RiskMap Technical Assistance
Indiana Success Stories

Darrin Miller, Emily Whitehead

INAFSM Conference

September 8, 2016

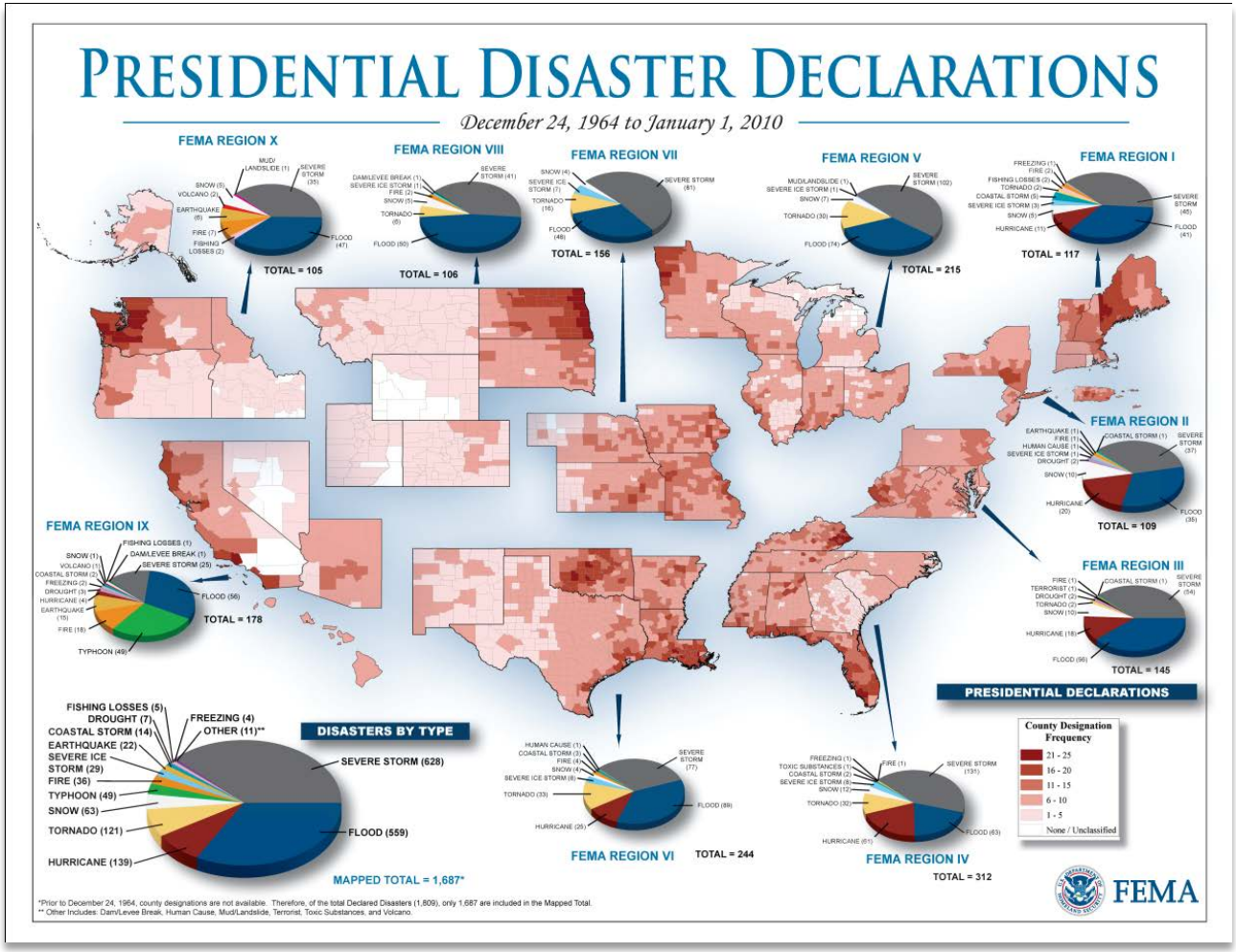
FEMA

Presentation Outline

- **Overview**
  - Map Mod to Risk MAP
- **Phased Discovery**
  - Phase 1 – Hazard Assessment
  - Phase 2 – Mitigation & Assistance
    - Mitigation Action Needs
    - Technical Assistance
- **Mitigation Technical Assistance Success Stories**
- **Next Steps**
  - "So what?"
- **Questions**

Overview: Need for Mitigation

Federal Disaster Costs
1980-1989: $3.9 B
1990-1999: $25.4 B
2000-2009: $150.0 B+



Overview: Risk MAP

Map MODERNIZATION
Federal Emergency Management Agency

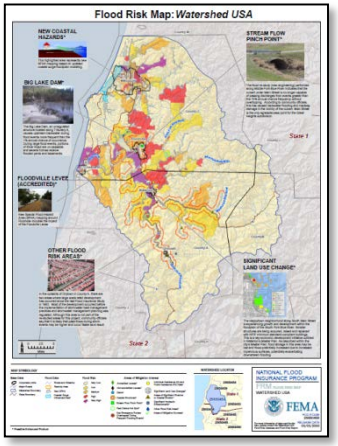
- Five year effort to modernize maps
- From paper to digital flood data digital maps
- Improved flood data quality
- 87 of 92 counties effective digital maps

RiskMAP
Increasing Resilience Together

- Collaborative approach
- Goals: quality data, public awareness, action that reduces risk
- Watershed-oriented
- Focus on up-front coordination /scoping
- Discovery is mandatory

Overview: Risk MAP

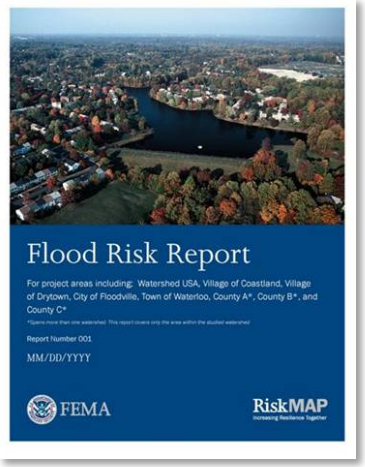
Flood Risk Database



Flood Risk Map

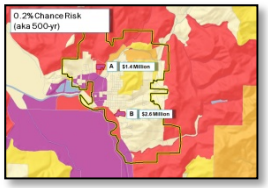
Flood Risk Assessment Data
Flood Depth & Analysis Grids

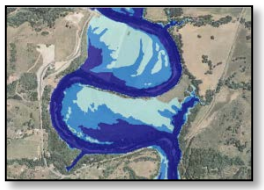
Changes Since Last FIRM Data
Areas of Mitigation Interest

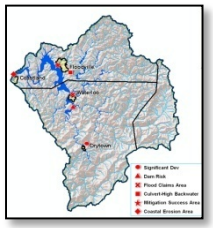


Flood Risk Report

Ad-Hoc Flood Risk Analyses







Risk MAP data sets

Changes since last FIRM

Depth grids (10-, 25-, 50-, 100-, and 500-year)

Percent Annual Chance

Percent Chance over 30-years

Depth grids (2-, 5-, and 200-year) (enhanced product)

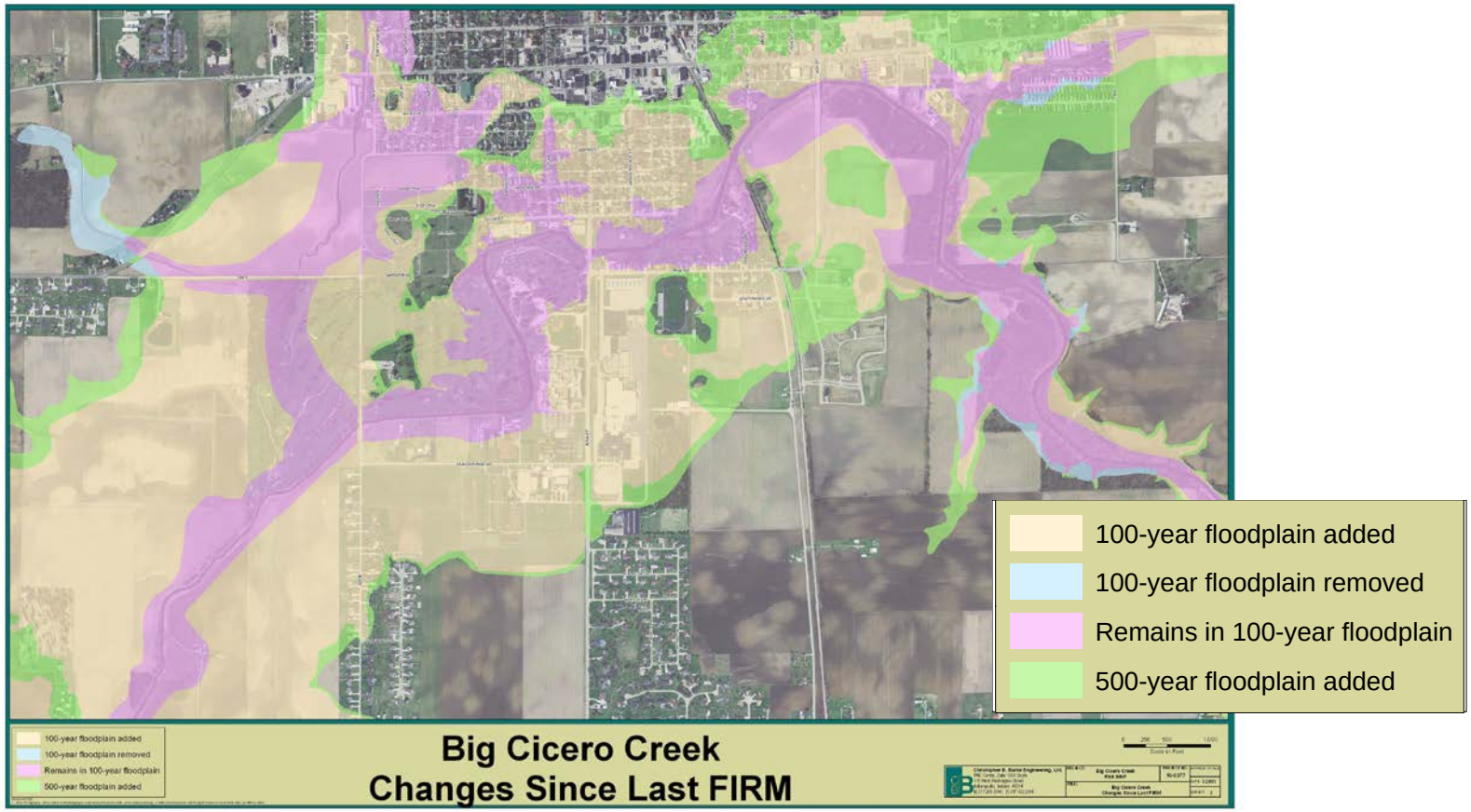
Depth grids (1%+) (enhanced product)

Velocity grids (enhanced product)

Annualized Depth (enhanced product)

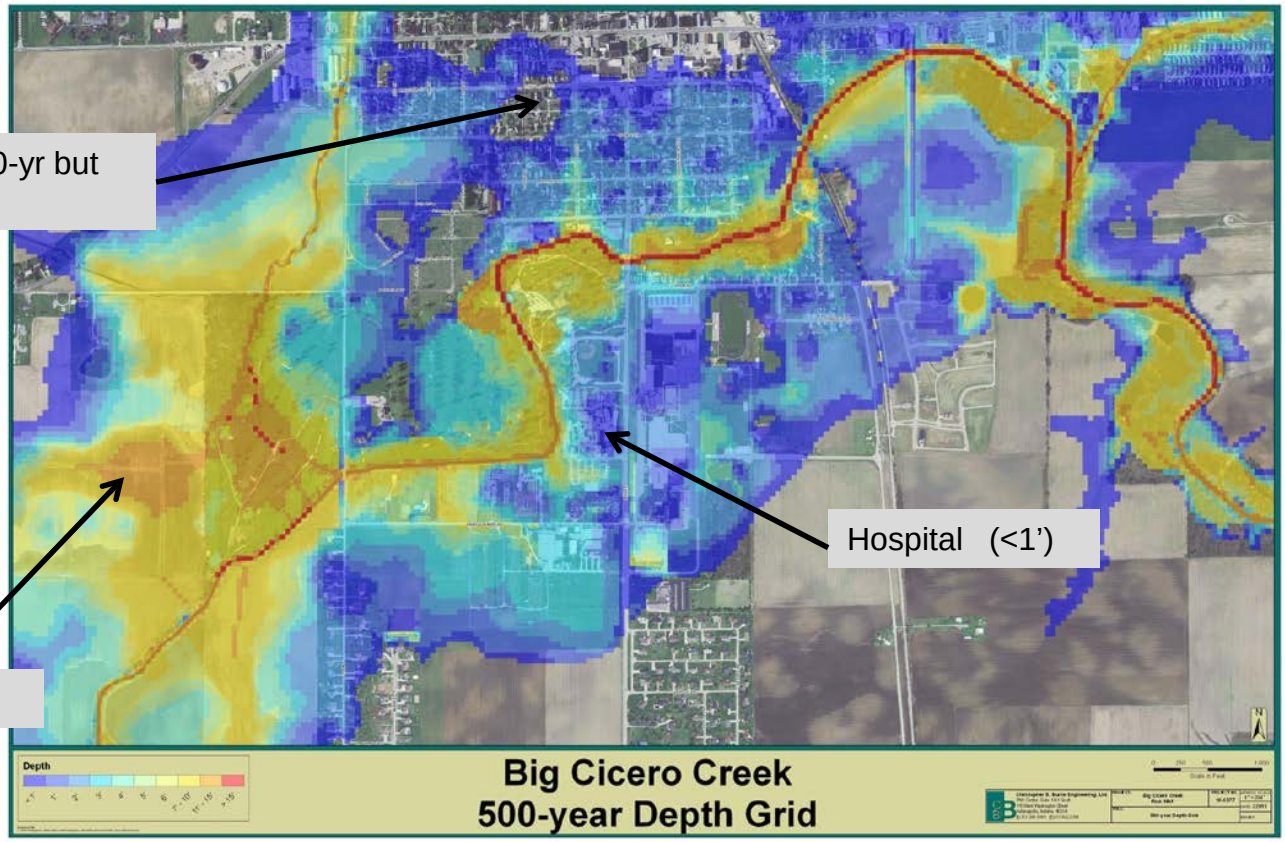
Risk MAP data set

- **Changes Since Last FIRM** – floodplain zone changes
  - Value is for notification of public about changes to public



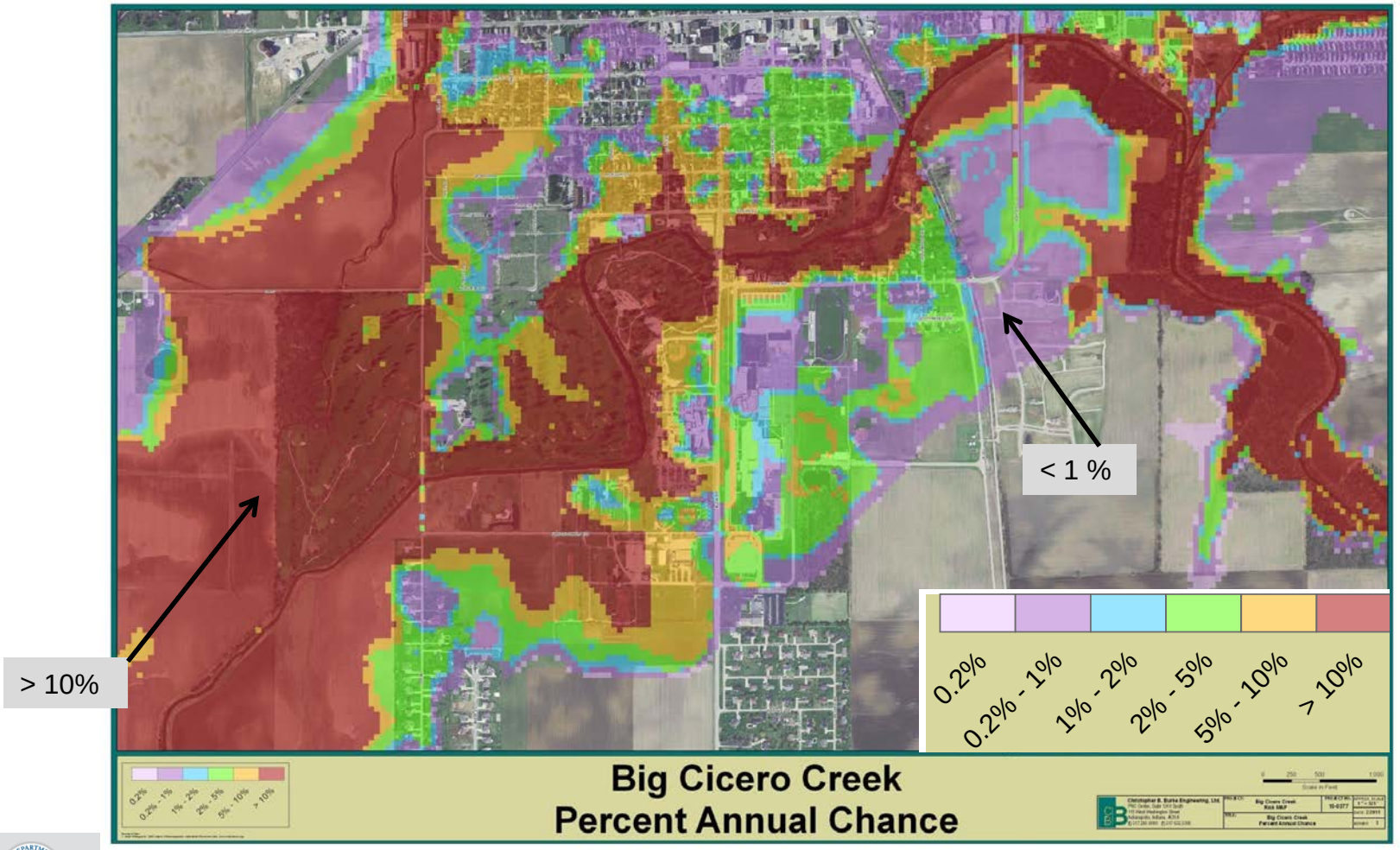
Risk MAP data set

- **Depth Grid** - increase flood risk awareness by communicating that risk varies within the mapped floodplain
  - Final product can include 2-, 10-, 25-, 50-, 100-, 200-, & 500-year events



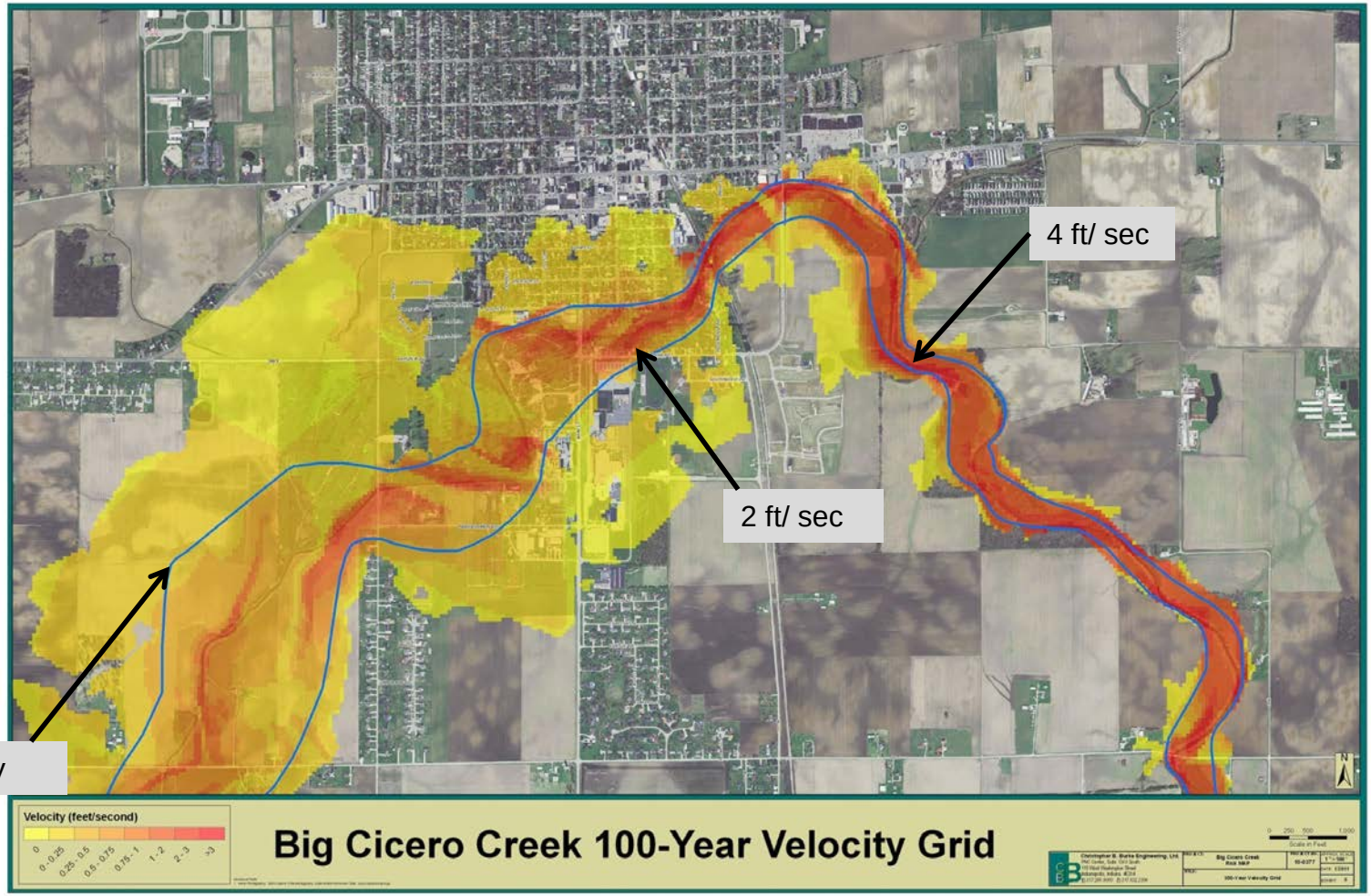
Risk MAP data set

- **Percent Annual Chance**- flood frequency in any given year



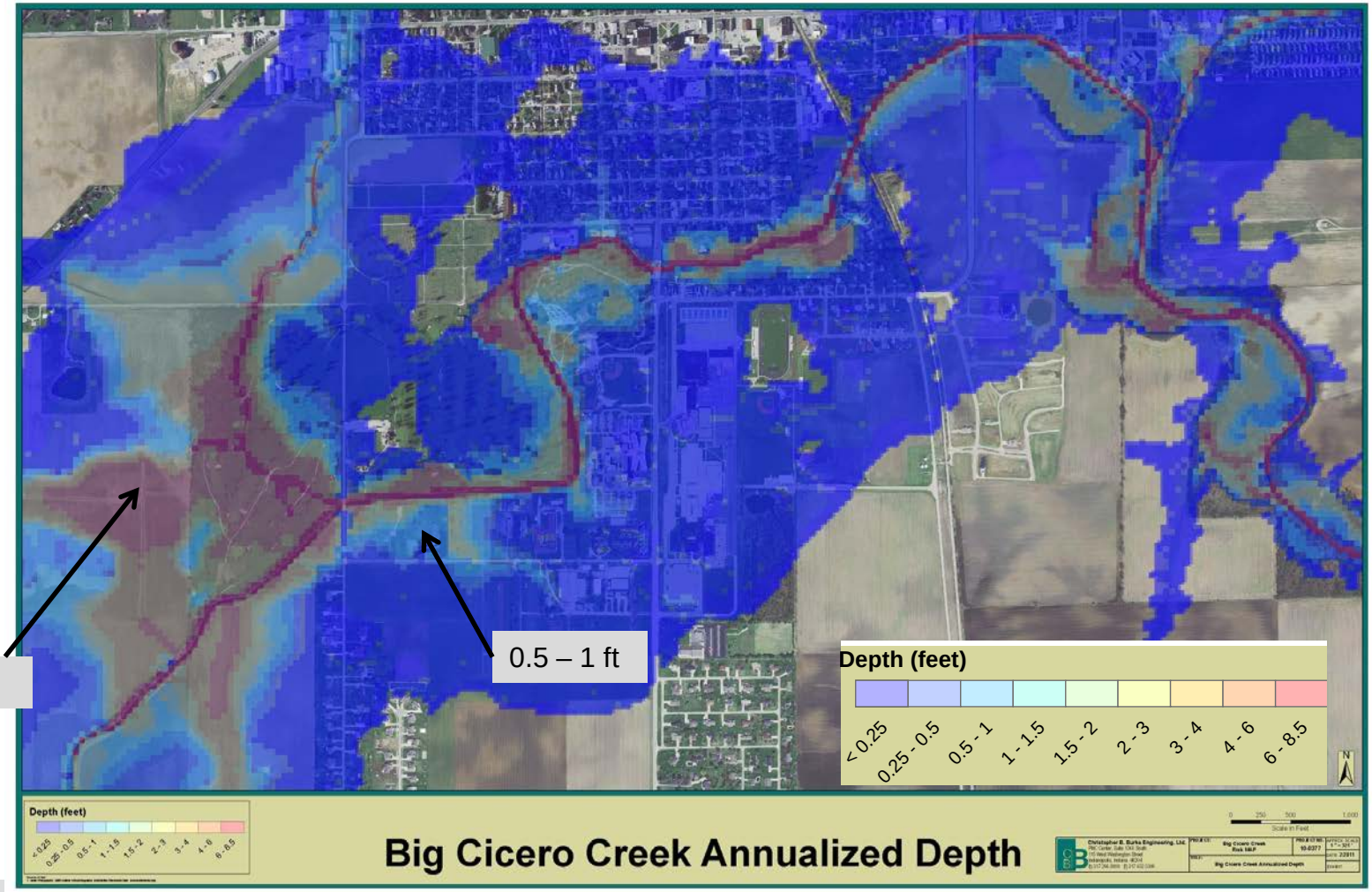
Risk MAP data set

- **Velocity Grid** - “Enhanced” product generated from HEC-RAS model



Risk MAP data set

- **Annualized Depth Grid** – frequency weighted depth.



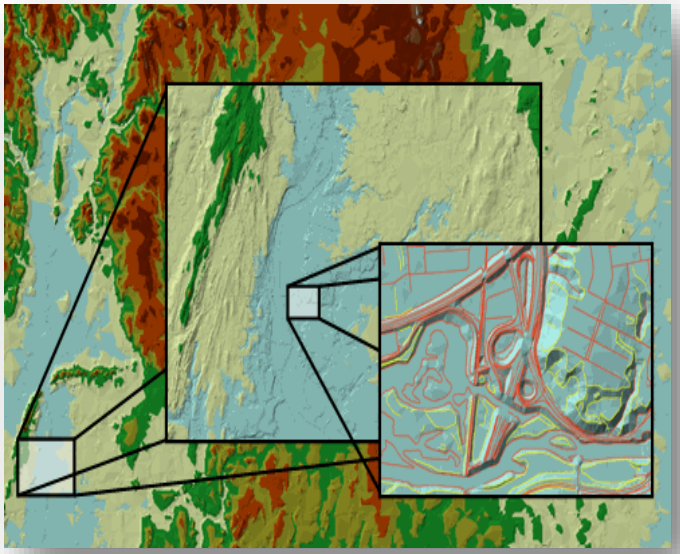
Mitigation Technical Support?

Discovery

Discovery is the process of data mining, collection, and analysis with the goal of initiating a flood risk or mitigation project and risk discussions with the watershed

When:

- After an area/watershed has been prioritized
- Before a Risk MAP project is scoped or funded



Phase 1 – Hazard assessment

- Flood studies / mapping needs
- Automated Engineering Results
- Data availability & information exchange
- Individual Community Breakout Sessions

Phase 2 - Mitigation

- Flood risk assessments
- Mitigation planning technical assistance projects

Information Exchange

Phase 1 Pre-Meeting Stage

- **Webinar(s) to introduce Discovery project**
- **Requested each Community to Fill Out Questionnaire:**
  - **Desired Flood Study Areas**
  - **Existing Local Study Data**
  - **Existing Local GIS Data**
    - **LiDAR**
    - **Orthophotography**
  - **Mitigation Planning Needs**
  - **Desired Mitigation Projects**
  - **Communication and/or Outreach**
  - **Compliance and/or Training**

Sign In							
Community	County (if Different)	State	Information Exchange Call Date (mm/dd/yy)	Name and Title of Local Official Attending Webinar	Name and Title 2 (additional attendee)	Name and Title 3 (additional attendee)	Are there any flooding sources in your community that you feel need a new study or updated mapping? (Yes, No
N/A	Wyandot County	Ohio	8/19/2014	Greg Moon - Director, Wyandot County Regional Planning Commission			Possibly
Marion		Ohio	8/19/2014	Danny Stewart, Assistant Director, Marion County Planning	Elizabeth Burns, GIS Director		Yes
Delaware County		Ohio	8/21/2014	Duane B. Matlack Floodplain Administrator			Yes
Fairfield County		OH	8/21/2014	James Mako/Senior Planner			Yes
Franklin County		OH	8/21/2014	Matt Brown, Planning Administrator			Yes
Franklin County		OH	8/21/2014	Matt Brown, Planning Administrator			Yes
Franklin County		OH	8/21/2014	Matt Brown, Planning Administrator			Yes
Franklin County		OH	8/21/2014	Matt Brown, Planning Administrator			Yes
Franklin County		OH	8/21/2014	Matt Brown, Planning Administrator			Yes

Flood Study Needs Prioritized

- **Flood Study Needs Gathered**
- **Flood Study Needs Prioritized using a Ranking System**
  - Needs Evaluated Based on Mapping Parameters, such as:
    - Average Annualized Loss (AAL) Level (high/medium/low)
    - Coordinated Needs Management Strategy (valid/unverified/to be assessed)
    - Local/State Mapping Need (yes/no)
    - Leverage Data Available (yes/no)
    - Area of Mitigation Interest (yes/no)
  - Needs receive a ranking, or total score, between 0 and 10:
    - 0-4 points = Low Priority
    - 5-7 points = Medium Priority
    - 8-10 points = High Priority

Mitigation Technical Support Prioritized

- **Mitigation Technical Support Needs Gathered**
- **Mitigation Needs Prioritized Using a Different Ranking System**
  - Needs are Evaluated Based on Mitigation Parameters, such as:
    - Same geographic location as mapping need (yes/no)
    - Likelihood Action will be Advanced (high/medium/low)
    - Inside regulated floodplain (yes/no)
    - Critical facility involved (yes/no)
    - Community Has Current Hazard Mitigation Plan (yes/no)
    - Is the Technical Assistance a Non-Regulatory FEMA Product (yes/no)
    - Flood Hazard Related Need (yes/no)

  - Needs receive a ranking, or total score, between 0 and 10:
    - 0-3 points = Low Priority
    - 4-6 points = Medium Priority
    - 7-10 points = High Priority

Mitigation Technical Assistance - Indiana Success Stories

- **Mitigation Technical Support Needs Gathered:**
  - Roads Overtopping During Flood:
    - Depth Grids & Maps developed using NOAA forecasted gage elevations for more accurate indication of potential flooding extents;
    - Hydraulic impact assessment of elevating local roads;
    - Hydrologic and hydraulic modeling to determine proper sizing of storm water infrastructure;
      - Harrison County, IN
      - Jackson County, IN
      - Washington County, IN
      - Town of Brooklyn, IN
      - City of New Albany, IN
      - City of Noblesville, IN
      - City of Salem, IN

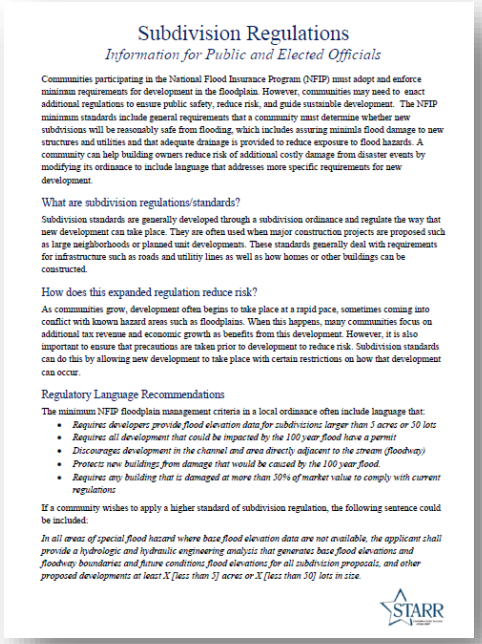
Courtesy: FEMA / Creative Commons Attribution 2.0 Gener

Mitigation Technical Assistance - Indiana Success Stories

- **Calculate Base Flood Elevations (BFEs) for repetitive loss structures/properties and/or critical facilities:**
  - Enhance existing approximate (Zone A) flood studies to calculate BFE's and identify best mitigation project locations;
  - Create depth grids to identify flood risks surrounding critical facilities and provide potential flooding depths to address evacuation needs.
    - Jackson County, IN
    - Morgan County, IN
    - Washington County, IN
    - City of Martinsville, IN
    - City of Noblesville, IN

Mitigation Technical Assistance - Indiana Success Stories

- **Higher standards for community ordinances**
  - Provided documentation for compensatory storage and subdivision regulations:
    - City of New Albany, IN
    - Floyd County, IN
    - Harrison County, IN
    - Town of French Lick, IN
    - Town of West Baden Springs, IN
    - City of Salem, IN
    - Washington County, IN



Subdivision Regulations

Information for Public and Elected Officials

Communities participating in the National Flood Insurance Program (NFIP) must adopt and enforce minimum requirements for development in the floodplain. However, communities may need to enact additional regulations to ensure public safety, reduce risk, and guide sustainable development. The NFIP minimum standards include general requirements that a community must determine whether new subdivisions will be reasonably safe from flooding, which includes assuring minimum flood damage to new structures and utilities and that adequate drainage is provided to reduce exposure to flood hazards. A community can help building owners reduce risk of additional costly damage from disaster events by modifying its ordinance to include language that addresses more specific requirements for new development.

What are subdivision regulations/standards?

Subdivision standards are generally developed through a subdivision ordinance and regulate the way that new development can take place. They are often used when major construction projects are proposed such as large neighborhoods or planned unit developments. These standards generally deal with requirements for infrastructure such as roads and utility lines as well as how homes or other buildings can be constructed.

How does this expanded regulation reduce risk?

As communities grow, development often begins to take place at a rapid pace, sometimes coming into conflict with known hazard areas such as floodplains. When this happens, many communities focus on additional tax revenue and economic growth as benefits from this development. However, it is also important to ensure that precautions are taken prior to development to reduce risk. Subdivision standards can do this by allowing new development to take place with certain restrictions on how that development can occur.

Regulatory Language Recommendations

The minimum NFIP floodplain management criteria in a local ordinance often include language that:

- *Requires developers provide flood elevation data for subdivisions larger than 5 acres or 50 lots*
- *Requires all development that could be impacted by the 100 year flood have a permit*
- *Discourages development in the channel and area directly adjacent to the stream (floodway)*
- *Protects new buildings from damage that would be caused by the 100 year flood.*
- *Requires any building that is damaged at more than 50% of market value to comply with current regulations*

If a community wishes to apply a higher standard of subdivision regulation, the following sentence could be included:

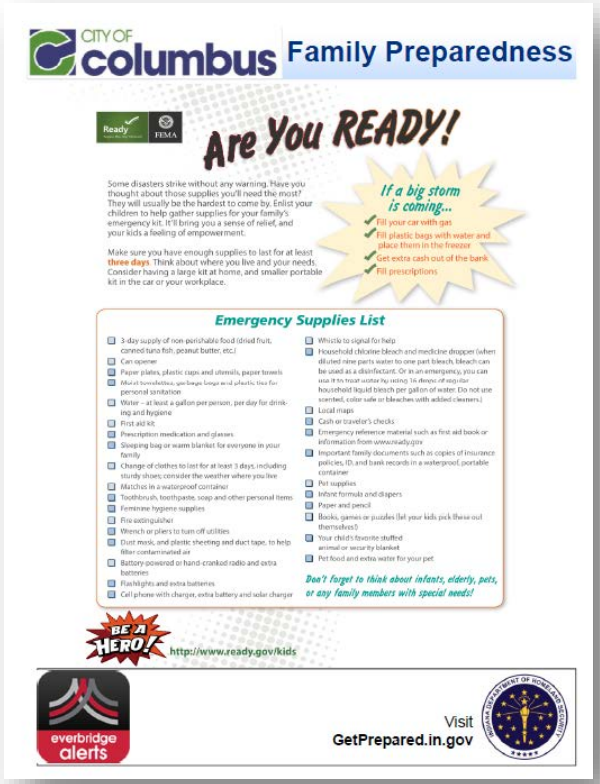
In all areas of special flood hazard where base flood elevation data are not available, the applicant shall provide a hydrologic and hydraulic engineering analysis that generates base flood elevations and floodway boundaries and future conditions flood elevations for all subdivision proposals, and other proposed developments at least X [less than 5] acres or X [less than 50] lots in size.

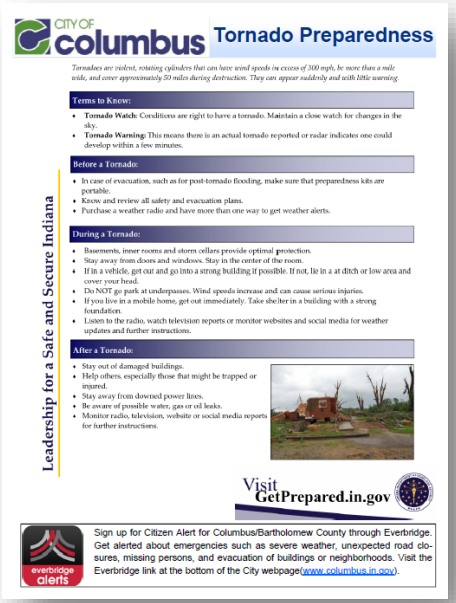
STARR

- **Identify Fluvial Erosion Areas**
  - Erosion prone areas shown on fluvial erosion maps (provided by Indiana POLIS Center) & development ordinance language:
    - Town of Mooresville, IN
    - Town of Morgantown, IN

Mitigation Technical Assistance - Indiana Success Stories

- **Enhance Community Preparedness Pre/Post-Disaster**
  - Outreach documentation, based on FEMA & IDHS fact sheets, customized for hazards preparedness needs.
    - City of Columbus, IN





Mitigation Technical Assistance - Indiana Success Stories

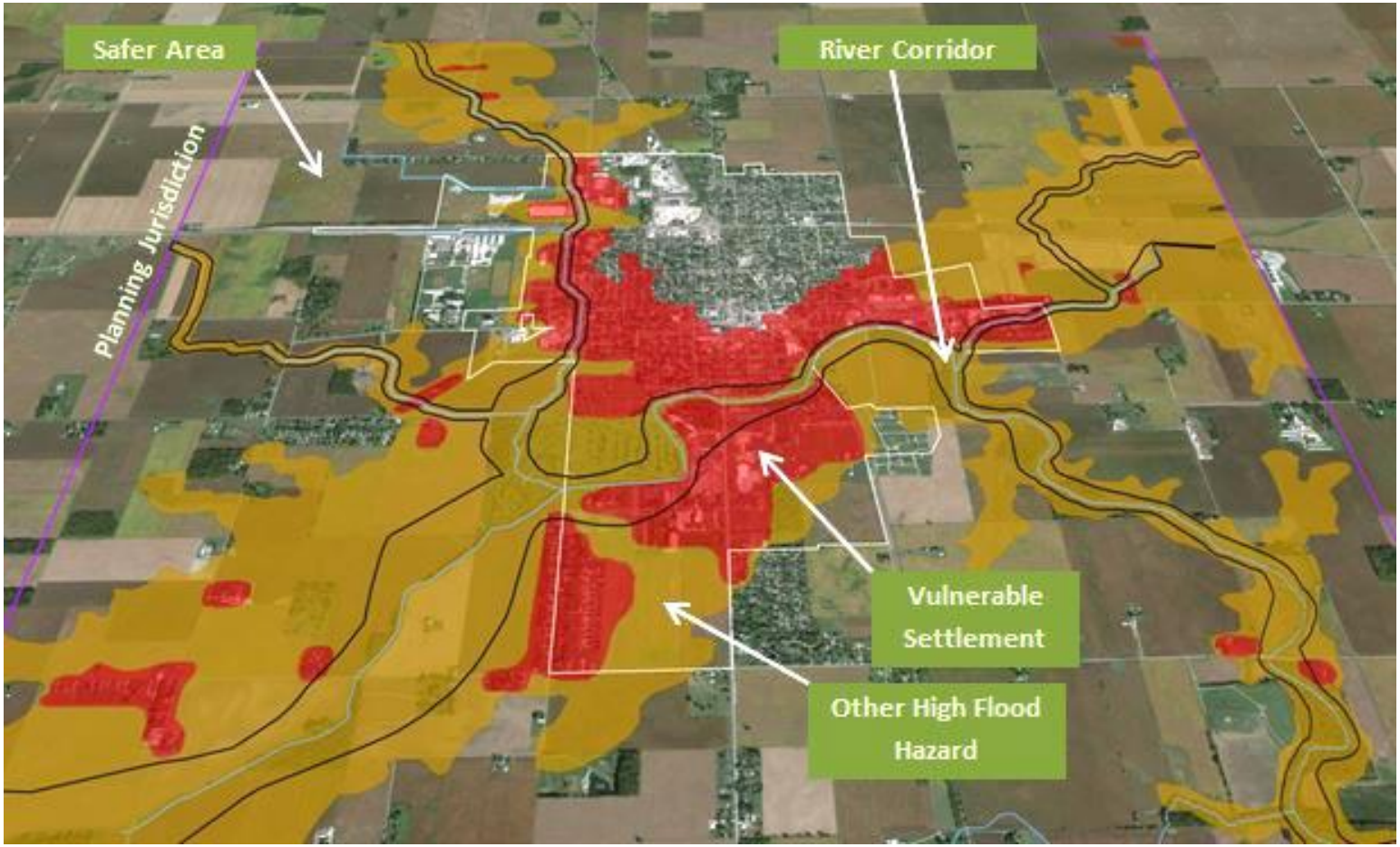
- **Flood Resilience Strategies for Tipton**

- Adopt Overall Strategies
  - Conducting regular audits of policies, regulations, and budgets
  - Checking for consistency, updating, integrating, and revising plans, policies, and regulations
  - Participation in the Community Rating System

- Adopt Specific Land Use Strategies for Distinct Geographical Areas
  - River Corridors (floodway and erosional corridors)
  - Other Flood Hazard Areas (floodway fringe areas)
  - Vulnerable Settlements (developments already existing in harms way)
  - Safer Areas (low flood risk areas)
  - The entire Watershed (the Big Cicero Watershed)

Mitigation Technical Assistance - Indiana Success Stories

- **Flood Resilience Strategies for Tipton**



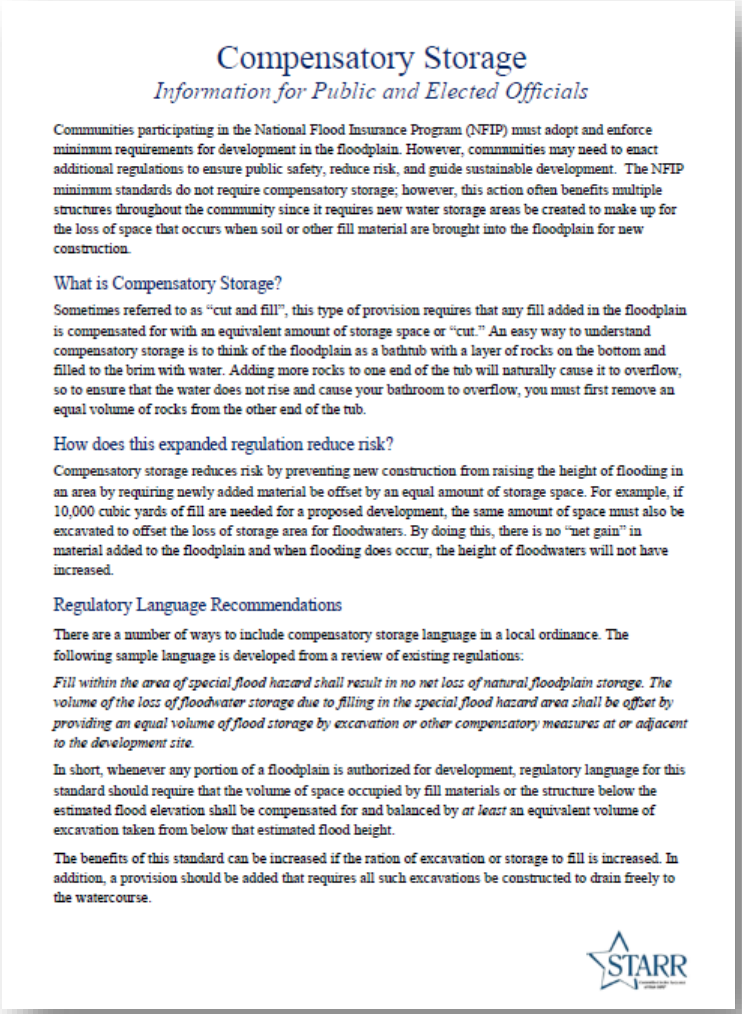
Mitigation Technical Assistance - Indiana Success Stories

- **Flood Resilience Strategies for Tipton**

Planning Area	Area Boundary	Intent of Area Strategy
River Corridor	Floodway or fluvial erosion hazard area, whichever is greater	To conserve land and prohibit new development
Other High Flood Hazard Areas	Undeveloped land in the floodway fringe	To conserve land and maintain the natural and beneficial function of the floodway fringe
Vulnerable Settlements	Existing developed land in the SFHA (floodway fringe and floodway)	To protect people, buildings, and facilities in vulnerable areas and reduce future flood risk
Safer Areas	Outside the SFHA but within the planning jurisdiction	To plan for and promote development in areas that are less vulnerable to future floods
Watershed	Entire drainage area	To promote coordination and partnerships and implement practices to slow, spread, and infiltrate flood water

Next Steps

- **Acting on the information:**
  - Community Ordinances with Higher Standards:
    - Compensatory storage for fill in floodplain
    - subdivision regulations
    - fluvial erosion zones
    - Community Rating System (CRS) credit



Compensatory Storage

Information for Public and Elected Officials

Communities participating in the National Flood Insurance Program (NFIP) must adopt and enforce minimum requirements for development in the floodplain. However, communities may need to enact additional regulations to ensure public safety, reduce risk, and guide sustainable development. The NFIP minimum standards do not require compensatory storage; however, this action often benefits multiple structures throughout the community since it requires new water storage areas be created to make up for the loss of space that occurs when soil or other fill material are brought into the floodplain for new construction.

What is Compensatory Storage?

Sometimes referred to as "cut and fill", this type of provision requires that any fill added in the floodplain is compensated for with an equivalent amount of storage space or "cut." An easy way to understand compensatory storage is to think of the floodplain as a bathtub with a layer of rocks on the bottom and filled to the brim with water. Adding more rocks to one end of the tub will naturally cause it to overflow, so to ensure that the water does not rise and cause your bathroom to overflow, you must first remove an equal volume of rocks from the other end of the tub.

How does this expanded regulation reduce risk?

Compensatory storage reduces risk by preventing new construction from raising the height of flooding in an area by requiring newly added material be offset by an equal amount of storage space. For example, if 10,000 cubic yards of fill are needed for a proposed development, the same amount of space must also be excavated to offset the loss of storage area for floodwaters. By doing this, there is no "net gain" in material added to the floodplain and when flooding does occur, the height of floodwaters will not have increased.

Regulatory Language Recommendations

There are a number of ways to include compensatory storage language in a local ordinance. The following sample language is developed from a review of existing regulations:

Fill within the area of special flood hazard shall result in no net loss of natural floodplain storage. The volume of the loss of floodwater storage due to filling in the special flood hazard area shall be offset by providing an equal volume of flood storage by excavation or other compensatory measures at or adjacent to the development site.

In short, whenever any portion of a floodplain is authorized for development, regulatory language for this standard should require that the volume of space occupied by fill materials or the structure below the estimated flood elevation shall be compensated for and balanced by *at least* an equivalent volume of excavation taken from below that estimated flood height.

The benefits of this standard can be increased if the ration of excavation or storage to fill is increased. In addition, a provision should be added that requires all such excavations be constructed to drain freely to the watercourse.

STARR

Next Steps

- **Acting on the information :**
  - Increased Awareness & Preparedness
    - Checklists to educate/prepare community for pre/post-disaster

CITY OF columbus

Flood Preparedness

Flooding is the most common natural disaster in the United States. Floods can develop over the course of a few weeks or happen quickly.

Terms to Know:

- Flood Watch: Conditions for local flooding are favorable.
- Flood Warning: A flood is occurring or is likely to occur soon.
- Flash Flood Watch: Conditions may develop that lead to flash flooding.
- Flash Flood Warning: Flash flooding is imminent or occurring.

Before a Flood:

- Contact your insurance provider to purchase flood insurance.
- Become aware of any flood plains in the area.
- If in a flood plain, put hot water heaters, electrical panels and furnaces away from the ground.
- In case of an evacuation, make sure that preparedness kits are portable.
- Have basements waterproofed.
- If flooding is possible, try and create a barrier between the house and the water or it's likely path.

During a Flood:

- Evacuate the home if flooding is possible. Know the area and make sure to know alternate escape routes in case one is blocked.
- Get to higher ground if possible.
- If evacuating, take all pets. However, many shelters may NOT allow pets inside due to sanitary conditions, so plan accordingly.
- Do NOT try to drive through water. As little as 2 feet can cause most cars to float, and as little as a few inches of moving water can wash most cars away with the current.
- Do NOT try to cross moving water on foot. As little as a few inches can knock an adult off their feet.
- Watch TV or listen to the radio to find out what actions to take next.
- Take pets, however, shelters may NOT allow pets inside due to sanitary conditions, so plan accordingly.

Leadership for a Safe and Secure Indiana

Visit GetPrepared.in.gov

everbridge alerts

Sign up for Citizen Alert for Columbus/Bartholomew County through Everbridge. Get alerted about emergencies such as severe weather, unexpected road closures, missing persons, and evacuation of buildings or neighborhoods. Visit the Everbridge link at the bottom of the City webpage(www.columbus.in.gov).

Next Steps

- **Acting on the information:**
  - Flood depth maps/grids uses:
    - Identify emergency response areas & alternate evacuation routes;
    - Enhance Benefit Cost Analysis for hazard mitigation grant opportunities;
  - Hydrologic and/or hydraulic analyses:
    - Preliminary design improvements (storm-water infrastructure or flood-proofing)

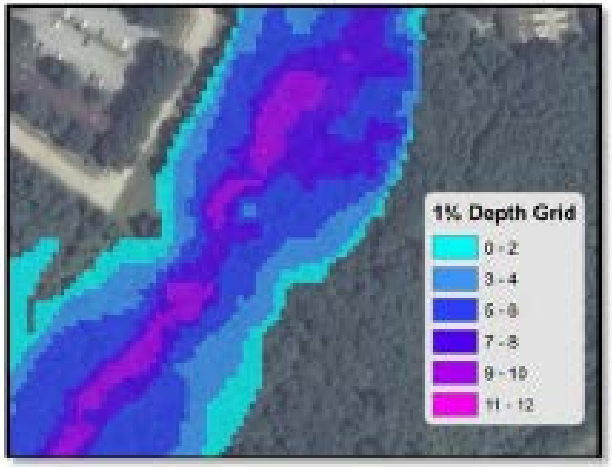


Figure 2: Flood Depth Grid

Next Steps

- **Acting on the Information:**
- **Identified Floodzone Study Needs:**
  - Upper Wabash Watershed
    - Little Deer Creek, 6.8m, Cass Co
    - Wabash River, 2.7m, Huntington Co
    - Rabbit Run, 2.0m, City of Huntington
    - Charley Creek, 4.2m, City of Wabash
    - Wabash River, 3.6m, Wells Co
  - St. Joseph Watershed
    - Croft Ditch, 5.6m, Albion
    - Lake Wawasee, Kosciusko Co
    - Elkhart River, Elkhart Co (redelin.)
    - Auten Ditch, 3.3m, St. Joseph Co
    - Berlin Court Ditch, 2.3m, Nappanee

Questions?

- **Presenters:**
  - Darrin Miller, dmiller@dnr.in.gov
  - Emily Whitehead, emily.whitehead@stantec.com

- Thanks to staff who provided content regarding their efforts in flood mitigation from: