



# Floodplain Management within a 2D Floodplain/Floodway Hazard Area

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# WHY WORRY ABOUT FLOOD RISK



...we are working together to get the best flood map possible to educate all on community risk.

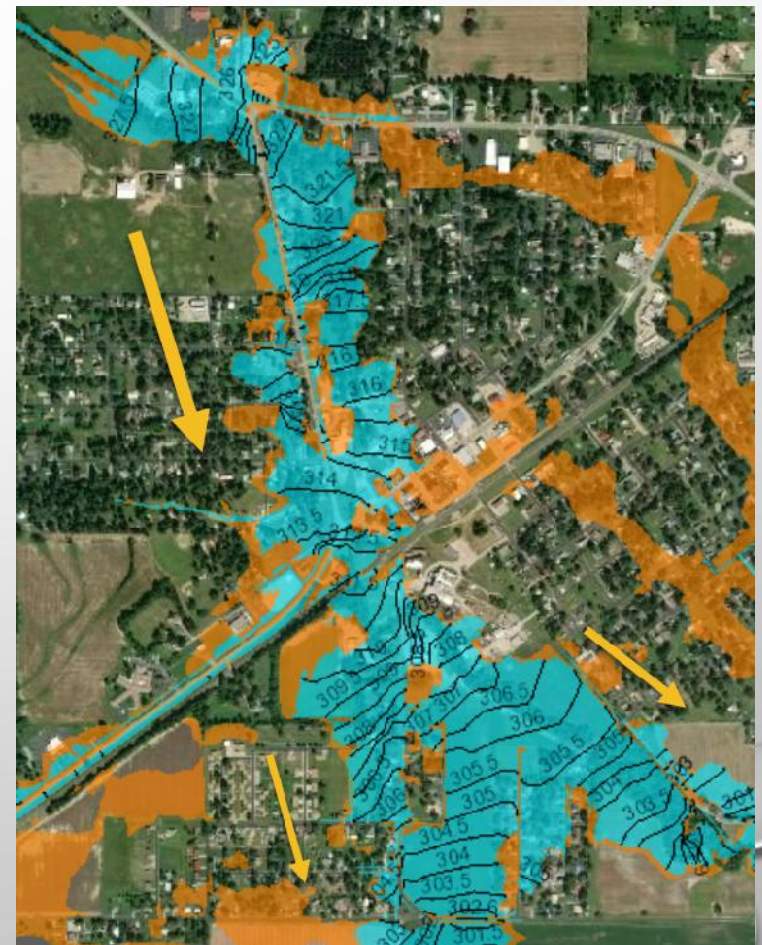
# FEMA FLOODPLAIN MAPS 2D OR NOT 2D

- GREATER USGS QL1 AND QL2 LIDAR DATA COVERAGE
- NEED FOR EFFICIENT RISK IDENTIFICATION BEYOND THE NFIP FLOODPLAIN
- GOALS TO ELIMINATE PAPER MAPS AND MAP UNMAPPED AREAS (RURAL AND URBANIZED)
- INCREASED FUNDING AND EMPHASIS ON 2D STUDIES
- MINIMAL MOVEMENT ON 1D TO 2D FIS INFORMATION
- 2D FLOODWAYS – URBAN LEGEND

## WHY CHANGE FROM PROVEN METHOD OF PAST 30 YEARS?

- More Accurate WSELS in 2D flowing areas
- Better Data for Data Analytics
  - Better Velocity Information
  - More defined split flow
- Potentially better hydrology
- Fulfills the need to define risk beyond NFIP

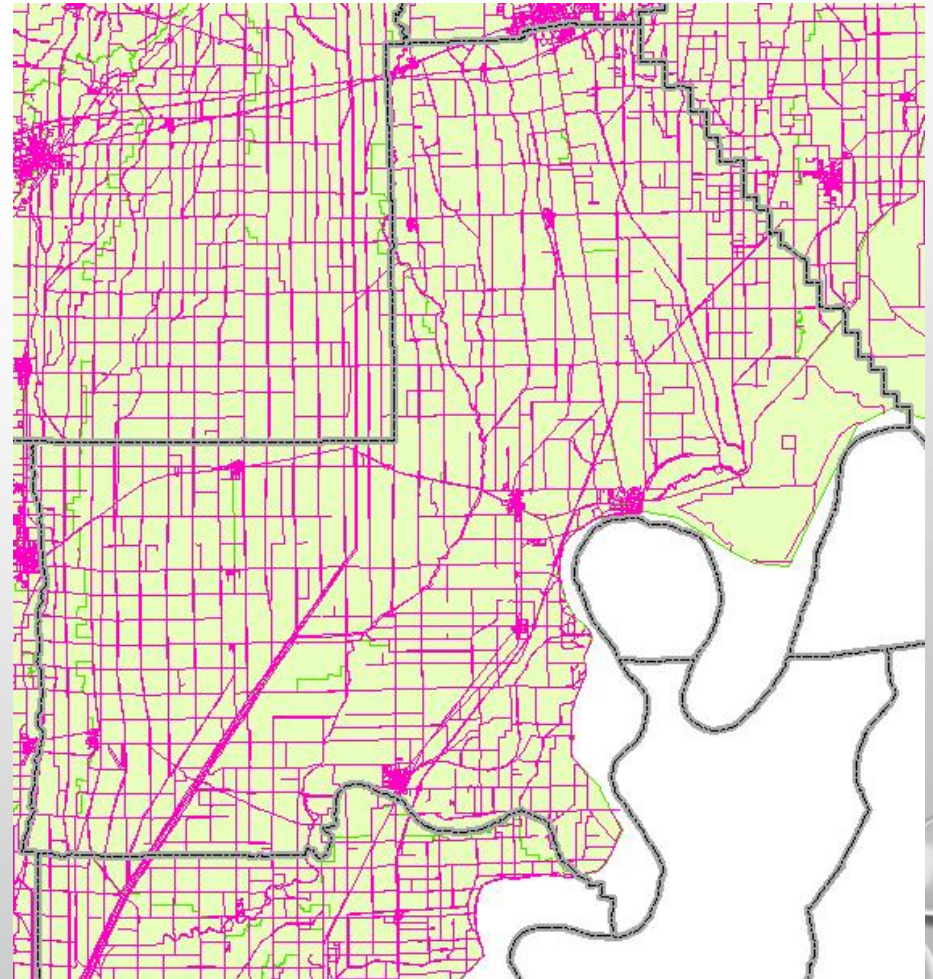






# WTH are Break Lines?

Railroads  
Levees  
Agricultural Berms  
Dams  
DOT roads  
County roads  
Farmer roads



# WTH are Hydro Connectors?

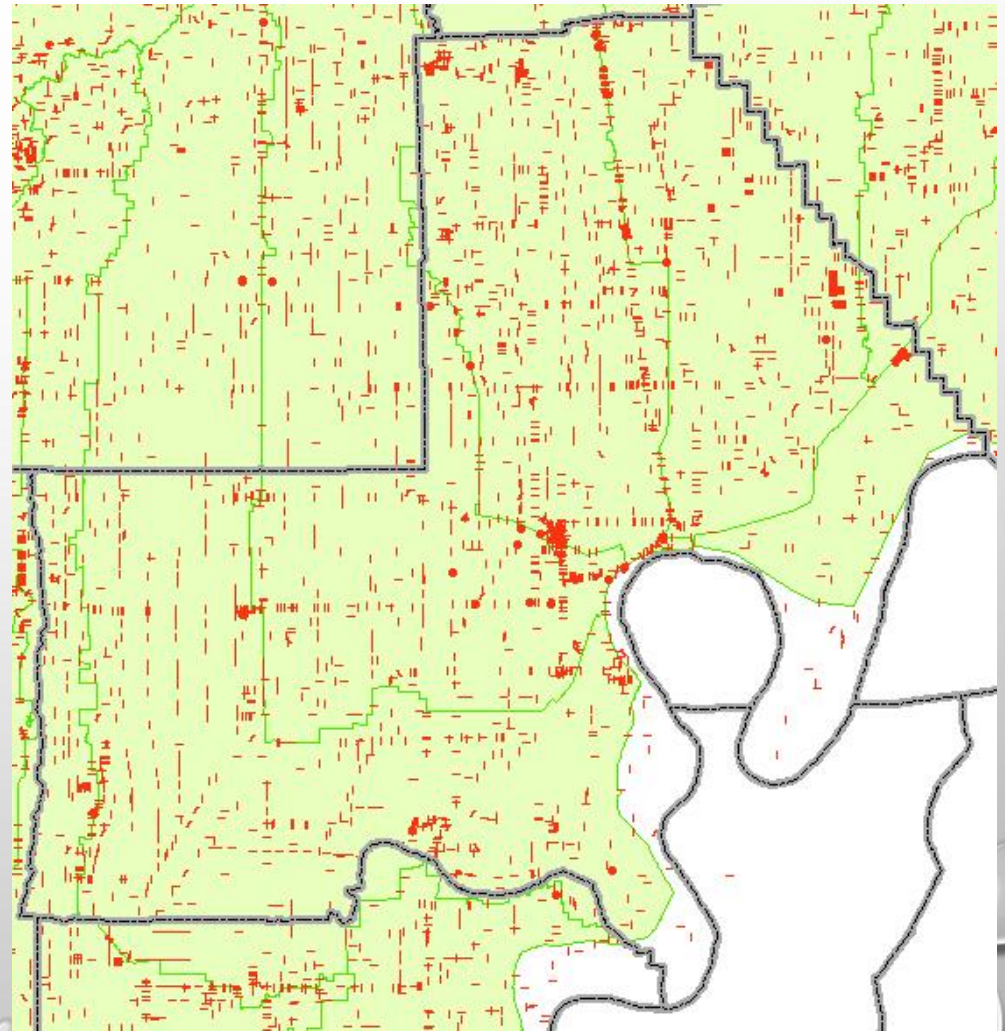
Dams

Berms

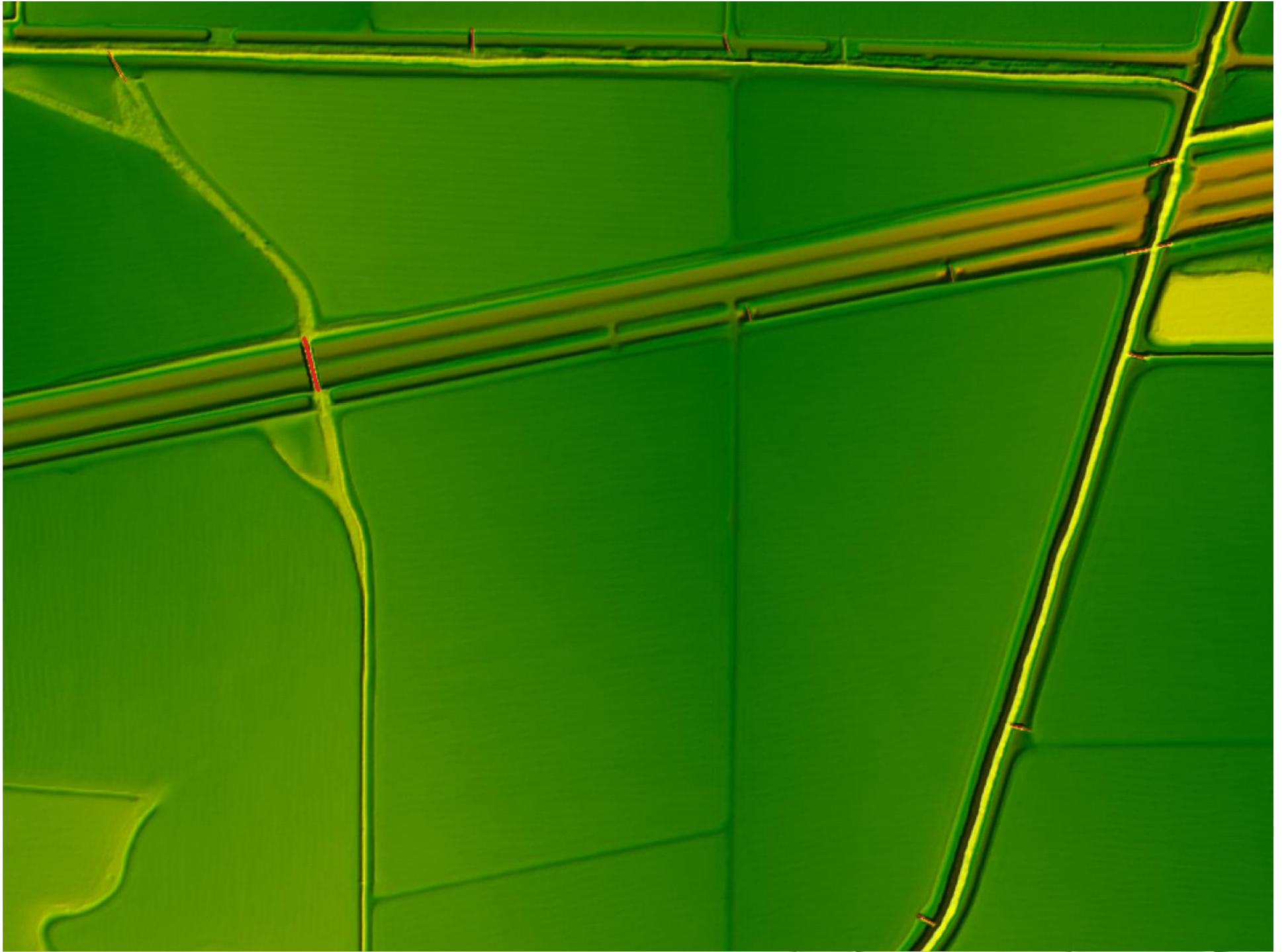
Roads

Railroads

Any raised ground in  
the digital LiDAR that  
has a culvert or  
bridge









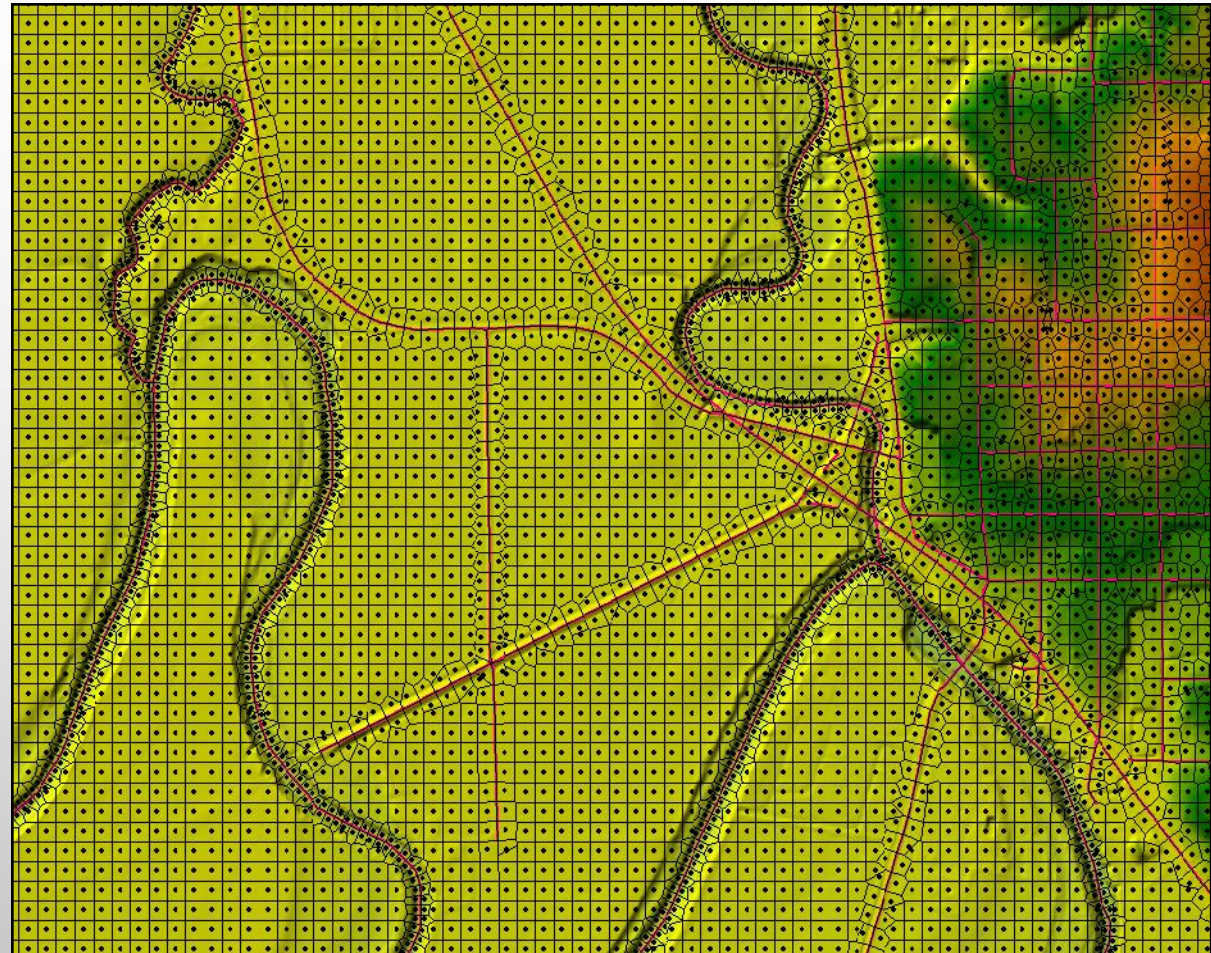
## WHERE ARE THE CROSS SECTIONS?

- BFE lines to the tenth of a foot or map scale serve as cross sections



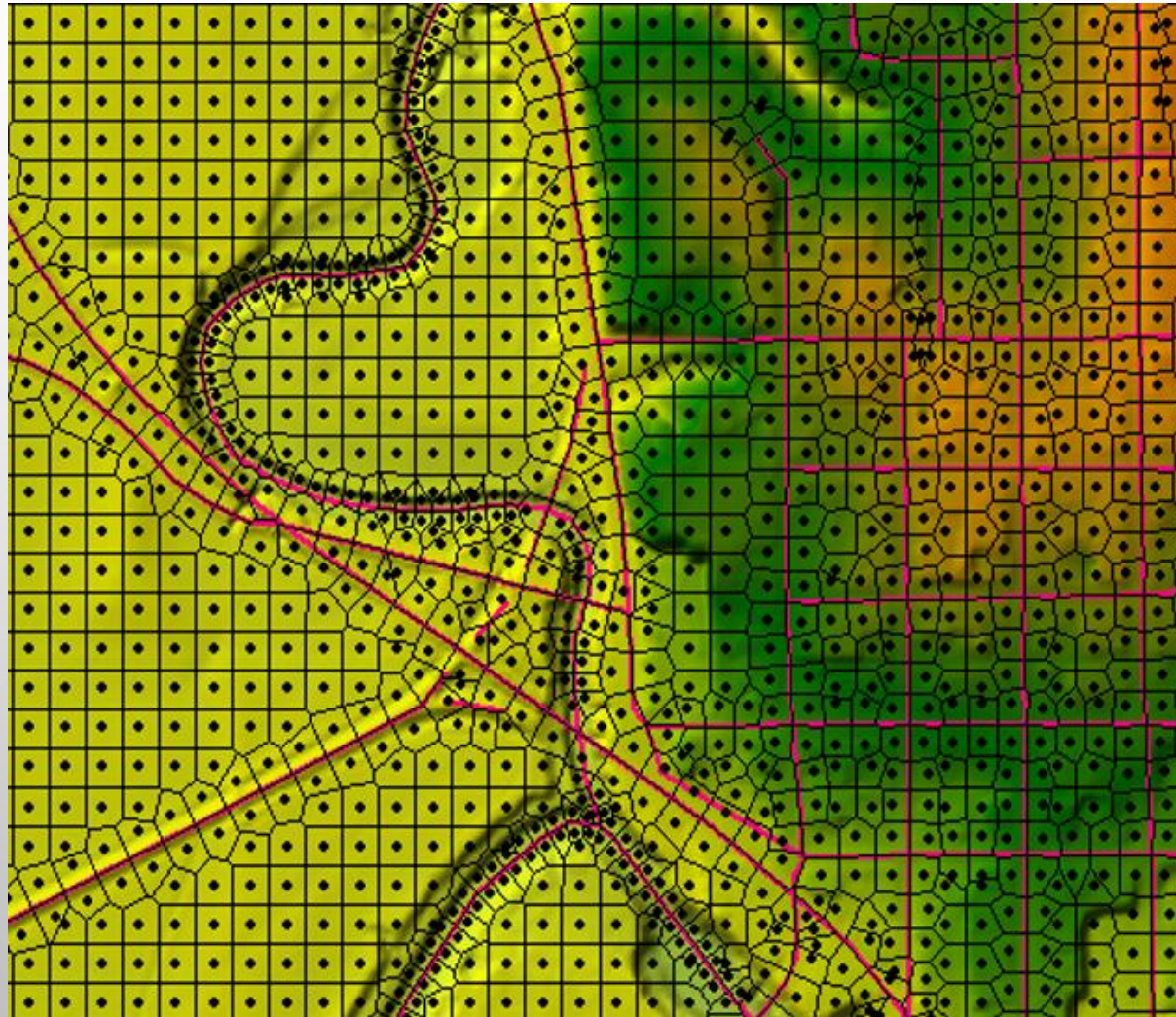
## WHAT IS A MESH?

- RAILROADS
- LEVEES
- AG. BERMS
- DAMS
- KDOT ROADS
- COUNTY ROADS
- FARMER ROADS





# I AM SO CONFUSED?

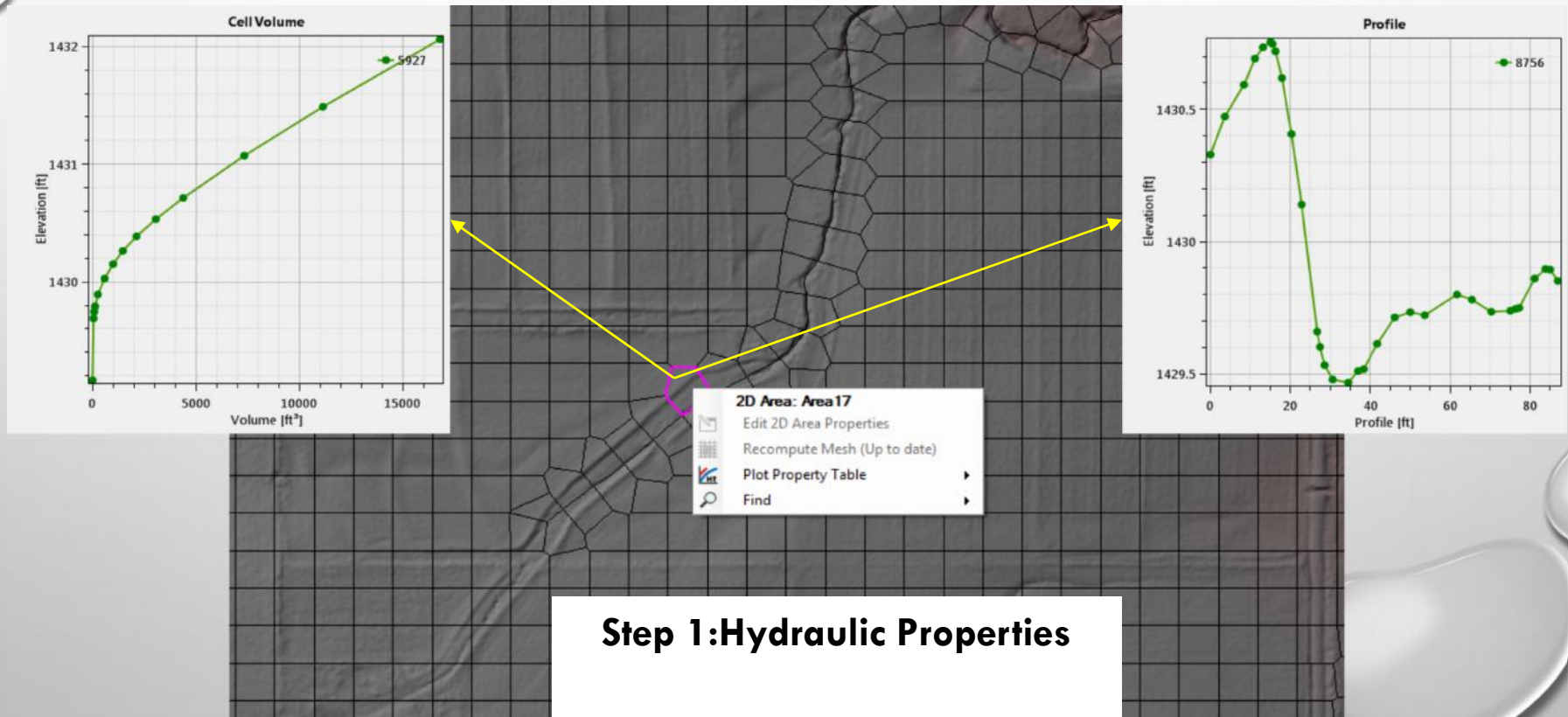




## WHERE DID YOU GET THE 9.4 INCH RAINFALL AMOUNT?

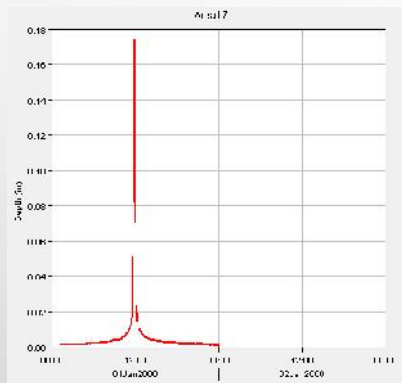
- ATLAS 14 RAINFALL DEPTHS
- CONVERT RAINFALL TO EXCESS RAINFALL (RUNOFF)
- NESTED DISTRIBUTION BASED ON TEMPORAL DISTRIBUTIONS
- APPLY EXCESS TO MODEL MESH (RAIN ON GRID)

# WHAT IS RAIN-ON-GRID?



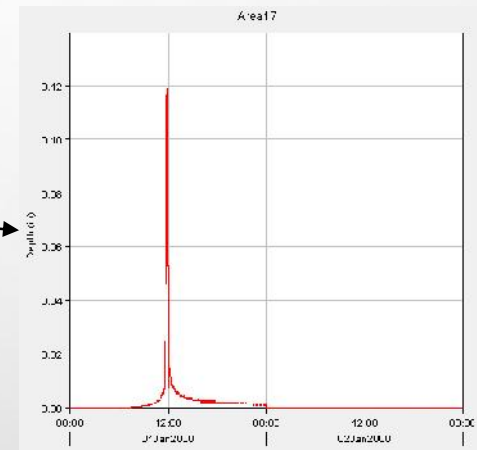
wood.

# WHAT IS RAIN-ON-GRID?



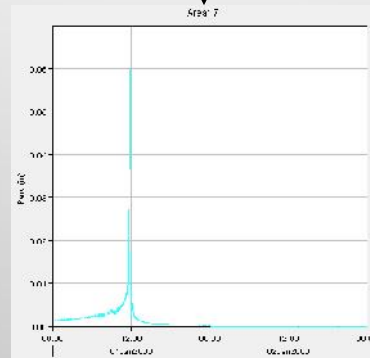
**Rain on Cell**

**Step 2:  
Hydrologic  
Cycle  
Calculations  
(Per Cell)**



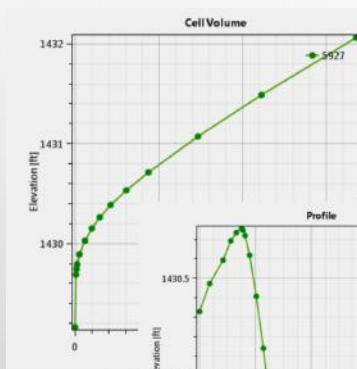
**Excess  
Precipitation**

**Soil  
Infiltration,  
Evaporation,  
etc.**

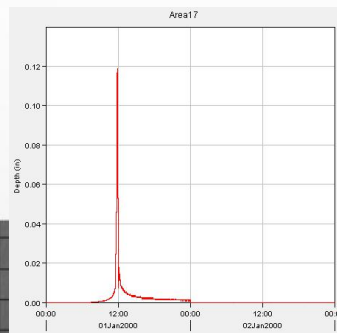




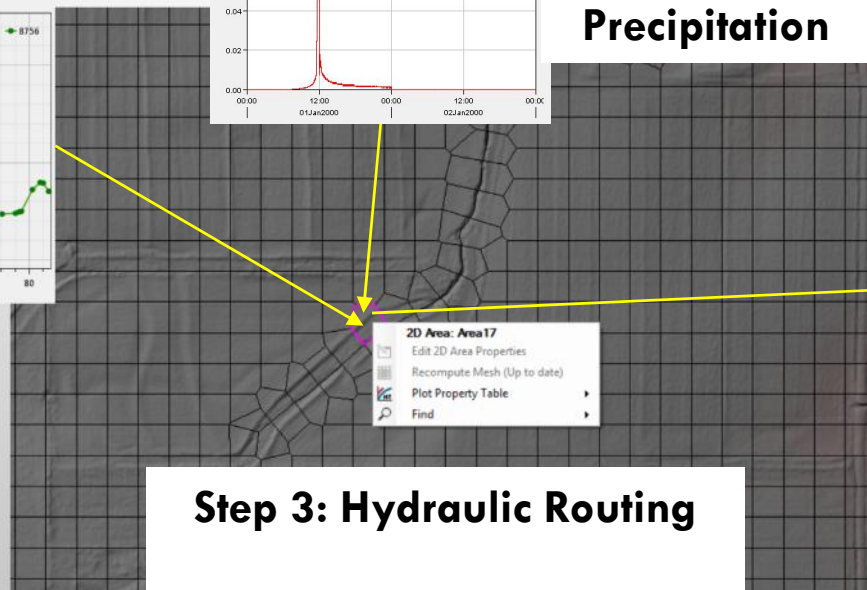
# WHAT IS RAIN-ON-GRID?



**Hydraulic  
Properties**



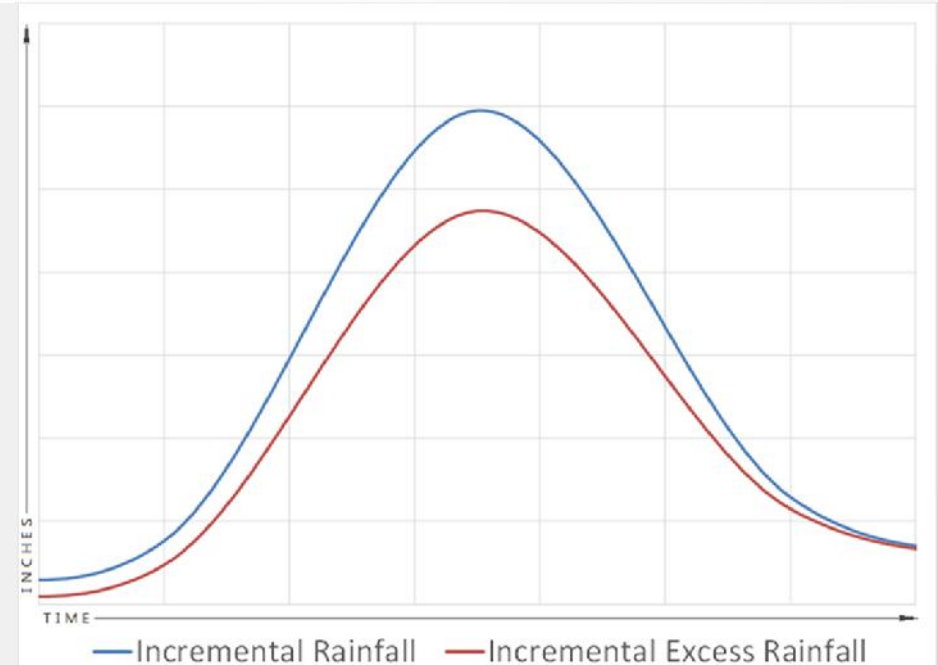
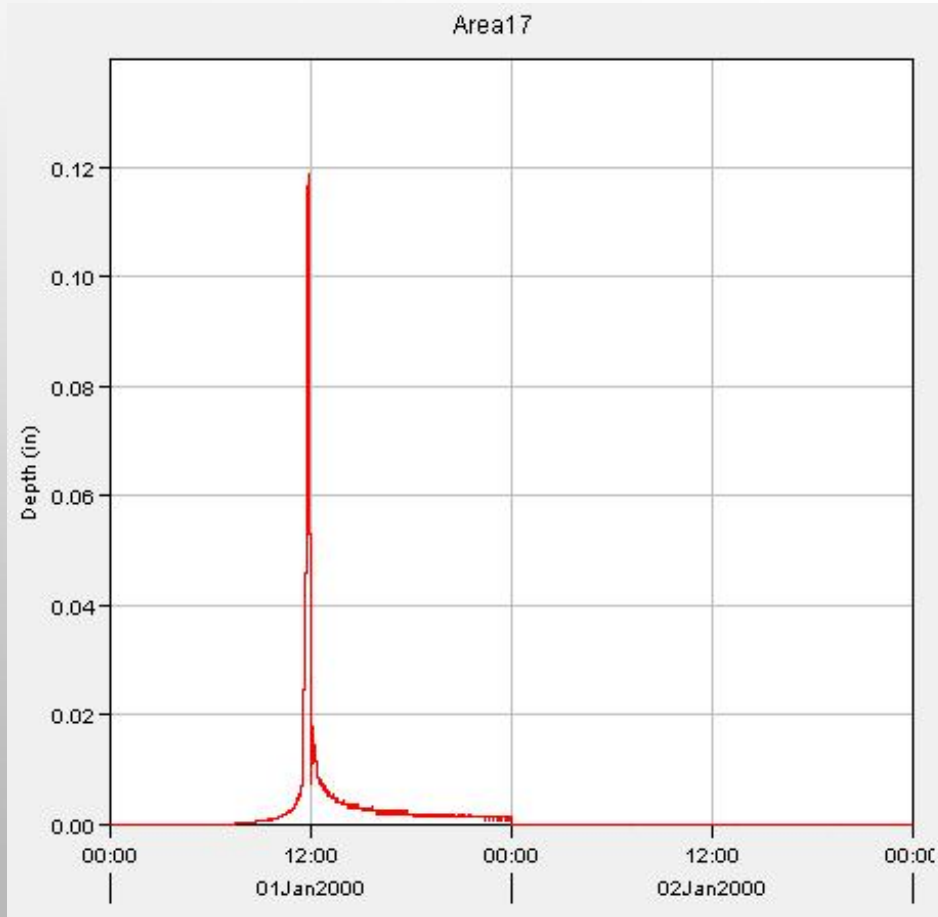
**Excess  
Precipitation**



**Step 3: Hydraulic Routing**

**Hydraulic  
Runoff**

# SO HOW DO YOU KNOW IT IS CORRECT?





**GOAL: DEVELOP A MODEL THAT SIMULATES THE TRUE  
WATERSHED RESPONSE.**

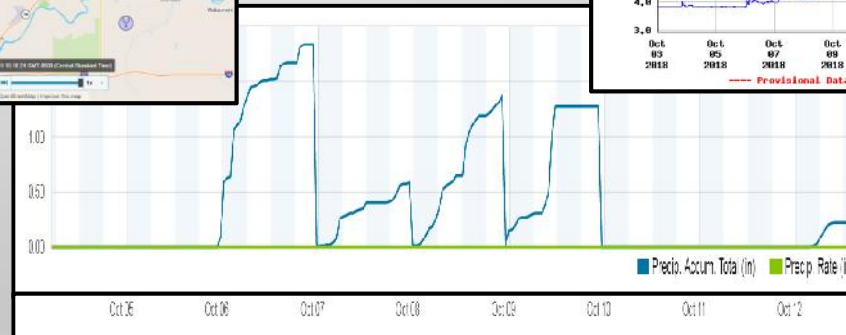
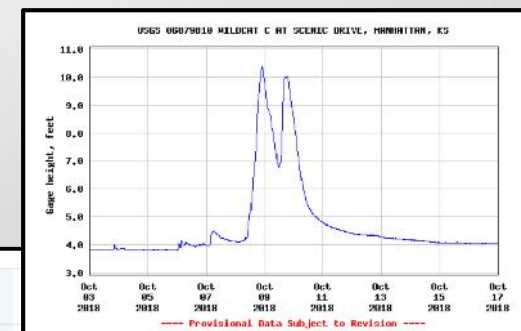
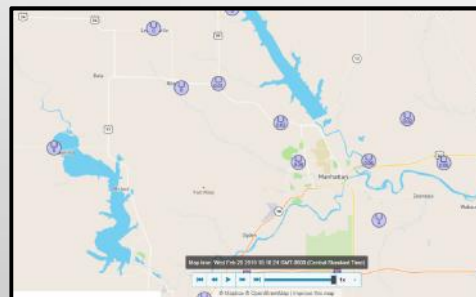
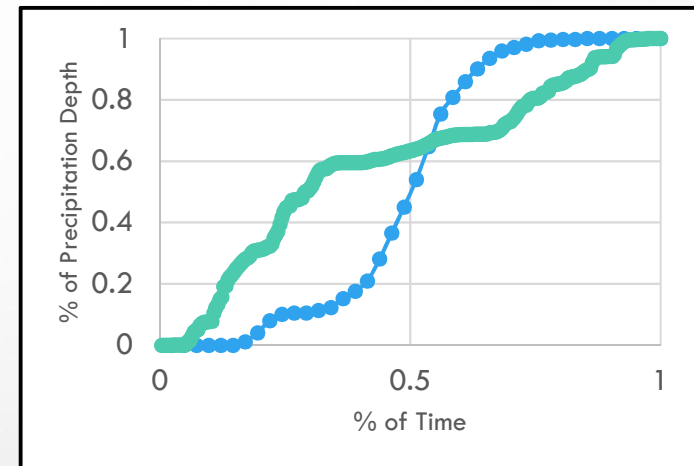
### **Custom & Proven Calibration Process**







- **IDENTIFY DESIRED HISTORICAL STORMS**
- **IDENTIFY & COLLECT RAINFALL DATA**
  - (NOAA-CDA, WEATHER UNDERGROUND, COCORAHS, ETC.)
- **IDENTIFY & COLLECT HWM & STREAM GAGE DATA**
  - (USGS, COMMUNITY, ETC.)



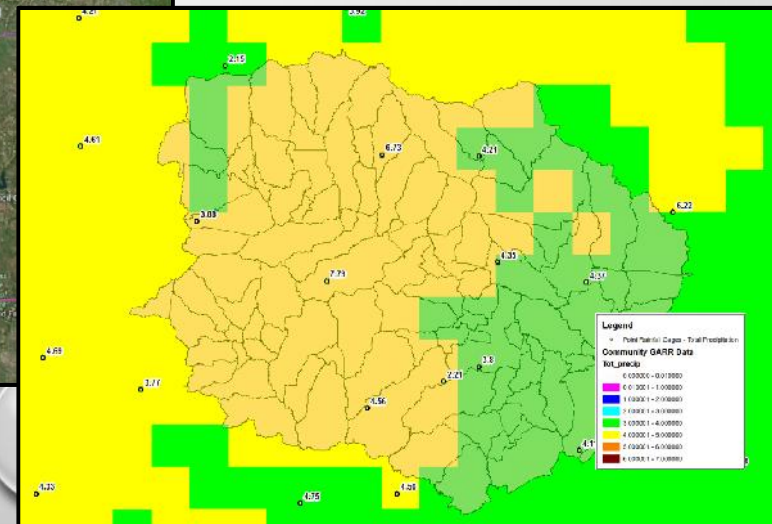
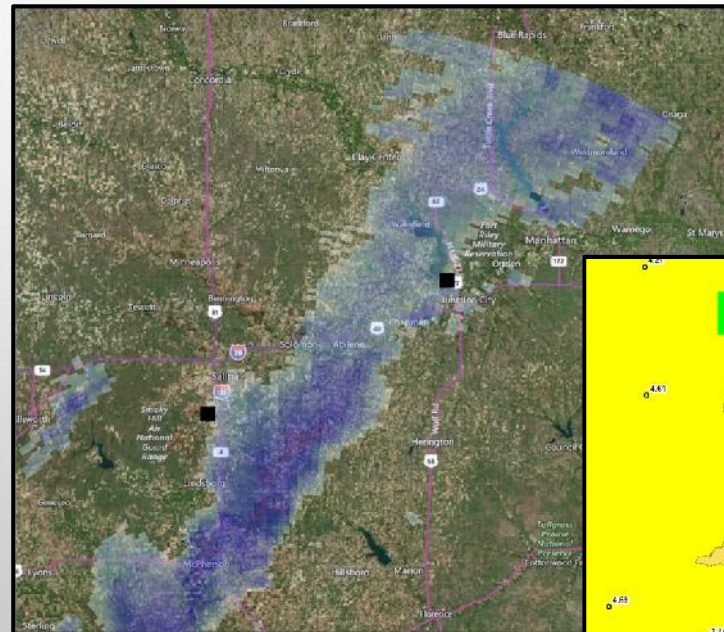
## COLLECT NEXRAD DATA

- CALIBRATE NEXRAD DATA TO POINT RAINFALL INFORMATION
- DERIVE HYETOGRAPHS FOR MODEL SIMULATION

Storm  
Selection &  
Data  
Collection

NEXRAD  
Collection,  
Calibration,  
&  
Hyetograph  
Development

Simulation &  
Validation of  
Model  
Response

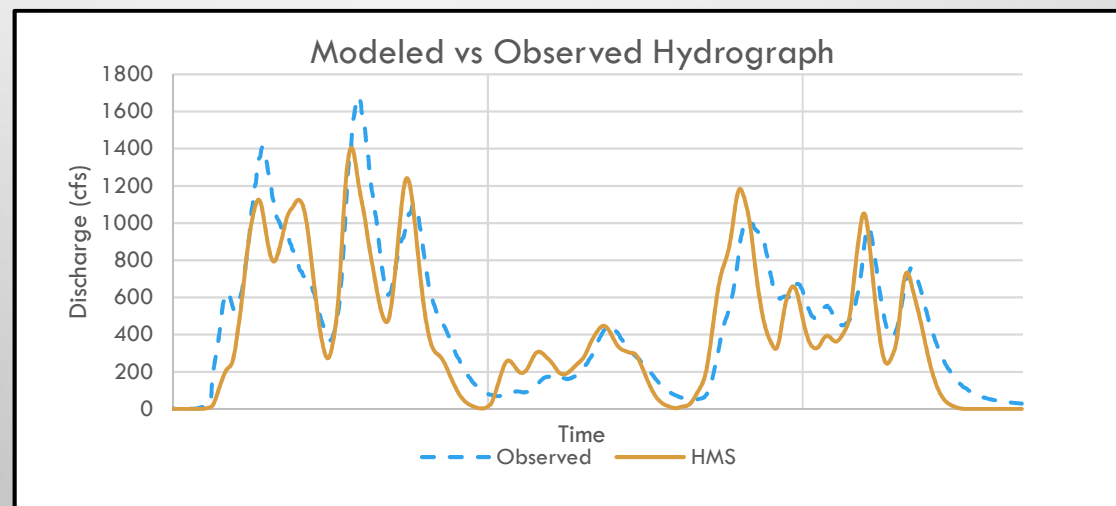
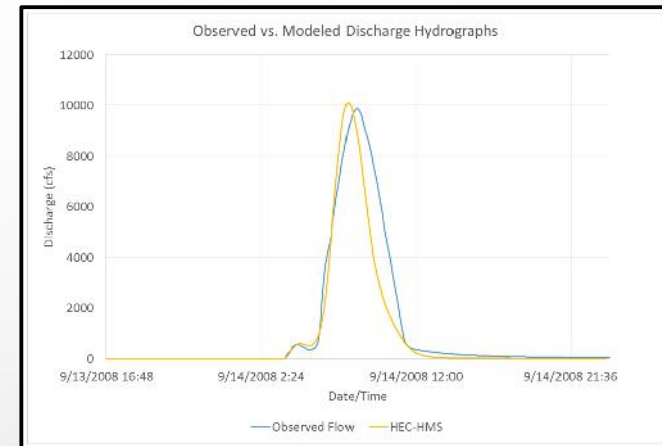


- **SIMULATE DERIVED HYETOGRAPH IN MODEL**
- **VALIDATE MODEL RESPONSE TO OBSERVED DATA**

Storm  
Selection &  
Data  
Collection

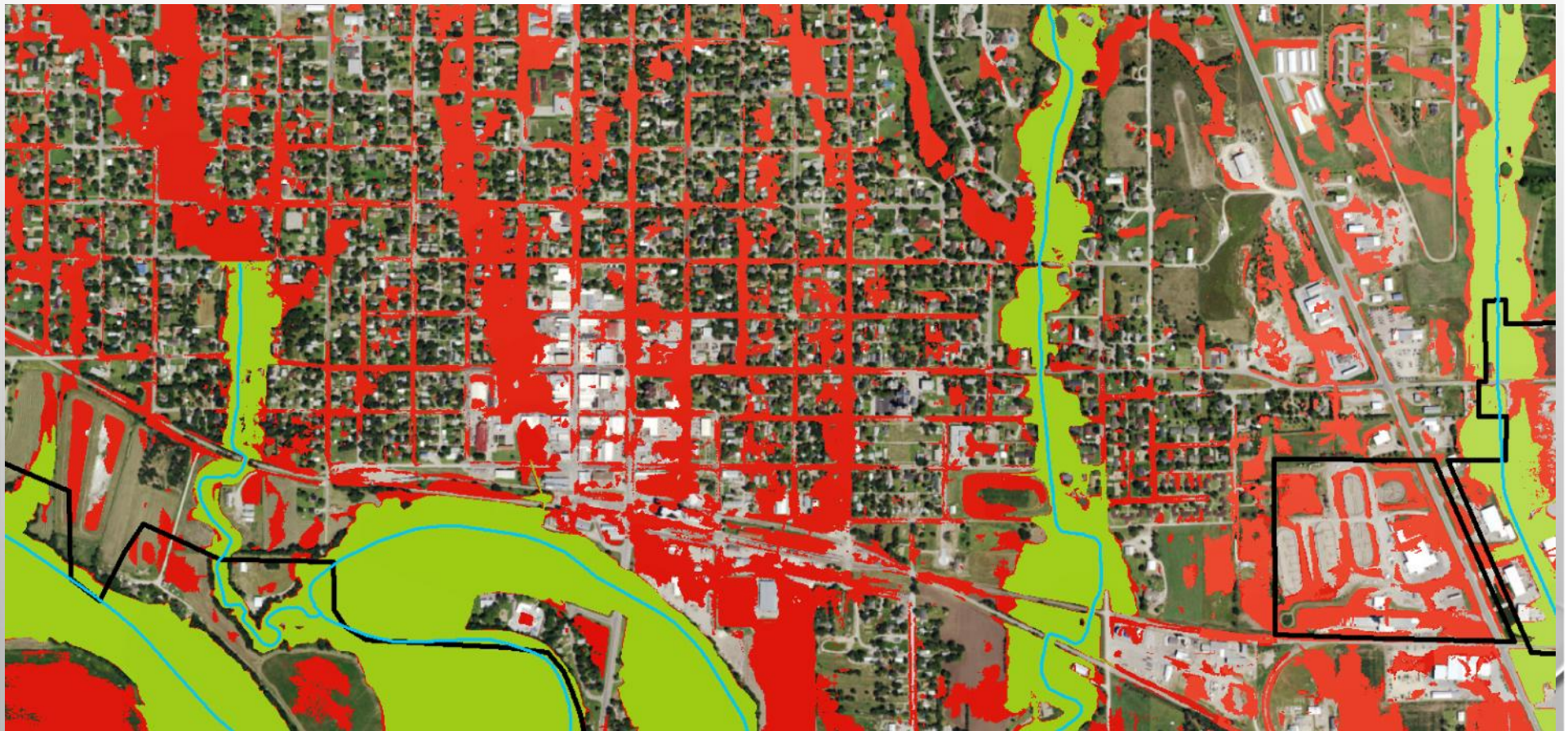
NEXRAD  
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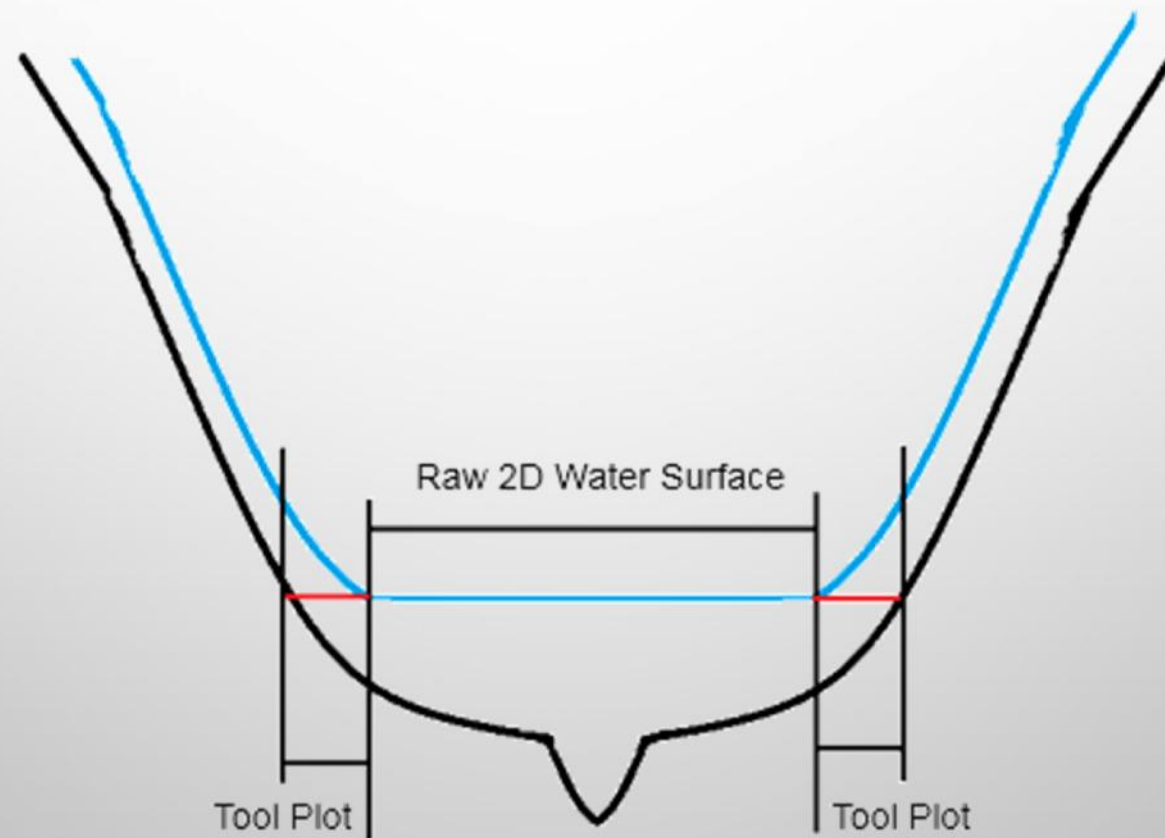




# WHY IS MY REGULATORY FLOODPLAIN DIFFERENT FROM MODEL RESULTS?

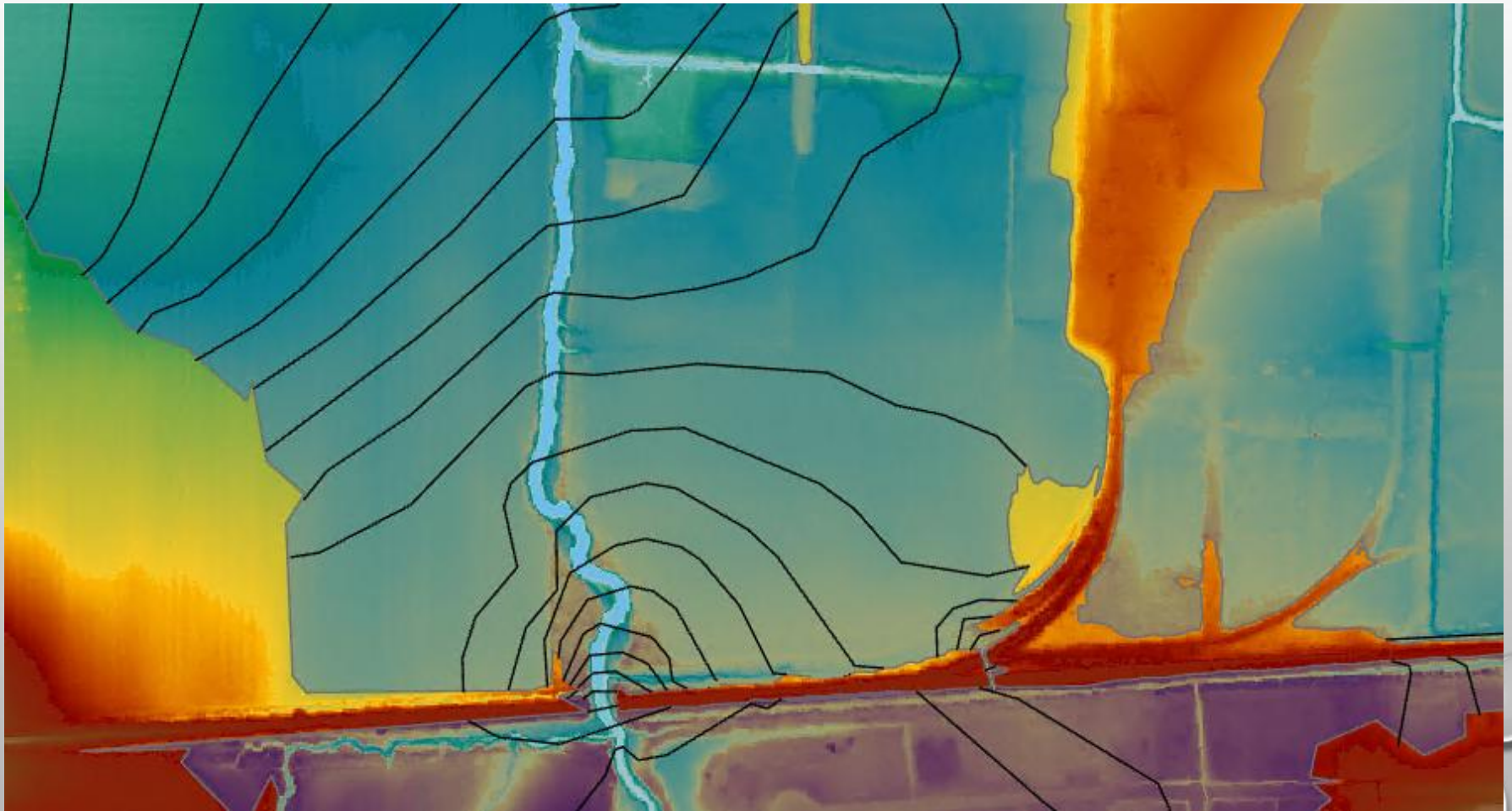


# Shore Lining





## WHY ARE THE BFE LINES CURVED?

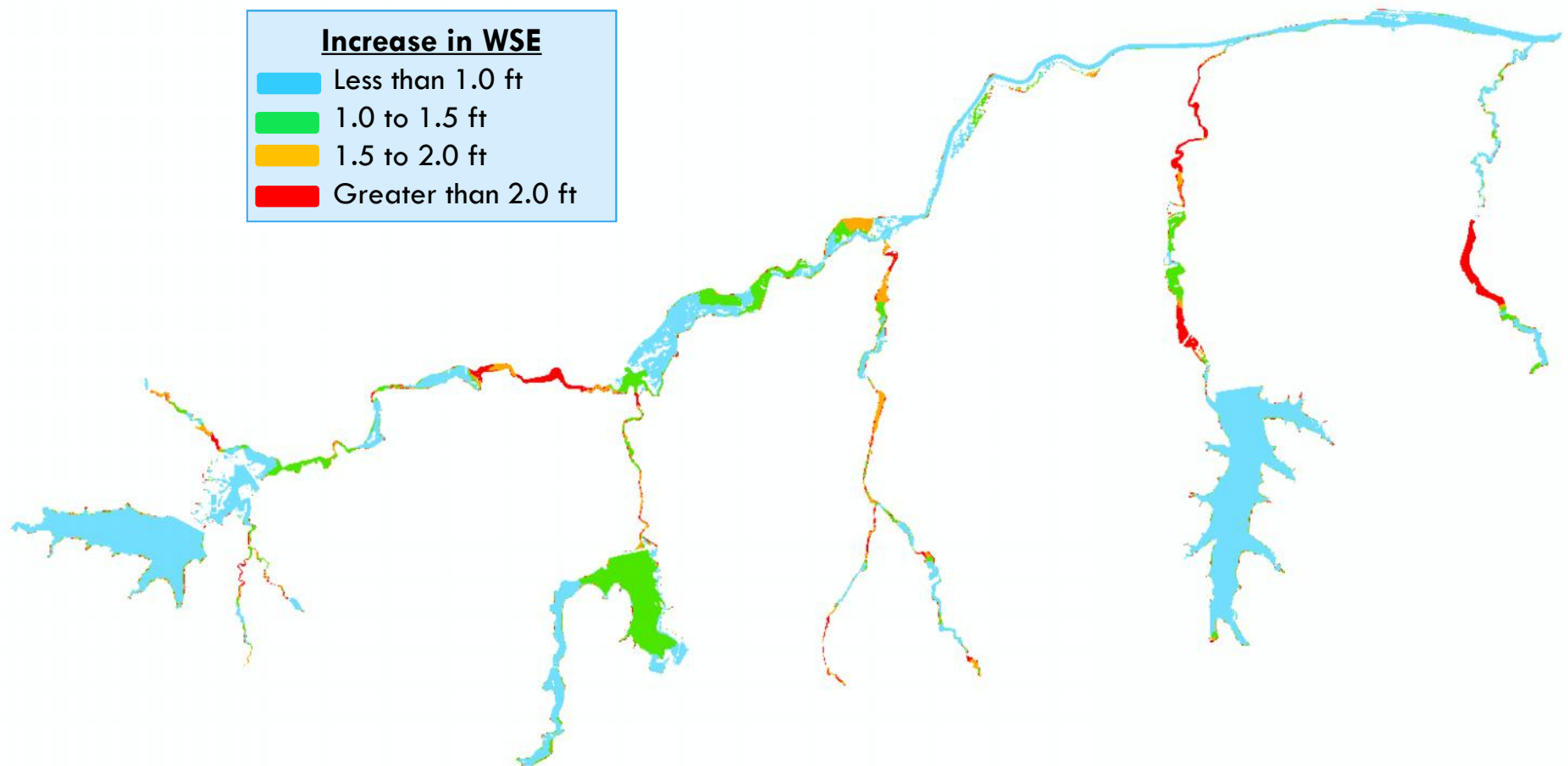
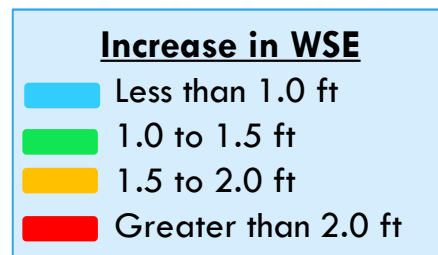




Development in the fringe requires compensating cut and fill? Why all frequencies instead of just 1%?



# WHY ARE FLOODWAYS SO WIDE?



# CURRENT

## Guestimate of Implementation

- a) Floodway is not equal conveyance.
- b) Surcharge is not fully optimized.
- c) Built to adhere to the 1D Regulations yet maintains 2D detail.
- d) Modifications impact hydrology and hydraulics.