vary among different states.

8. Acronyms and Definitions

A	
AAL	Average Annualized Loss
ALR	Annualized Loss Ratio
AoMI	*Areas of Mitigation Interest*
B	
BCA	Benefit-Cost Analysis
BFE	Base Flood Elevation
BMP	Best Management Practices
C	
CFR	Code of Federal Regulations
COG	Continuity of Government Plan
COOP	Continuity of Operations Plan
CRS	Community Rating System
CSLF	Changes Since Last FIRM
D	
DHS	Department of Homeland Security
DMA 2000	Disaster Mitigation Act of 2000
E	
EOP	Emergency Operations Plan
F	
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FRD	Flood Risk Database
FRM	Flood Risk Map
FRR	Flood Risk Report
FY	Fiscal Year
G	
GIS	Geographic Information System
H	
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
I	
IA	Individual Assistance
L	
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
LOMR-F	Letter of Map Revision Based on Fill
N	
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NRCS	Natural Resource Conservation Service
P	
PA	Public Assistance
PDM	Pre-Disaster Mitigation
R	
RFC	Repetitive Flood Claims
Risk MAP	Mapping, Assessment, and Planning
S	
SFHA	Special Flood Hazard Area
SHMO	State Hazard Mitigation Officer
SRL	Severe Repetitive Loss
U	
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

0.2-percent-annual-chance flood – The flood elevation that has a 0.2-percent chance of being equaled or exceeded each year. Sometimes referred to as the 500-year flood.

1-percent-annual-chance flood – The flood elevation that has a 1-percent chance of being equaled or exceeded each year. Sometimes referred to as the 100-year flood.

Average Annualized Loss (AAL) – The estimated long-term weighted average value of losses to property in any single year in a specified geographic area

Annualized Loss Ratio (ALR) – Expresses the annualized loss as a fraction of the value of the local inventory (total value/annualized loss).

Base Flood Elevation (BFE) – Elevation of the 1-percent-annual-chance flood. This elevation is the basis of the insurance and floodplain management requirements of the NFIP.

Berm – A small levee, typically built from fill dirt.

Cfs – Cubic feet per second, the unit by which discharges are measured (a cubic foot of water is about 7.5 gallons).

Consequence (of flood) – The estimated damages associated with a given flood occurrence.

Crest – The peak stage or elevation reached or expected to be reached by the floodwaters of a specific flood at a given location.

Dam – Any artificial barrier that impounds or diverts water and that: (1) is 25 feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier or from the lowest elevation of the outside limit of the barrier if it is not across a stream channel or watercourse, to the maximum water storage elevation or (2) has an impounding capacity at maximum water storage elevation of 50 acre-feet or more.

Design flood event – The greater of the following two flood events: (1) the base flood, affecting those areas identified as SFHAs on a community's FIRM; or (2) the flood corresponding to the area designated as a flood hazard area on a community's flood hazard map or otherwise legally designated.

Erosion – Process by which floodwaters lower the ground surface in an area by removing upper layers of soil.

Essential facilities – Facilities that, if damaged, would present an immediate threat to life, public health, and safety. As categorized in Hazus, essential facilities include hospitals, emergency operations centers, police stations, fire stations, and schools.

Flood – A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from: overflow of inland or tidal waters; unusual and rapid accumulation or runoff of surface waters from any source; mudflow; or collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.

Flood Insurance Rate Map (FIRM) – An official map of a community, on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community. See also Digital Flood Insurance Rate Map.

Flood Insurance Study (FIS) – Contains an examination, evaluation, and determination of the flood hazards of a community, and if appropriate, the corresponding water-surface elevations.

Flood risk – Probability multiplied by consequence; the degree of probability that a loss or injury may occur as a result of flooding. Sometimes referred to as vulnerability.

Floodborne debris impact – Floodwater moving at a moderate or high velocity can carry floodborne debris that can impact buildings and damage walls and foundations.

Floodwall – A long, narrow concrete or masonry wall built to protect land from flooding.

Floodway (regulatory) – The channel of a river or other watercourse and that portion of the adjacent floodplain that must remain unobstructed to permit passage of the base flood without cumulatively increasing the water surface elevation more than a designated height (usually 1 foot).

Floodway fringe – The portion of the SFHA that is outside of the floodway.

Flow pinch point – A point where a human-made structure constricts the flow of a river or stream.

Freeboard – The height above the base flood added to a structure to reduce the potential for flooding. The increased elevation of a building above the minimum design flood level to provide additional protection for flood levels higher than the 1-percent-chance flood level and to compensate for inherent inaccuracies in flood hazard mapping.

Hazus – A GIS-based risk assessment methodology and software application created by FEMA and the National Institute of Building Sciences for analyzing potential losses from floods, hurricane winds, and earthquakes.

High velocity flow – Typically comprised of floodwaters moving faster than 5 feet per second.

Loss ratio – Expresses loss as a fraction of the value of the local inventory (total value/loss).

Levee – A human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

Mudflow – A river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water.

Probability (of flood) – The likelihood that a flood will occur in a given area.

Risk MAP – A FEMA strategy to work collaboratively with state, local, and tribal entities to deliver quality flood data that increases public awareness and leads to action that reduces risk to life and property.

Riverine – Of or produced by a river. Riverine floodplains have readily identifiable channels.

Special Flood Hazard Area (SFHA) – Portion of the floodplain subject to inundation by the base flood.

Stafford Act – Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288. This Act constitutes the statutory authority for most federal disaster response activities especially as they pertain to FEMA and FEMA programs.

Stillwater – A rise in the normal level of a water body.

Vulnerability – Probability multiplied by consequence; the degree of probability that a loss or injury may occur as a result of flooding. Sometimes referred to as flood risk.

9. Additional Resources

ASCE 7 – National design standard issued by the American Society of Civil Engineers (ASCE), *Minimum Design Loads for Buildings and Other Structures*, which gives current requirements for dead, live, soil, flood, wind, snow, rain, ice, and earthquake loads, and their combinations, suitable for inclusion in building codes and other documents.

ASCE 24-05 – National design standard issued by the ASCE, *Flood Resistant Design and Construction*, which outlines the requirements for flood resistant design and construction of structures in flood hazard areas.

National Flood Insurance Program (NFIP), Federal Emergency Management Agency (FEMA), www.floodsmart.gov

FEMA, www.fema.gov

DNR Floodplain Program, http://dnr.wi.gov/topic/floodplains/riskmap.html

ASCE, 2010. *So, You Live Behind a Levee!* Reston, VA.

FEMA Publications – available at www.fema.gov

FEMA, 1985. *Manufactured Home Installation in Flood Hazard Areas*, FEMA 85. Washington, DC, September 1985.

FEMA and the American Red Cross, 1992. *Repairing Your Flooded Home*, FEMA 234/ARC 4476. Washington, DC, August 1992.

FEMA, 1996. *Addressing Your Community's Flood Problems*, FEMA 309. Washington, DC, June 1996.

FEMA, 1998. *Homeowner's Guide to Retrofitting*, FEMA 312. Washington, DC, June 1998.

FEMA, 1999. *Protecting Building Utilities from Flood Damage*, FEMA 348. Washington, DC, November 1999.

FEMA, 2003. *Interim Guidance for State and Local Officials - Increased Cost of Compliance Coverage*, FEMA 301. Washington, DC, September 2003.

FEMA, 2000. *Above the Flood: Elevating Your Floodprone House,* FEMA 347. Washington, DC, May 2000.

FEMA, 2001. *Understanding Your Risks: Identifying Hazards and Estimating Losses*, FEMA 386-2. Washington, DC, August 2001.

FEMA, 2002a. *Getting Started: Building Support for Mitigation Planning*, FEMA 386-1. Washington, DC, September 2002.

FEMA, 2002b. *Integrating Manmade Hazards into Mitigation Planning*, FEMA 386-7. Washington, DC, September 2002.

FEMA, 2003a. *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies*, FEMA 386-3. Washington, DC, April 2003.

FEMA, 2003b. *Bringing the Plan to Life: Implementing the Hazard Mitigation Plan*, FEMA 386-4. Washington, DC, August 2003.

FEMA, 2004a. *Design Guide for Improving School Safety in Earthquakes, Floods, and High Winds*, FEMA 424. Washington, DC, January 2004.

FEMA, 2004b. *Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners*, FEMA 64. Washington, DC, April 2004.

FEMA, 2005. *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning*, FEMA 386-6. Washington, DC, May 2005.

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FEMA, 2006b. *Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects*, FEMA 386-9. Washington, DC, August 2008.

FEMA, 2006c. "*Designing for Flood Levels Above the BFE," Hurricane Katrina Recovery Advisory 8, Hurricane Katrina in the Gulf Coast: Building Performance Observations, Recommendations, and Technical Guidance*, FEMA 549, Appendix E. Washington, DC, July 2006.

FEMA, 2007a. *Property Acquisition Handbook for Local Communities*, FEMA 317. Washington, DC, September 2007.

FEMA, 2007b. *Public Assistance Guide*, FEMA 322. Washington, DC, June 2007.

FEMA, 2007c. *Using Benefit-Cost Review in Mitigation Planning*, FEMA 386-5. Washington, DC, May 2007.

FEMA, 2007d. *Design Guide for Improving Critical Facility Safety from Flooding and High Winds: Providing Protection to People and Buildings*, FEMA 543. Washington, DC, January 2007.

FEMA, 2007e. *Selecting Appropriate Mitigation Measures for Floodprone Structures*, FEMA 551. Washington, DC, March 2007.

FEMA, 2007f. *Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings,* FEMA 577. Washington, DC, June 2007.

FEMA, 2008. *Reducing Flood Losses Through the International Codes: Meeting the Requirements of the National Flood Insurance Program,* FEMA 9-0372, Third Edition. Washington, DC, December 2007.

10. Appendix A – WDNR Presentation Slides

FEMA WDNR

Resilience Meeting: Lower Wisconsin Watershed

Boscobel & Sauk City, Wisconsin

10:30am & 2:30pm
March 6, 2014

RiskMAP
Increasing Resilience Together

Introductions

- **Risk MAP Project Team, Wisconsin Department of Natural Resources (WDNR)**
  - Colleen Hermans - GIS Lead
  - Gary Heinrichs - NFIP Coordinator
  - Chris Olds - Floodplain Engineer
  - Jordan Thole & Tanya Lourigan– Regional Engineers
- **Wisconsin Emergency Management (WEM)**
  - Katie Sommers & Kimberly Berginnis, Disaster Response and Recovery Planners

FEMA WDNR 2 RiskMAP Increasing Resilience Together

Agenda

- **Project status & Understanding your flood risk**
  - Colleen Hermans
- **Strategies to reduce that risk**
  - Chris Olds
- **Resources available**
  - Katie Sommers
- **How to communicate about flood risk & Next Steps**
  - Gary Heinrichs
- **Questions and Discussion**

FEMA WDNR 3 RiskMAP Increasing Resilience Together

Risk MAP Project Status

- **What is Risk MAP?**
  - Risk **M**apping, **A**ssessment, and **P**lanning
  - Builds off of Map Modernization
- **Where have we been?**
  - Participated in Discovery
    - Reviewed flood risk data gathered from across the watershed
    - Discussed your flooding history, development plans, flood risk concerns, stormwater management activities, and other daily operations that impact flood risk
    - Reviewed your mitigation planning and project activities and status
  - Open Houses
    - Will be held in all Lower Wisconsin Watershed counties starting in May 2014
  - Schedules for each project are on your handout

FEMA WDNR 4 RiskMAP Increasing Resilience Together

Meeting Objectives

- **To help you better understand:**
  - Your flood risk, as individual communities and as a watershed
  - Strategies you can use to reduce your risk
  - Resources available to help you implement those strategies
  - The importance of communicating flood risk to your constituents
  - How FEMA's flood risk products can be used as a tool to improve your job and your community's objectives

FEMA WDNR 5 RiskMAP Increasing Resilience Together

Understanding Your Flood Risk

FEMA WDNR 6 RiskMAP Increasing Resilience Together

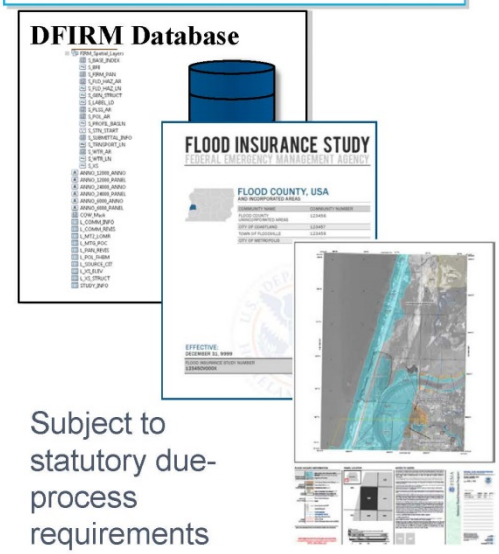
Understanding Your Flood Risk

- **By understanding how your flood risks have changed, you can make informed decisions to reduce them**
- **WDNR developed your FEMA Risk MAP products based on:**
  - Data gathered from you during the "Discovery" process
  - Analyses associated with the development of the flood risk products
    - Engineering
    - Flood hazard mapping
    - Risk assessment

FEMA WDNR 7 RiskMAP Increasing Resilience Together

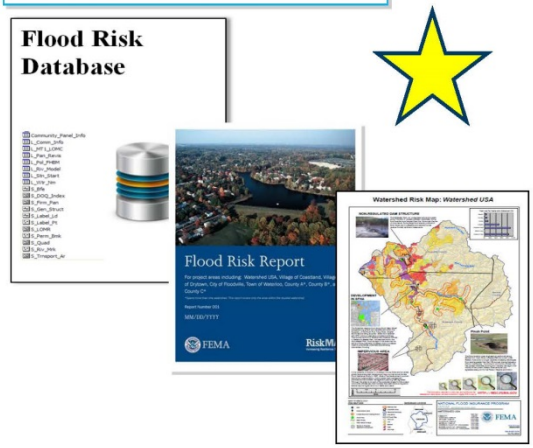
Program Product Comparisons

New 2011 Regulatory Products



Subject to statutory due-process requirements

Non-Regulatory Products

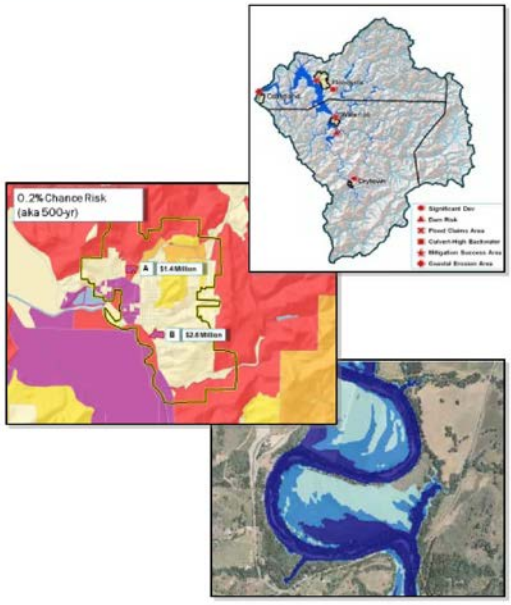


Not subject to statutory due-process requirements

FEMA WDNR 8 RiskMAP Increasing Resilience Together

Flood Risk Products

- **Flood Risk Map**
- **Flood Risk Report**
- **Flood Risk Database**
  - Changes Since Last FIRM
  - Depth and Analysis Grids
  - Flood Risk Assessment (HAZUS)

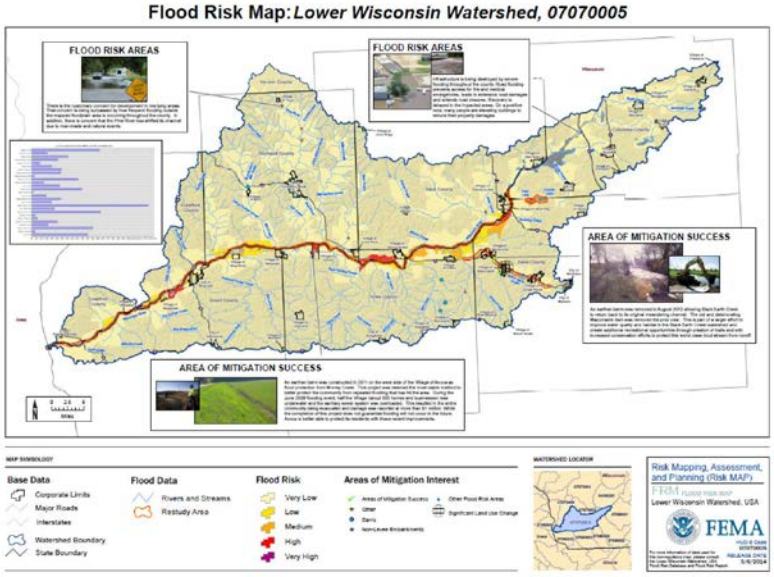


FEMA WDNR 9 RiskMAP Increasing Resilience Together

Flood Risk Map

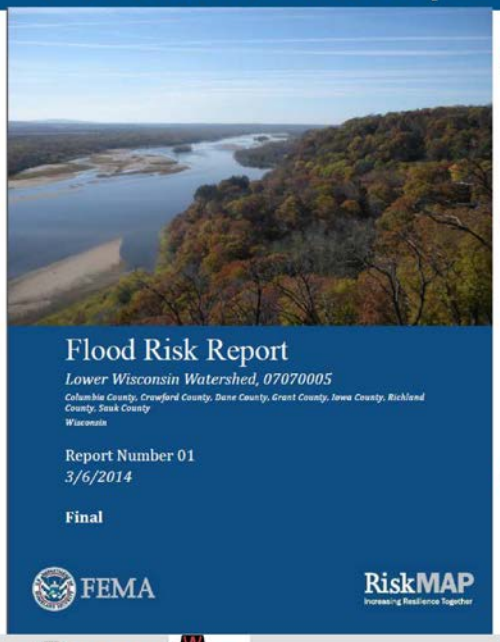
- **Visually Promotes Risk Awareness**
  - Contains results of Risk MAP project non-regulatory datasets
  - Promotes additional flood risk data not shown but located within the Flood Risk Database

Flood Risk Map: *Lower Wisconsin Watershed, 07070005*



FEMA WDNR 10 RiskMAP Increasing Resilience Together

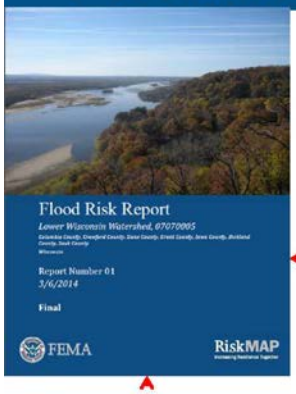
Flood Risk Report



- **Background**
  - Purpose, Methods
  - Risk Reduction Practices
- **Project Results**
  - Changes Since Last FIRM
  - Depth & Analysis Grids
  - Flood Risk Assessment
  - Enhanced Analyses
- **Summarized by Locations**
  - Communities and Watersheds

FEMA WDNR 11 RiskMAP Increasing Resilience Together

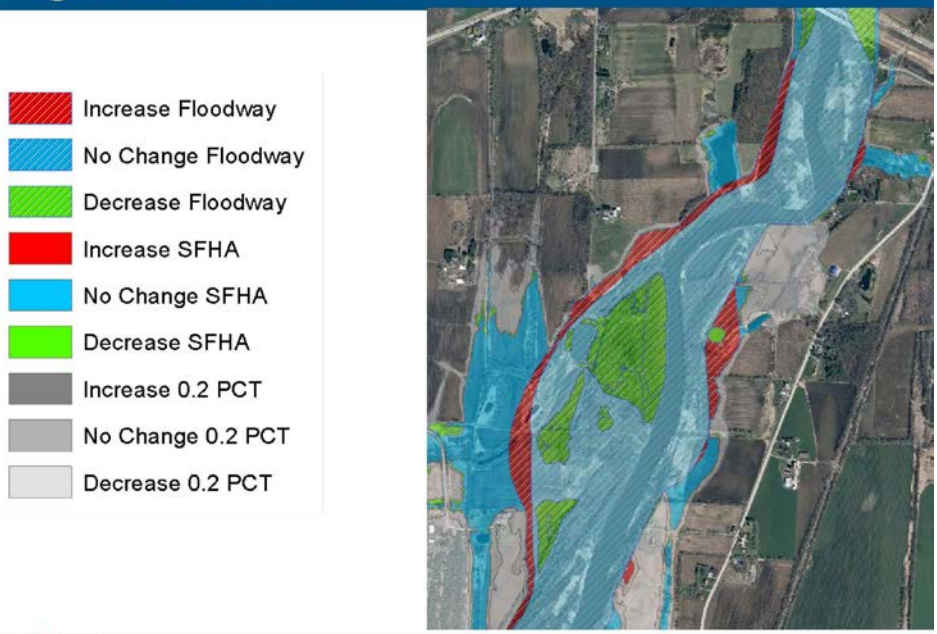
Flood Risk Database



	Total Inventory		Estimated Potential Losses for Flood Event Scenarios									
			10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[3]	Loss Ratio[3,4]	Dollar Losses[3]	Loss Ratio[3,4]	Dollar Losses[3]	Loss Ratio[3,4]	Dollar Losses[3]	Loss Ratio[3,4]	Dollar Losses[3]	Loss Ratio[3,4]
Residential Building/Contents	$691,600,000	72%	$52,800,000	8%	$67,200,000	10%	$74,500,000	11%	$82,100,000	12%	$6,100,000	1%
Commercial Building/Contents	$152,000,000	16%	$23,400,000	15%	$30,100,000	20%	$33,200,000	22%	$37,300,000	25%	$2,700,000	2%
Other Building/Contents	$110,700,000	12%	$4,600,000	4%	$6,700,000	6%	$8,000,000	7%	$9,800,000	9%	$600,000	1%
Total Building/Contents[2]	$956,900,000	100%	$81,100,000	8%	$104,000,000	11%	$116,000,000	12%	$129,300,000	14%	$16,700,000	2%
Business Disruption[1]	N/A	N/A	$1,100,000	N/A	$1,500,000	N/A	$1,700,000	N/A	$2,000,000	N/A	$100,000	N/A
TOTAL[5]	$956,900,000	N/A	$82,300,000	9%	$107,300,000	11%	$119,200,000	12%	$134,300,000	14%	$17,000,000	2%

FEMA WDNR 12 RiskMAP Increasing Resilience Together

Changes Since Last FIRM

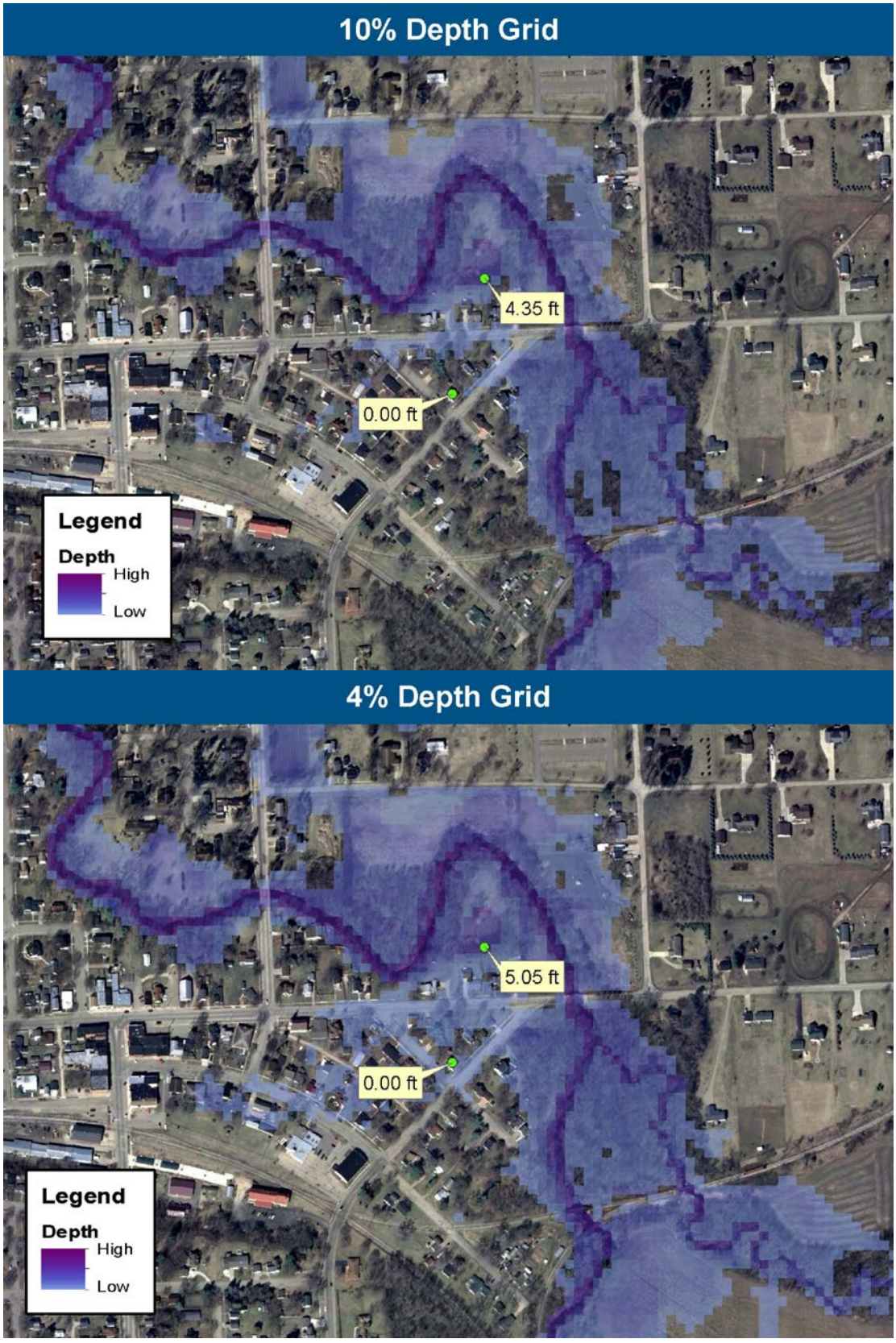


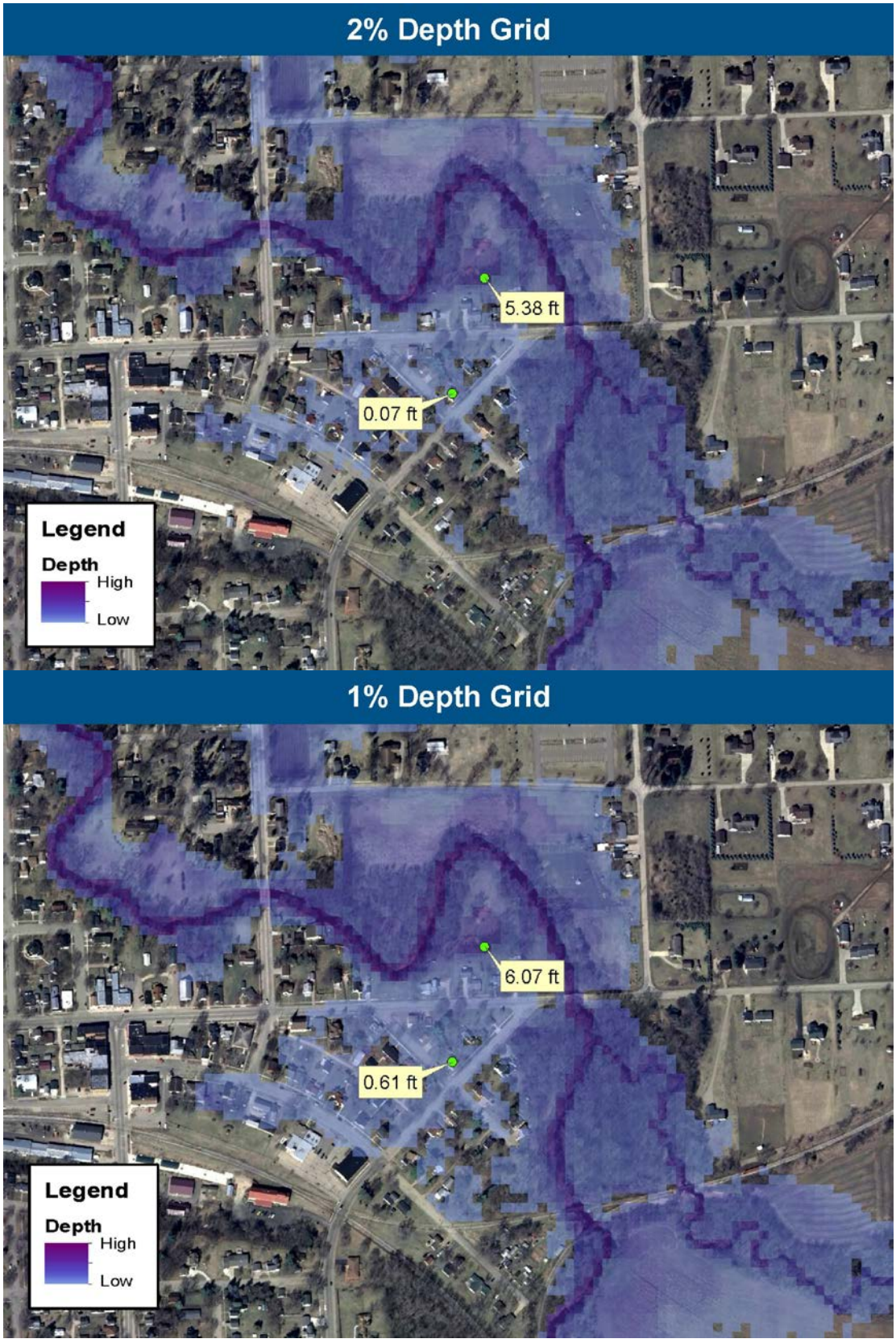
FEMA WDNR 13 RiskMAP Increasing Resilience Together

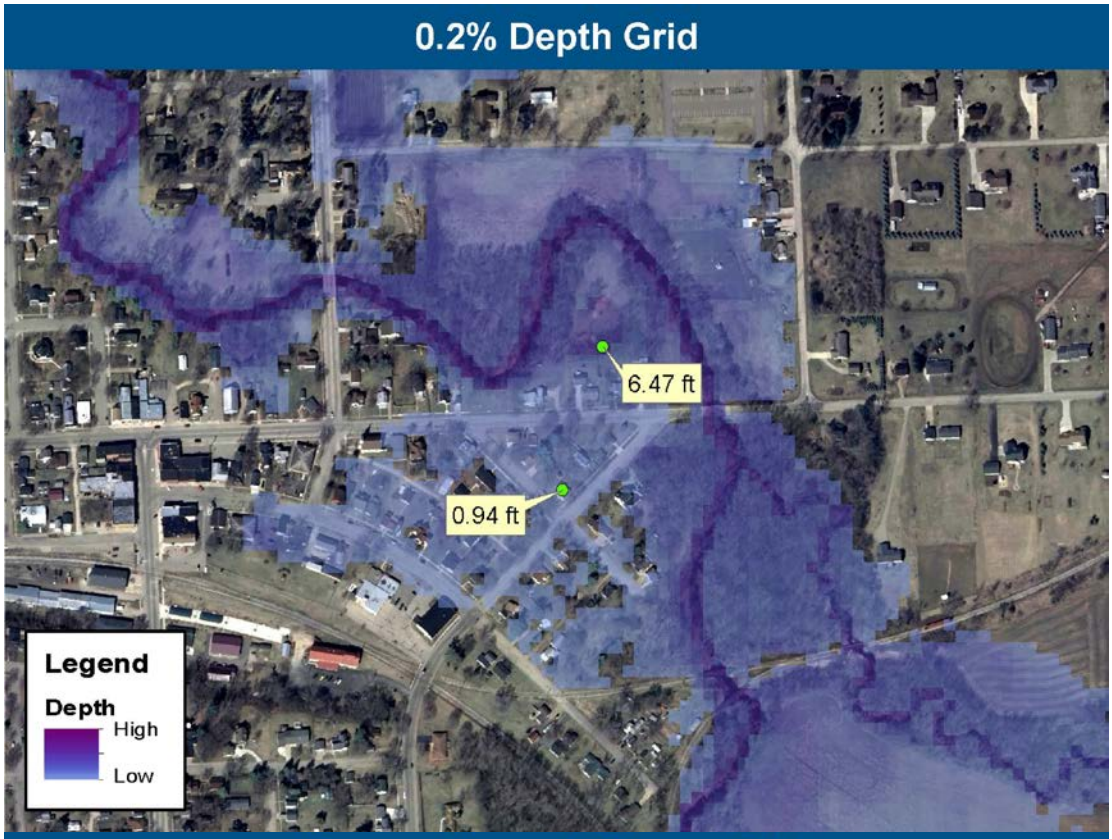
Depth and Analysis Grids

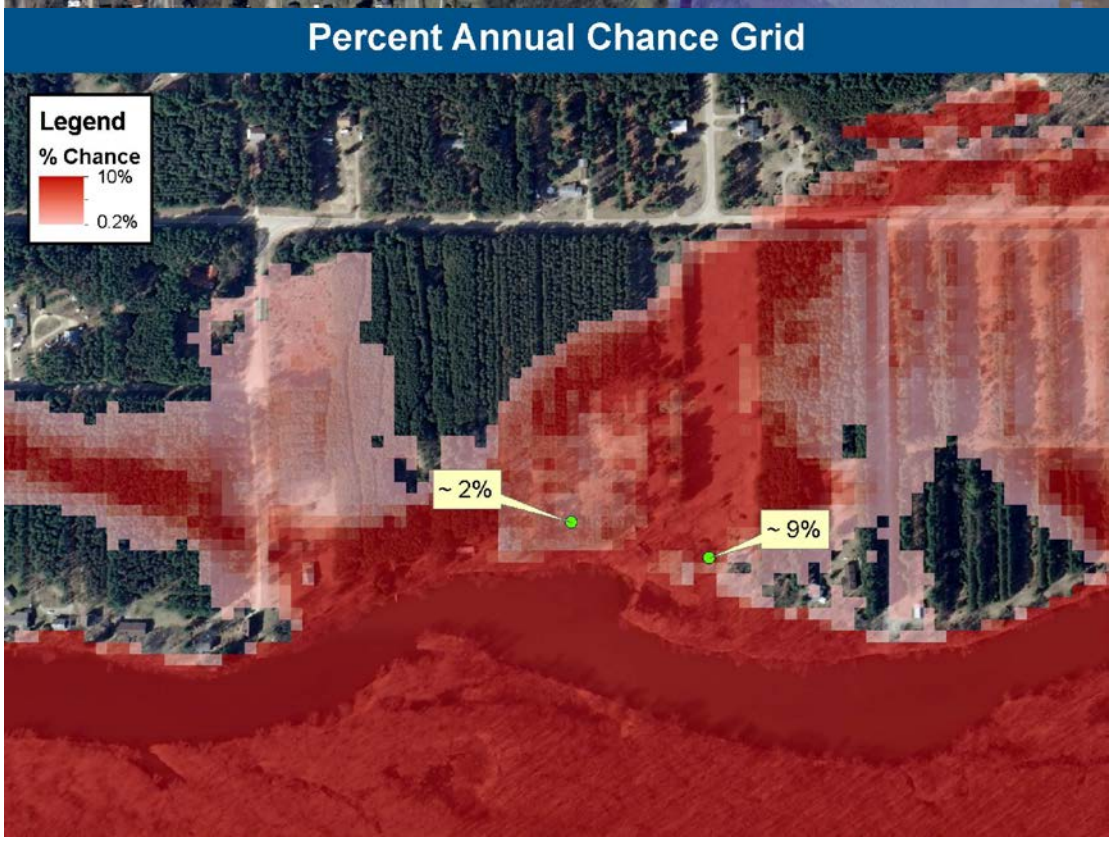
- **Depth Grids**
  - Show the depth of flooding during 5 flood events
    - 10% depth grid, 4% depth grid, 2% depth grid, 1% depth grid, 0.2% depth grid
- **Percent Annual Chance Grid**
  - Shows the risk of flooding in a one year period
- **Percent 30-Year Chance Grid**
  - Shows the risk of flooding over a 30-year period

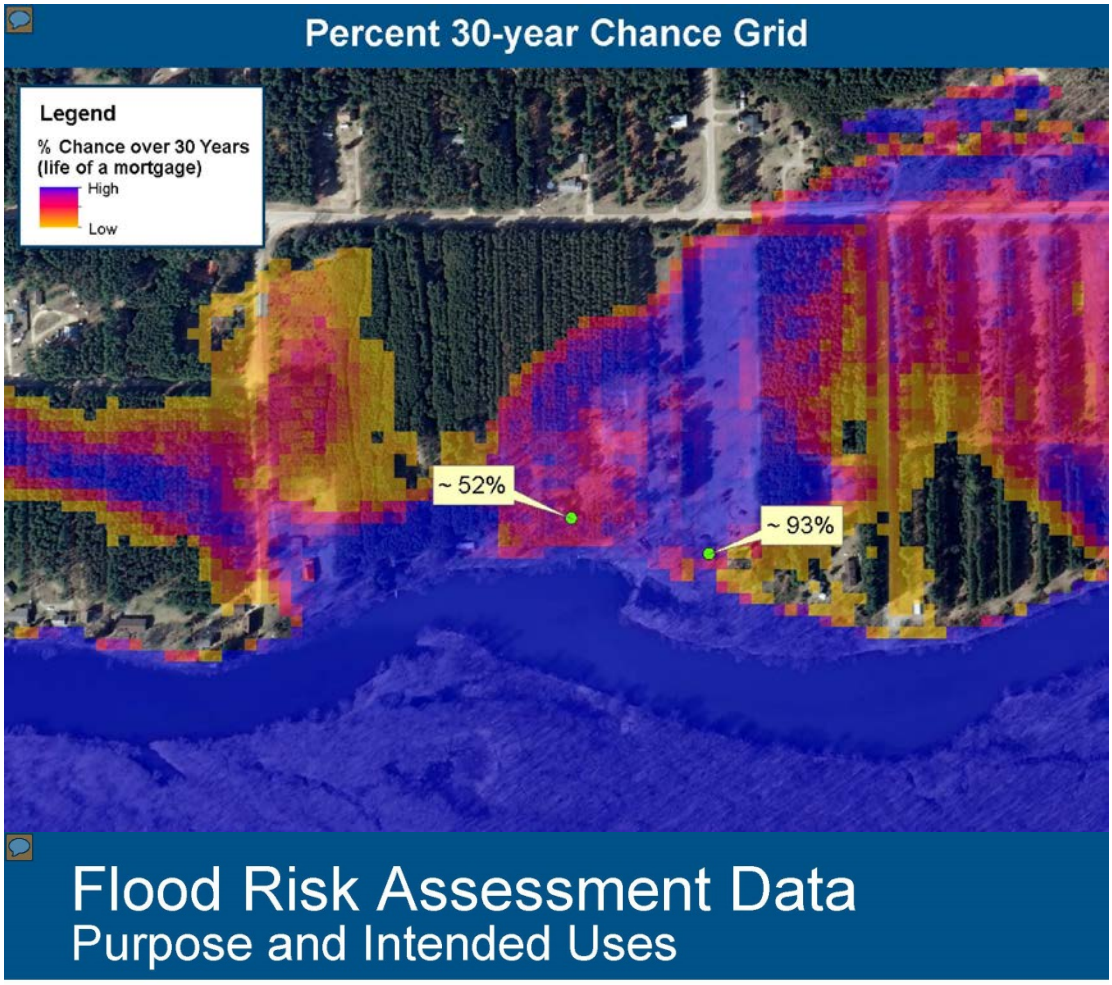
FEMA WDNR 14 RiskMAP Increasing Resilience Together


10% Depth Grid
4.35 ft
0.00 ft
Legend
Depth
High
Low
4% Depth Grid
5.05 ft
0.00 ft
Legend
Depth
High
Low


2% Depth Grid
5.38 ft
0.07 ft
Legend
Depth
High
Low
1% Depth Grid
6.07 ft
0.61 ft
Legend
Depth
High
Low


0.2% Depth Grid
6.47 ft
0.94 ft
Legend
Depth
High
Low


Percent Annual Chance Grid
Legend
% Chance
10%
0.2%
~ 2%
~ 9%



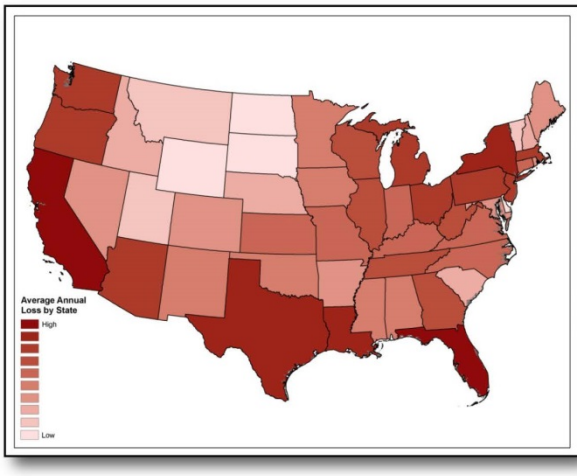
Flood Risk Assessment Data
Purpose and Intended Uses

- **Identify Areas and Communicate Relative Flood Risk:**
  - Flood prone areas
  - Vulnerable people and property
- **Provide Flood Risk $:**
  - Potential damage severity for different flood frequencies
  - Identify locations with possible cost effective mitigation options
- **Improve Estimates for Flood Risk $:**
  - Losses from Average Annualized Loss (AAL) Study
  - Refined losses from new flood study depth grids
  - Refined general building stock data from local sources

FEMA WDNR 22 RiskMAP Increasing Resilience Together

Flood Risk Assessment Data
2010 AAL Study

- **2010 HAZUS-MH Flood Average Annualized Loss Estimation (AAL) was performed for the contiguous U.S. using MR4**
- **Inputs:**
  - County-wide study regions
  - 30 meter DEM
  - Default Census data
- **Final Output included:**
  - Total exposure
  - Average Annualized Loss
  - Annualized Loss Ratio

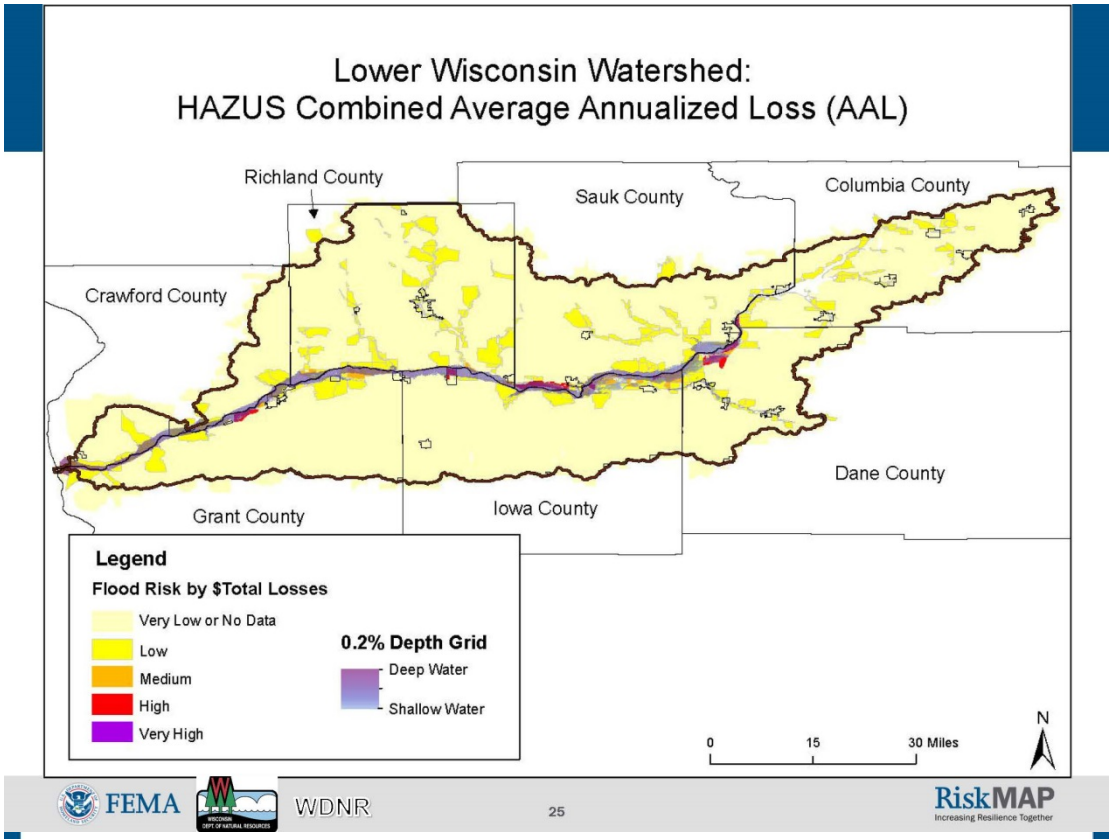


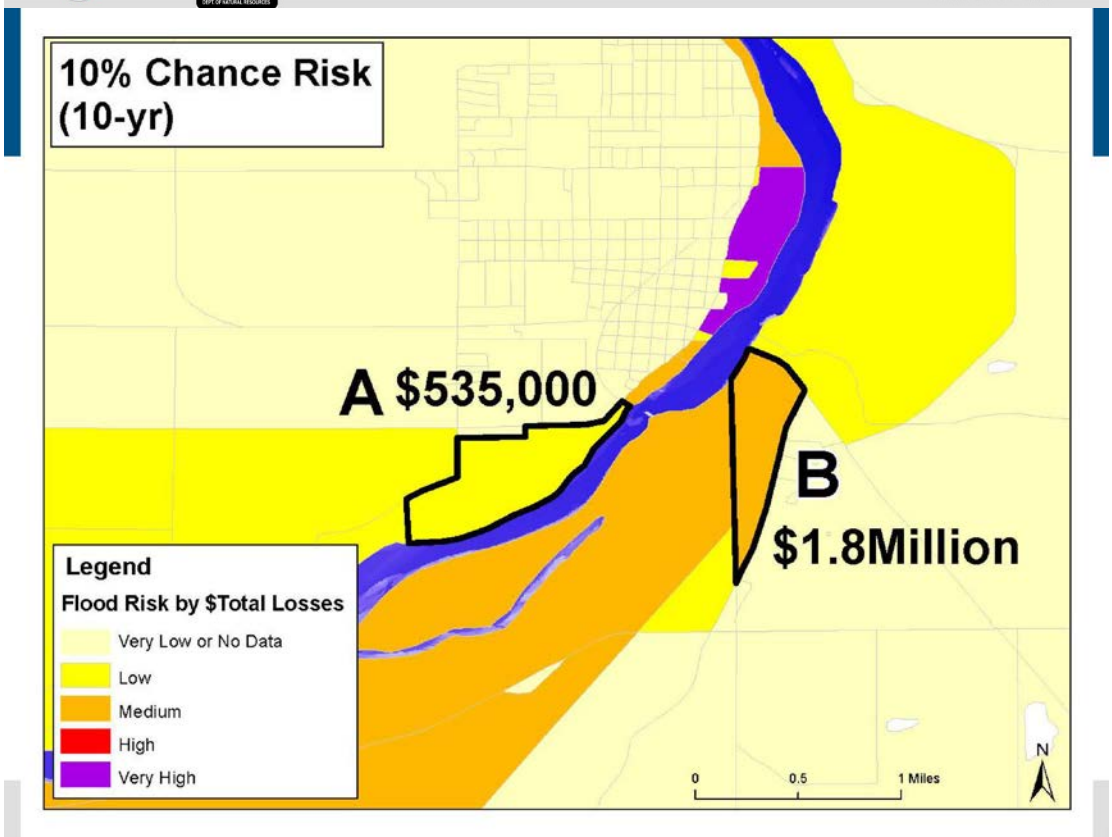
FEMA WDNR 23 RiskMAP Increasing Resilience Together

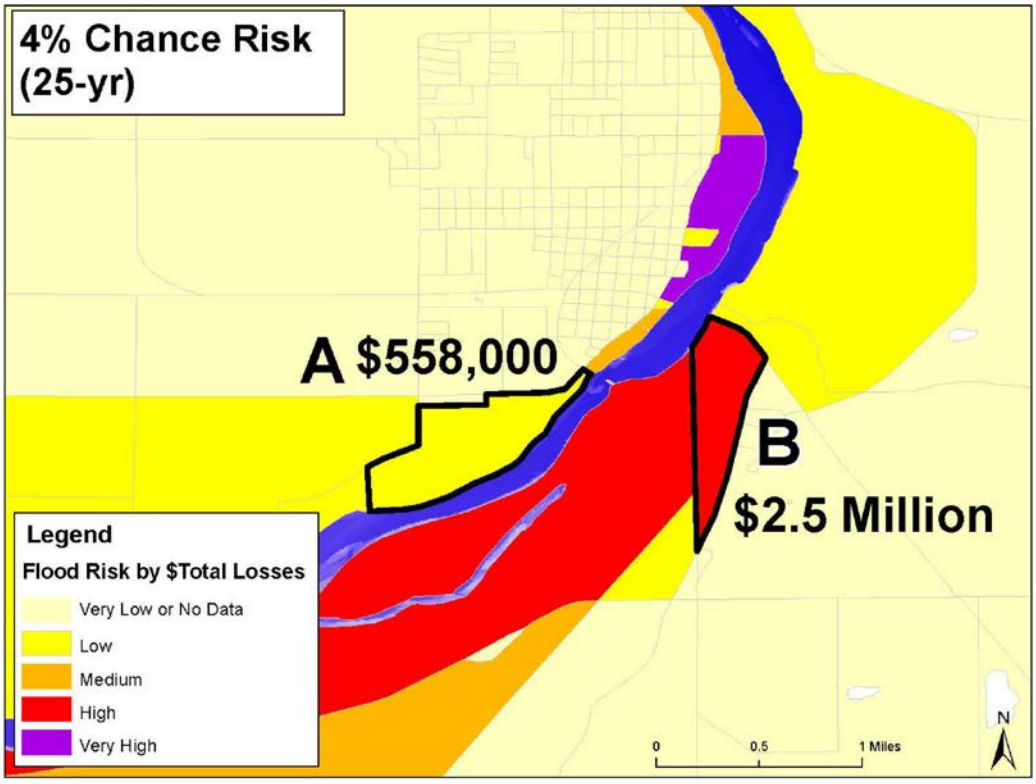
Flood Risk Assessment Data
Refined HAZUS Analysis

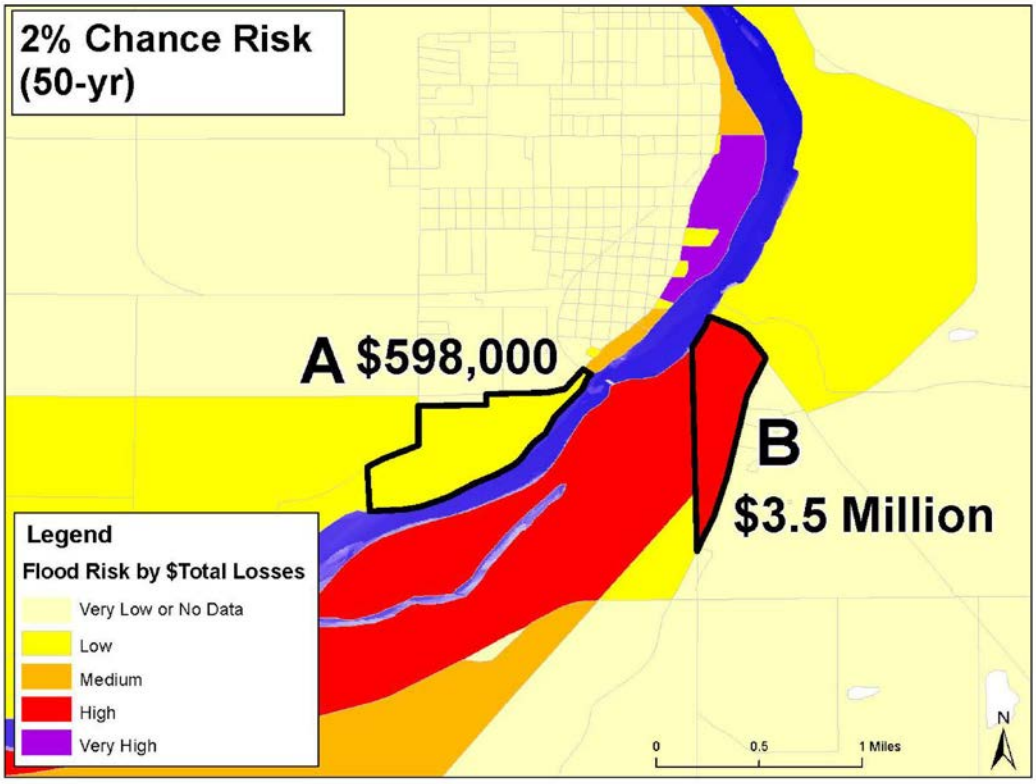
- **Overview**
  - Depth Grids from new study areas imported into HAZUS
  - HAZUS run for each return period, losses estimated, and annualized
  - HAZUS results exported and stored in Flood Risk Database
- **Estimation of Losses**
  - Dollar Losses
    - Residential, Commercial and Other Losses
  - Percent Damage
    - Structure and Content Considerations
  - Business Disruption

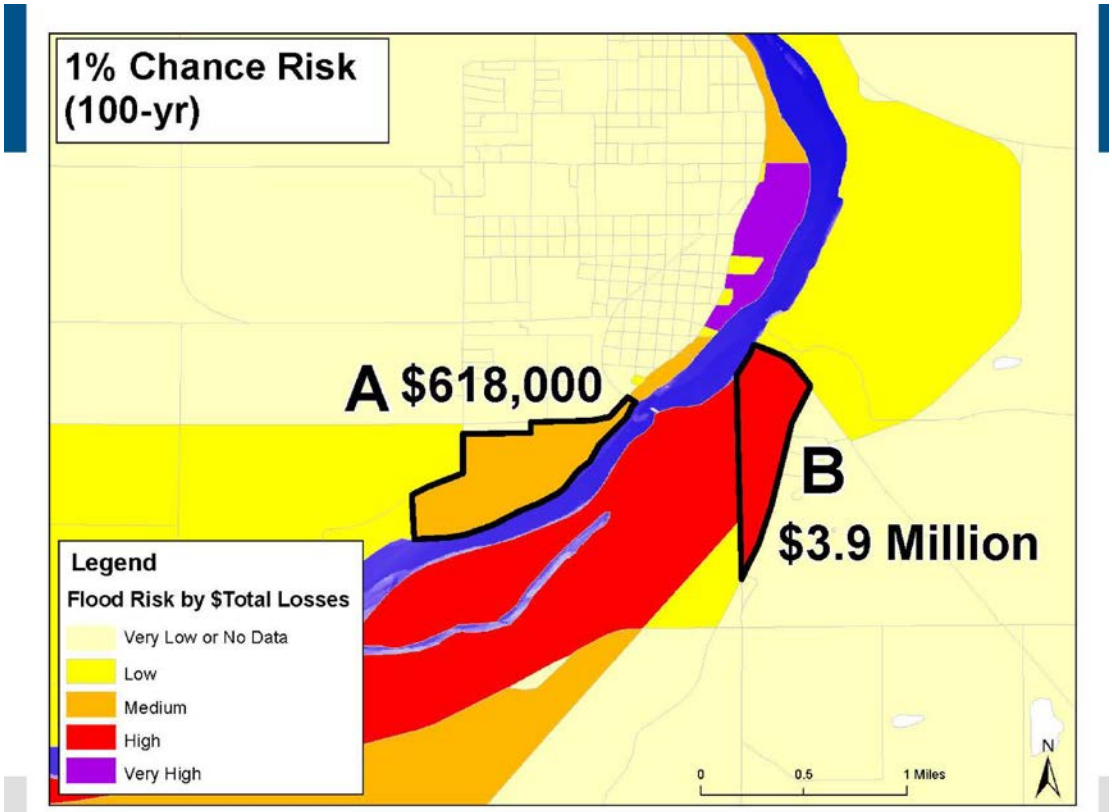
FEMA WDNR 24 RiskMAP Increasing Resilience Together

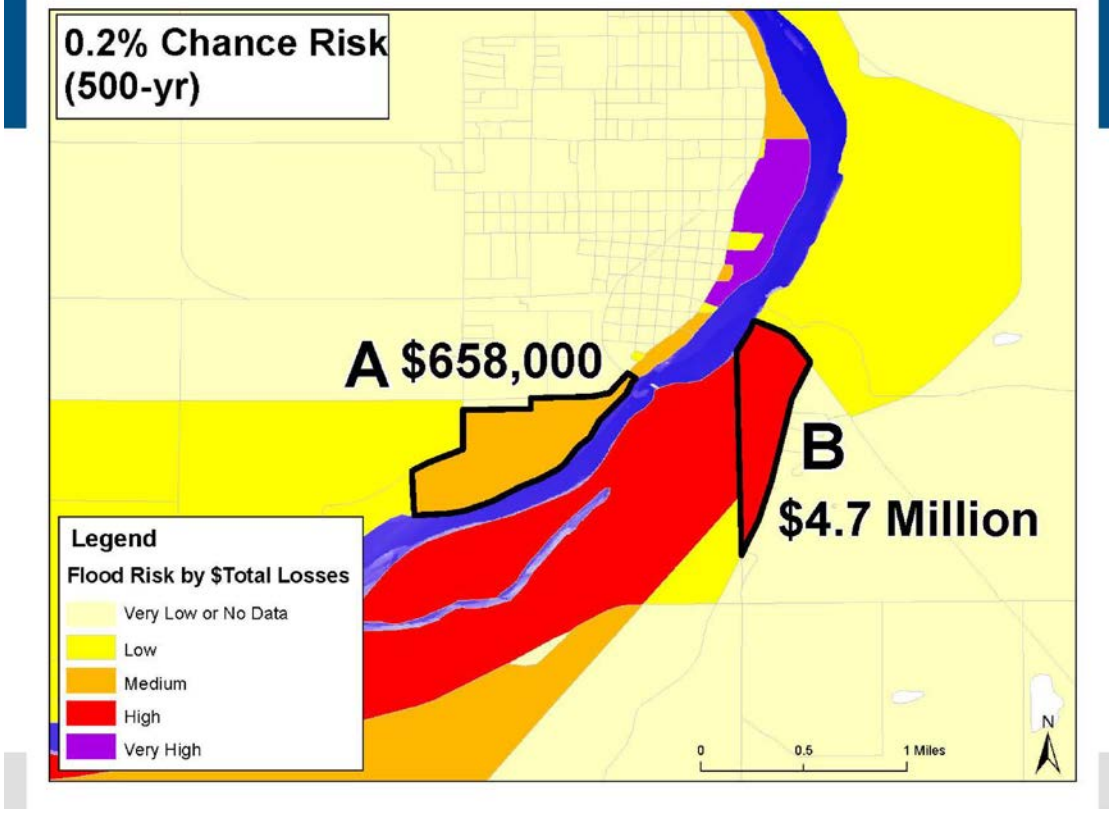

Lower Wisconsin Watershed:
HAZUS Combined Average Annualized Loss (AAL)
Richland County
Sauk County
Columbia County
Crawford County
Dane County
Grant County
Iowa County
Legend
Flood Risk by $Total Losses
Very Low or No Data
Low
Medium
High
Very High
0.2% Depth Grid
Deep Water
Shallow Water
0
15
30 Miles
N
FEMA
WDNR
25
RiskMAP
Increasing Resilience Together

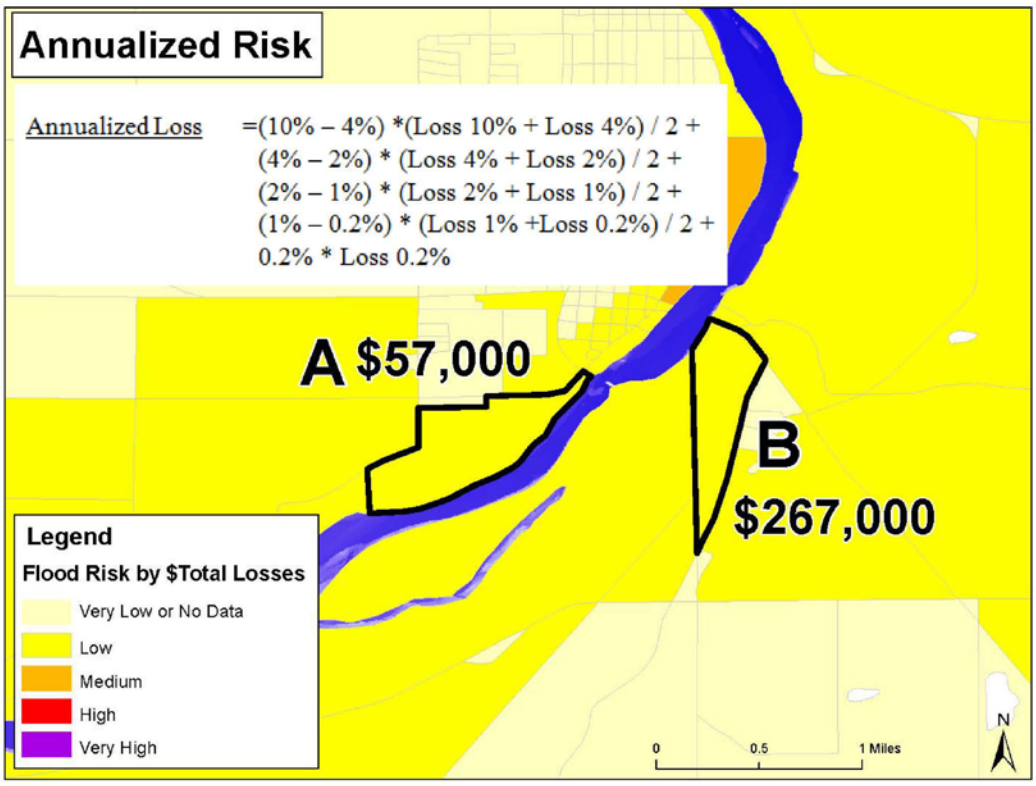

10% Chance Risk
(10-yr)
A $535,000
B
$1.8Million
Legend
Flood Risk by $Total Losses
Very Low or No Data
Low
Medium
High
Very High
0
0.5
1 Miles
N

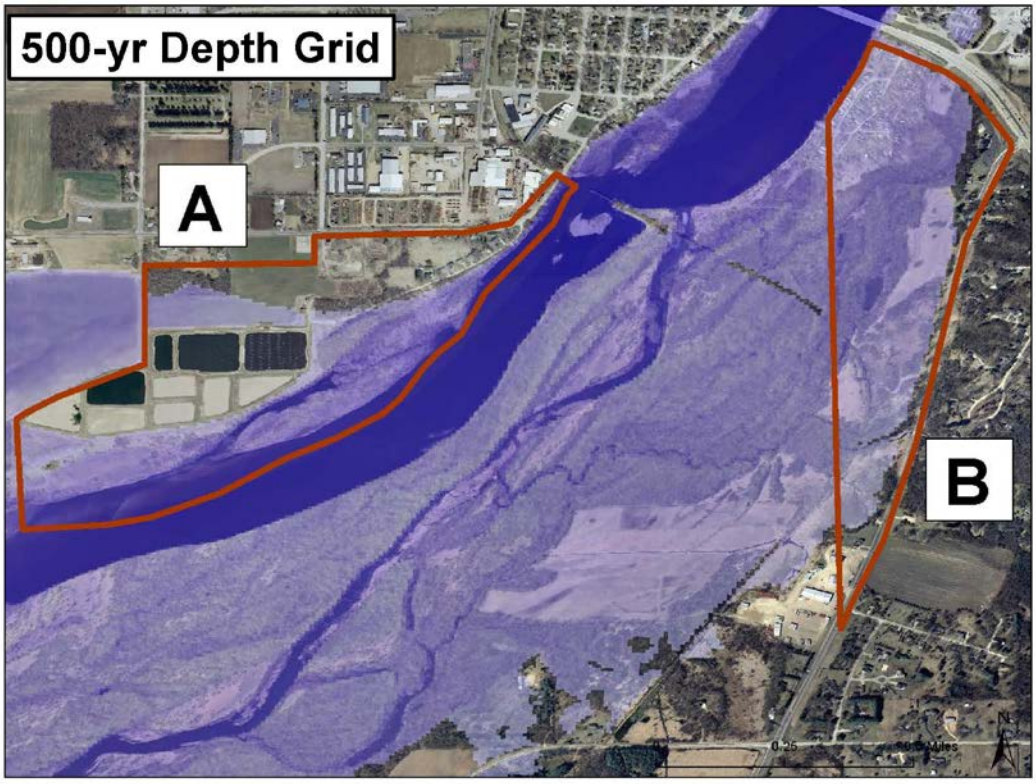

4% Chance Risk
(25-yr)
A $558,000
B
$2.5 Million
Legend
Flood Risk by $Total Losses
Very Low or No Data
Low
Medium
High
Very High
0
0.5
1 Miles
N


2% Chance Risk
(50-yr)
A $598,000
B
$3.5 Million
Legend
Flood Risk by $Total Losses
Very Low or No Data
Low
Medium
High
Very High
0
0.5
1 Miles
N


1% Chance Risk
(100-yr)
A $618,000
B
$3.9 Million
Legend
Flood Risk by $Total Losses
Very Low or No Data
Low
Medium
High
Very High
0
0.5
1 Miles
N


0.2% Chance Risk
(500-yr)
A $658,000
B
$4.7 Million
Legend
Flood Risk by $Total Losses
Very Low or No Data
Low
Medium
High
Very High
0
0.5
1 Miles
N


Annualized Risk
Annualized Loss =(10% – 4%) *(Loss 10% + Loss 4%) / 2 +
(4% – 2%) * (Loss 4% + Loss 2%) / 2 +
(2% – 1%) * (Loss 2% + Loss 1%) / 2 +
(1% – 0.2%) * (Loss 1% +Loss 0.2%) / 2 +
0.2% * Loss 0.2%
A $57,000
B
$267,000
Legend
Flood Risk by $Total Losses
Very Low or No Data
Low
Medium
High
Very High
0
0.5
1 Miles
N


500-yr Depth Grid
A
B

Flood Risk Report Content – Community Summaries

HAZUS-MH Estimated Loss Information

Watershed USA's flood risk analysis incorporates results from a FEMA performed HAZUS-MH analysis which accounts for newly modeled areas in the study area and newly modeled depths for certain flood events. Potential losses were estimated as well as potential loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

	Total Inventory		Estimated Potential Losses for Flood Event Scenarios									
			10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[3]	Loss Ratio[1,6]	Dollar Losses[3]	Loss Ratio[1,6]	Dollar Losses[3]	Loss Ratio[1,6]	Dollar Losses[3]	Loss Ratio[1,6]	Dollar Losses[3]	Loss Ratio[1,6]
Residential Building/Contents	$11,000,000	28%	$3,400,000	31%	$3,900,000	35%	$4,000,000	36%	$4,300,000	39%	$400,000	3%
Commercial Building/Contents	$25,700,000	66%	$7,300,000	28%	$9,300,000	36%	$10,100,000	39%	$11,600,000	45%	$800,000	3%
Other Building/Contents	$2,100,000	5%	$200,000	9%	$200,000	10%	$300,000	13%	$400,000	19%	$20,000	1%
Total Building/Contents[2]	$38,800,000	100%	$10,900,000	28%	$13,300,000	34%	$14,300,000	37%	$16,300,000	42%	$1,400,000	4%
Business Disruption[3]	$0	N/A	$200,000	N/A	$300,000	N/A	$300,000	N/A	$400,000	N/A	$20,000	N/A
TOTAL[4]	$38,800,000	N/A	$11,100,000	29%	$13,600,000	35%	$14,600,000	38%	$16,600,000	43%	$1,400,000	4%

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

FEMA WDNR 33 RiskMAP Increasing Resilience Together

Strategies To Reduce Your Flood Risk

FEMA WDNR 34 RiskMAP Increasing Resilience Together

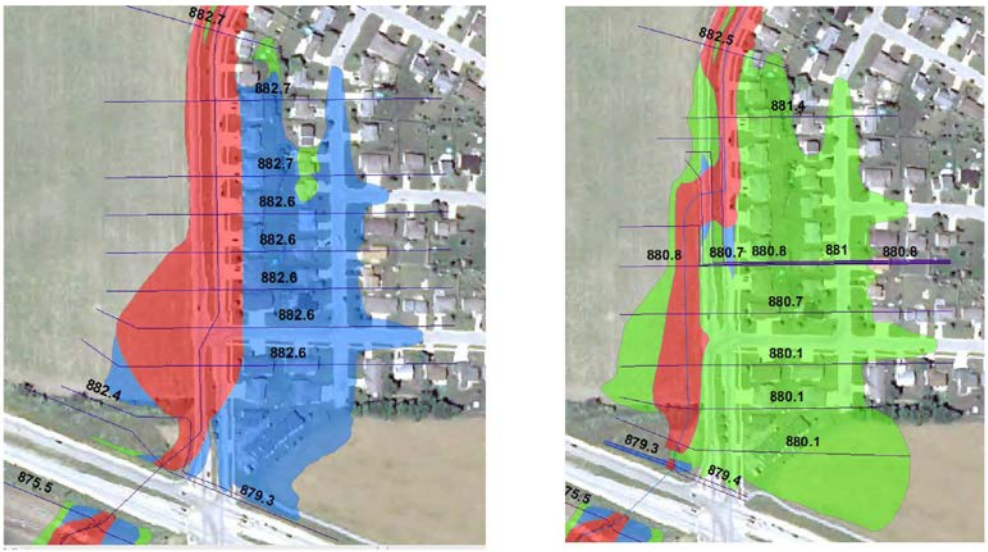
Strategies to Reduce Flood Risk

There are many strategies you can take to reduce your flood risk

- **Prevention**
  - Affects future development
  - Includes ordinances and building codes
- **Property protection**
  - Affects existing development
  - Includes elevation and acquisition
- **Public education and awareness**
  - Informs people about risk
  - Includes outreach activities
- **Natural resource protection**
  - Protects water quality
  - Protects Habitats
  - Restores resources
- **Emergency services protection**
  - Protects critical facilities
- **Structural projects**
  - Involves construction
  - Includes berms
  - Includes altering stream routes

FEMA WDNR 35 RiskMAP Increasing Resilience Together

Spotlight on a Local Best Practice



Red = Floodway Blue = 100-year Floodfringe Green = 500-year floodplain

FEMA WDNR 36 RiskMAP Increasing Resilience Together

Spotlight on a Local Best Practice

FEMA WDNR 37 RiskMAP Increasing Resilience Together

Mitigation Action Form

Date:_____

Contact Information

Please enter the primary contact associated with this Mitigation Action.

1. Full Name:_____
2. Email Address:_____
3. Title and Organization:_____
4. Jurisdiction Name(s):_____

Mitigation Action Information

5A. Describe your community's natural hazard and mitigation action/strategy:

_____

_____

_____

5B. What is your community's progress on this action/strategy?

_____

_____

Project Information

6. Estimated Project Duration

☐ Less than 1 yr ☐ 1-2 yrs ☐ 2-3 yrs ☐ 3-5 yrs ☐ More than 5 yrs

7. Estimated Project Cost

☐ Less than $150,000 ☐ $150,000-$400,000 ☐ $400,001 - $750,000 ☐ $750,001 - $1,000,000 ☐ Greater than $1,000,000

← Scan this image with your smartphone to visit the Mitigation Action Collection website.

Mitigation Action Collection Form
http://mat.msc.fema.gov/
Version 01/10/2014

FEMA RiskMAP Increasing Resilience Together

Mitigation Action Form

8. **What is the estimated source or strategy for funding this project?**

9. **Additional Details**
Enter any additional details about your project below.

You may return this form 4 ways:
1) Scan and email the form to Colleen.Hermans@Wisconsin.gov
2) Bring the completed form to the Resilience Meeting on March 6, 2014
3) Fax your form attn. Colleen Hermans WT/3 to 608-267-2800
4) Or, mail your form to:
Colleen Hermans WT/3
Wisconsin Department of Natural Resources
P.O. Box 7921
Madison, WI 53707-7921

FEMA

RiskMAP
Increasing Resilience Together

Mitigation Action Form

Mitigation Action Types

Local Plans and Regulations

- **Zoning and Ordinances**
  - Easements
  - Erosion Overlay Districts
  - Setbacks
  - Open Space Preservation
  - Enclosure Limits
  - Other
- **Transfer of Development Rights**
- **Building Codes**
  - Enforcement
  - Higher Floodway Standards
  - Additional Freeboard (2 ft above BFE)
  - International Building Code
  - International Residential Code
  - Post Disaster Code Enforcement
  - Other
- **Establish Funding Source for Risk Reduction**
- **Incentives for Risk Reduction**
- **National Hazards Integrated into Other Plans**
  - Capital Improvement Plan
  - Comprehensive Plan
  - Master Plan
  - Site Plan
  - Stormwater Management
  - Coastal Zone Management
  - Floodplain Management

Natural Systems

- **Forest/Vegetation Management**
  - Xeriscaping
- **Fuel Reduction**
- **Open Space Preservation**
- **Protect and Restore Natural Functions**
  - Beach Nourishment
  - Reef of breakwater Restoration
  - Dune Rehabilitation/Protection
  - Ground Water Recharge
  - Sediment Trapping Vegetation
  - Wetland Restoration
  - Other
- **Soil Stabilization or Erosion Control**
  - Sloping/Grading
  - Vegetation
  - Terracing
  - Rip Rap
  - Geotextile Fabric
  - Other
- **Stream Maintenance**
- **Tree Management**
- **Other**

Structure and Infrastructure Projects

- **Acquisition**
- **UHI Albedo Enhancement**
  - Green Roof
  - Reflective Surfaces
- **Elevation**
  - Structure
  - Utilities
  - Other
- **Flood Control/Management**
  - Culvert Expansion/Modification
  - Bridge Expansion/Modification
  - Sediment Retention
  - Detention/Retention Basin
  - Dams/Levees
  - Drainage Improvements
  - Green Roofs
  - Jetties
  - Permeable Paving
  - Rain Gardens
  - Revetments
  - Seawalls
  - Other
- **Retrofit**
  - Structural
  - Non-Structural
  - Other
- **Safe Room Construction**
- **Underground Utilities**
- **Other**

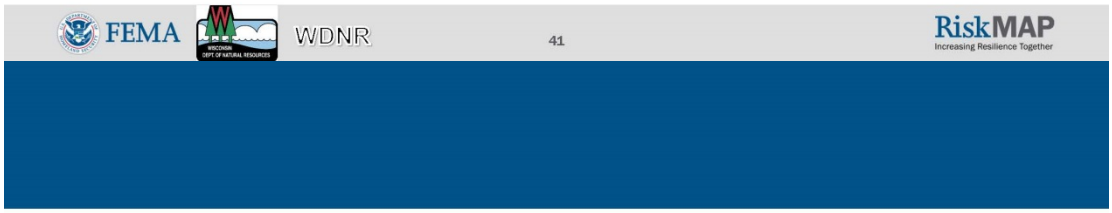
← Scan this image with your smartphone to visit the Mitigation Action Collection website.

Mitigation Action Collection Form
http://nat.msc.fema.gov/
Version 01/10/2014

FEMA

RiskMAP
Increasing Resilience Together

Resources to Implement Your Strategies and Reduce Your Flood Risk



Please see the Wisconsin Emergency Management Presentation for this section

Communication Roles and Responsibilities

Communicate About Your Risk

- **Flood risk awareness:**
  - Leads to action
  - Increases overall community resilience
  - Builds support for implementing the mitigation plan
- **Your constituents:**
  - Expect to hear about flood risk from officials, lenders, insurance agents, surveyors, and real estate agents
  - Will talk about flood risk impacts with neighbors, friends and family

Communicate About Your Risk (cont.)

- **Risk MAP makes it easier to share flood risk information with your constituents:**
  - Draft letters to citizens
  - Draft media materials
  - Use the Risk MAP products to communicate risk
    - Flood Risk Report, broken down by community
    - Changes Since Last FIRM
    - HAZUS analysis
    - Depth & Analysis Grids
  - Local community meetings, workshops, neighborhood outreach
  - Have a Flood Risk section in your local library

What Next?

- **Mitigation action list**
- **Develop outreach plans**
- **Work together to coordinate on:**
  - Mitigation planning
  - Grant applications or technical assistance
  - Communication
- **Please pick up a CD with this data before you leave**
- **We will send a follow-up email with resources and links**

Questions & Discussion

- **Non-Reg Data, Scheduling**: Colleen Hermans
- **NFIP, Ordinance**: Gary Heinrichs
- **Engineering, Mitigation Action Form**: Chris Olds
- **Mitigation, Emergency Management**: Katie Sommers and & Kimberly Berginnis

Thanks for participating! We'll be communicating again soon.

FEMA WDNR 47 RiskMAP Increasing Resilience Together

11. Appendix B – WEM Presentation Slides

Value of Mitigation

For every $1 spent on mitigation, $4 is saved in future damages.
(Per the National Institute of Building Sciences -2005)

Why Do We Mitigate?

In Wisconsin

- $3 billion in Disaster-related damages last 3 decades
- 12 Federal Disaster Declarations in the 90's compared to 6 in the 80's
- 2000, 2001, two in 2002, 2004, 2007, 2008, two in 2010, 2011, 2012, 2013
- 2 snow emergencies (2000 and 2008)

Examples of Mitigation

Acquisition/Demolition

Communities acquire land, demolish structures and keep the land in open space designation

Images from Darlington, WI


Elevation
Elevation raises a structure out of the floodplain. Wisconsin has specific regulations to follow with elevation projects. See DNR for more information.
Image from Soldiers Grove, WI

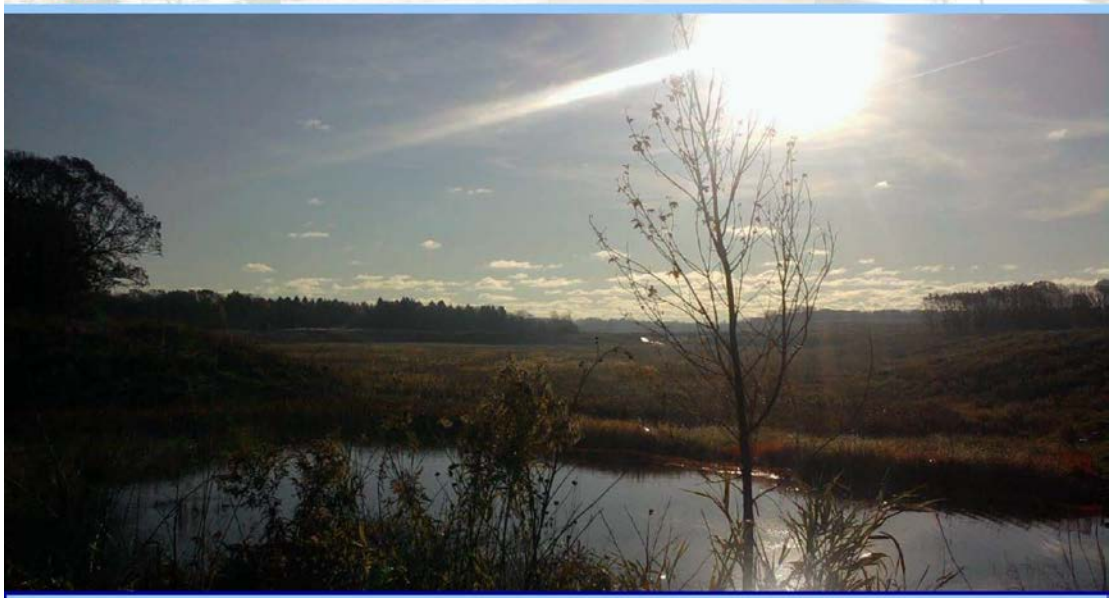

Floodwall
Floodwalls can prevent water from inundating structures that cannot be elevated, relocated, or demolished.
Image from Darlington, WI

Community Safe Room

Community Safe Rooms built to FEMA-361 standards can withstand winds up to 250 MPH

Image from Town of Dunn, WI

Stormwater Detention



Detention ponds can store storm water runoff, decreasing flash flooding in urban areas.

Image from MMSD Stormwater Detention Project (Wauwatosa, WI)

Stormwater

Stream restoration allows watersheds to better manage flooding

Image from Thiensville, WI

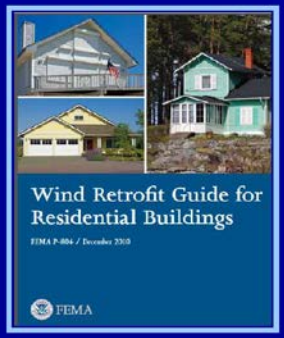
River Warning Systems

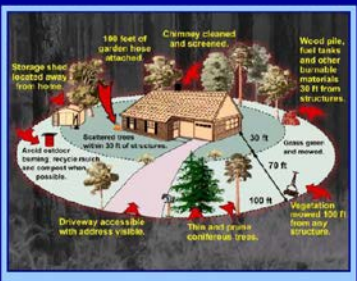
River warning systems installed on conservation dams to warn county officials about expected dam breaching.

Images from Vernon County

Other Projects

Mobile Home Tie-Downs





Proper Landscaping

- Raise appliances and utilities
- Install back-flow valves
- Retrofit for wind resistance
- Education and public awareness
- INSURANCE (flood and sewer)
- Land use planning

Benefits of Mitigation

- Protect the health/safety of citizens
- Preserve or expand tax base
- Attract or retain business/industry
- Revitalize a depressed area

Gays Mills, WI

Gays Mills, WI

Benefits of Mitigation

- Enhance recreation and tourism
  - Parks
  - Trails
- Increase community pride & improve quality of life
- Save tax dollars

Darlington, WI

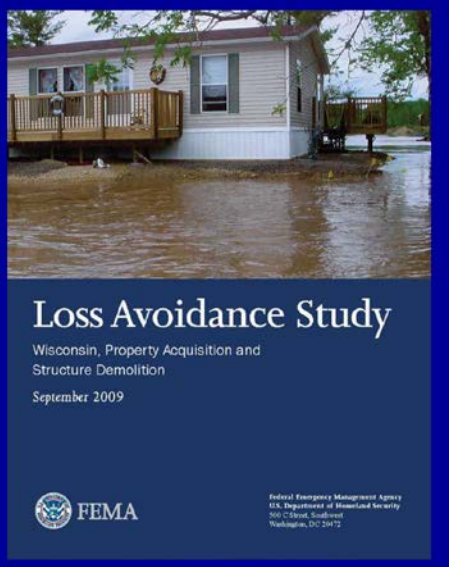

Chaseburg, WI

Mitigation Successes

- Soldiers Grove: Acquisition/demolition, relocation, elevation
- Gays Mills: Acquisition/demolition, relocation, elevation
- Prairie du Chien: Acquisition/demolition, relocation
- Reedsburg: Acquisition/demolition
- Rock Springs: Acquisition/demolition
- Spring Green: Acquisition/demolition

Mitigation Success: Losses Avoided

- Crawford County Highway Department
  - 2001 Mitigation Project
  - Project Costs: $663,780
  - Losses Avoided: $3,929,449
- Return on Investment: 592%
- Looked at 2 flood events (2007 and 2008)
- ROI increases with subsequent events



Mitigation Planning

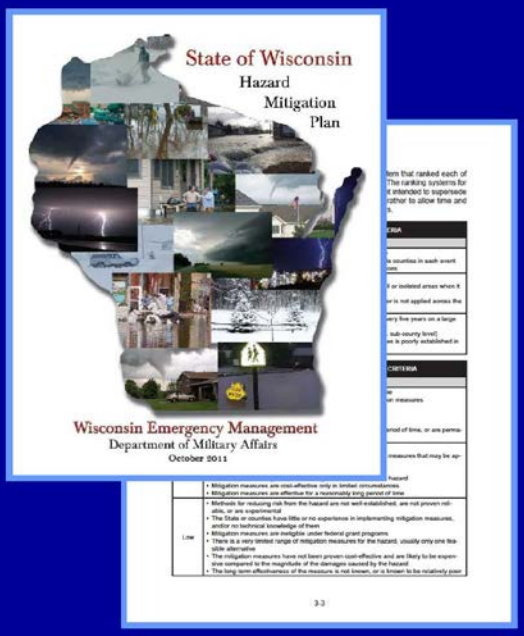
Disaster Mitigation Act of 2000

- Public Law 106-390 signed into law 10/30/00
- Establishes a national disaster hazard mitigation program
  - Section 203: Pre-Disaster Mitigation Program
  - Section 322: Mitigation Planning Requirement

Vision of DMA 2000

- To reduce disaster losses thru pre-disaster mitigation planning by pre-identifying, cost-effective mitigation.
- Mitigation planning would then streamline and speed up the recovery process.

Mitigation Planning



- Describe actions to mitigate hazards, risks, and vulnerabilities
- Establish strategy to implement those actions
- Pre-identify projects to ensure comprehensive, integrated approach to hazard reduction

Mitigation Actions

Mitigation actions identified through RiskMAP process need to be coordinated with the county hazard mitigation planning process.

Planning Status

- Columbia County: Expired 9/29/13; updating
- Crawford County: Expires 7/26/2017
- Dane County: Expires 5/12/2015
- Grant County: Expires 5/9/2018
- Iowa County: Expires 10/17/2017
- Richland County: Expires 10/9/2014; updating
- Sauk County: Expires 10/3/2017

Mitigation Assistance

Public Assessment Program

Incorporate cost-effective mitigation measures when repairing damaged public facilities.

Unified Hazard Mitigation Assistance Program

Hazard Mitigation Grant Program

Pre-Disaster Mitigation Program

Flood Mitigation Assistance Program

Eligible Sub-Applicants

Entity	Program Name: HMGP (Hazard Mitigation Grant Program)	Program Name: PDM (Pre-Disaster Mitigation)	Program Name: FMA (Flood Mitigation Assistance)
State Agencies	√	√	√
Tribal Governments	√	√	√
Local Governments	√	√	√
Private Non-Profit Organizations (PNPs)	√		

Cost Sharing

Programs	Mitigation Activity Grant (Percent of Federal/Non-Federal Share)	Management Costs (Percent of Federal/Non-Federal Share)	
		Grantee	Sub-Grantee
HMGP	75/25	100/0	-/- *
PDM	75/25	75/25	75/25
PDM – Sub-grantee is a small impoverished community	90/10	75/25	90/10
PDM – Tribal grantee is small impoverished community	90/10	90/10	90/10
FMA	75/25	75/25	75/25
FMA – repetitive loss property	90/10	90/10	90/10
FMA – severe repetitive loss property	100/0	100/0	100/0

Funding Availability

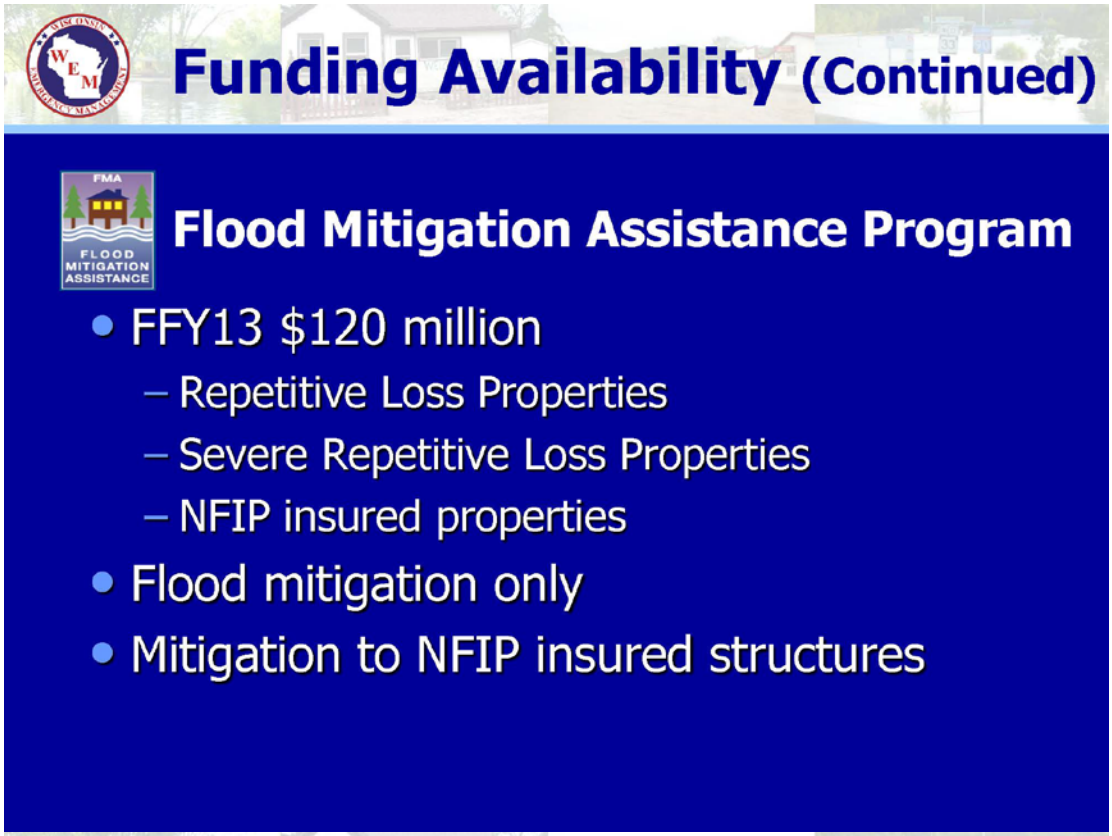
Hazard Mitigation Grant Program

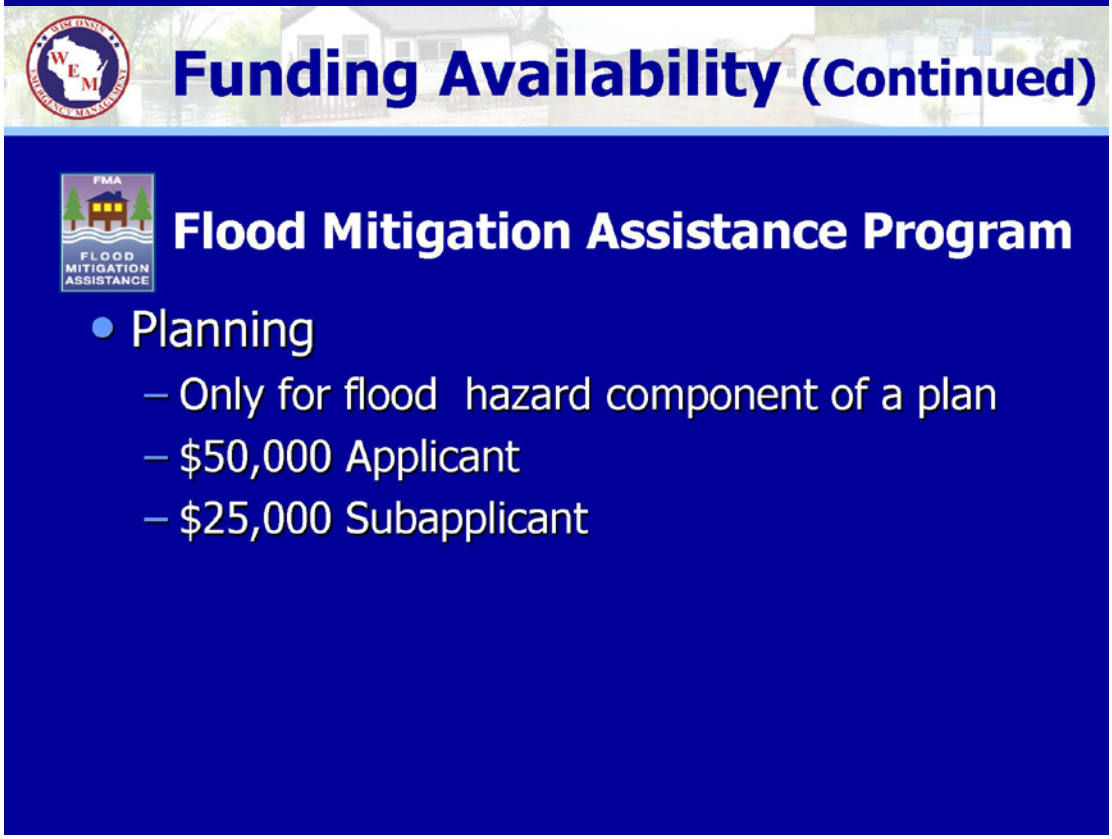
- Post-disaster
- 15% (20% with Enhanced Plan) of the total federal funds allocated for Public and Individual Assistance programs for each disaster
- Wisconsin is an "enhanced" state

Funding Availability (Continued)

Pre-Disaster Mitigation Program

- Annual, national competition
- Subgrants projects capped at $3 million federal share; Planning $800,000 for new plan, $300,000 plan update
- FFY13 $23.7 million nationwide
- Program reauthorized through 9/30/13


Funding Availability (Continued)
Flood Mitigation Assistance Program
FFY13 $120 million
Repetitive Loss Properties
Severe Repetitive Loss Properties
NFIP insured properties
Flood mitigation only
Mitigation to NFIP insured structures


Funding Availability (Continued)
Flood Mitigation Assistance Program
Planning
Only for flood hazard component of a plan
$50,000 Applicant
$25,000 Subapplicant

Funding Availability (Continued)

Repetitive Loss Properties

- 90/10 cost share
- Definition (significantly different):
  - Incurred flood-related damage on 2 occasions that equaled or exceeded 25% of the market value at the time of each event; and
  - At the time of second event of flood-related damage, the flood insurance policy includes ICC coverage

Repetitive Loss Properties

- Dane County: 1 property
- Muscoda: 1 property
- Gays Mills: 2 properties (1 acquired)
- Steuben: 1 property (part of pending project)

Funding Availability (Continued)

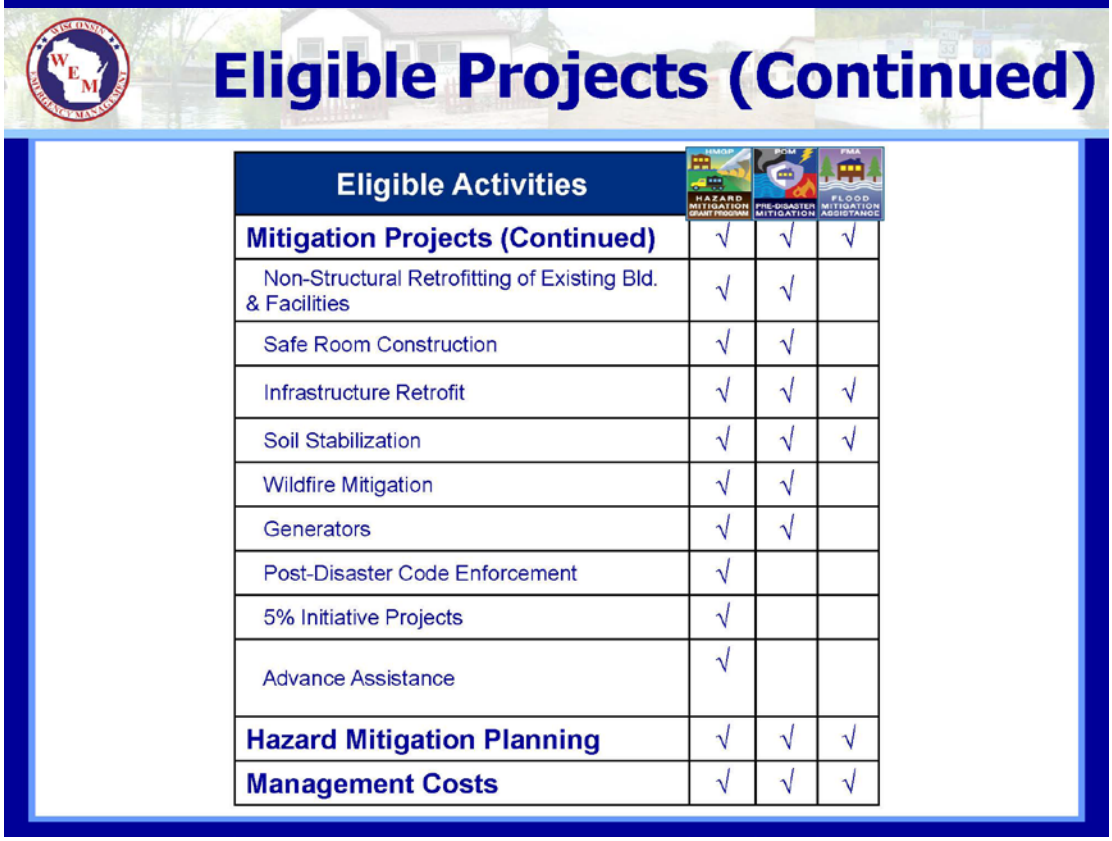
Severe Repetitive Loss Properties

- 100% funding
- Definition:
  - At least 4 NFIP claim payments over $5,000 each, and cumulative exceeds $20,000; or
  - 2 payments exceeds the market value of the structure
- None in the lower Wisconsin River watershed

Local Match

- Can be provided by any source as long as not federal dollars
- CDBG is pass through money and loses federal identity
- ICC (Increased Cost of Compliance) funds
- State programs (CDBG, DNR Municipal Flood)
- Property owners
- Volunteer and in-kind
- Will coordinate with agencies on the state hazard mitigation teams, councils, board, etc.


Eligible Projects
Eligible Activities
HMGP
HAZARD MITIGATION GRANT PROGRAM
PDM
PRE-DISASTER MITIGATION
FMA
FLOOD MITIGATION ASSISTANCE
Mitigation Projects
Property Acquisition & Structure Demolition
Property Acquisition & Structure Relocation
Structure Elevation
Mitigation Reconstruction
Dry Floodproofing of Historic Residential Structures
Dry Floodproofing of Non-Residential Structures
Minor Localized Flood Reduction Projects
Structural Retrofitting of Existing Buildings


Eligible Projects (Continued)
Eligible Activities
HMGP
HAZARD MITIGATION GRANT PROGRAM
PDM
PRE-DISASTER MITIGATION
FMA
FLOOD MITIGATION ASSISTANCE
Mitigation Projects (Continued)
Non-Structural Retrofitting of Existing Bld. & Facilities
Safe Room Construction
Infrastructure Retrofit
Soil Stabilization
Wildfire Mitigation
Generators
Post-Disaster Code Enforcement
5% Initiative Projects
Advance Assistance
Hazard Mitigation Planning
Management Costs

Requirements

- Participating in the NFIP and in good standing
- Cost-beneficial
- Environmentally sound
- Considered other alternatives
- Best alternative
- Solves the problem
- Plan requirement

Cost Effectiveness

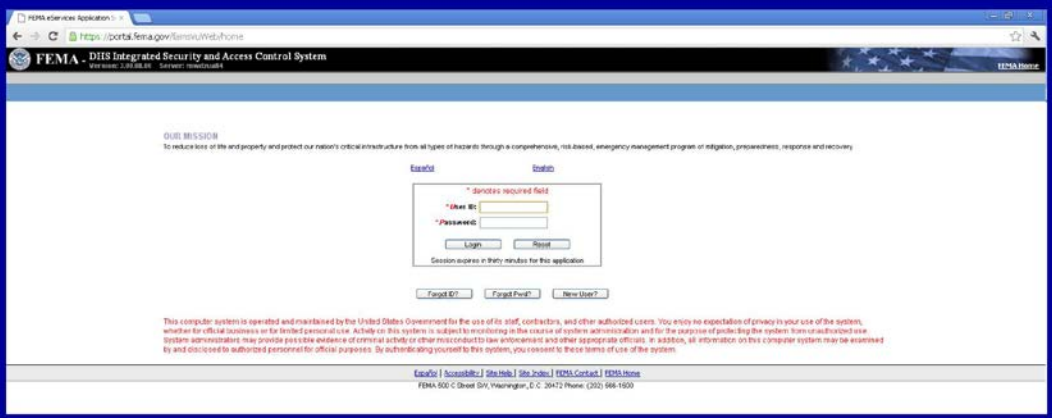
- Project benefits must be greater than the project costs of at least 1 to 1 ratio
- Can aggregate properties in a project
- If determined substantially damaged by local floodplain coordinator, BCA is waived; automatically cost-effective
- Lowest finished floor critical information to the benefit-cost analysis
- If BCA is .75, can look at counting environmental benefits (economic value for green open space ad riparian area)

Recent BCA Changes

- For acquisition, if the property is located in the FEMA 100-year floodplain and the total cost is $276,000 or less it is cost-effective.
- For elevation, if the property is located in the FEMA 100-year floodplain and the total cost is $175,000 or less it is cost-effective.
- For projects containing multiple structures, the average cost of all structures must meet the criterion.

Requirements

- HMA applications (PDM and FMA) have to be submitted via FEMA's eGrants system



Wisconsin Mitigation Priorities

- Acquisition/Demolition
  - Substantially damaged properties
  - Severe Repetitive Loss and Repetitive Loss Properties
  - Flood damaged
  - Floodway
  - Flood Fringe
  - Non-floodplain
- Elevation in flood fringe
  - Substantially damaged
  - Less than 50% damaged

Wisconsin Mitigation Priorities

- Floodproofing or retrofitting
- Structural projects that protect improved property
- Development or update of all hazard mitigation plans

Mitigation Funding

- Columbia County: $85,393
- Crawford County: $3,741,178
- Dane County: $2,123,049
- Grant County: $1,246,794
- Iowa County: $76,920
- Richland County: $250,493
- Sauk County: $9,080,739

TOTAL: $16,604,566

Questions?

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WEM Hazard Mitigation:
http://emergencymanagement.wi.gov/mitigation

FEMA Hazard Mitigation Assistance:
http://www.fema.gov/hazard-mitigation-assistance