

# County of Greenville, South Carolina



## Gilder Creek Watershed Study

# Introduction

- Greenville County
  - Butch Kirven, County Council Chairman
  - Fred Payne, County Councilman
  - Paula Gucker, Public Works Director
  - Keith Drummond, Manager-Codes Enforcement
  - Robert Hall, PE, CFM, Floodplain Manager
- Woolpert, Inc.
  - Bill Spearman, PE, PH
  - Hal Clarkson, PE, CFM
  - James Riddle, PE
  - Daniel Whittington, PE, GISP

# Agenda

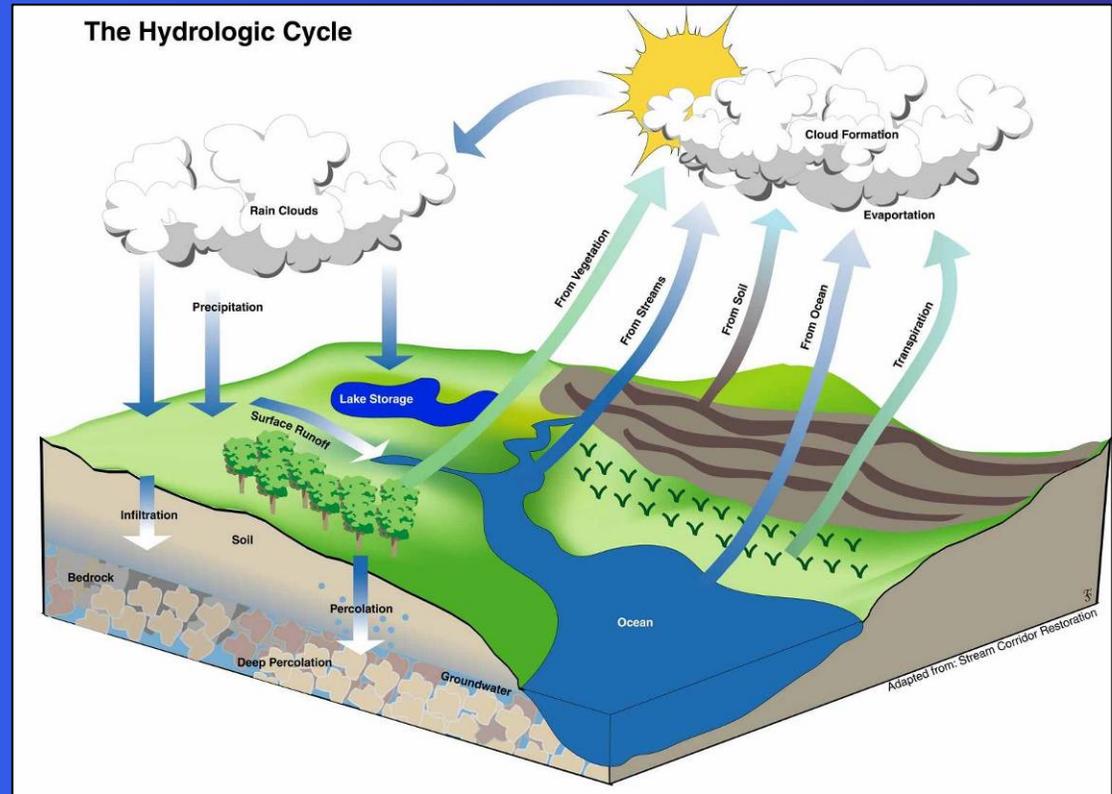
- Study purpose
- Progress to date
- Preliminary results
- Model validation
- Alternatives analysis
- Questions/answers





# Definitions

- **Hydrology**
- Hydraulics
- Watershed & Sub-basins
- Storm Frequencies
- Floodplain
- FEMA
- FIRM



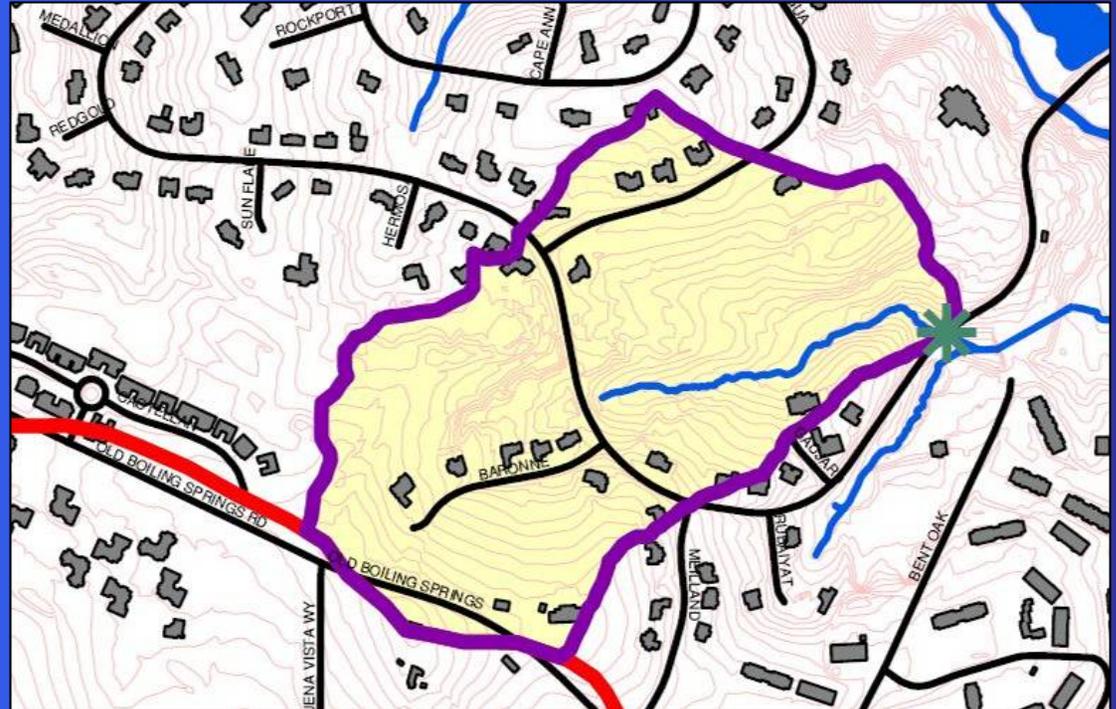
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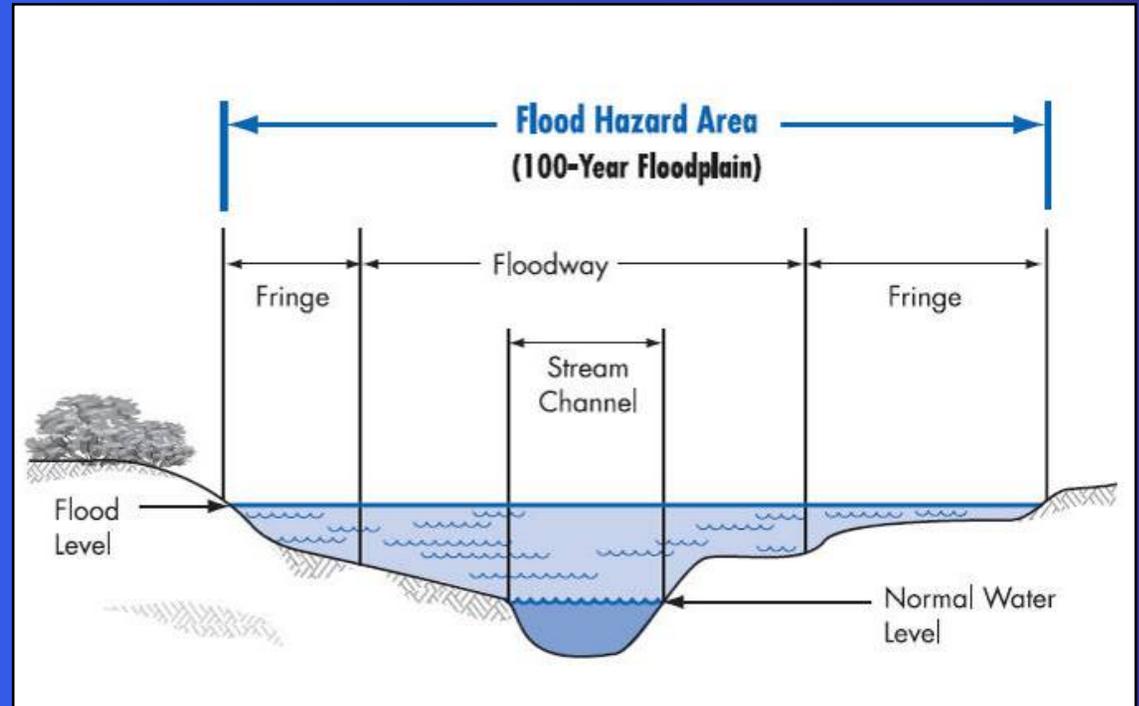
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Storm Frequency	Rainfall (inches)
2-Year	4.02
10-Year	5.84
25-Year	7.10
100-Year (1%)	9.45

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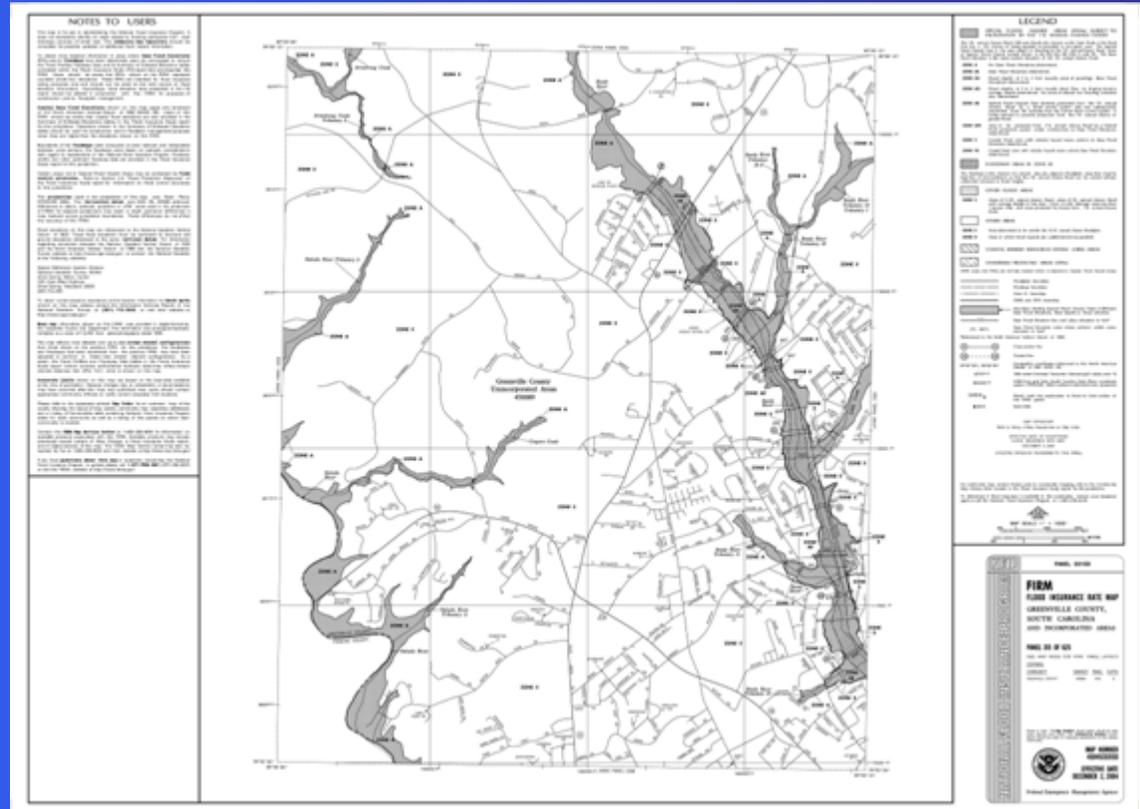
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# Watershed Reconnaissance



A total of 24 personnel were used in the data gathering effort over 6 weeks.

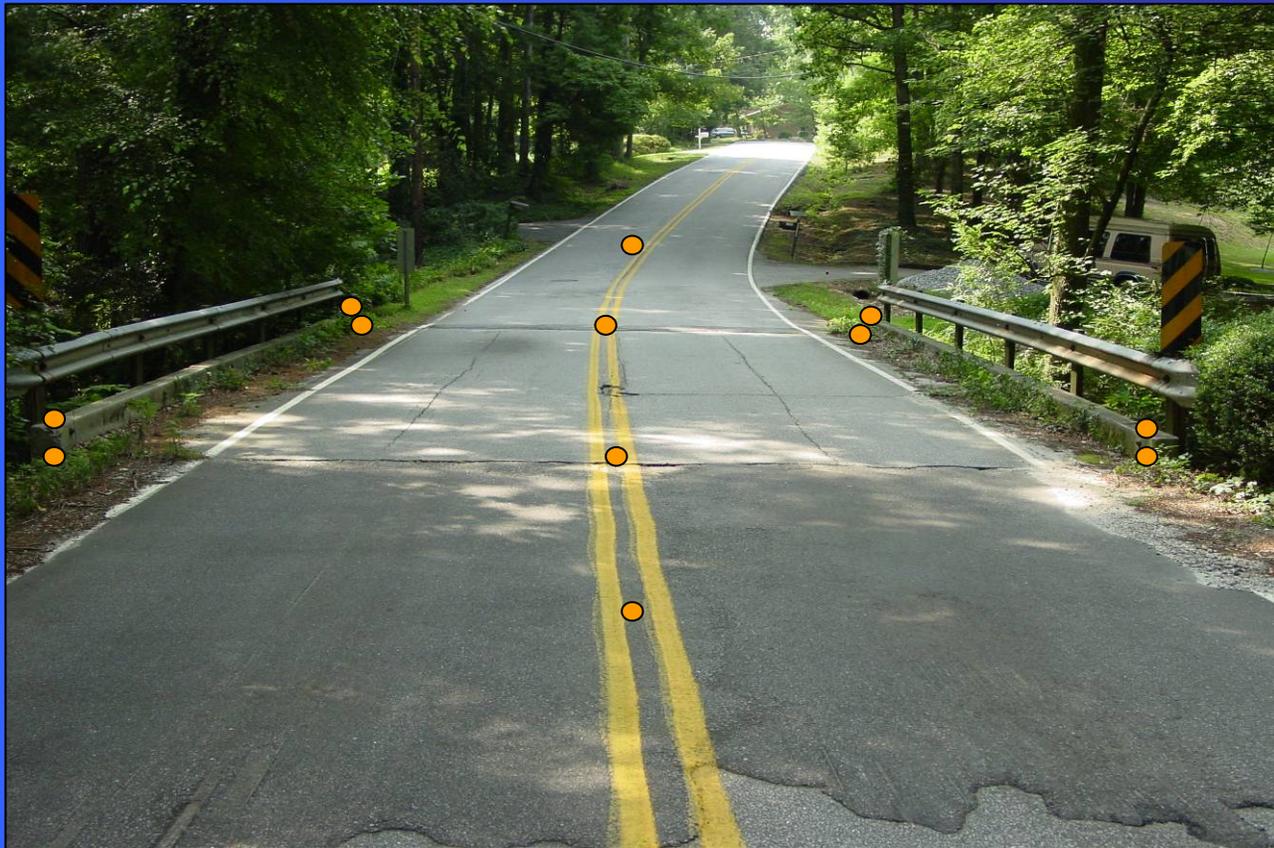
# Stream Walks

- Field crews walked 67 miles of streams to collect the following:
  - Channel/pipe measurements
  - 1,800 cross sections
  - Digital pictures
  - Estimates of channel resistance (i.e. vegetation, trees, channel bends)



# Bridge/Culvert Survey

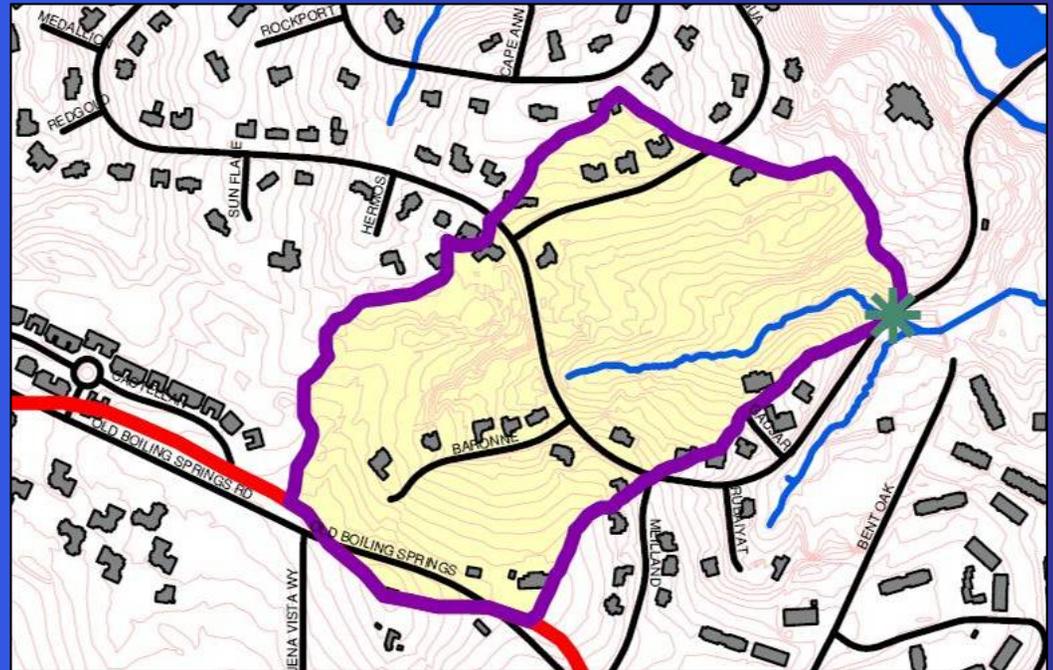
- Surveyed a total of 141 culvert and bridge crossings



# Hydrologic Modeling

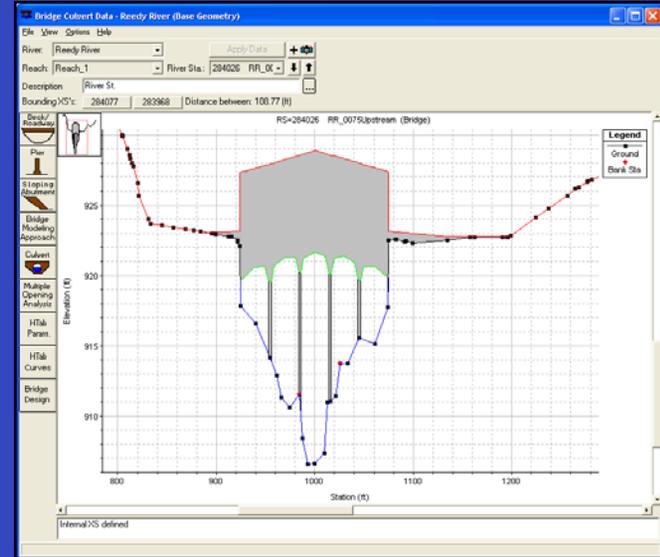
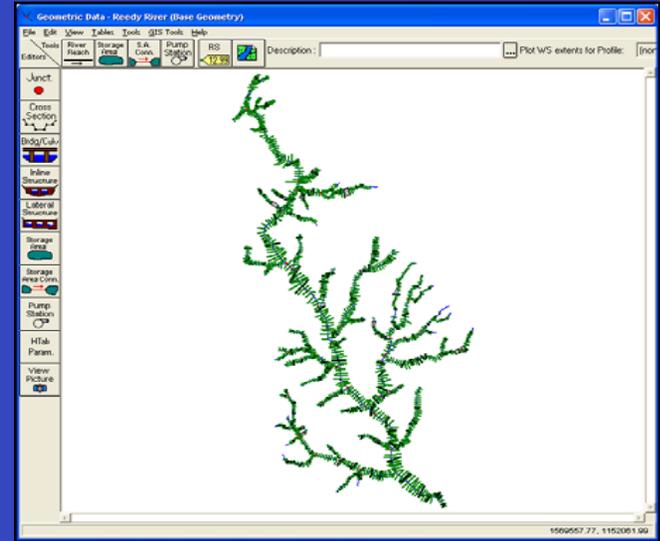
- Divided the basin into 196 sub-watersheds to predict the amount of storm water runoff during rainfall events using:

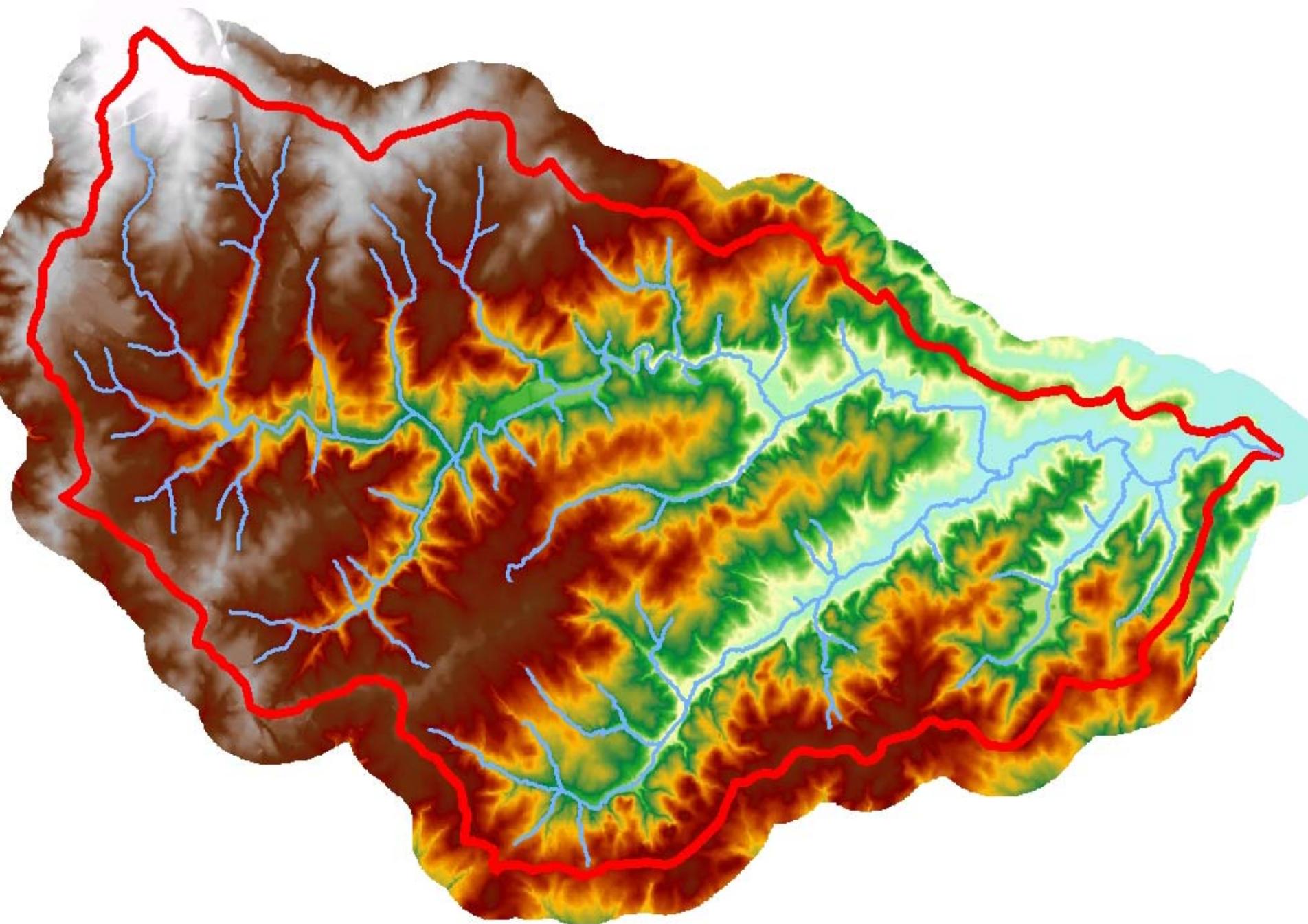
- Drainage area
- Soils
- Landuse



# Hydraulic Modeling

- Predicted water surface elevations using the following:
  - Bridge/culvert survey data
  - Runoff predicted from hydrologic modeling
  - Channel and floodplain geometry
  - Channel slope
  - Channel resistance (i.e. vegetation, trees, channel bends)





# High Water Marks



# Model Validation

- Obtained NWS historical rainfall data where available
- Received pictures and documentation from you of historical flood events
- Selected TS Jerry (Aug '95) and **July '05 storms** for validation



# Initial Validation Results

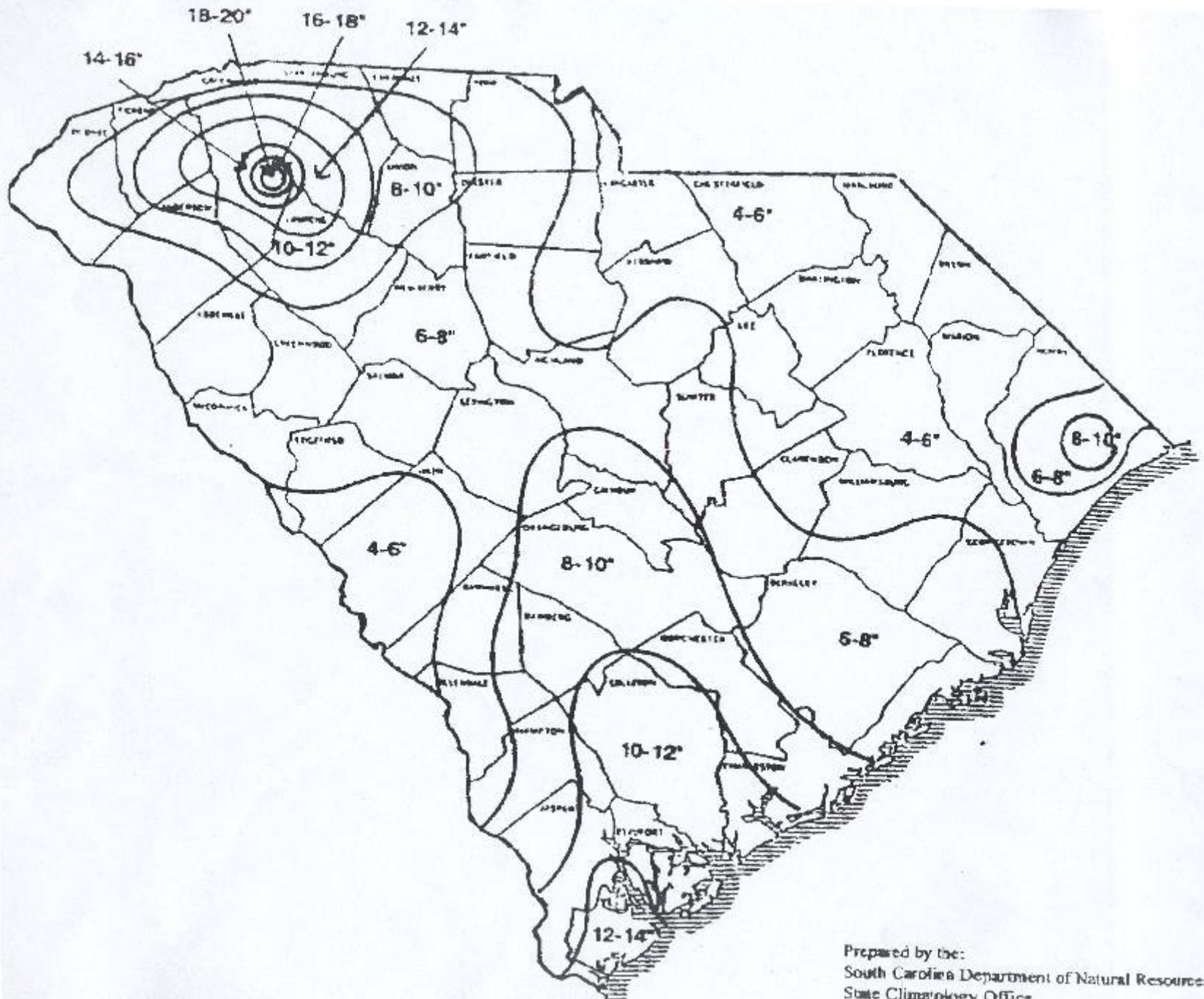
- Model vastly under predicted flooding as shown in TS Jerry photos, particularly on east side of basin
- Flooding much lower than 100-year FEMA mapping
- Performed field assessment, revised model inputs, little improvement



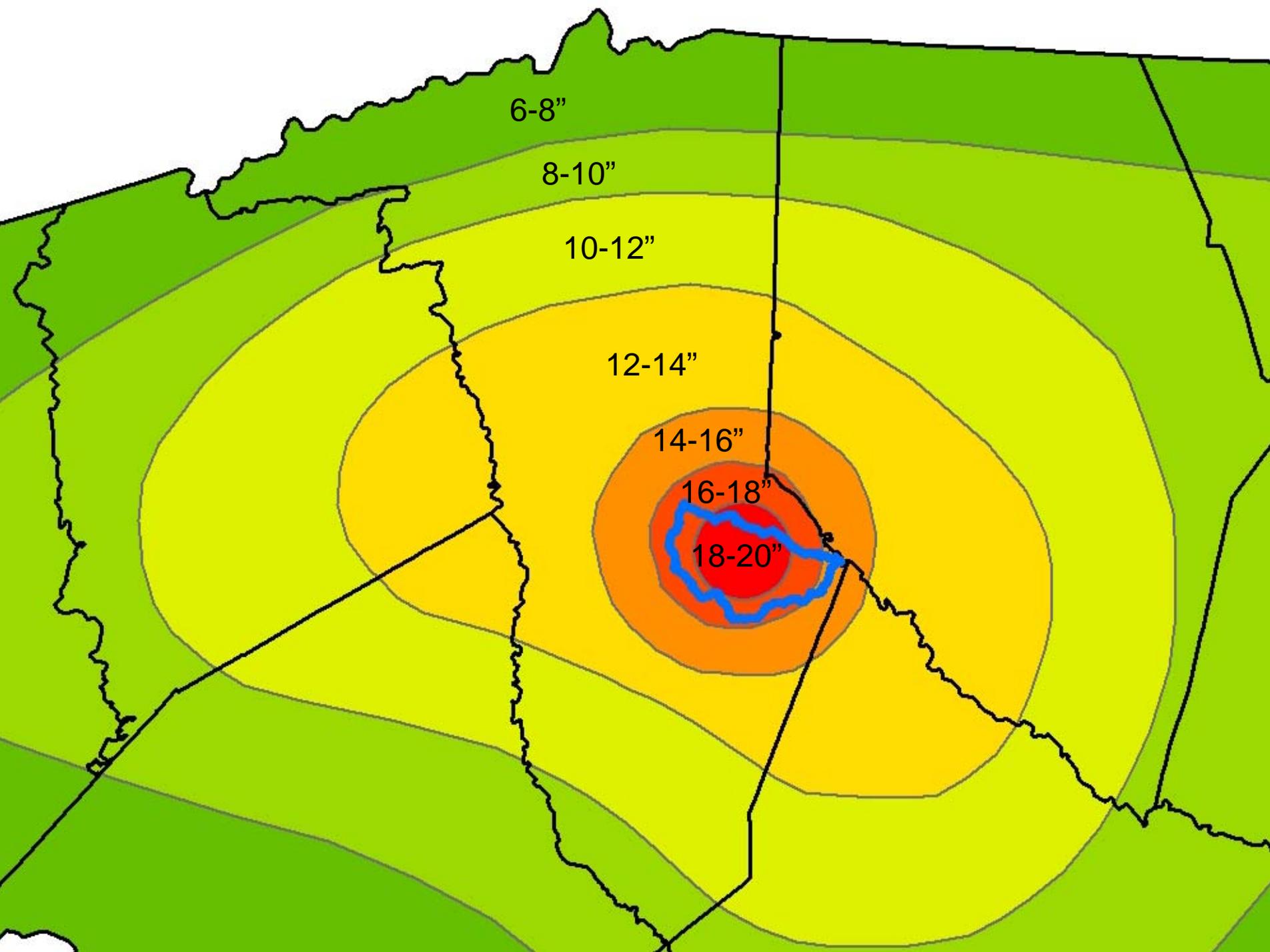
# Validation

- Began to question TS Jerry rainfall data
  - GSP – 14 in
  - Belton – 11 in
  - Travelers Rest – 10 in
- County found unconfirmed post storm report





Prepared by the:  
 South Carolina Department of Natural Resources  
 State Climatology Office  
 (Updated August 29, 1995)



# Validation

- Contacted GSP NWS Office for more information
- NWS provided archived TS Jerry information
  - Damage assessments
  - Road closings
  - Rainfall data, bucket report

COUNTY: Greenville, East Central

WHERE: Greer, 705 Phillips Rd.

TOTAL MEASURED: 15.90

HOW: Rain gage

COUNTY: Greenville, East Central

WHERE: Taylors

TOTAL MEASURED: 17.75

HOW: Unknown

COUNTY: Greenville, East Central

WHERE: Taylors, 11 South St.

TOTAL MEASURED: 18.00

HOW: Rain Bucket

COUNTY: Greenville, East Central

WHERE: Greer, 134 Bennett's Bridge Rd.

TOTAL MEASURED: 15.50

HOW: Overflowed bucket

# Not your everyday storm...



2-inches

Summer  
Thunderstorm



9.45-inches

100-year  
Storm

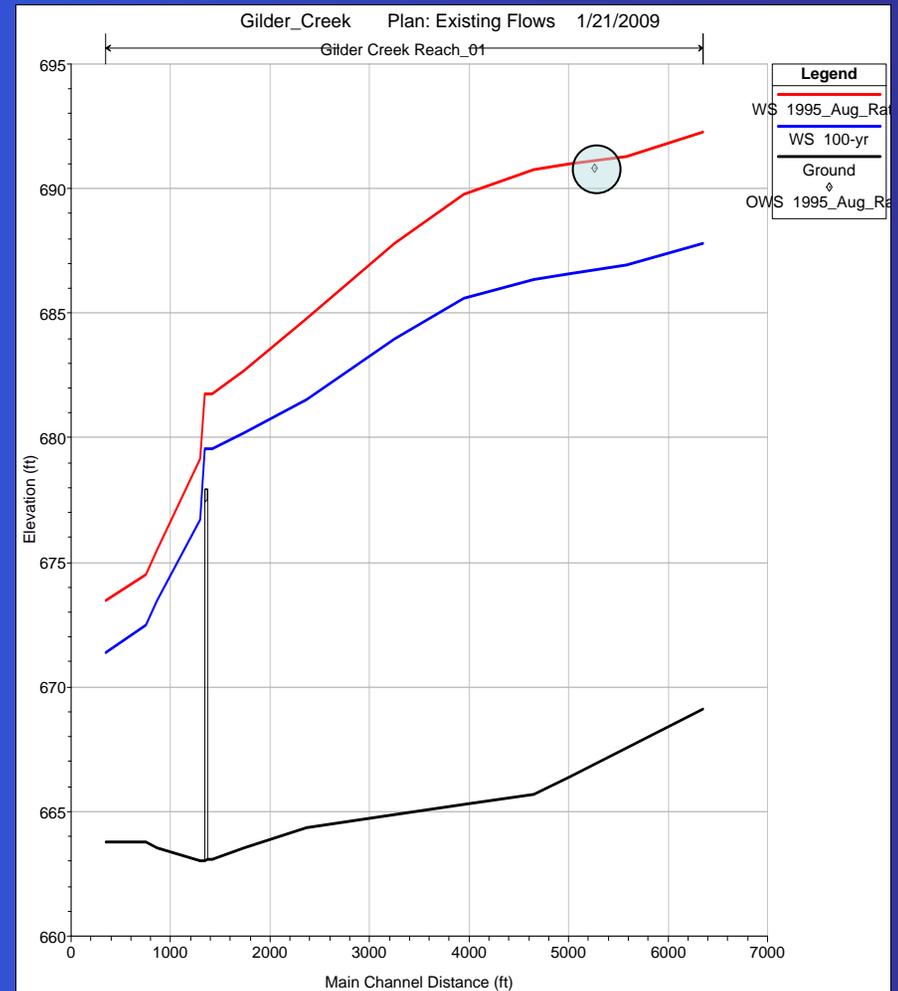


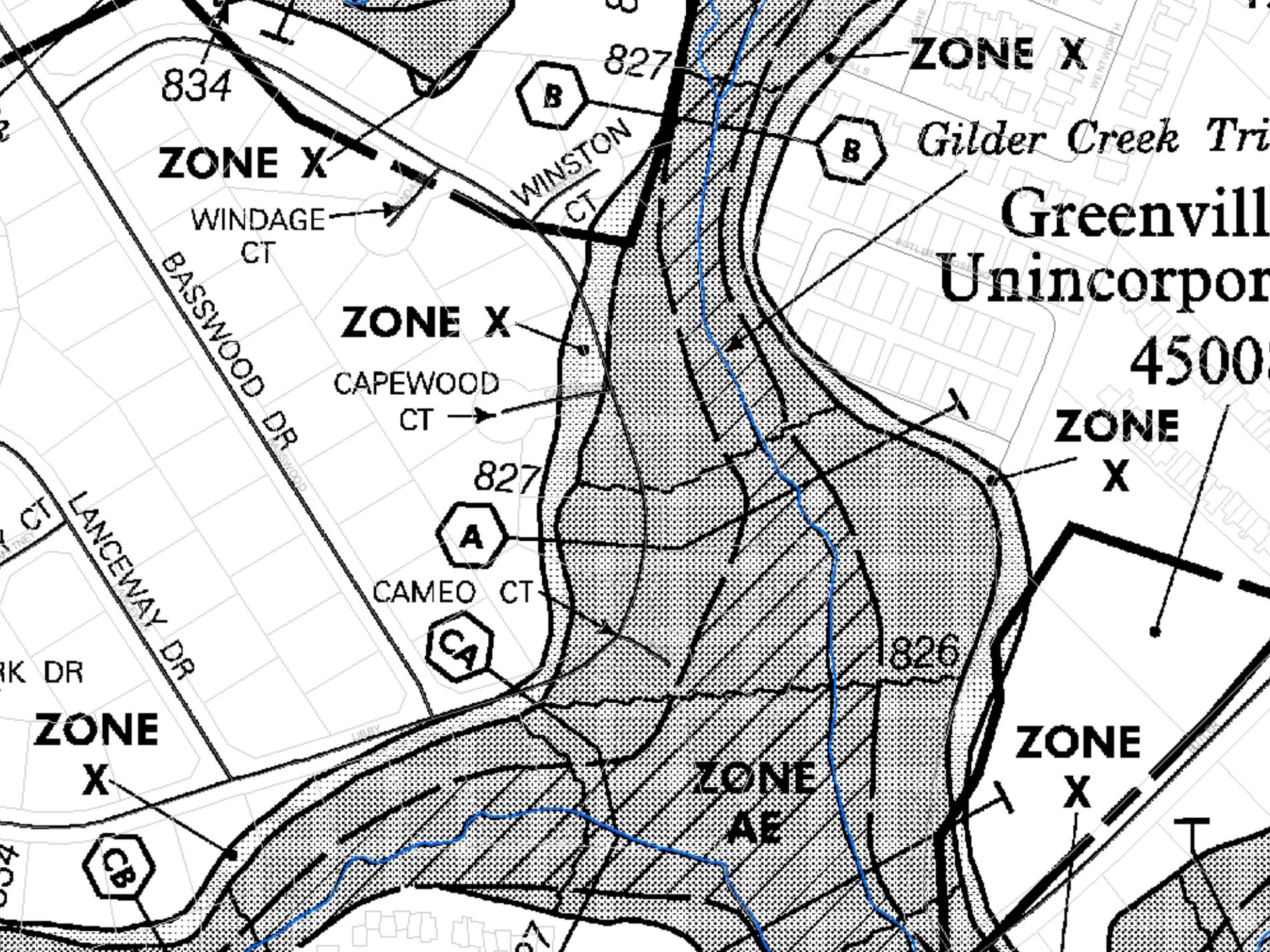
18-inches

TS Jerry

# Final Validation

- Matched HWMs within 0.2 -1.0 feet
  - Kingswood Circle
  - Lee Vaughn Road
- Model inputs provide representative results for other events





**ZONE X**

**ZONE X**

**ZONE X**

**ZONE X**

**ZONE X**

**ZONE AE**

**ZONE X**

Gilder Creek Tr  
Greenville  
Unincorporated  
4500

834

827

827

826



WINDAGE CT

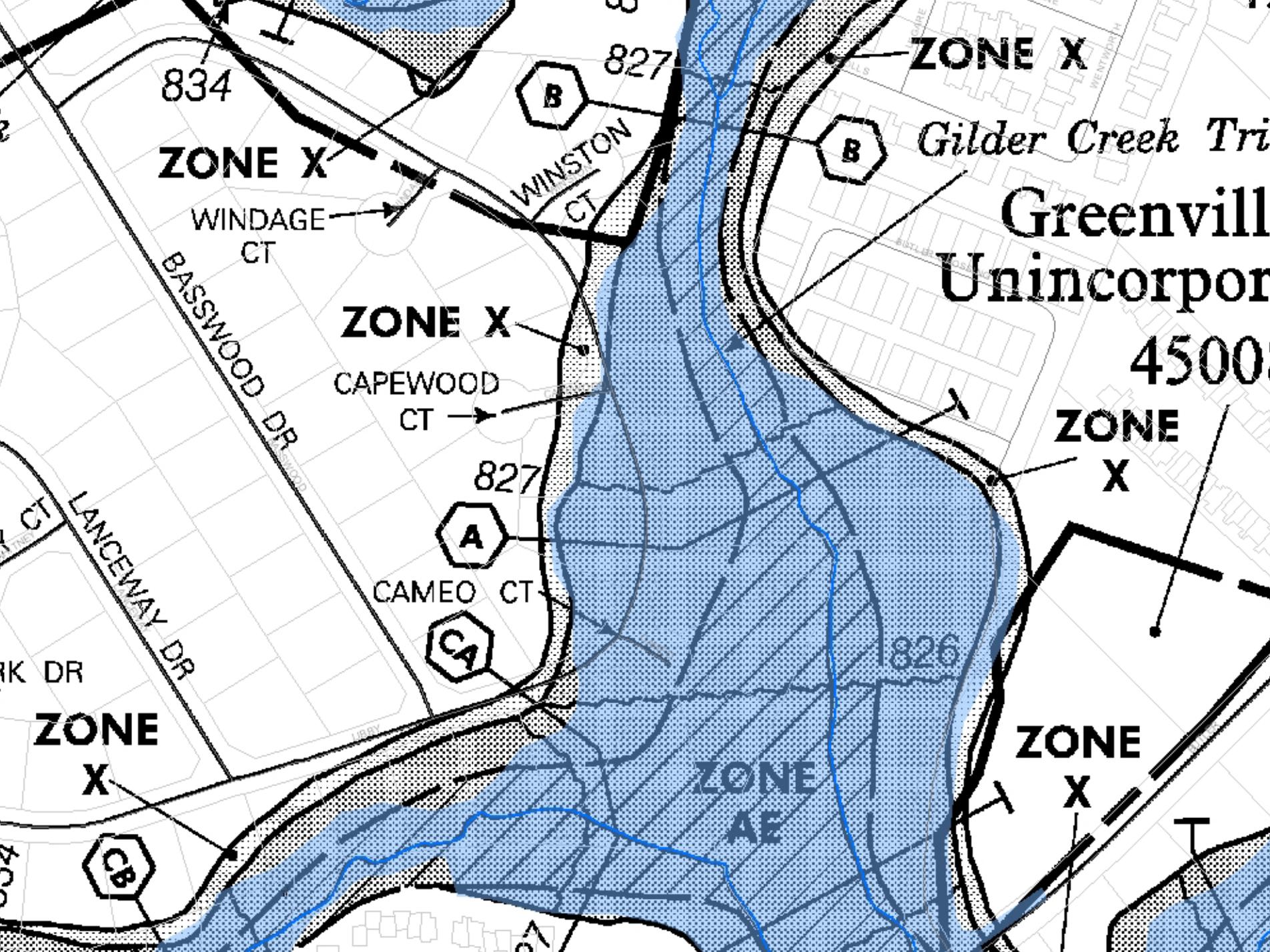
WINSTON CT

CAPEWOOD CT

BASSWOOD DR

LANCEWAY DR

MARK DR



**ZONE X**

Gilder Creek Tri

Greenville  
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WINSTON CT

CAPEWOOD CT

CAMEO CT

WINDAGE CT

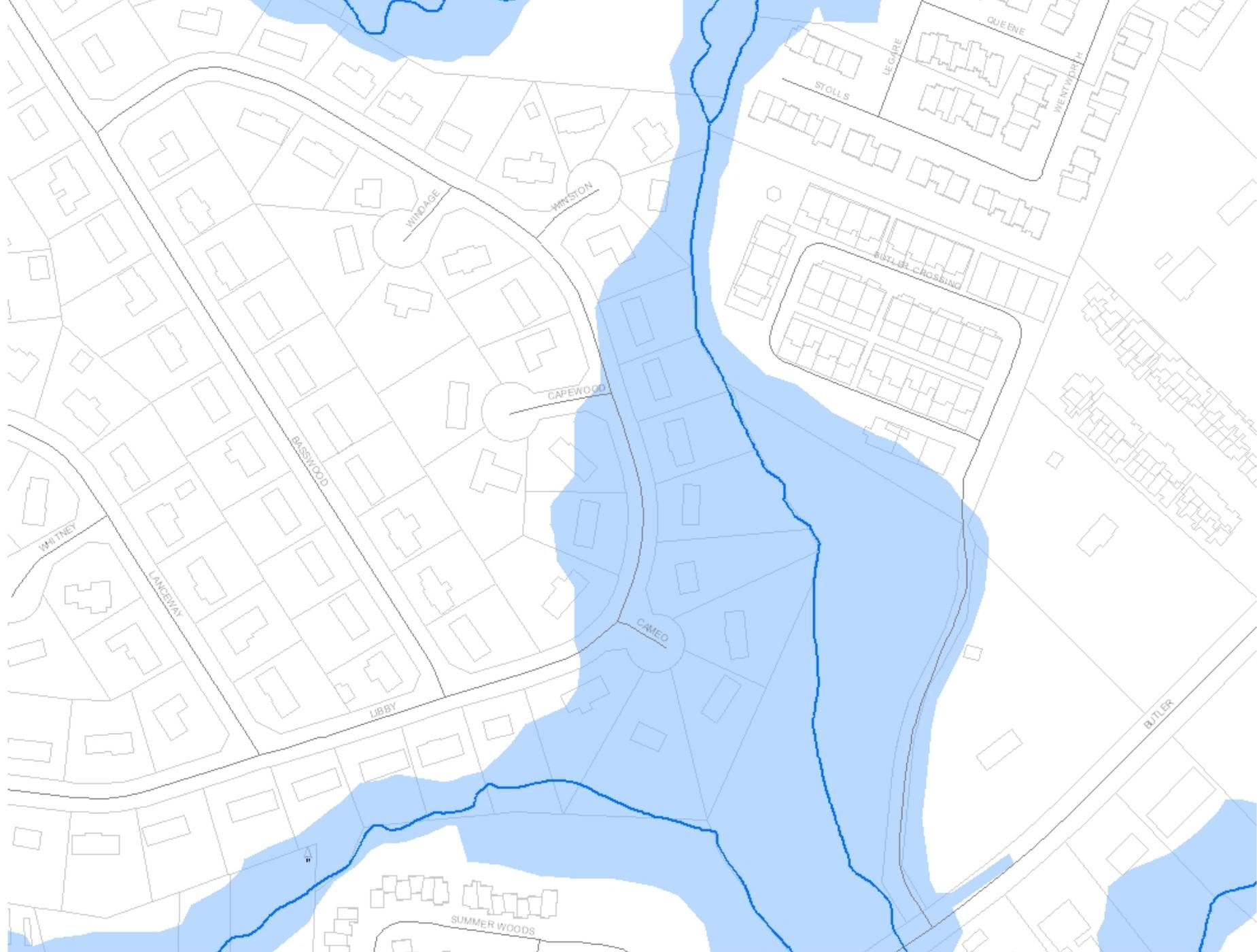
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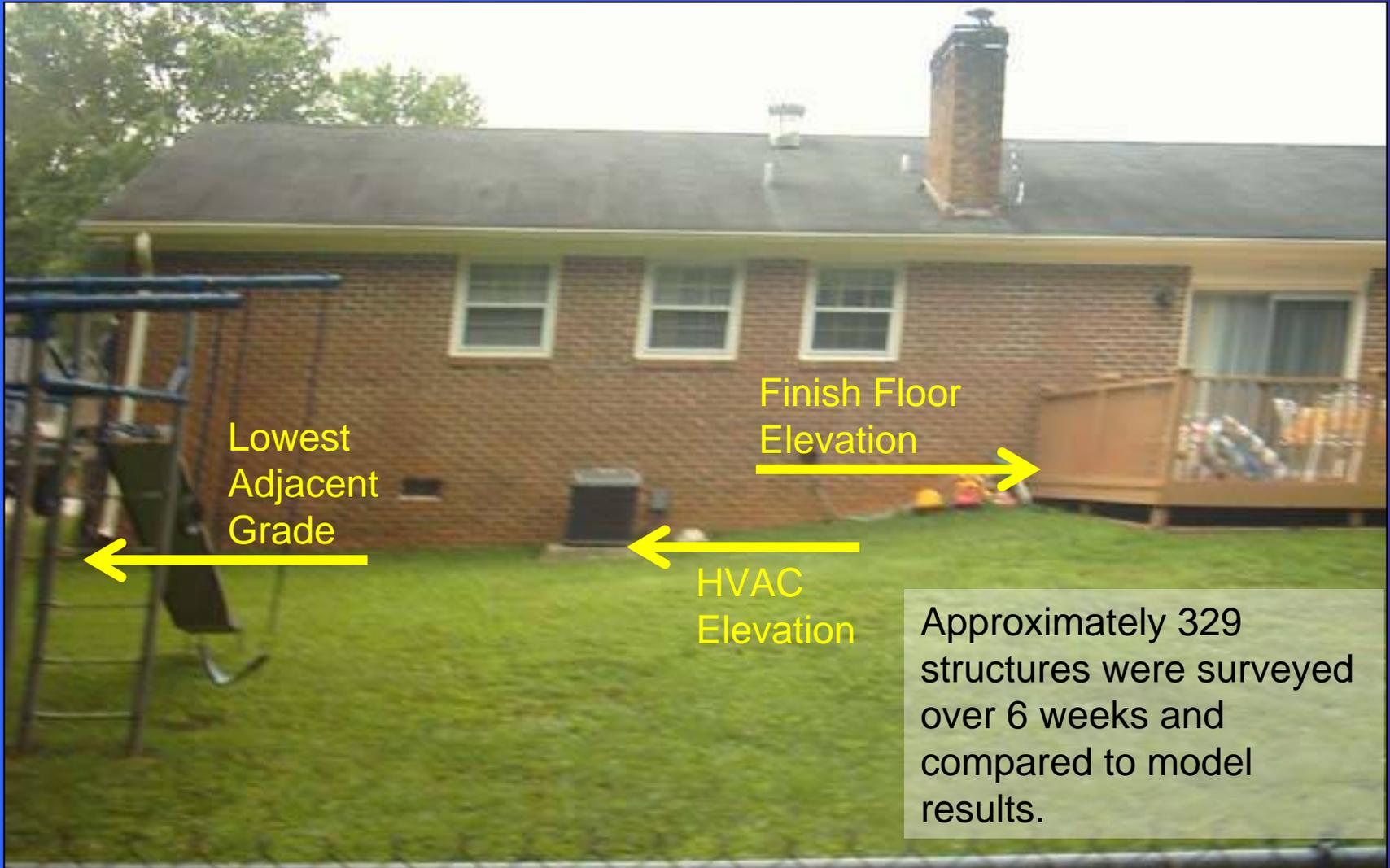


# Mapping Assessment

- Previous study adjusted watershed characteristics to match photos, we adjusted (corrected) rainfall
- Previous study assumed TS Jerry equivalent to 100-year storm, we believe it was much, much greater



# Residential Structure Survey



Lowest  
Adjacent  
Grade

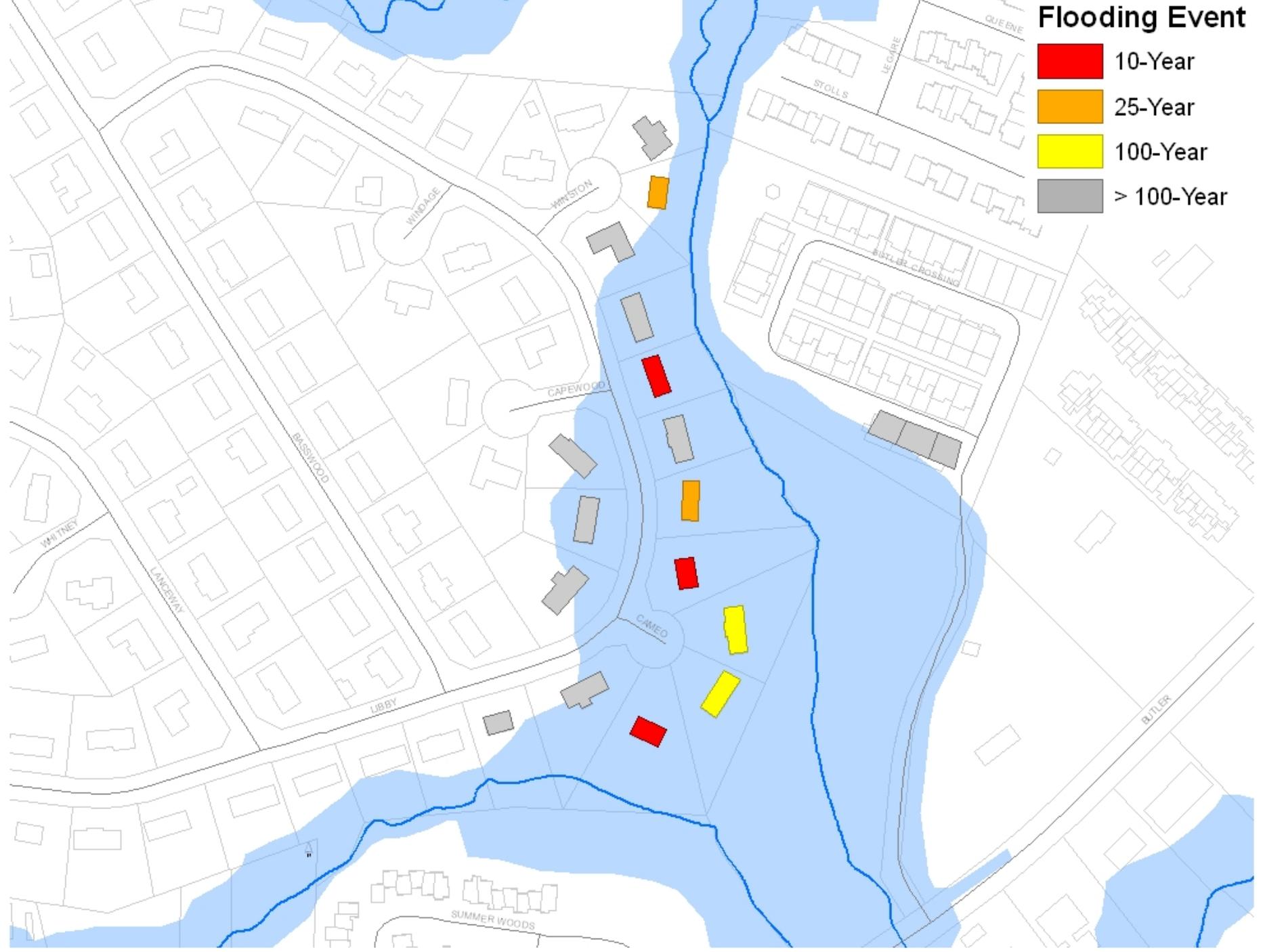
Finish Floor  
Elevation

HVAC  
Elevation

Approximately 329  
structures were surveyed  
over 6 weeks and  
compared to model  
results.

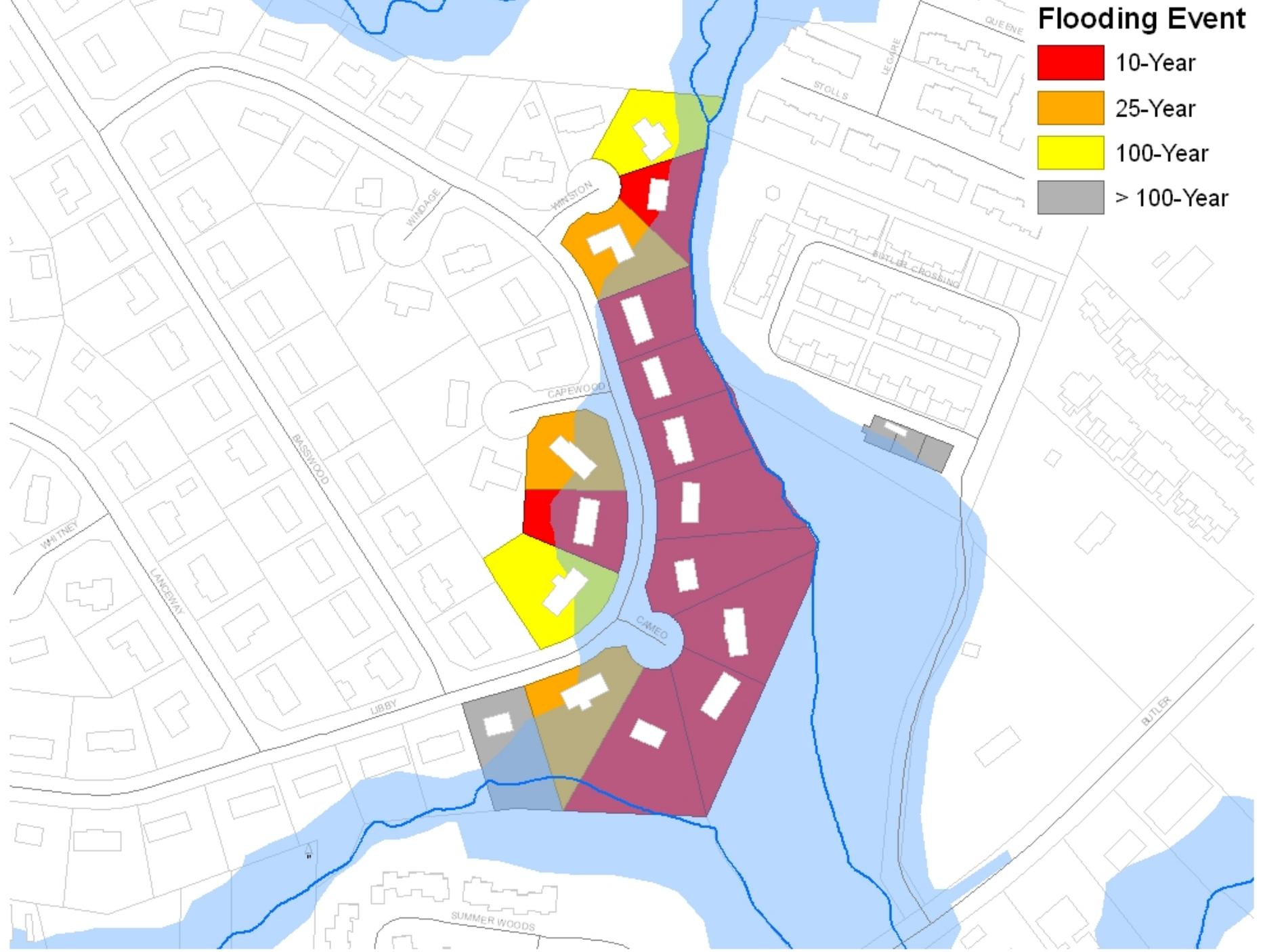
# Flooding Event

- 10-Year
- 25-Year
- 100-Year
- > 100-Year



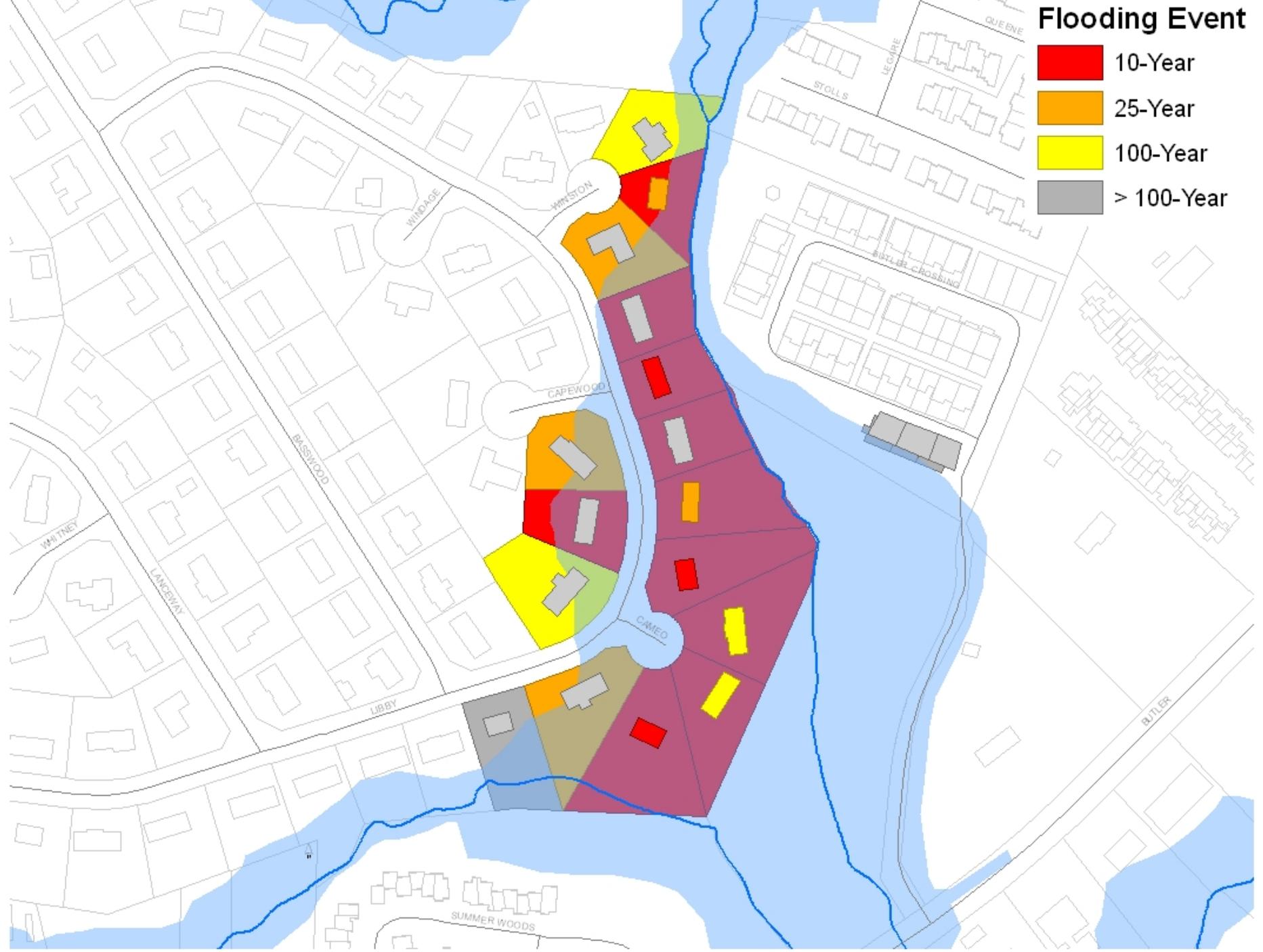
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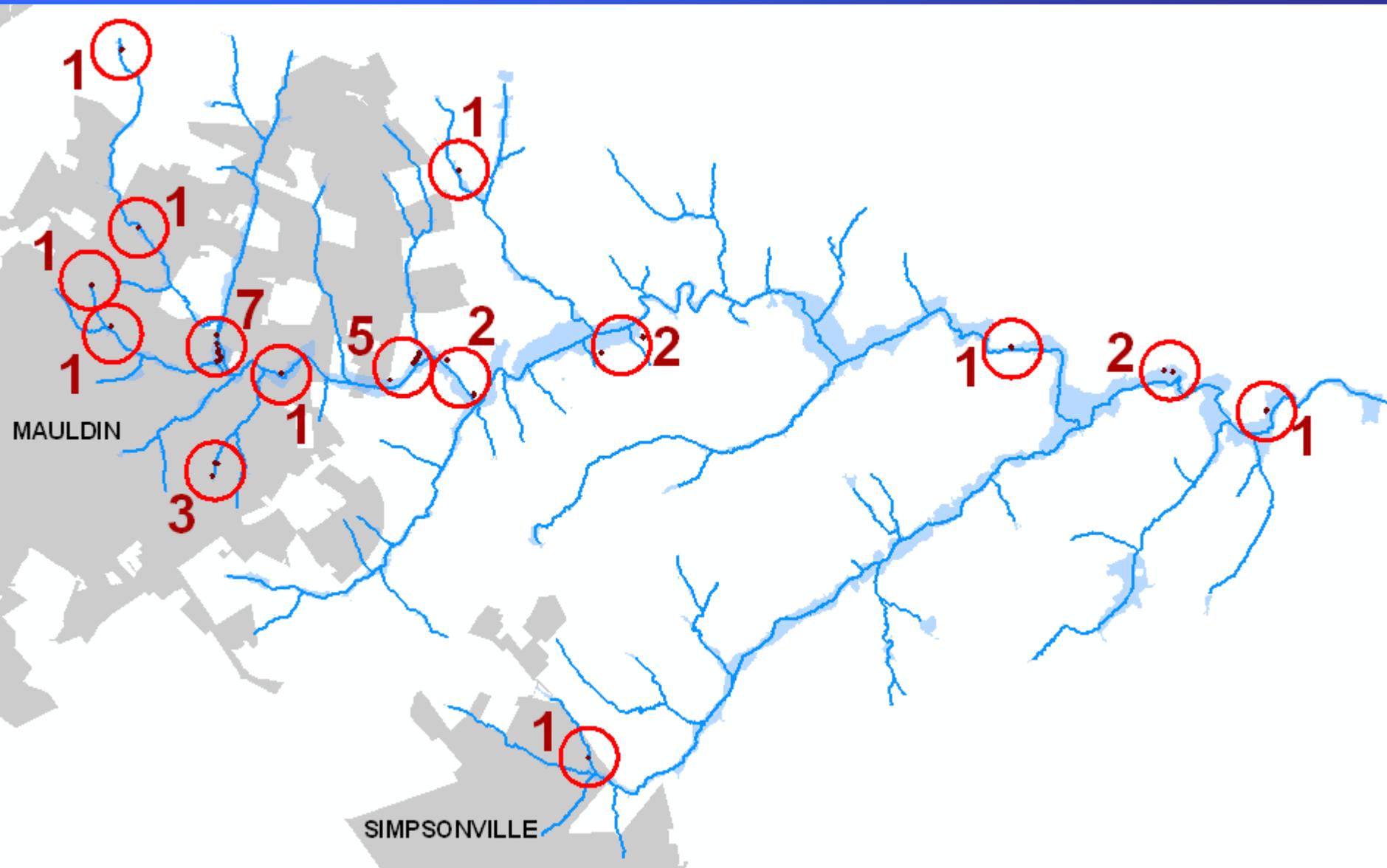


# Results

- Yard flooding
- Culvert/bridge overtopping
  - 8 County roads (2-year storm)
- Structures at risk during flooding
  - 30 homes (100-year storm)



# Neighborhood Flooding



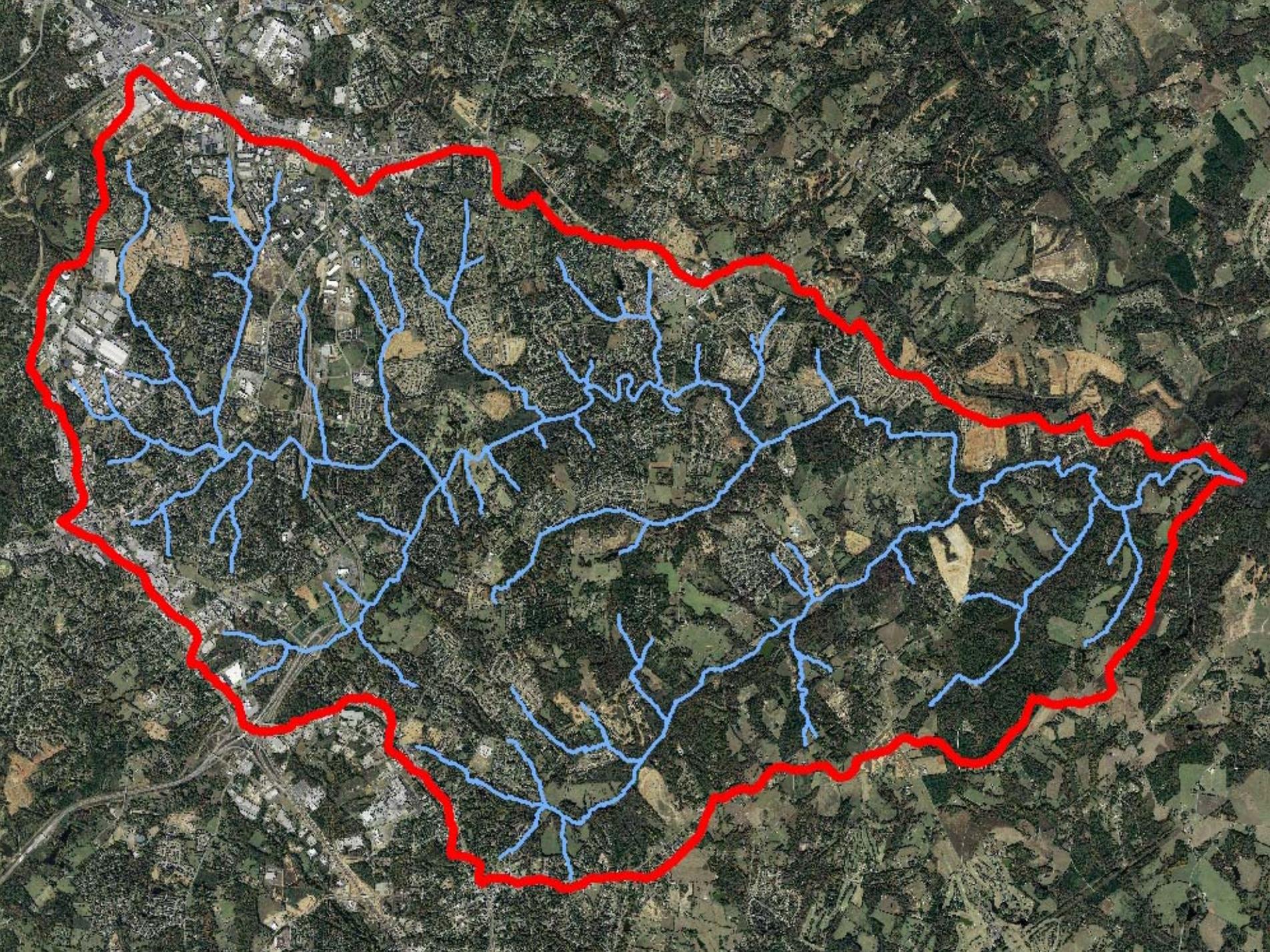
# Neighborhood Flooding

- No neighborhoods contained more than 7 structures experiencing residence flooding (100-yr storm)

Residential Flooding (100-yr)	Number of Affected Homes
Libby Lane area (Mauldin)	7
Ricelan Drive area	5
Mimosa/Elm Drive area (Mauldin)	3

# Alternatives Analysis

- Based on initial evaluation, analysis will focus on on more localized solutions for **western half** of watershed such as:
  - Culvert/bridge improvements
  - House-by-house solutions



# Alternatives Analysis

- Culvert/bridge improvements
  - Evaluation of individual road crossings for potential improvements
  - Consideration given to roadways which eliminate or reduce access by emer. services



# Alternatives Analysis

- House-by-House Solutions
  - Flood protection systems
  - Elevated structures
  - Property acquisition



# Alternatives Analysis

- Regional detention and/or policy improvements to control future development in **eastern portion of basin**



# What's next

- Provide County with risk assessment of individual structures
- Provide guidance for potential mitigation opportunities
- Analyze individual road crossings and options for regional detention

# Questions and Answers



# Contact Information

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2000 Center Point Drive, Suite 2200  
Columbia, SC 29210

- Phone

- Columbia – 803.731.0261

- E-mail

- Hal Clarkson – [harold.clarkson@woolpert.com](mailto:harold.clarkson@woolpert.com)
- James Riddle – [james.riddle@woolpert.com](mailto:james.riddle@woolpert.com)