

# Owen County Transportation Vulnerability Study

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# Project Background

- Project funded by FEMA
- Awarded through a competitive process
- Part of FEMA's Risk MAP program
- Goal is to develop a process that can be used for other locations



# The Vision for Risk Map

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



# Risk MAP Goals

- Further enhance Map Mod products and align flood risk programs
- Engage communities in planning and assessment
- Guide communities in communicating risk to constituents
- Encourage participation in the NFIP

*Deliver quality data to increase public awareness and reduce risk to life and property*



# Project Scope

- Develop GIS tools and processes that can be used to assess potential flood damage to transportation assets
- Create a process that can be applied to other counties or communities
- Pilot site is Owen County, Indiana



Question: Why did we choose to focus on transportation assets?

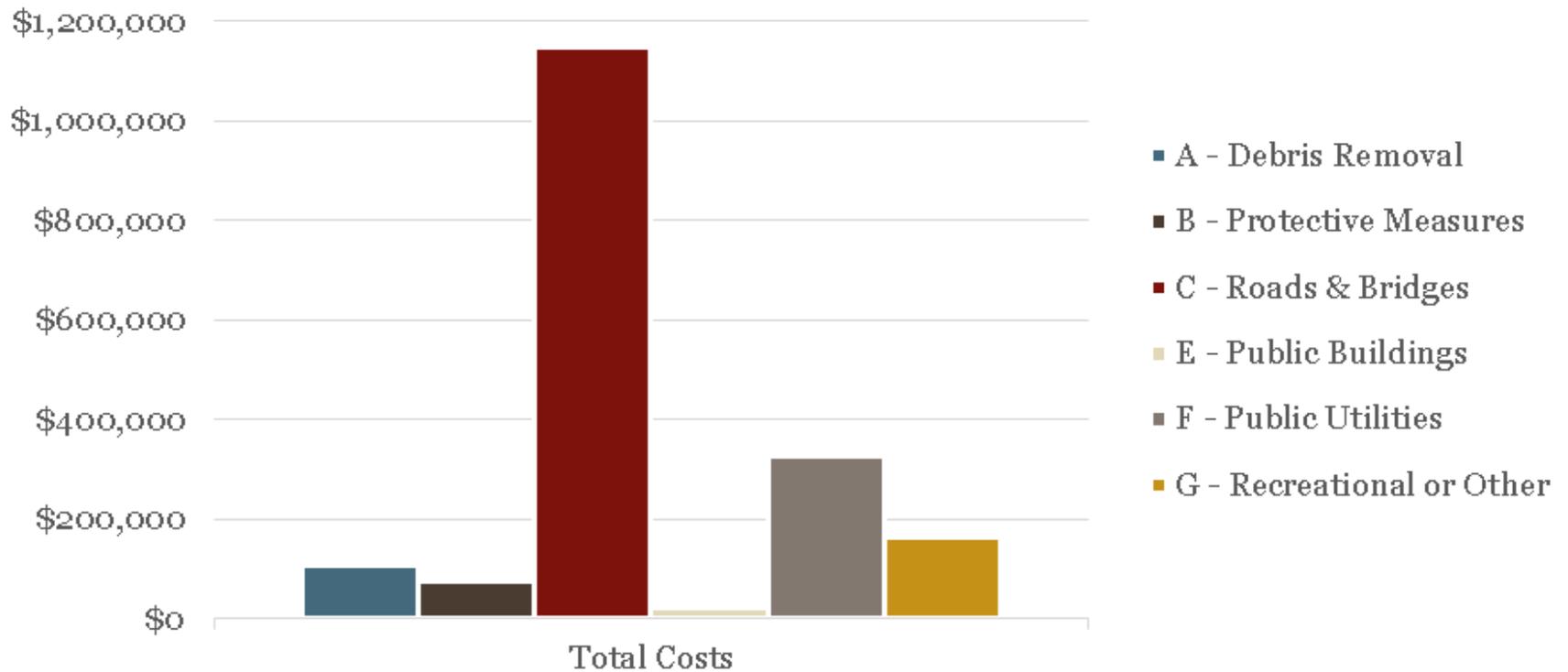


# Public Assistance Data

- Purpose is to provide grants to assist state, tribal and local governments
- Can be used for debris removal, emergency protective measures, repair of publically owned facilities and structures



## Total Obligation Public Assistance



# Project Concept

- Step 1: Identify top areas of concern within the county
- Step 2: Complete focused analysis of a select set of the areas of highest interest
- Step 3: Work with county to develop a plan of action



# Phased Approach

- Phase I - Initial Data Collection and GIS Analysis
- Phase II – Community Meeting / Priority Ranking
- Phase III – Site Visit / Action Definition
- Phase IV – Action Completed / Report Compilation



# Phase I – Data Resources.

- Public assistant data
- Accurate street centerlines
- High quality elevation data (DEM)
- SFHA
- Flood depth grids
- Accurate bridge data



# Phase I - Analysis

- Analyzed Roads and Bridges
- Evaluated the road and bridge surface elevations with various flood frequency elevations
- Generate a scoring process to produce a priority listing



# Centerlines

- Sought highly accurate Centerlines
- Converted to a polygon feature and Segmented
- Elevations extracted from DEM



# Bridges

## Bridges presented their own challenges

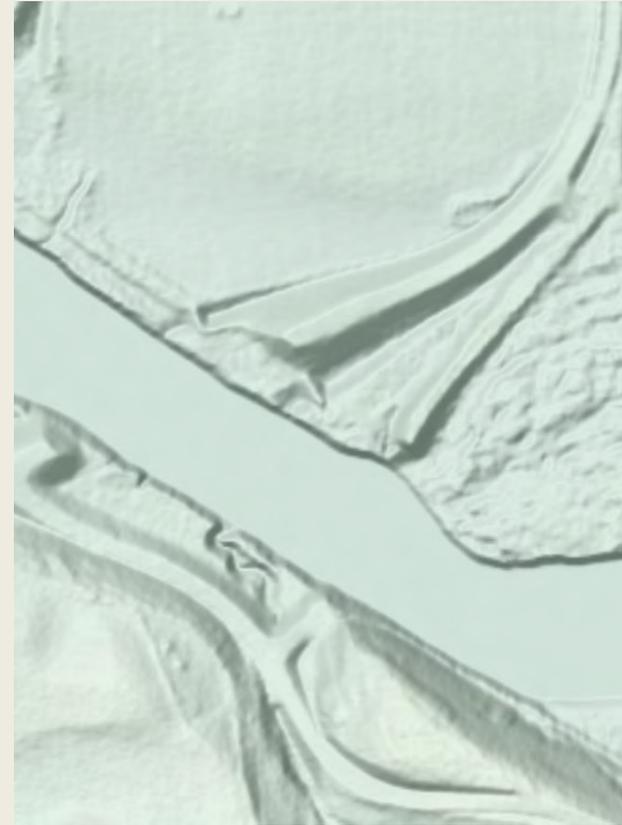
- Accuracy issues with locations
- Acquisition of bridge deck elevations
- Pre processed DEM – “Hydro Flattening”
- Elevations of bridge ramp used

# Bridges – Hydro Flattening

## Aerial Photography

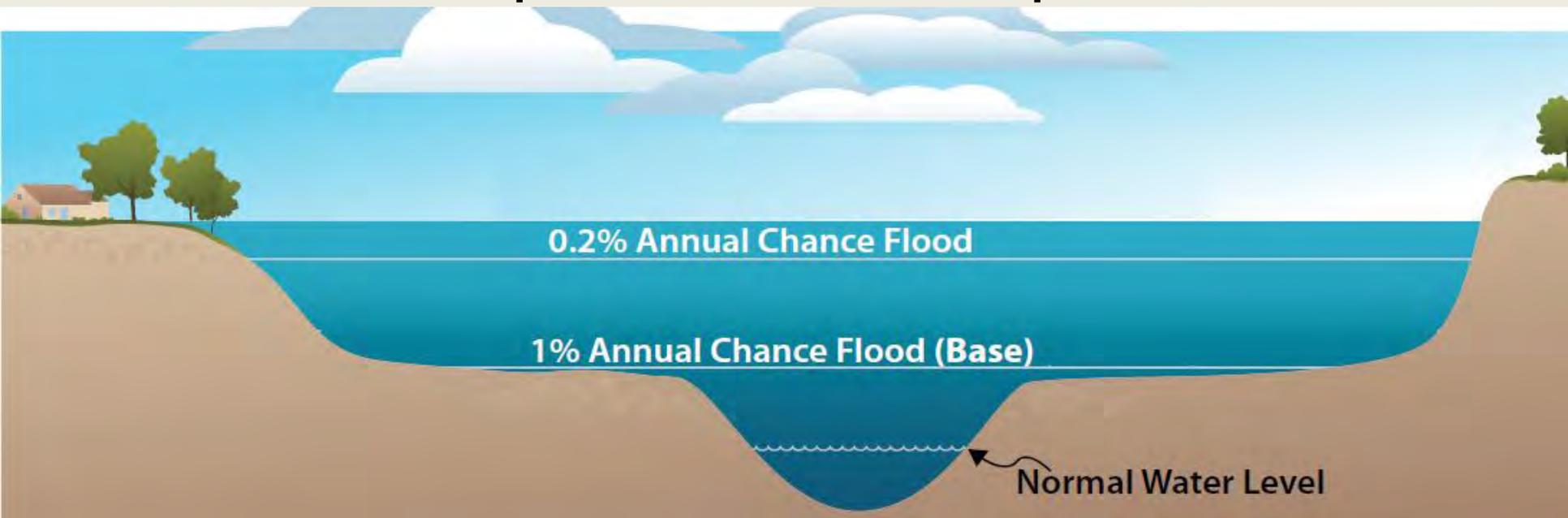


## Lidar Data



# Flood Depth Grids

Flood Depth Grids are a GIS feature that is composed of equally sized cells that contain values that represent water depth.



# Flood Depth Grids

- Ideally would use depth grids generated from H and H modeling of the 100 Year flood.
- For this effort Depth grids were generated using FEMA's Hazus MH software
- Following frequencies:
  - 10 year, 25 year, 50 year, 100 year and 500 year
  - 10%, 4%, 2%, 1% and 0.2%



# Analysis

- Resulted in road and bridge segments each with a “Priority” score
- False positives caused by:
  - Boat ramps
  - Use of bridge approach for bridge deck elevation
- Used default DEM from Hazus for analysis

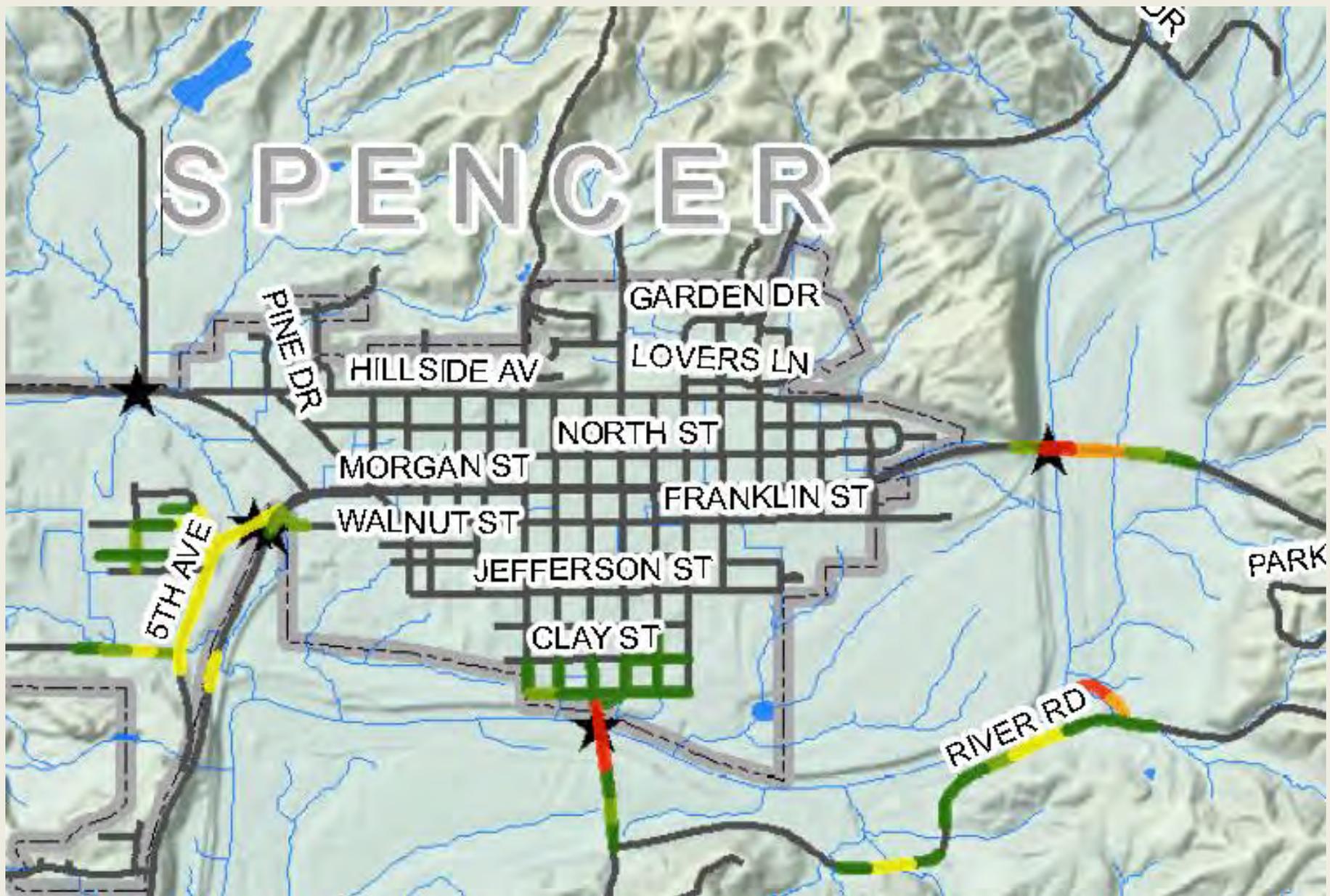


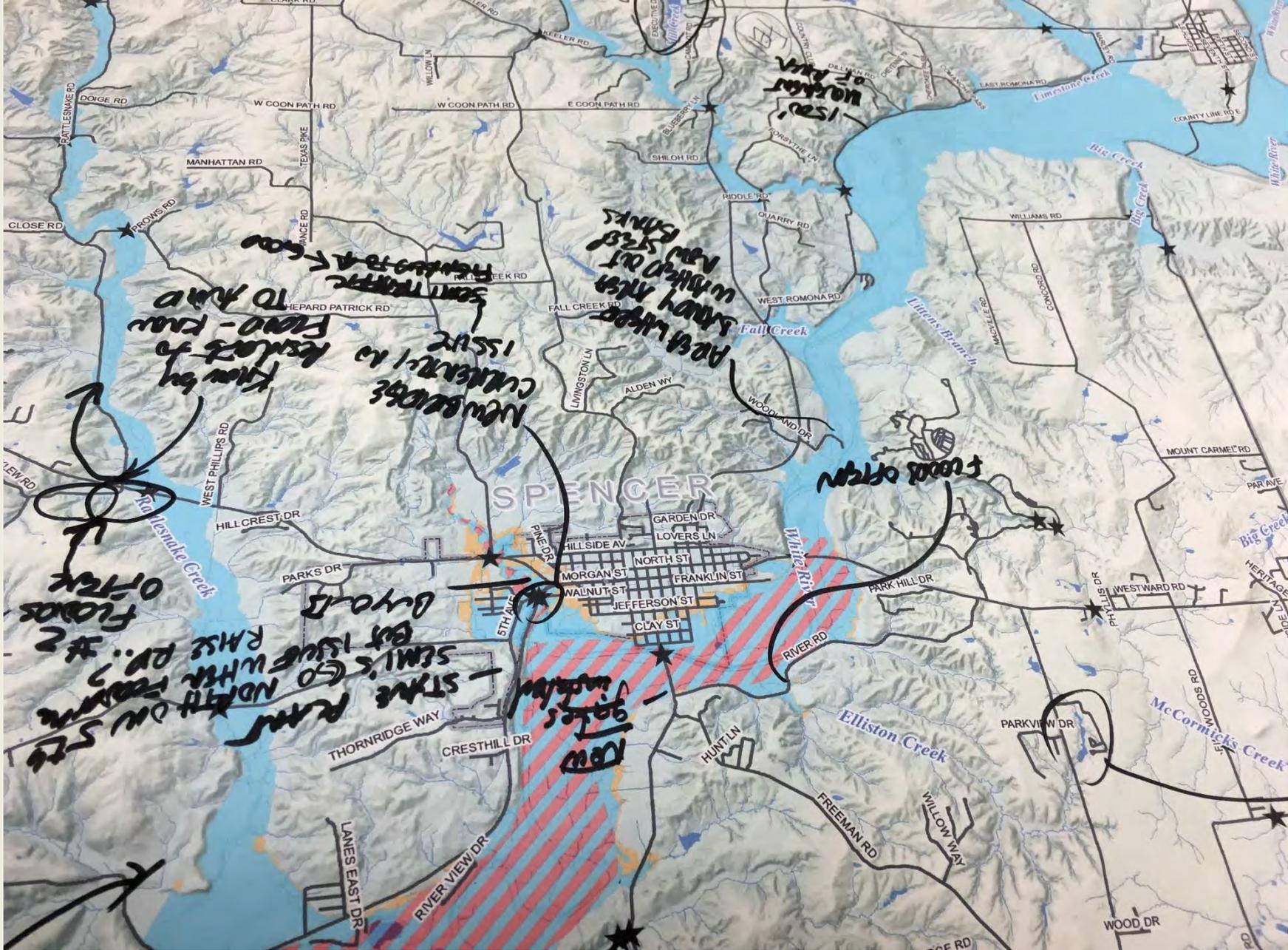
# Phase II – Community Meeting

- A meeting was held in Owen County on December 7, 2015
- In general, the GIS analysis identified the areas of concern
- Priority ranking was modified during the meeting

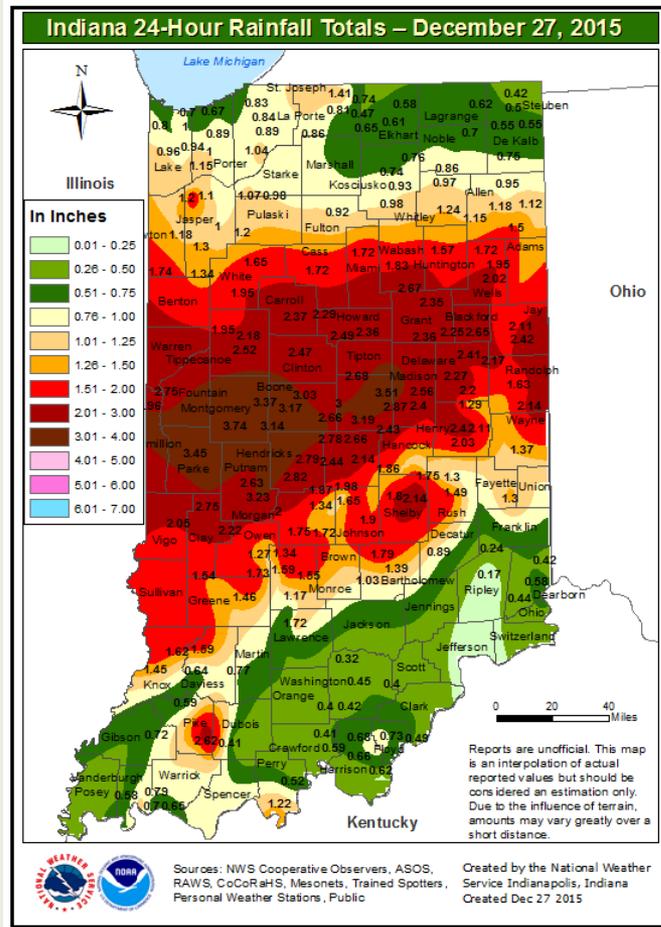


# SPENCER





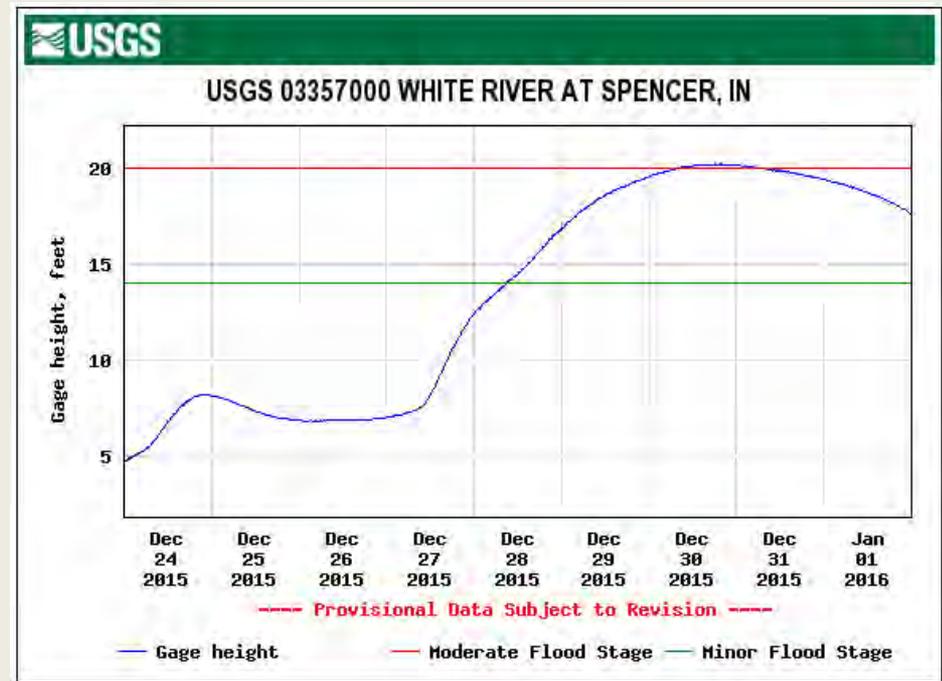
# Phase II – Site Visit



- NWD – Dec 2015 9<sup>th</sup> wettest on record
- Over 3.5 inches of rain fell during a 24 hour period on December 27<sup>th</sup>
- Unique chance to see things in action

# Phase II - Site Visit

USGS stream gage in the White River at Spencer recorded heights of just over 20 or at moderate flood stage.



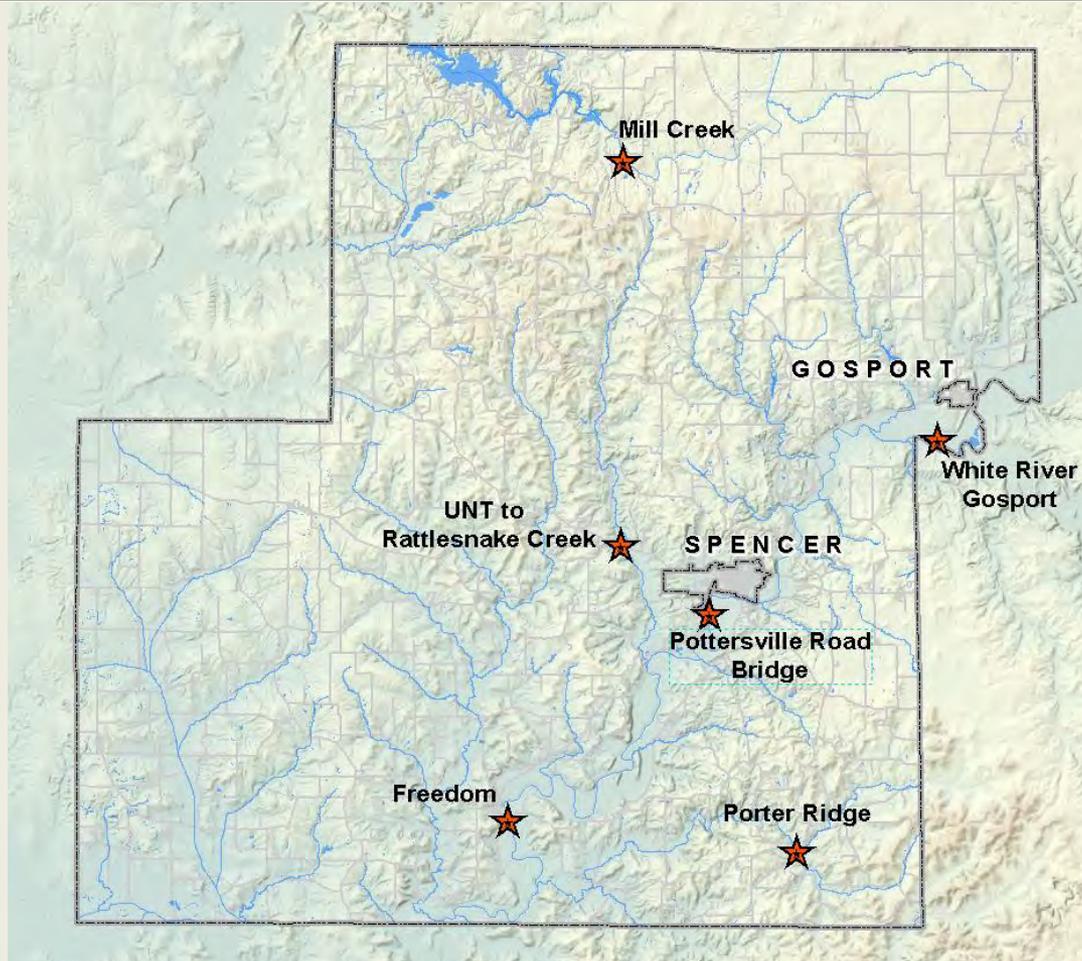
# Priority Ranking

Based on GIS analysis, Community Meeting and Site Visit, the following sites were selected for Phase III

- White River at Gosport
- Mill Creek
- Pottersville Rd Bridge South of Spencer
- Freedom
- Unnamed Tributary to Rattlesnake Creek
- Porter Ridge



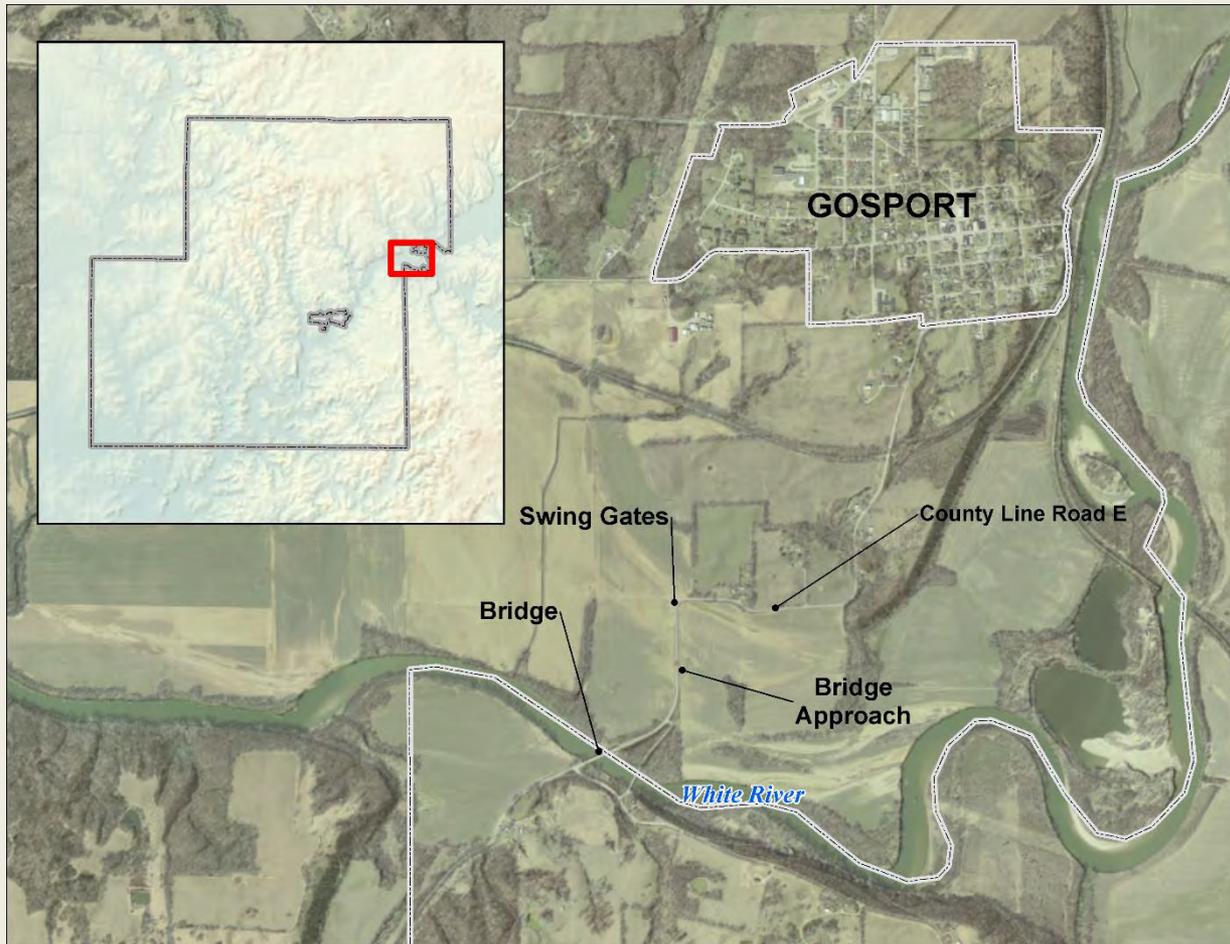
# Site Locations



# Phase III - Detailed Analysis

- Perform a detailed analysis of some of the highest priority areas
  - Examining existing models
  - New modeling
  - Depth grids
  - FEH mapping
  - Any additional data

# White River at Gosport



# Identified Issues

- Bridge Approach on County Line Road E floods during times of high flow on the White River
- Occurs 2 to 3 times a year
- Swing gates used to keep traffic off road when flooded
- Swing gates closed when flooding observed



# December Site Visit



# December Site Visit

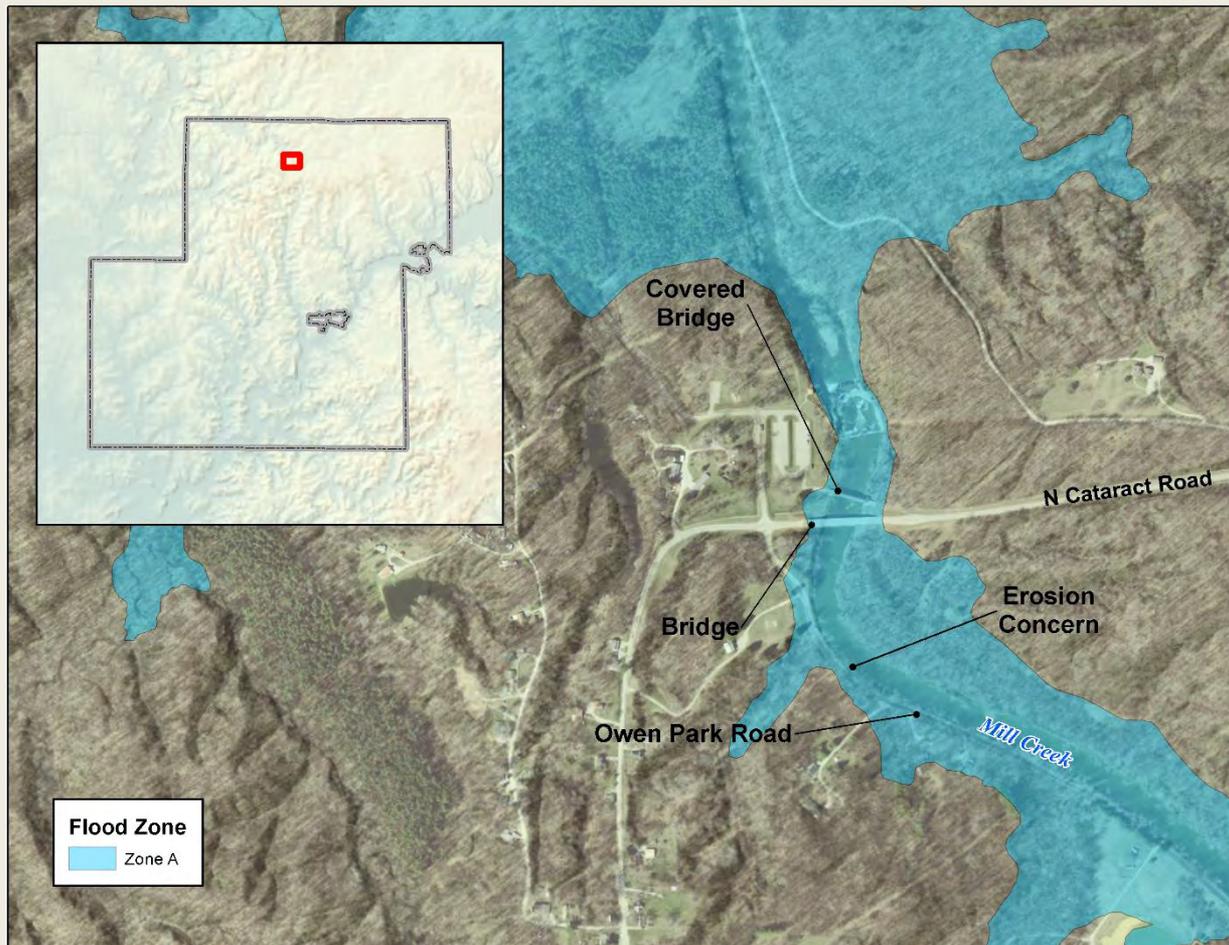


# Proposed Action

- Model this section of the white River - tie water elevations to the gage at spencer
- Determine at what gage heights the road floods
- Will provide County with a better way to monitor flooding - eliminating the reliance on site visits
- Help to avoid traffic traveling through flood waters



# Mill Creek



# Identified Issues

- Owen park road is parallel to Mill Creek south of the bridge at N Cataract Road
- Road is within the 1% floodplain
- The entire section is an erosion concern
- High water events have the potential for undermining the road



# December Site Visit



# December Site Visit

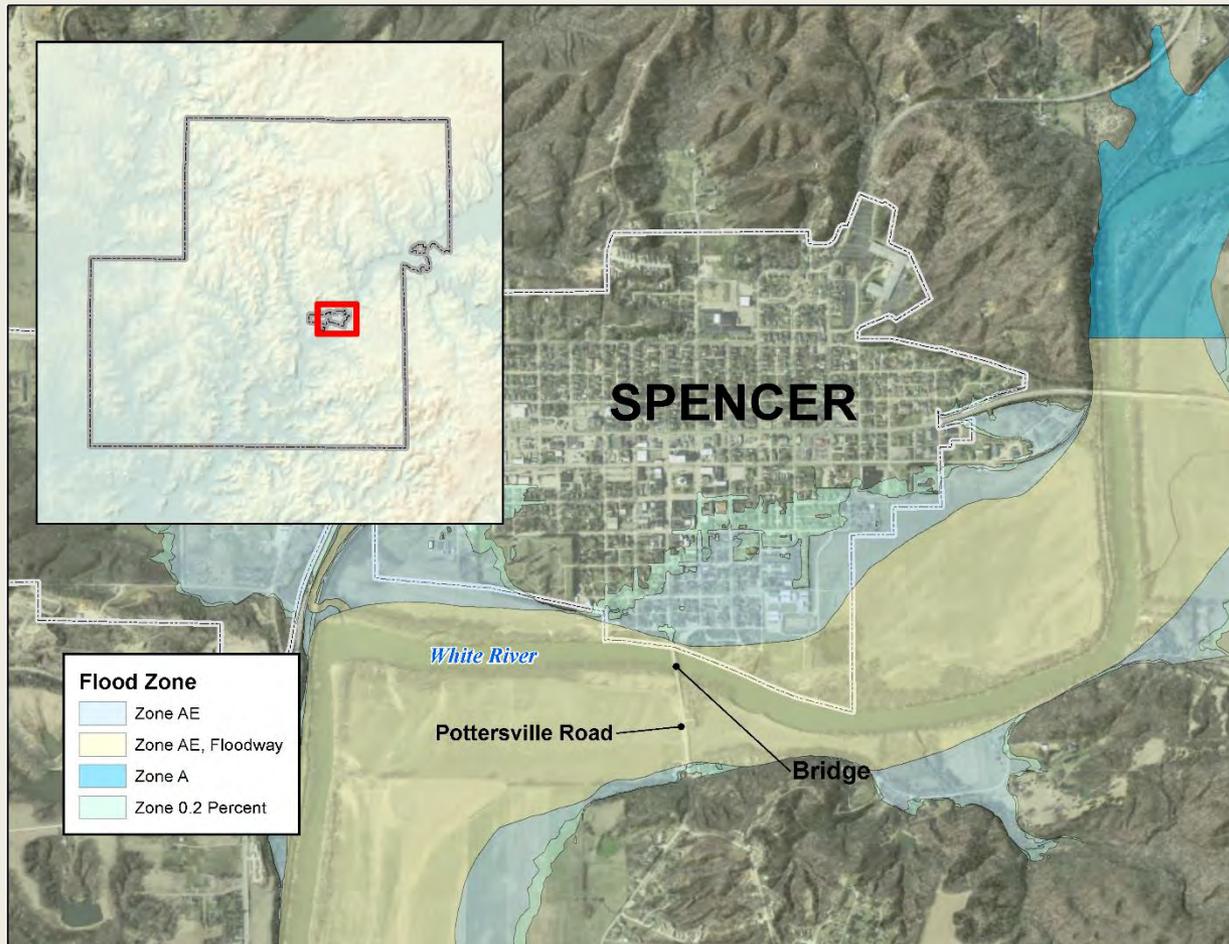


# Proposed Action

- IDNR will look into options for reducing the erosion risk to Owen Park Road.
- Include options for flow diversion, bank stabilization and road realignment.
- If realigning Owen Park Road is deemed feasible, cost estimates will be provided.



# Pottersville Road Bridge South of Spencer



# Identified Issues

- The bridge approach on Potterville Road, South of Spencer overtops during large events.
- The county has armored the road with concrete to reduce the possible damages
- Armoring did not include any culverts to allow high water beneath the surface



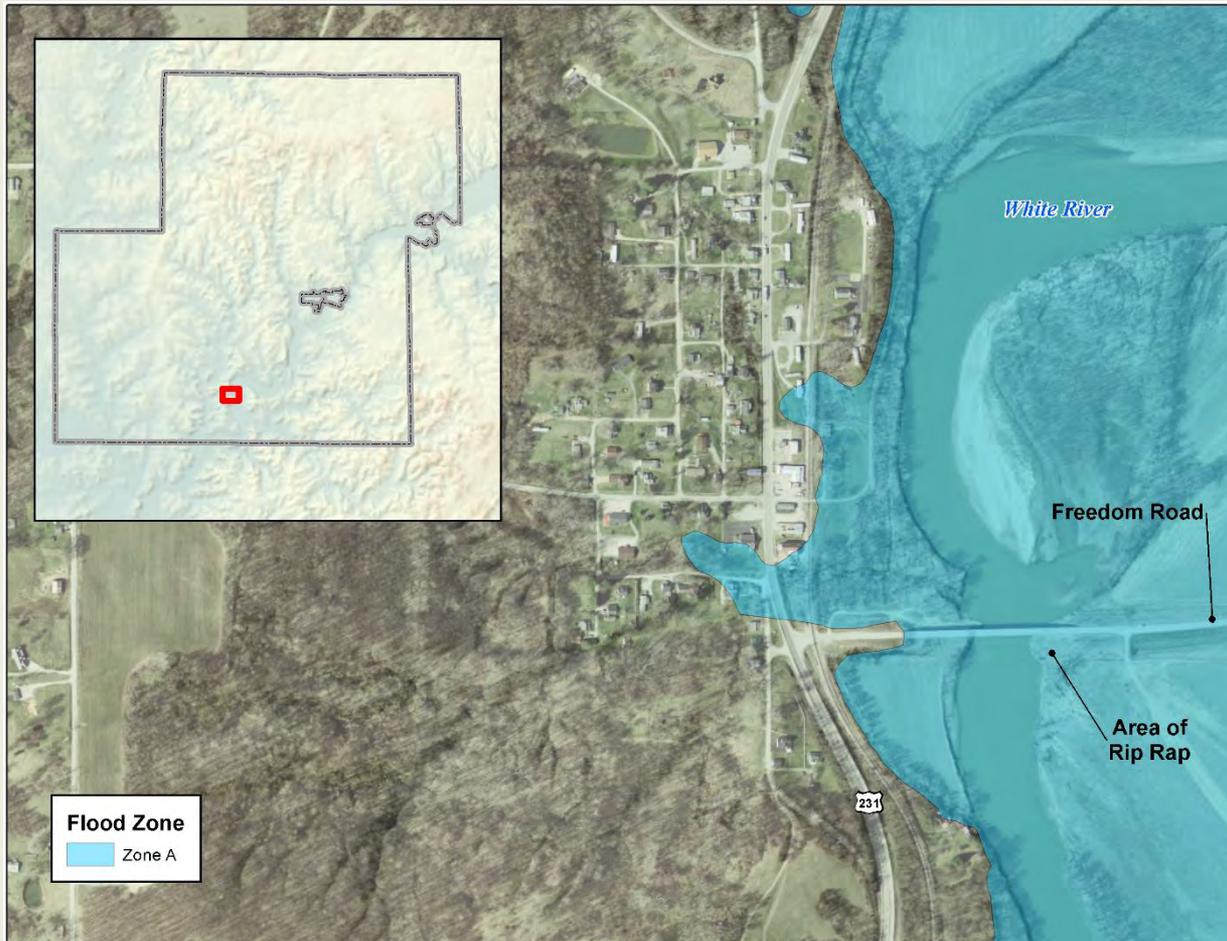
# December Site Visit



# Proposed Action

- Determine the frequencies that the approach road over tops and tie these frequencies to the USGS gage
- Use these frequencies to validate the USGS Flood Inundation Mapper built for this location.
- Evaluate the impact of raising the road and adding culverts. This evaluation would include a cost analyses.

# Freedom



# Identified Issues

- Area of erosion on east side of the White River
- Rip rap placed just south of the Freedom Road Bridge
- The rip rap reduces the opening beneath the bridge
- May cause increased flooding and erosion beneath the bridge



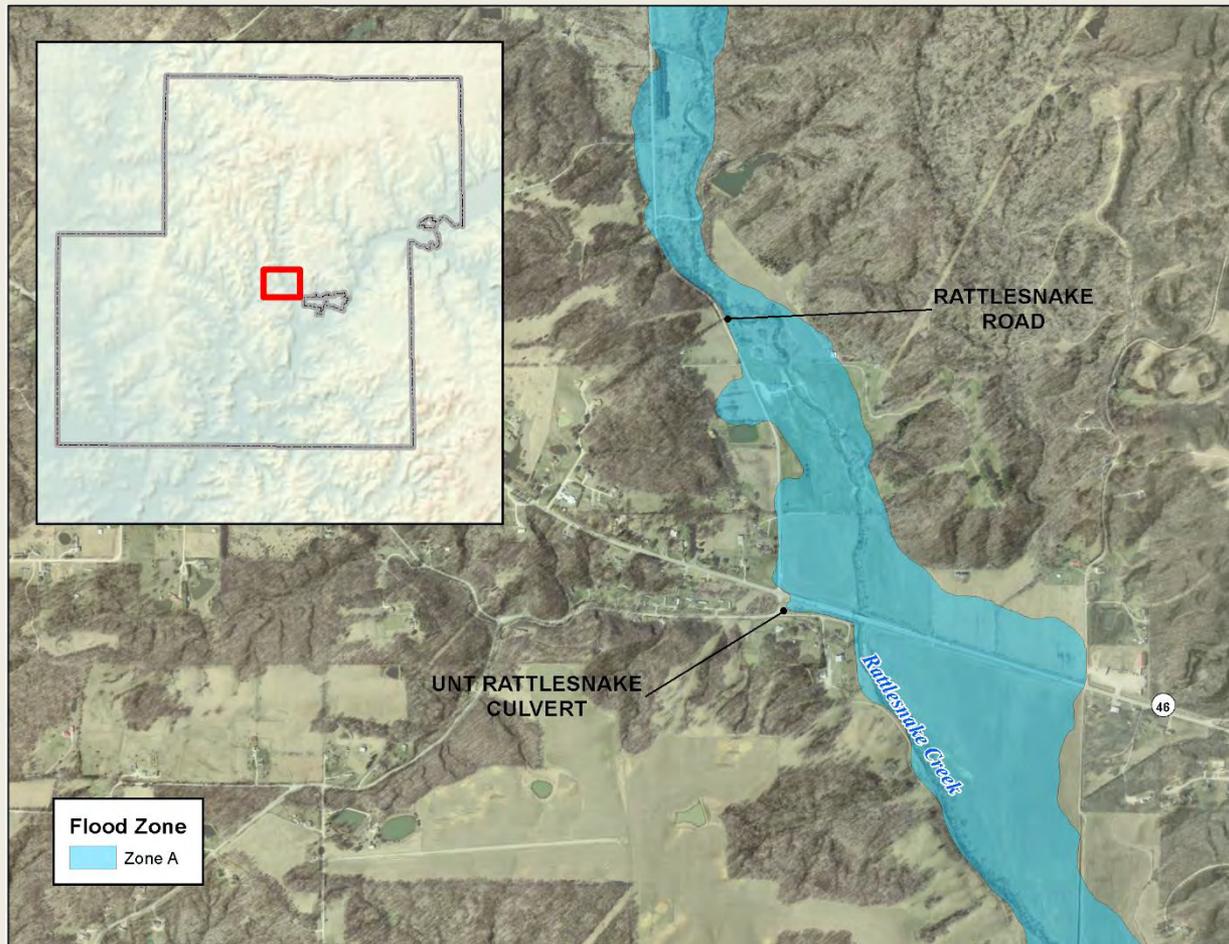
# December Site Visit



# Proposed Action

- Model the reach with different parameters for the opening beneath the bridge
- Determine impact on flow rates, erosion and flooding
- Investigate additional bank stability methods for reducing erosion
- Cost estimates may be provided should viable alternatives be proposed

# UNT to Rattlesnake Creek



# Identified Issues

- Rattlesnake Road runs along Rattlesnake Creek and is often overtopped during flooding events
- An undersized culvert on a tributary to Rattlesnake Creek is suspected as contributing to the volume of flooding



# December Site Visit



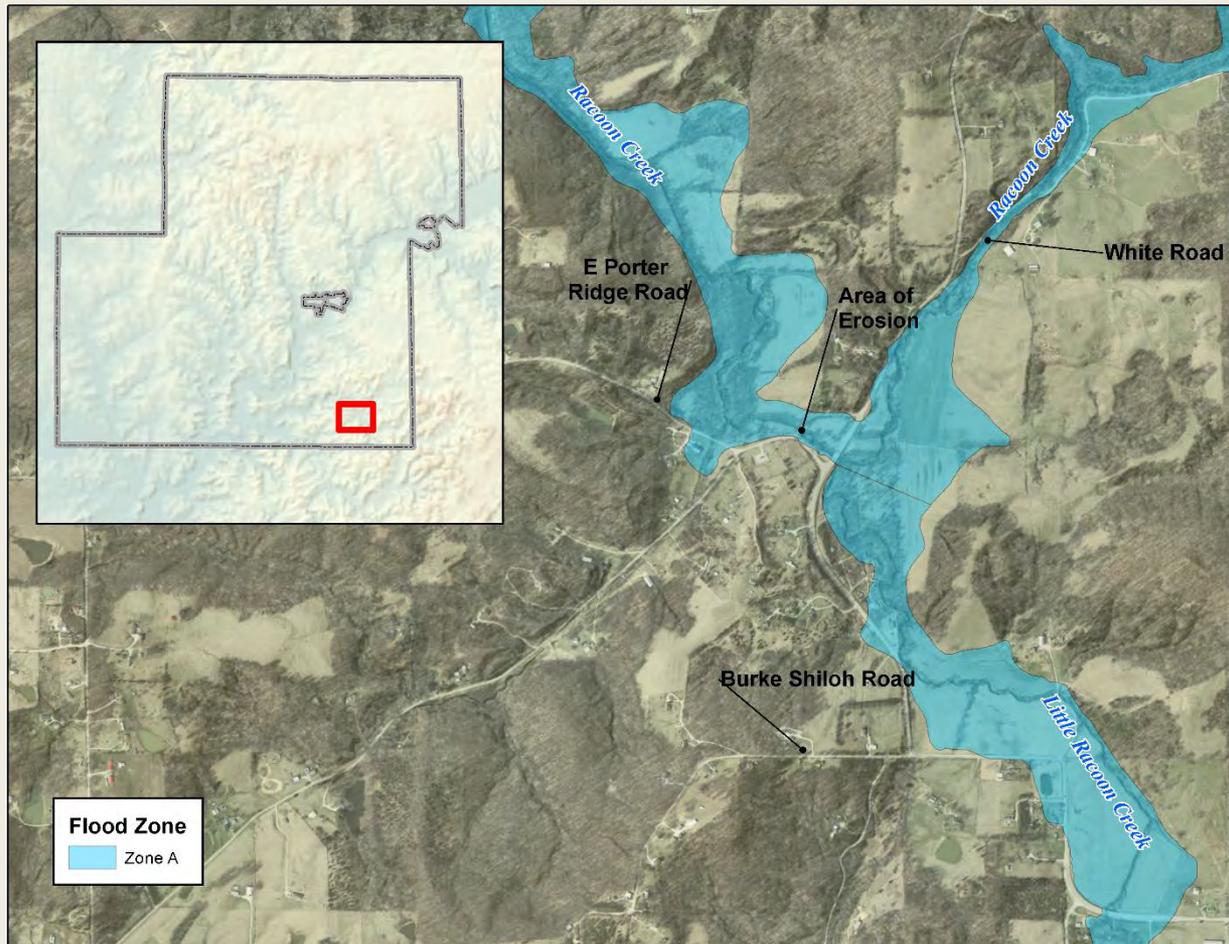
# December Site Visit



# Proposed Action

- Evaluate any potential changes that could be made to alleviate the flooding
- Evaluate what impact would occur if the culvert size was increased on the tributary
- Present an estimate for modifying the culvert should it render a positive impact on flooding

# Porter Ridge



# Identified Issues

- Erosion west of the confluence of Little Raccoon Creek and Raccoon Creek
- An utility building adjacent to Raccoon Creek that is at risk
- An abandoned bridge just west may be constricting flow during flooding

# December Site Visit



# December Site Visit



# Proposed Action

- Evaluate the flooding and erosion
- Model with increased capacity beneath the active bridge and removal of abandoned bridge.
- If the modeling supports removal of the flow impairments, an approximate estimate for removal will be provided

# Phase III – Detail Analysis / Report

- Identified actions will be processed
- Where appropriate, estimates for structural mitigation actions will be provided
- Compile a report for submittal to FEMA and County



Thank you for listening.

Questions or Comments?

