FEMA’s Role in Dam Safety

Ted Perkins
Regional Engineer, Dam Safety Lead
Mitigation Division, Risk Analysis Branch
FEMA Region X

The National Dam Safety Program: Overview

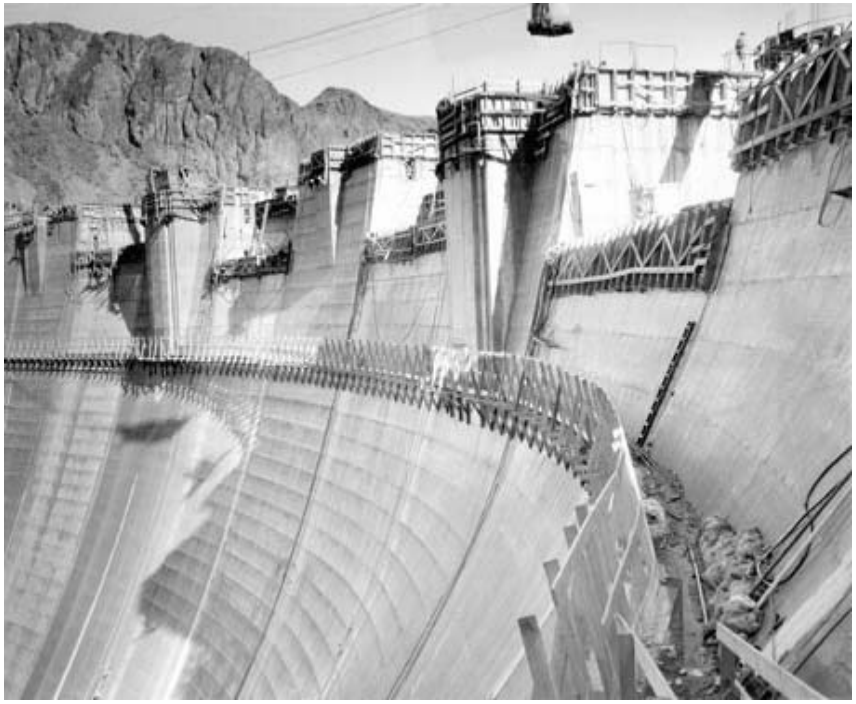
- The FEMA is the lead agency for the National Dam Safety Program (NDSP).

- FEMA's NDSP Mission: To work with our partners to develop and maintain a comprehensive understanding of the flood risk posed by our Nation's dams and support efforts that will have the greatest reduction of those risks.

- For FY 2010 the Dam Safety Act authorizes $11.9M to FEMA to fund Program activities ($8.3M State grants, $1.9M research $700K training and $1M for additional staff).

- Actual FY2010 funding for the Program is $10M ($7.5M State grants, $1.8M research, $700K training)

The National Dam Safety Program: History of the Program



- The responsibility for efforts to coordinate dam safety was established by Executive Order 12148 in 1979.
- October 12, 1996, the President signed into law the Water Resources Act of 1996 (Public Law 104-303).
- Section 215 of P.L. 104-303 established the National Dam Safety Program and named the Administrator, of FEMA as its coordinator.
- The Dam Safety Act of 2006, Public Law 109-460, reauthorized the National Dam Safety Program through 2011.

The National Dam Safety Program: Program Activities

- **State Assistance**
  - Grant funds are provided to the states to strengthen their dam safety programs.
- **Research & Development**
  - Addresses a cross-section of issues and needs for dam safety.
- **Training & Technical Transfer**
  - FEMA supports a strong collaborative training program for dam safety professionals and dam owners.
- **Public Awareness & Outreach**
  - FEMA continues to bring the message of dam safety to its stakeholders.

The National Dam Safety Program: State Assistance

- **FY 2010 State Assistance Initiatives**
  - **For FY 2010, FEMA is requesting that states use a portion of their grant funds to develop public awareness and outreach programs and materials on the risk posed by dams to the downstream public and critical facilities.**
  - **An emphasis for FY2010 grants will be on States completing condition assessments on high hazard potential dams.**
  - **Grant funds will continue to be used to increase the number of Emergency Action Plans (EAPs) for state-regulated high-hazard potential dams and the number of dam inspections conducted by the states.**

FEMA Dam Safety Publications & Resources

- http://www.fema.gov/dam-safety-publications-resources

Technical Manuals, Guides, and Reports

- Final Report on Coordination and Cooperation with the European Union on Embankment Failure Analysis (FEMA 602)
- Emergency Action Planning for State Regulated High-Hazard Potential Dams: Findings, Recommendations, and Strategies (FEMA 608)
- Technical Manual: Plastic Pipe Used in Embankment Dams (FEMA P-675)
- Technical Manual for Dam Owners: Impacts of Animals on Earthen Dams (FEMA 473)
- Technical Manual: Conduits through Embankment Dams (FEMA 484)
- Technical Manual for Dam Owners: Impacts of Plants on Earthen Dams (FEMA 534)
- Dam Owner's Guide to Plant Impact on Earthen Dams (FEMA L-263)
- Dam Owner's Guide to Animal Impacts on Earthen Dams (FEMA L-264)
- Conduits through Embankment Dams: Best Practices for Design, Construction, Identification and Evaluation, Inspection, Maintenance, Renovation, and Repair (FEMA L-266)

Federal Guidelines for Dam Safety

- Emergency Action Planning for Dam Owners (FEMA 64)
- Earthquake Analyses and Design of Dams (FEMA 65)
- Federal Guidelines for Dam Safety (FEMA 93)
- Selecting and Accommodating Inflow Design Floods for Dams (FEMA 94)
- Glossary of Terms (FEMA 148)
- Hazard Potential Classification System for Dams (FEMA 333)

Research Needs Workshop Reports

- Seepage through Embankment Dams (FEMA 535)
- Dam Spillways (FEMA 536)
- Spillway Gates (FEMA 537)
- Hydrologic Issues for Dams (FEMA 538)
- Outlet Works (FEMA 539)
- Impacts of Plants and Animals on Earthen Dams (FEMA 540)
- Embankment Dam Failure Analysis (FEMA 541)
- Risk Assessment for Dams

Ongoing Dam Safety Activities and Products

- Update of FEMA 64, *Federal Guidelines for Dam Safety: Emergency Action Planning for Dams.* Release planned for 2nd quarter 2013
- The *Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures* GeoDam-BREACH. Release planned for 2nd quarter 2013
- Update of FEMA 94, *Selecting and Accommodating Inflow Design Floods for Dams.* Release planned for 3rd quarter 2013
- FEMA, the USACE, and DHS are studying the integration of GeoDam-BREACH into the Dams Sector Analysis Tool (DSAT)

The National Dam Safety Program: The Future

- **FEMA Goals for FY 2010 and Beyond**
  - **Public Awareness and Risk Communication becoming a major component of the National Dam Safety Program**
  - **Develop training materials, guidance, tools, etc. that will address dam risks in each phase of the Emergency Management Cycle (mitigation, preparedness, response and recovery)**
  - **Improve dam safety data collection process and monitoring the performance of State dam safety programs.**
  - **Base State-assistance grants on a State Dam Safety Program's performance in assessing dam safety risk (i.e. inspections) and the State's ability and performance in implementing EAPs for high hazard dams.**

The National Dam Safety Program: The Future

- **FEMA's Goals for FY 2010 and Beyond**
  - **Improve the number and quality of EAPs.**
  - **Promote coordination between the State Dam Safety Officials, Emergency Managers, Floodplain Managers and Planners.**
  - **Increase inspections of dams and establish national minimum inspection standards.**
  - **Invest in developing tools and materials for educating local communities and the general public on dam related flood risk and how to mitigate, prepare and respond to that risk.**
  - **Work with Alabama to establish a State dam safety program.**

FEMA Dam Safety Program Roles

Primary Role

- **FEMA has a primary role under the National Dam Safety Program to support the efforts of the state and federal agency partners to continuously improve dam safety**

Secondary Role

- **FEMA has a role under the National Flood Insurance Program (NFIP) to promote proactive floodplain management/mitigation for multi-hazards including potential dam breach flooding**

National Dam Safety Program Strategic Plan Goals

- **Goal 1: Reduce the likelihood of dam failures**
- *Objective 1*: Assess all high- and significant-hazard potential dams for the risks they pose to life, property, and the environment
- *Objective 2*: Reduce the number of deficient dams in the United States
- *Objective 3:* Learn from dam failures in the United States and worldwide to improve dam safety programs
- *Objective 4:* Support effective federal and state dam safety programs

- **Goal 2: Reduce the potential consequences resulting from dam failures**
- *Objective 5:* Promote a program of Emergency Action Plan (EAP) implementation, compliance, and exercise for all high- and significant-hazard potential dams in the United States
- *Objective 6:* Improve consequence evaluation for dams nationwide

National Dam Safety Program Strategic Plan Goals

- **Goal 3: Promote public awareness of the benefits and risks related to dams**
- *Objective 7:* Convey the risk posed by dams to motivate and effect change
- *Objective 8:* Convey the important and unique roles of federal and state dam safety programs in keeping Americans safe from dam failures

- **Goal 4: Promote research and training for state dam safety and other professionals**
- *Objective 9:* Establish and implement a national course of study for state dam safety professionals
- *Objective 10:* Improve the awareness and understanding of dam risks for other professionals with roles in dam risk management
- *Objective 11:* Promote understanding of the knowledge and techniques needed to safely evaluate, operate, maintain, design, and construct dams

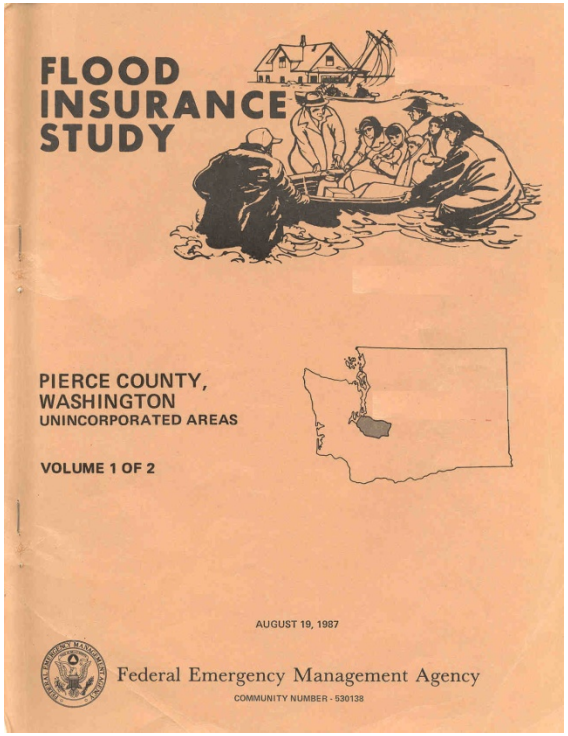
- **Goal 5: Align relevant federal programs to improve dam safety**
- *Objective 12:* Leverage the resources, capabilities, and authorities of the federal partners to promote the mission, goals, and objectives of the NDSP and to achieve greater efficiencies

FEMA's Vision for FY10 and Beyond

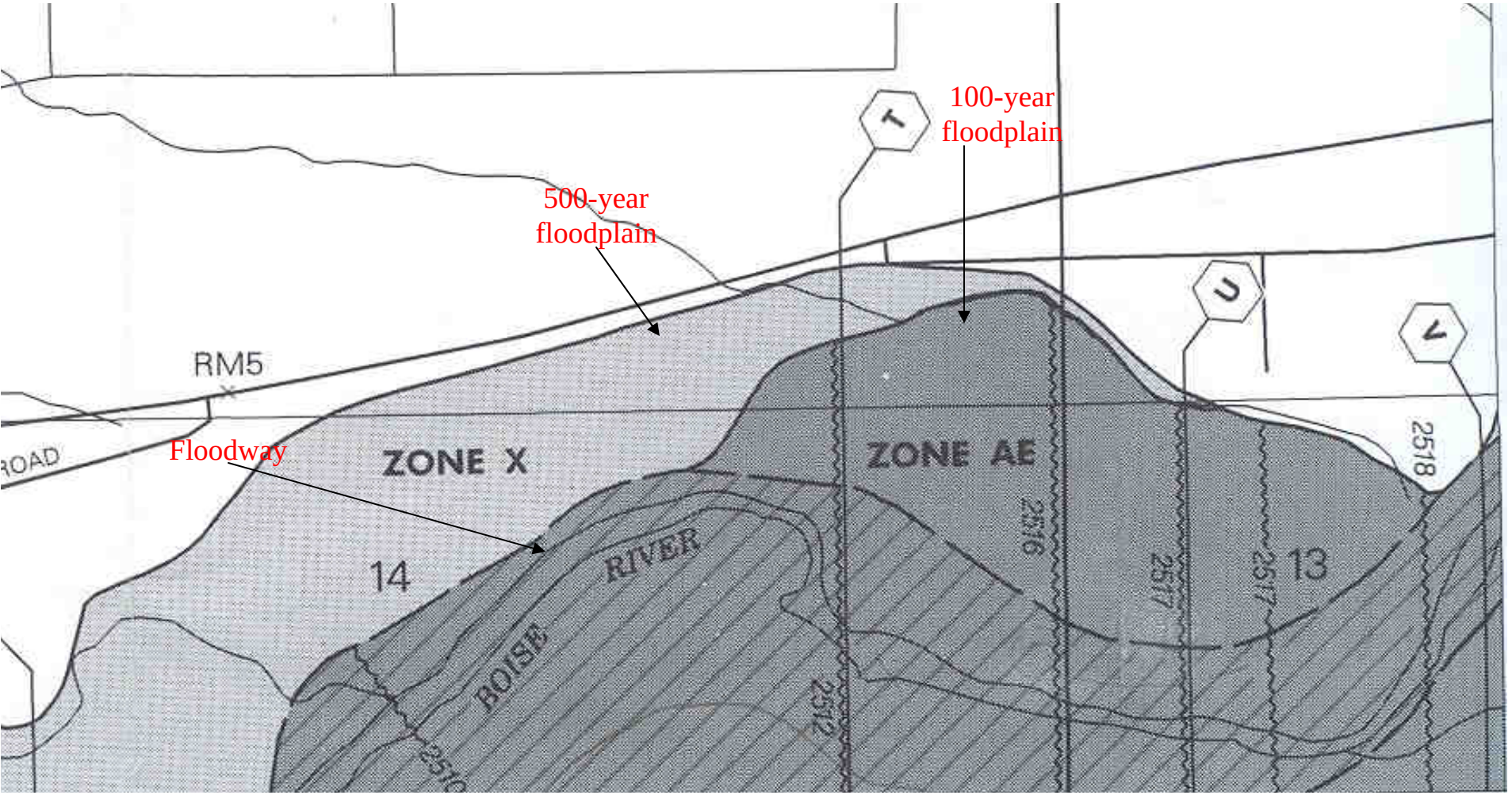
- **FEMA's NDSP will use engineering, science, technology, and outreach strategies to achieve FEMA's mission of "…*leading and supporting the Nation in a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery, and mitigation.*"**

Flood Insurance Studies (FIS)

- 1968 Act required FEMA to identify the Nation's floodplains
- FIS creates maps that show Special Flood Hazard Areas (SFHA); base (100-yr) floodplain
- FIS sets flood insurance rates per the maps
- Lenders must require flood insurance in the 100-year floodplain for Fed-related loans
- FIS provides communities with data to enforce their ordinances
- Study Report: Describes flood history, principal flood problems, flood protection measures, hydrology and hydraulic methods, floodway data tables, water surface profiles
- Flood Insurance Rate Map (FIRM): Shows floodplain limits, base flood elevations (BFEs), floodways, surveyed cross sections, corporate limits, roads, insurance zones



FEMA NFIP Flood Maps



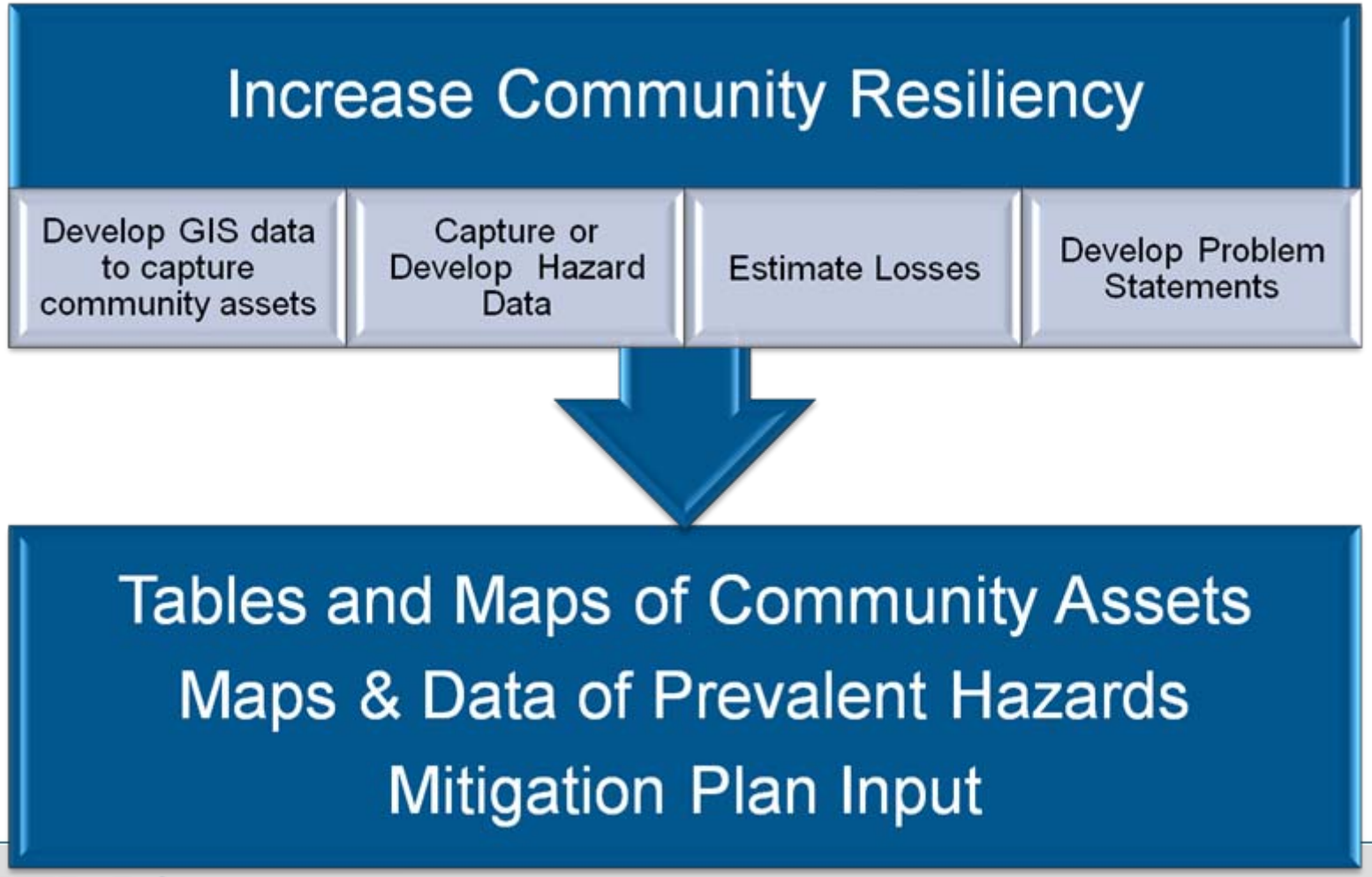
Risk MAP

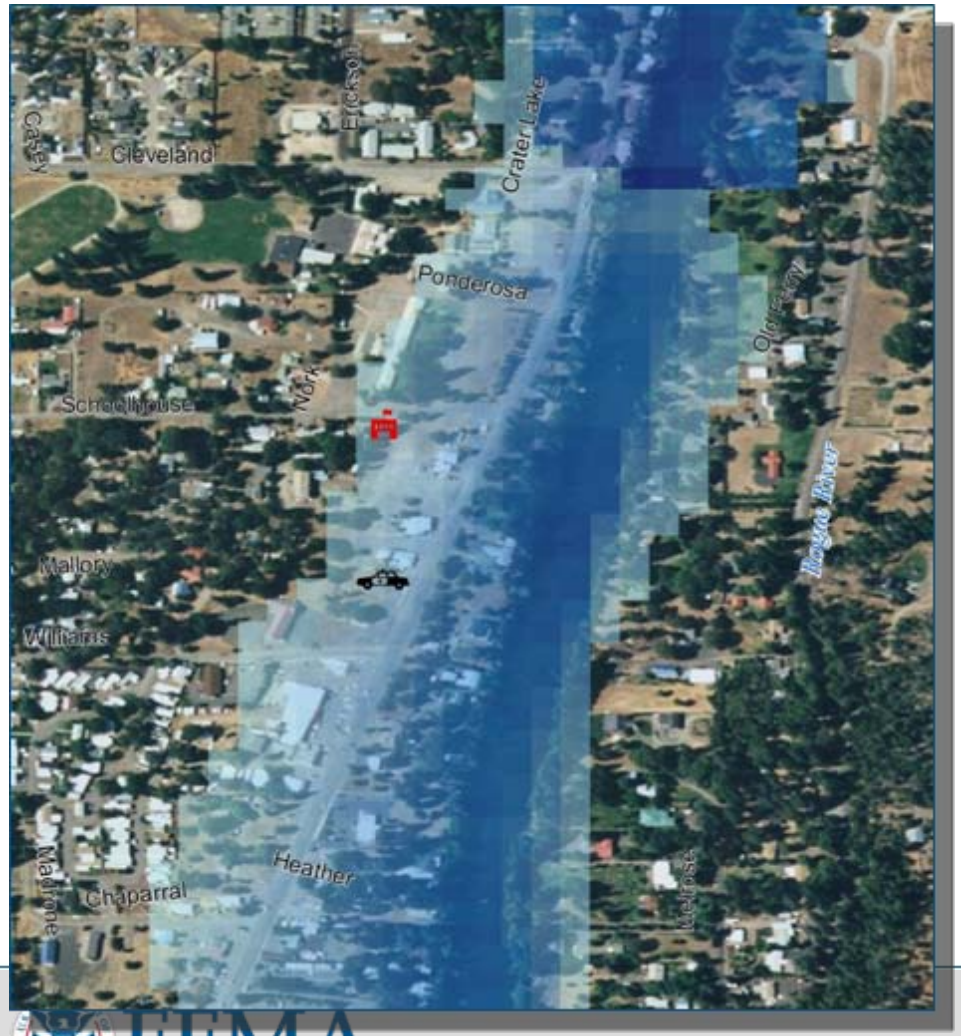

1
Identify Risk
Map Risk Data
2
Assess Risk
Assess Present and Future Risks
Goal—Measure Quantifiable Risk Reduction
3
Communicate Risk
Plan for Risk
4
Mitigate Risk
Transfer Risk
Reduce Risk
Risk MAP
Reduce Loss of Life and Property

Risk MAP (Mapping, Assessment, Planning) Vision

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

How Risk MAP can help your community.....

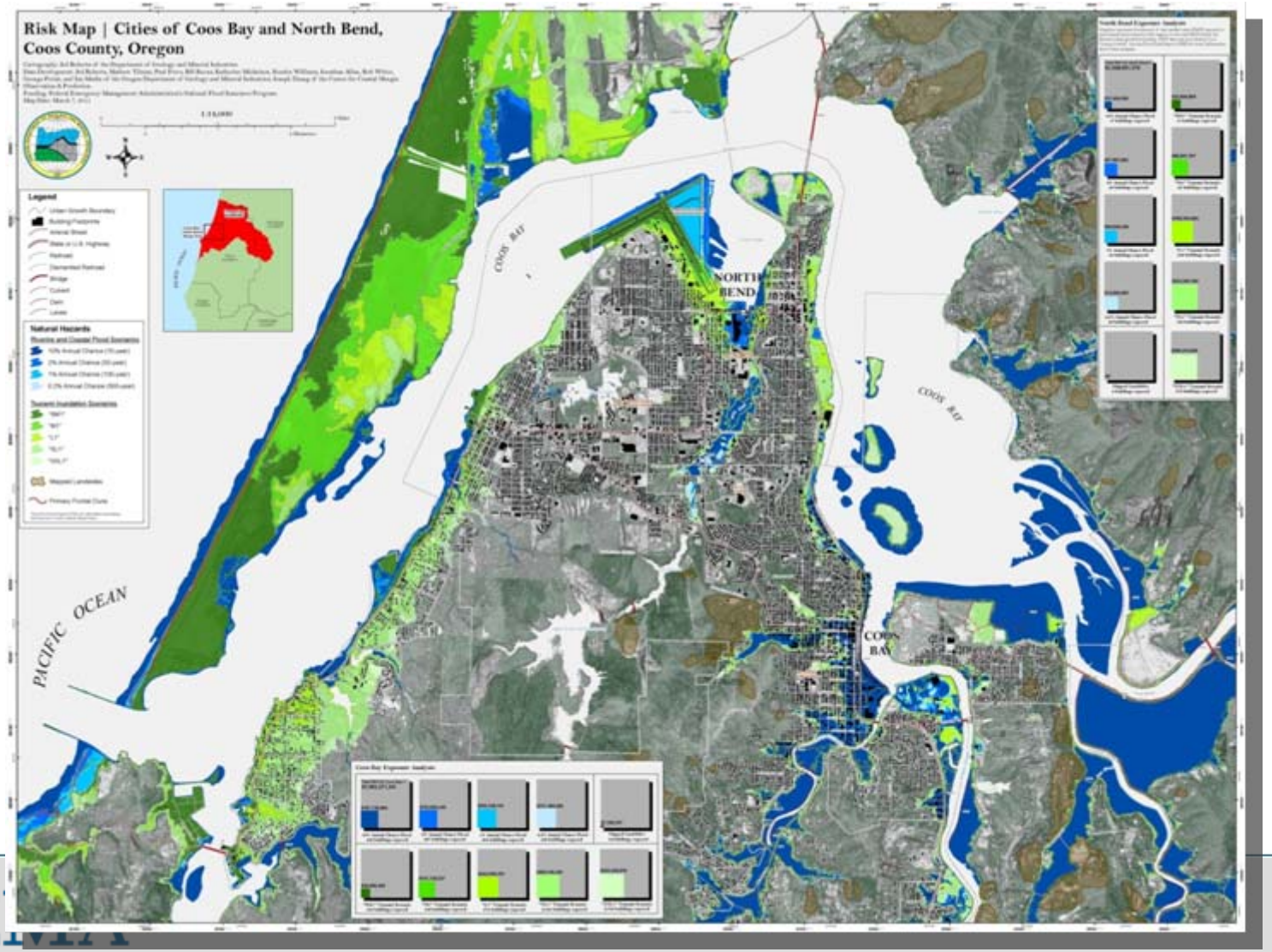


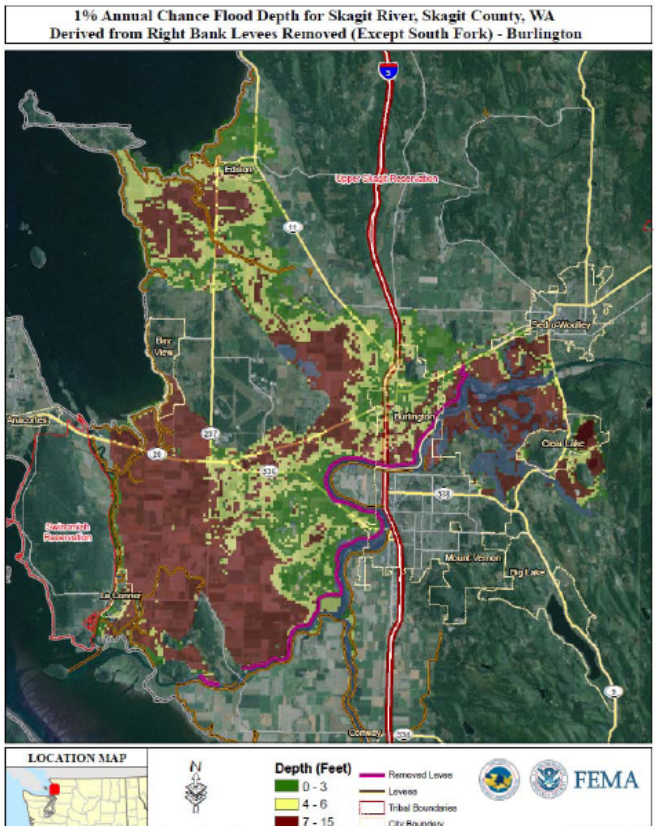


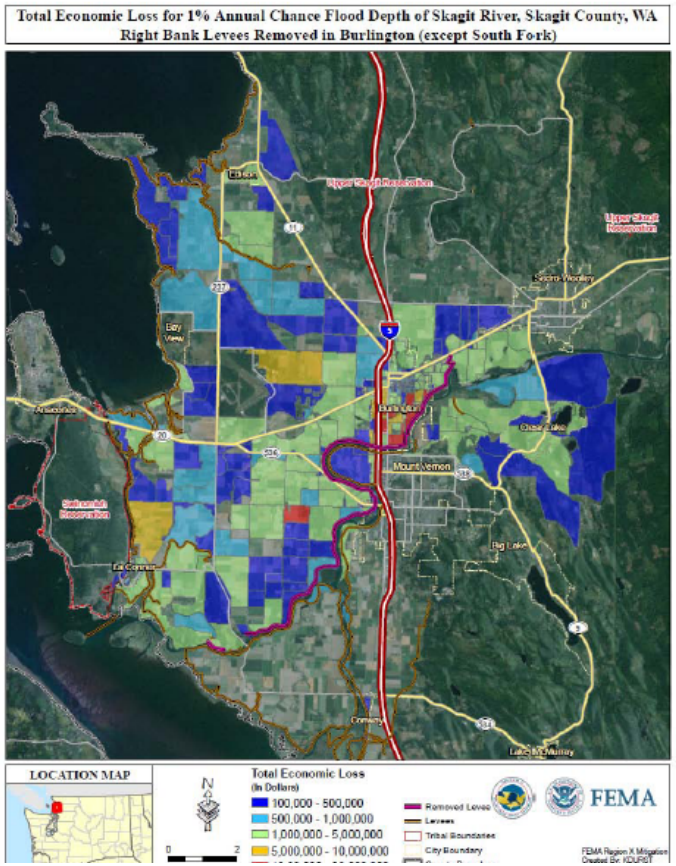
Potential Community Assets

- Agriculture and Food
- Banking and Finance
- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy
- Government Facilities
- Healthcare
- Information Technology
- Nuclear Reactors, Materials and Waste
- Postal and Shipping
- Transportation Systems
- Water

Flood	• Existing FEMA Studies • USACE Studies • New FEMA Studies
Wildfire	• WADNR
Landslide	• WADNR
Earthquake/ Tsunami	• WADNR • USGS/NOAA


Risk Map | Cities of Coos Bay and North Bend, Coos County, Oregon
PACIFIC OCEAN
COOS BAY
NORTH BEND
Legend
Natural Hazards





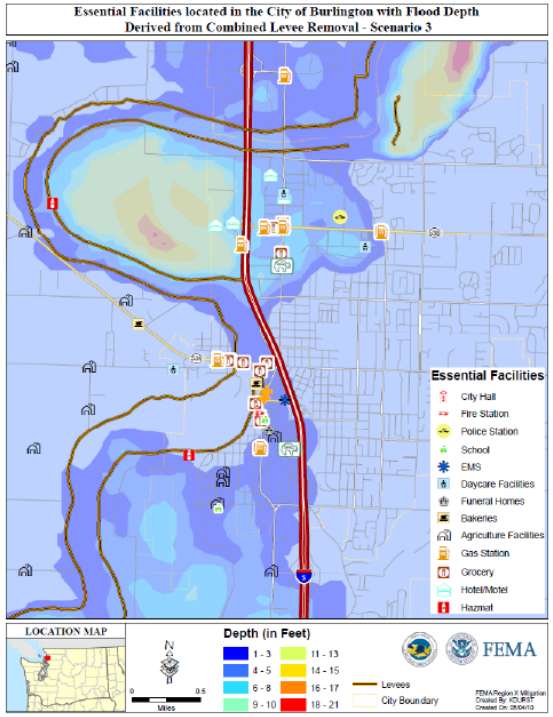


Table 1. Economic Loss Estimates for Scenario 1

Loss Category	Residential	Commercial	Industrial	Others	TOTAL
Building Loss					
Building	$135.7M	$44.3M	$11.7M	$14.8M	$206.5M
Content	$86.2M	$113.5M	$24.5M	$45.2M	$269.4M
Inventory	$0	$4.7M	$4.8M	$5.5M	$15.0M
Subtotal	$221.9M	$162.4M	$41.1M	$65.5M	$491.0M
Business Interruption					
Income	$40K	$710K	$10K	$390K	$1.2M
Relocation	$440K	$280K	$0	$0	$720K
Rental Income	$190K	$190K	$0	$0	$380K
Wage	$110K	$850K	$0	$2.1M	$3.0M
Subtotal	$780K	$2.0M	$10K	$2.4M	$5.3M
TOTAL	$222.7M	$164.5M	$41.1M	$67.9M	$496.2M

Table 12. Scenario Comparison of HAZUS Results for 2% annual chance flood

50 year Scenario 183,780cfs Discharge near Sedro-Woolley	Total Economic Loss	Economic Loss Ratio	Substantially Damage Buildings	Displaced Population	Debris (Tons)
Scenario A (Burlington Levee)	$411.5 M	17.0%	144	13,820	76,645
Scenario B (Mount Vernon Levee)	$478.8M	19.8%	135	10,368	79,697
Scenario D (Combined Levees)	$720.5 M	29.8%	143	19,363	117,875

Review and analyze the results of the hazard loss estimations

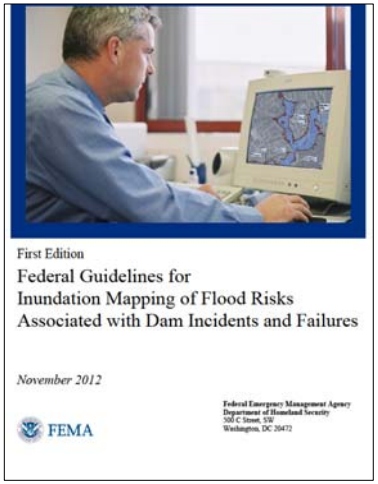
- Identify areas with highest vulnerabilities on a map

Develop list of problem statements based on findings

- The manufactured home park is the most vulnerable area to flooding. This area floods each year. Flooding is caused by excessive rains
- The sewage treatment plant is located in the 100-year floodplain
- The lighthouse, of significant historic value, is threatened by erosion from coastal flooding. The rate of erosion is 5 feet per year.

New FEMA Tools to Enhance Dam Safety and Risk MAP

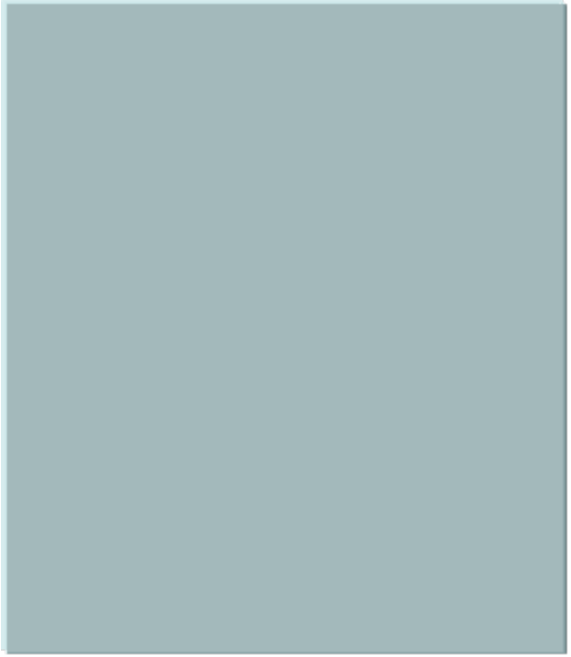
- **Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures**
- **Guidance for State Regulators**
  - Provides guidance to States to model dam breach zones and Emergency Action Plans (EAP's) consistently throughout the US
  - Presents a tiered dam breach study process that introduces simplified dam breach modeling methodology as a tool to increase the number of dam breach studies and EAP's
  - Provides standards for GIS-based dam breach model file naming and EAP map production so Risk MAP can leverage dam breach models and maps for the non-regulatory products



New FEMA Tools to Enhance Dam Safety and Risk MAP

Geospatial Dam Breach Rapid EAP, Consequences and Hazards (GeoDam-BREACH)

- **Simplified Inundation Modeling**
  - Uses the NWS SMPDBK program entirely within GIS with added functionality of importing stream crossing rating curves to map backwater
- **Risk MAP Datasets**
  - Tools for the automated creation of numerous raster and vector GIS datasets (e.g. depth grids, arrival times) from either SMPDBK or external datasets (e.g., HEC-RAS, 2D Models)
- **Loss of Life Assessment**
  - Automated application of the Brown and Graham method
- **Creation of EAP Map Panels**
  - Automated creation of EAP Map panels for variety of scales and paper sizes
- **EAP Development**
  - Semi automated development of EAPs in an editable Microsoft Word format using the NRCS template



GeoDam-BREACH Workflows and Functionality

- **Workflow 1 – Simplified Inundation Modeling**
  - **Uses the NWS SMPDBK program entirely within GIS with added functionality of importing stream crossing rating curves to map backwater**
- **Workflow 2 – Risk MAP Datasets**
  - **Tools for the automated creation of numerous raster and vector GIS datasets from either SMPDBK or external datasets (e.g., HEC-RAS, 2D Models)**
- **Workflow 3 – Loss of Life Assessment**
  - Automated application of the Brown and Graham method
- **Workflow 4 – Creation of EAP Map Panels**
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- **Workflow 5 – EAP Development**
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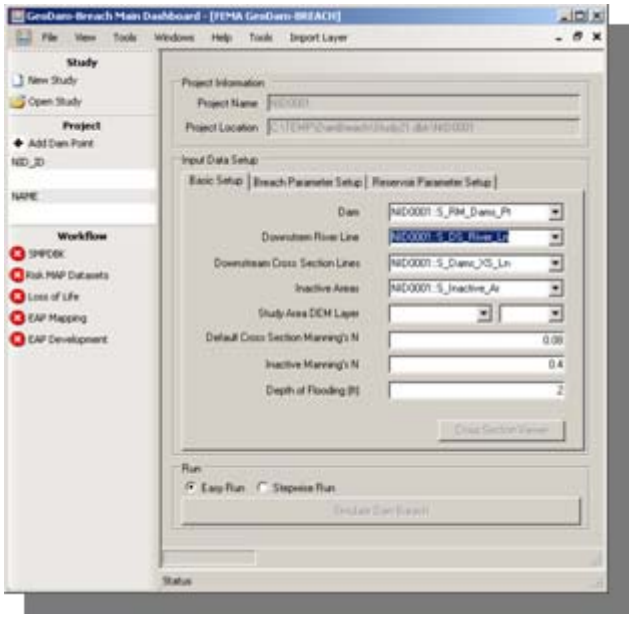
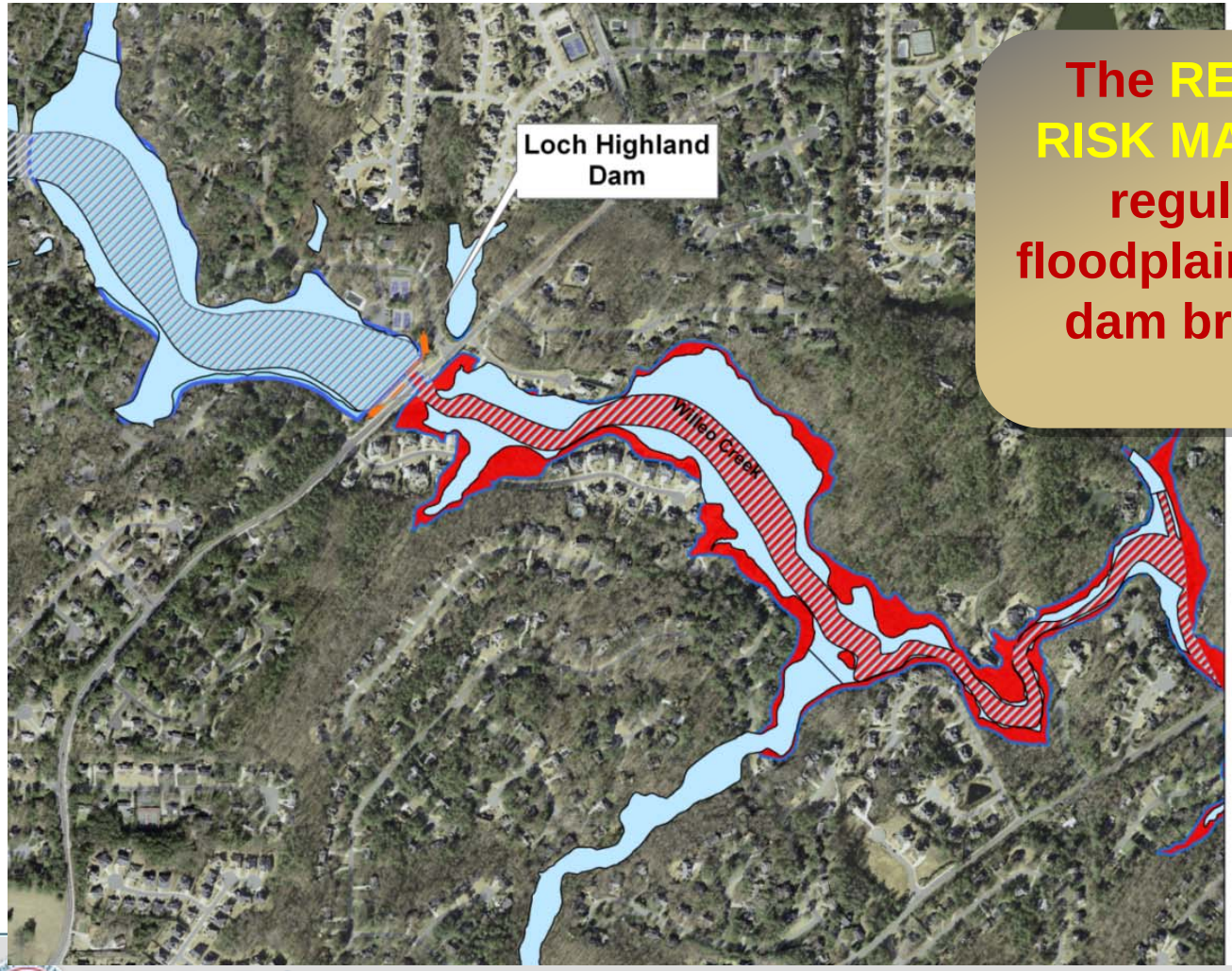


GeoDam-BREACH Toolset Functionality



The RESIDUAL FLOOD RISK MAP. It includes the regulatory 100-year floodplain overlaid with the dam breach inundation zone

Questions



FEMA