



**Smart Cities Week®**

2020 GLOBAL COLLABORATIVE ENGAGEMENT | OCT 19<sup>TH</sup> - NOV 10<sup>TH</sup>

# Nashville Mitigating the Impact of Urban Flooding

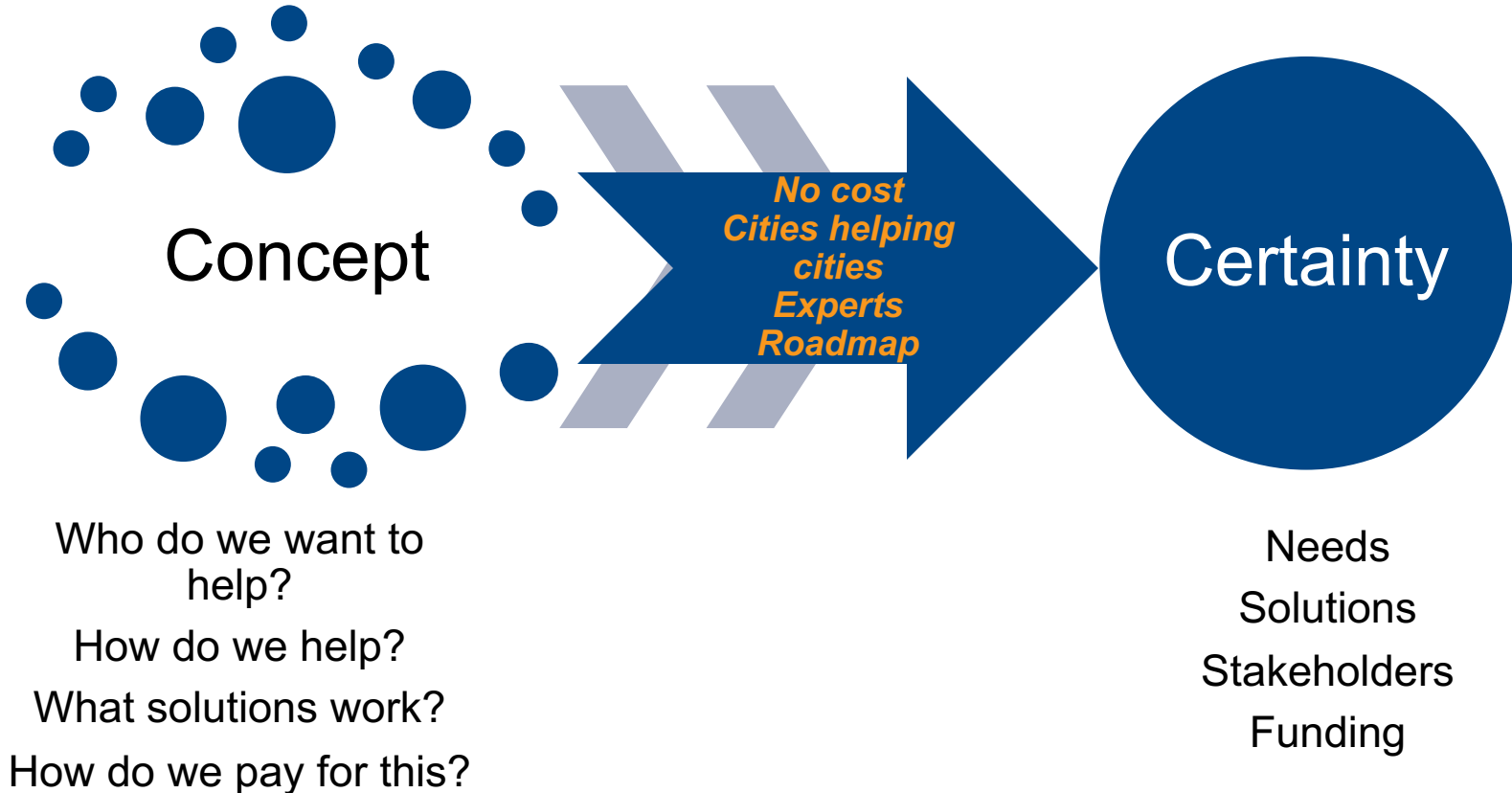
## CONTACT

[Philip.Bane@smartcitiescouncil.com](mailto:Philip.Bane@smartcitiescouncil.com)  
[Connie.Heath@smartcitiescouncil.com](mailto:Connie.Heath@smartcitiescouncil.com)

# Today's Schedule

Topics	Person
<ul style="list-style-type: none"> <li>• <b>Introduction</b> to Smart Cities Week Global and Collaborative Engagement process.</li> <li>• Introduce Faye DiMassimo</li> </ul>	Philip Bane
Welcome from Nashville and introduction of Mayor John Cooper	Faye DiMassimo
<b>Welcome Message from Mayor John Cooper</b>	Mayor John Cooper
<ul style="list-style-type: none"> <li>• Overview of urban flooding in Nashville and the use of 'equity in design' as a goal and process.</li> <li>• Introduction of Dr. Janey Camp</li> </ul>	Faye DiMassimo
<ul style="list-style-type: none"> <li>• <b>Overview</b> of rest of program (data / goals and next steps). Introduce Roger Lindsey and Jennifer Higgs</li> </ul>	Dr. Janey Camp
<ul style="list-style-type: none"> <li>• History of Flooding</li> <li>• Proactive Efforts for Public Safety/Response</li> <li>• Mitigating Flood Impacts</li> <li>• Future Planning</li> </ul>	Jennifer Higgs and Roger Lindsey
<b>Dialogue</b> about unanswered questions, vulnerable populations not reached (renters) and possibly solutions not explored so far.	Dr. Camp & Tom Palko
Questions	Philip Bane & Dr. Camp
<b>Conclusion</b> and explain <b>next meeting</b> where there will be break out groups	Phillip Bane

# Collaborative Engagement



Insert Mayor's Video

# Data Discussion – Post-event Efforts, Tools, and Investment

Roger Lindsey, PE, CFM

Practice Leader – Stormwater and Floodplain Management, Metro Water Services -  
Stormwater Division

Jennifer Higgs, GISP

GIS Lead Architect, Metro Planning





May 2010, Nashville

*Photo: WKRN*



May 2010, Nashville

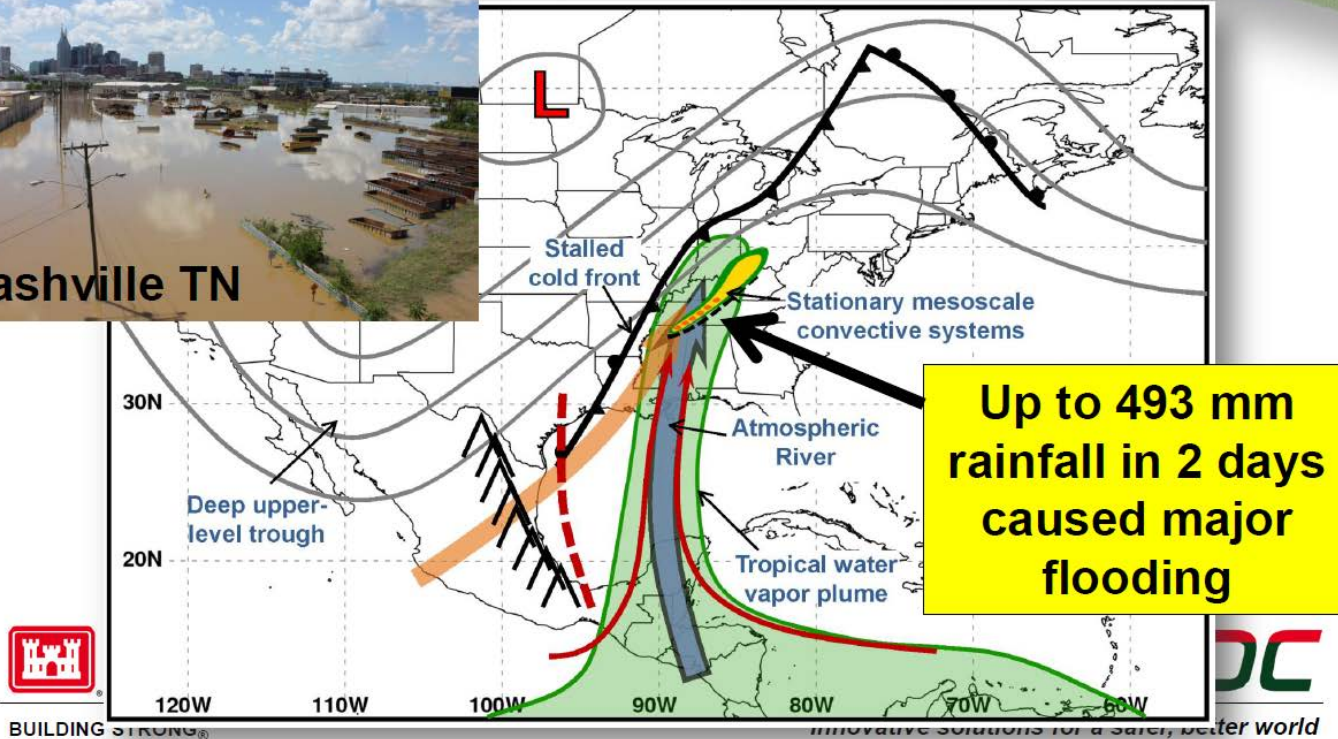
*Downtown*

*Photo: Larry McCormack, The Tennessean*



# Physical Processes Associated with Heavy Flooding Rainfall in Nashville, Tennessee, and Vicinity during 1–2 May 2010: The Role of an Atmospheric River and Mesoscale Convective Systems

Ben Moore, Paul Neiman, Marty Ralph, Faye Barthold  
Monthly Weather Review (2012)






# Public Safety

Nashville SAFE and Buyout Program





- Current Readings
- NWS Highest Predicted
- User Set Predicted

### Additional Layers

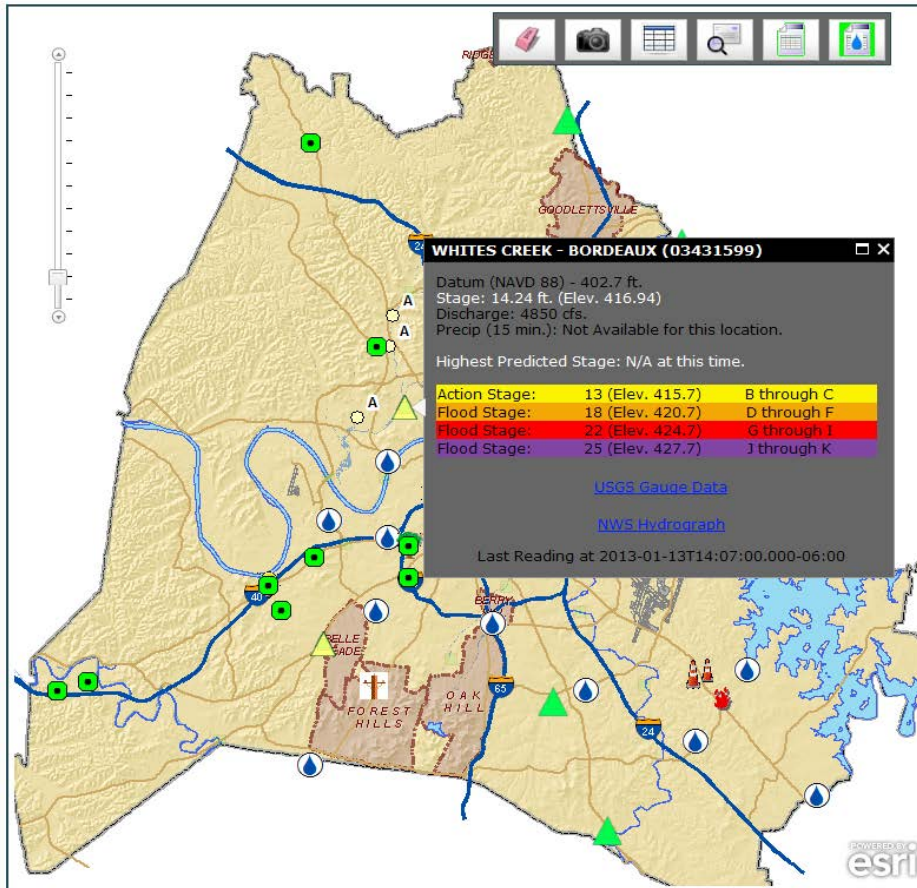
#### Select Additional Layers

- ☐ 2010 Aerial Photography
- ☒ Addresses
- ☐ FEMA Floodplain/Floodway
- ☐ Population Density by Blockgroup
- ☒ Stream Gauges
- ☒ Rain Gauges
- ☐ Population - Hispanic
- ☐ Population Over 65
- ☐ Road Closures
- ☐ Police Incidents
- ☒ OEM Incidents

#### Cameras

#### Links

#### Set Predicted Levels




USGS Real-Time Water Data for USGS 03431000 MILL CREEK NEAR ANTIOCH, TN

USGS 03431000 MILL CREEK NEAR ANTIOCH, TN  
**PROVISIONAL DATA SUBJECT TO REVISION**

Available data for this site: Time-series: Real-time data

This site is operated in cooperation with

 U.S. Army Corps of Engineers, Nashville District

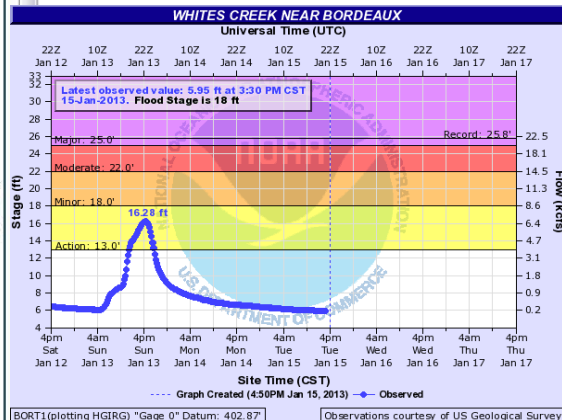
This station managed by the Nashville Field Office.

**Available Parameters**


- ☐ All 3 Available Parameters for this site
- ☒ 00060 Discharge
- ☒ 00065 Gage height
- ☐ 00045 Precipitation

**Output format**

Graph w/ stats (1-120) Days



# Nashville SAFE



- Current Readings
- NWS Highest Predicted
- User Set Predicted

### Additional Layers

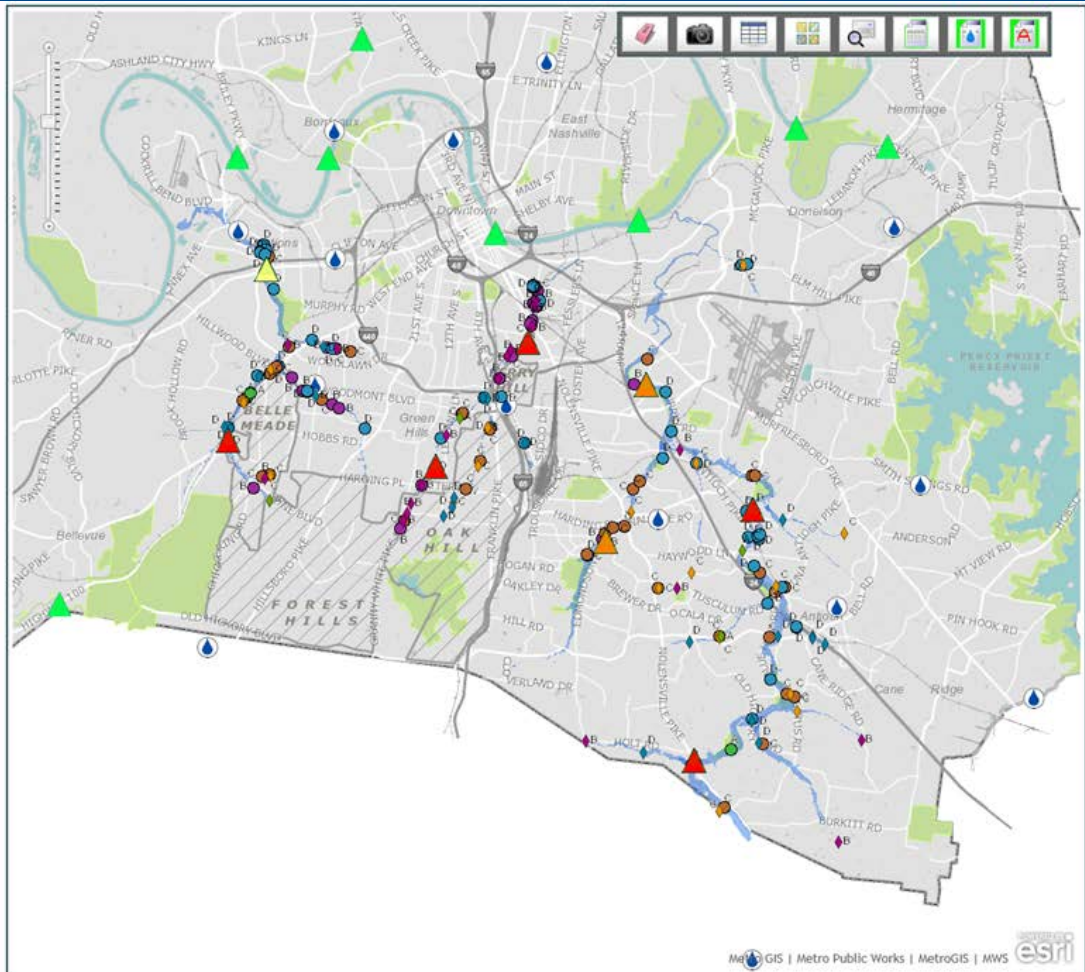
Select Additional Layers

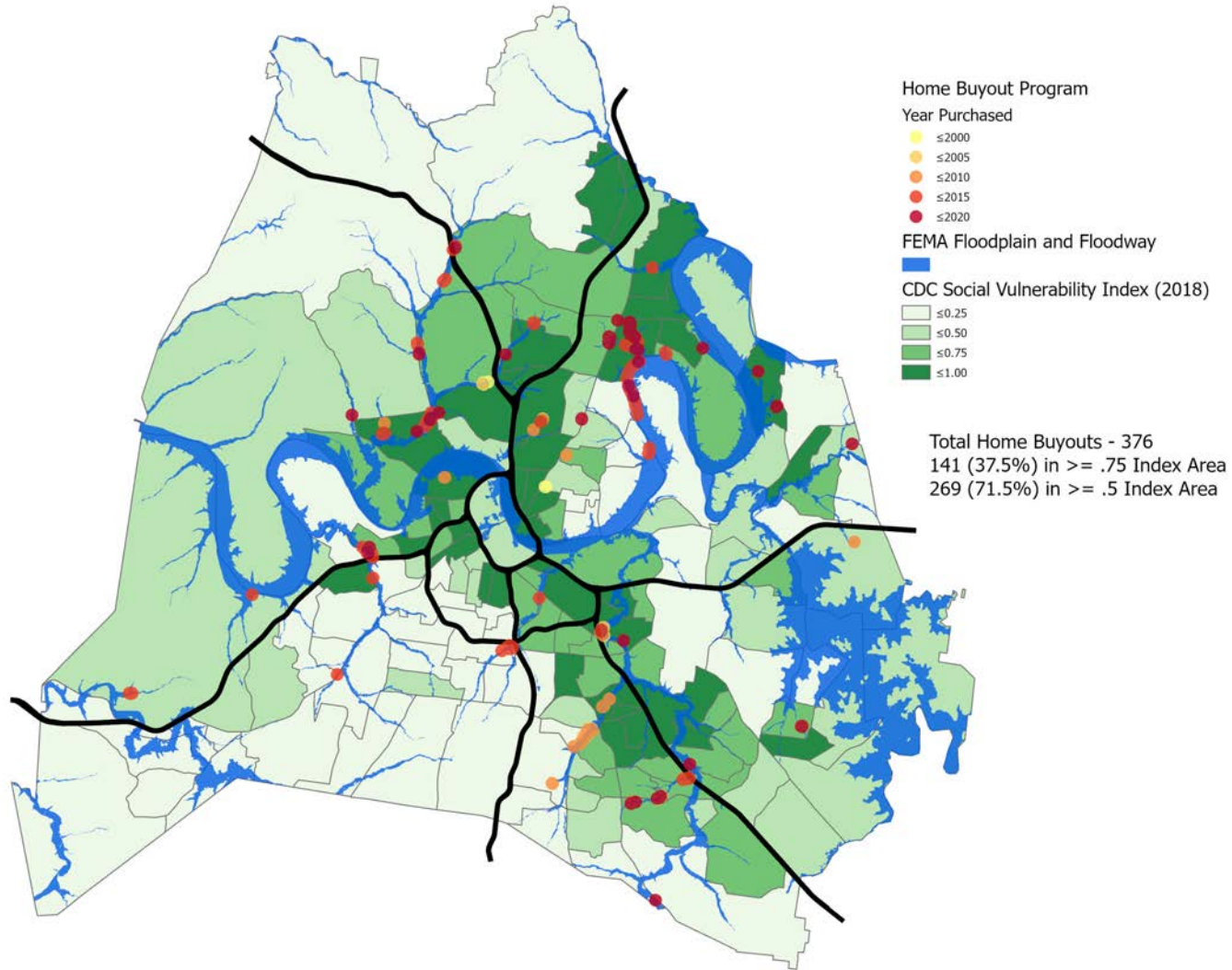
- ☒ Parcels / Subdivisions
- ☒ Addresses
- ☐ FEMA Floodplain/Floodway
- ☐ Population Density by Blockgroup
- ☒ Stream Gauges
- ☒ Rain Gauges
- ☐ Population Density - Hispanic
- ☐ Population Density - Over 65
- ☐ Population Density - Under 18
- ☐ Council Districts

Cameras

Links

Set Predicted Levels





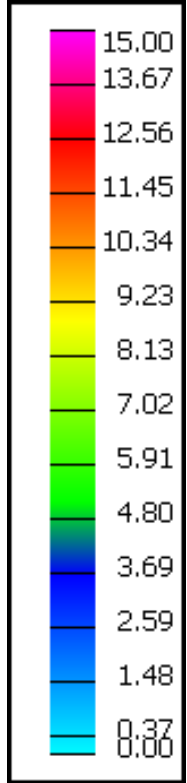
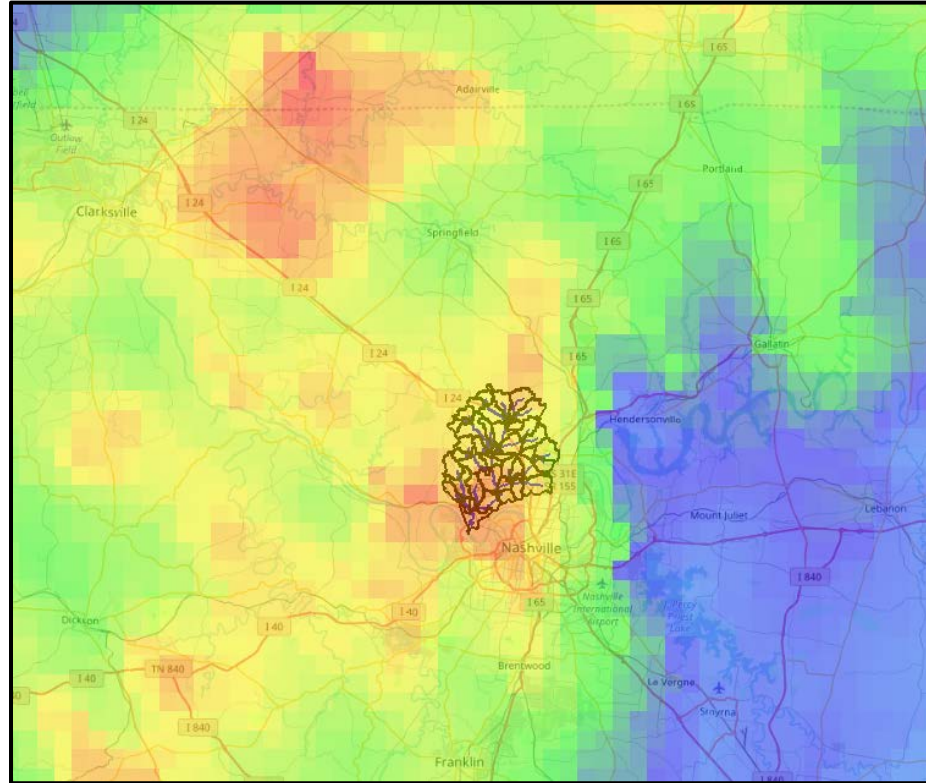
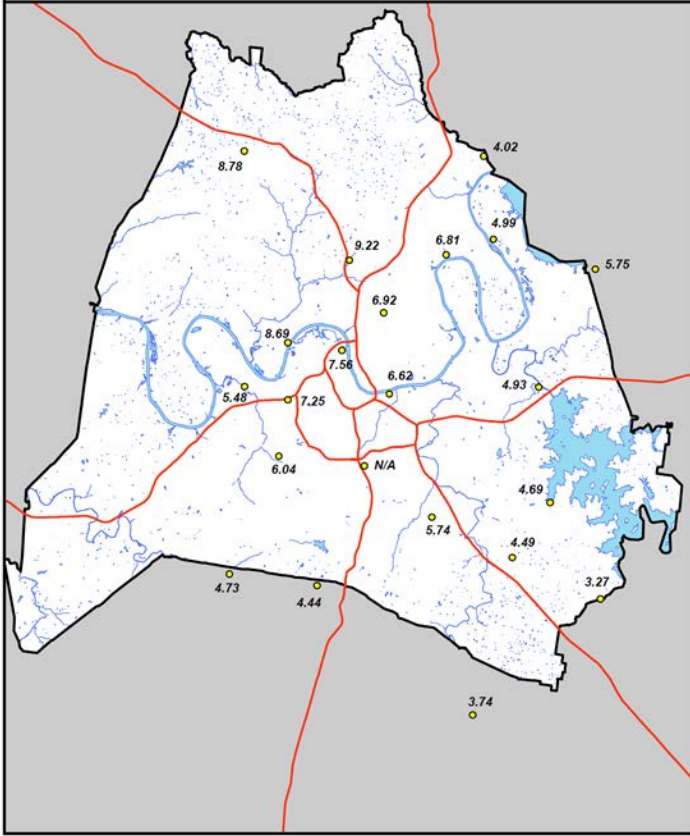
# New Gages and Real-Time Flood Modeling



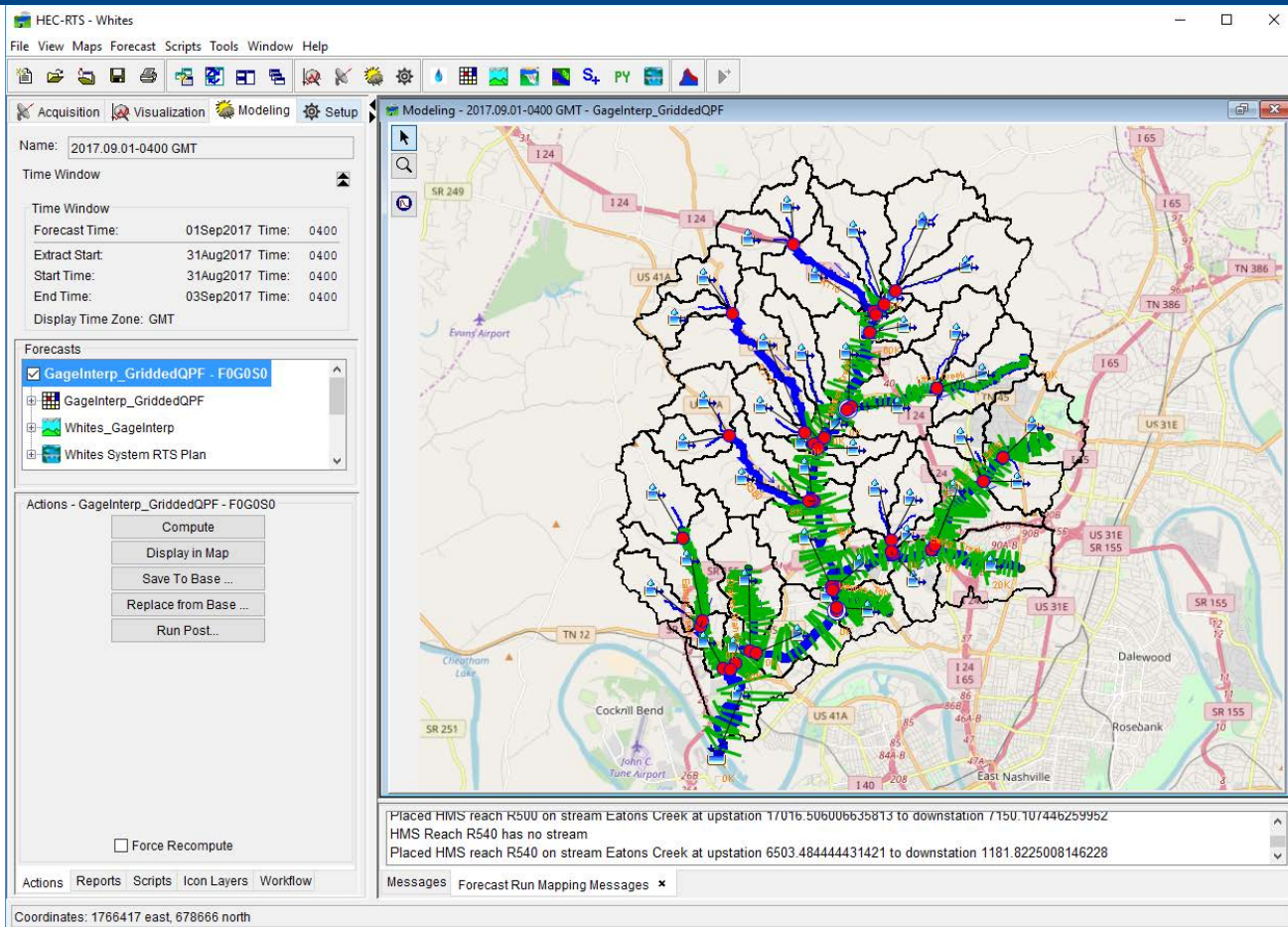


# Harvey Event Cumulative Rainfall

Aug 31 to Sept 1, 2017 Total Recorded Rain (inches)



# Whites Creek Watershed HEC-RTS Model



# Action Level Tool

AMEC

Summary

Drakes Branch - 1864.798  
100 ft US of W. Hamilton Rd

Eatons Creek - 16964.18  
0.75 mi US of Sulphur Ck Rd

Ewing Creek - 12652.91  
0.3 mi DS of I24

Little Creek - 9700.003  
0.25 mi DS of Brick Church Pike

North\_Fork\_Ewing - 12846.5  
0.1 mi DS of Bellshire Drive

Whites\_Creek - 30207.91  
Bordeaux Gage - DS of Buena Vista Pike

Whites\_Creek - 53738.23  
Old Hickory Blvd Gage - US of OHB

Whites\_Trib - 1295.566  
250 ft US of Dunbar Drive

Report

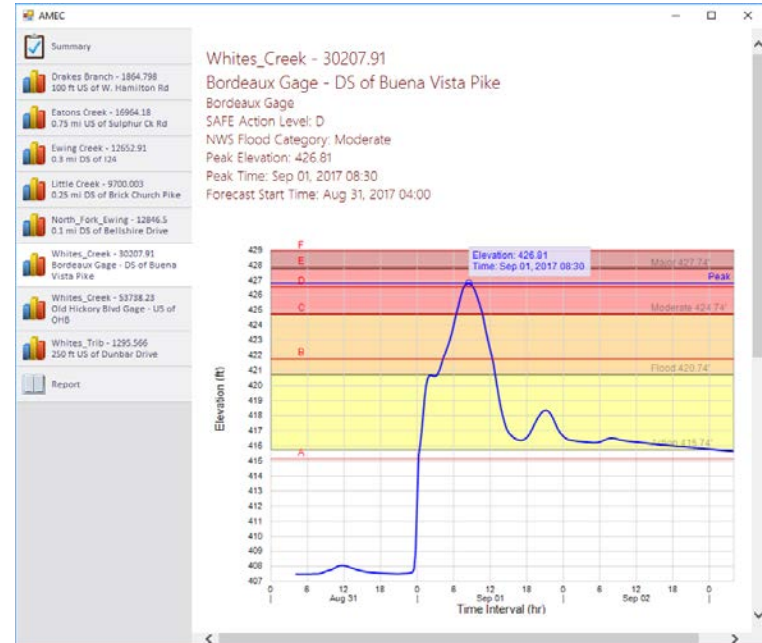
All Gages

Source HEC-RAS Model: D:\Nashville\_RT5\_Models\forecast\2017.09.01-0400\Whites\forecast.dss  
Forecast: Gageintpr\_GriddedQPF - F09090

Location	River	River Mile	Peak Elevation	Action Level	NWS Flood Category
100 ft US of W. Hamilton Rd	Drakes Branch	1864.798	408.51	B	n/a
0.75 mi US of Sulphur Ck Rd	Eatons Creek	16964.18	484.86	E	n/a
0.3 mi DS of I24	Ewing Creek	12652.91	465.05	C	n/a
0.25 mi DS of Brick Church Pike	Little Creek	9700.003	528.09	C	n/a
0.1 mi DS of Bellshire Drive	North_Fork_Ewing	12846.5	526.09	C	n/a
Bordeaux Gage - DS of Buena Vista Pike	Whites_Creek	30207.91	426.81	D	Moderate
Old Hickory Blvd Gage - US of OHB	Whites_Creek	53738.23	476.83	C	Flood
250 ft US of Dunbar Drive	Whites_Trib	1295.566	429.48	B	n/a

- Summary Table (above)
  - Summarizes action levels throughout the basin
- Forecast Point Information (right)
  - Accessed through left portion of the tool
  - Peak elevation and timing
  - Action Level
  - Stage Hydrograph

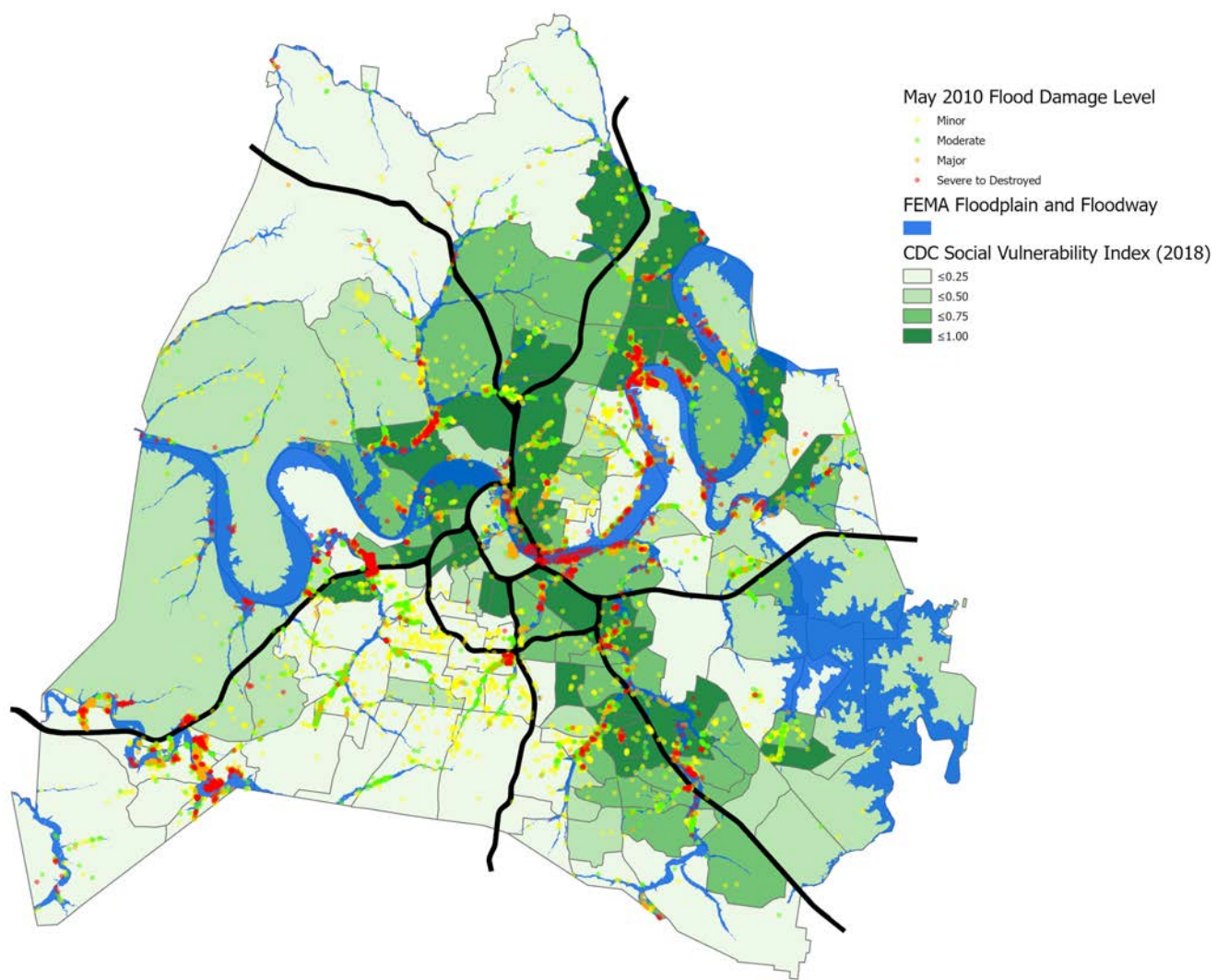
- Provides action level information for forecast points throughout the watershed
- Nashville SAFE and NWS Action Levels



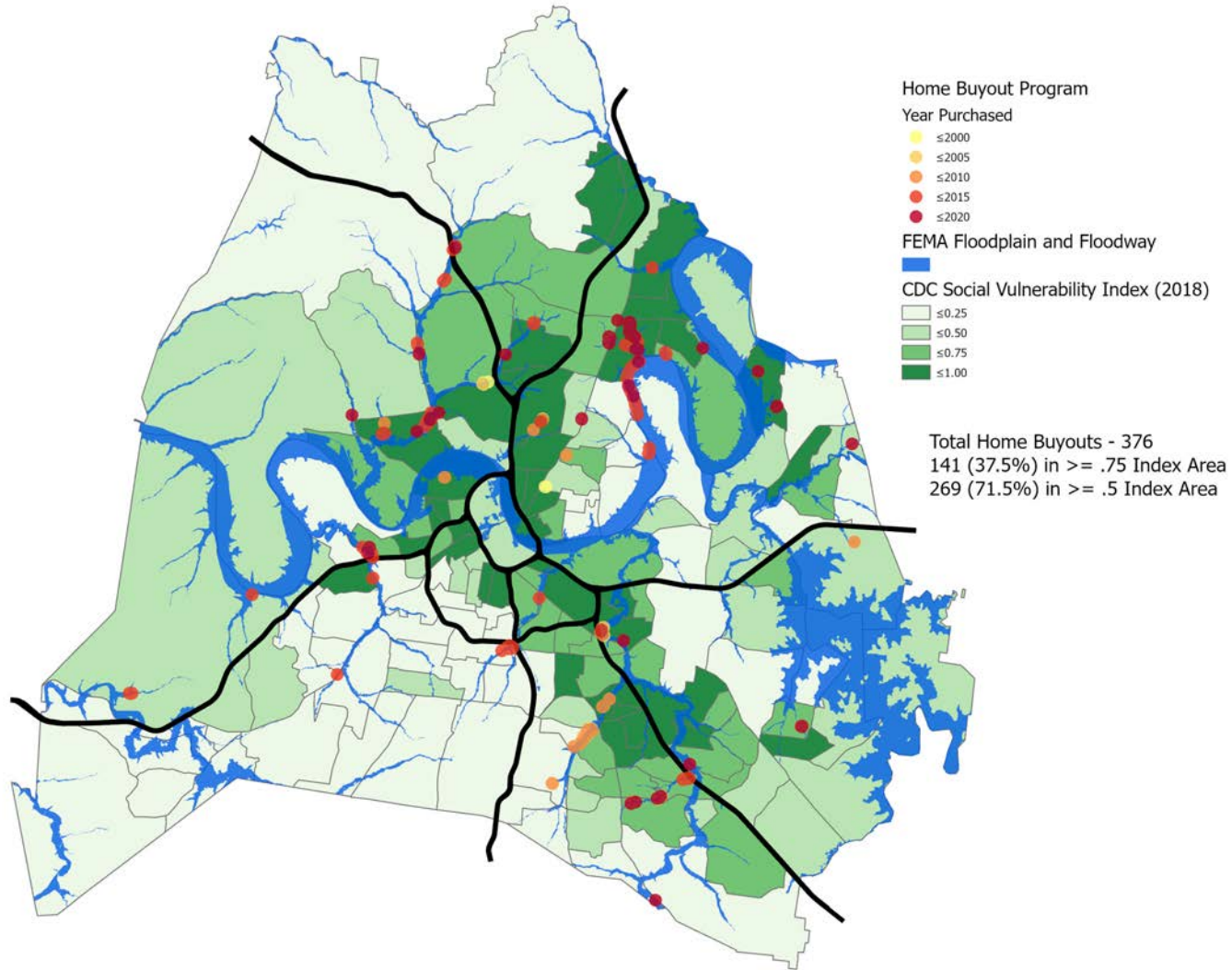
# Considering Additional Data Applications

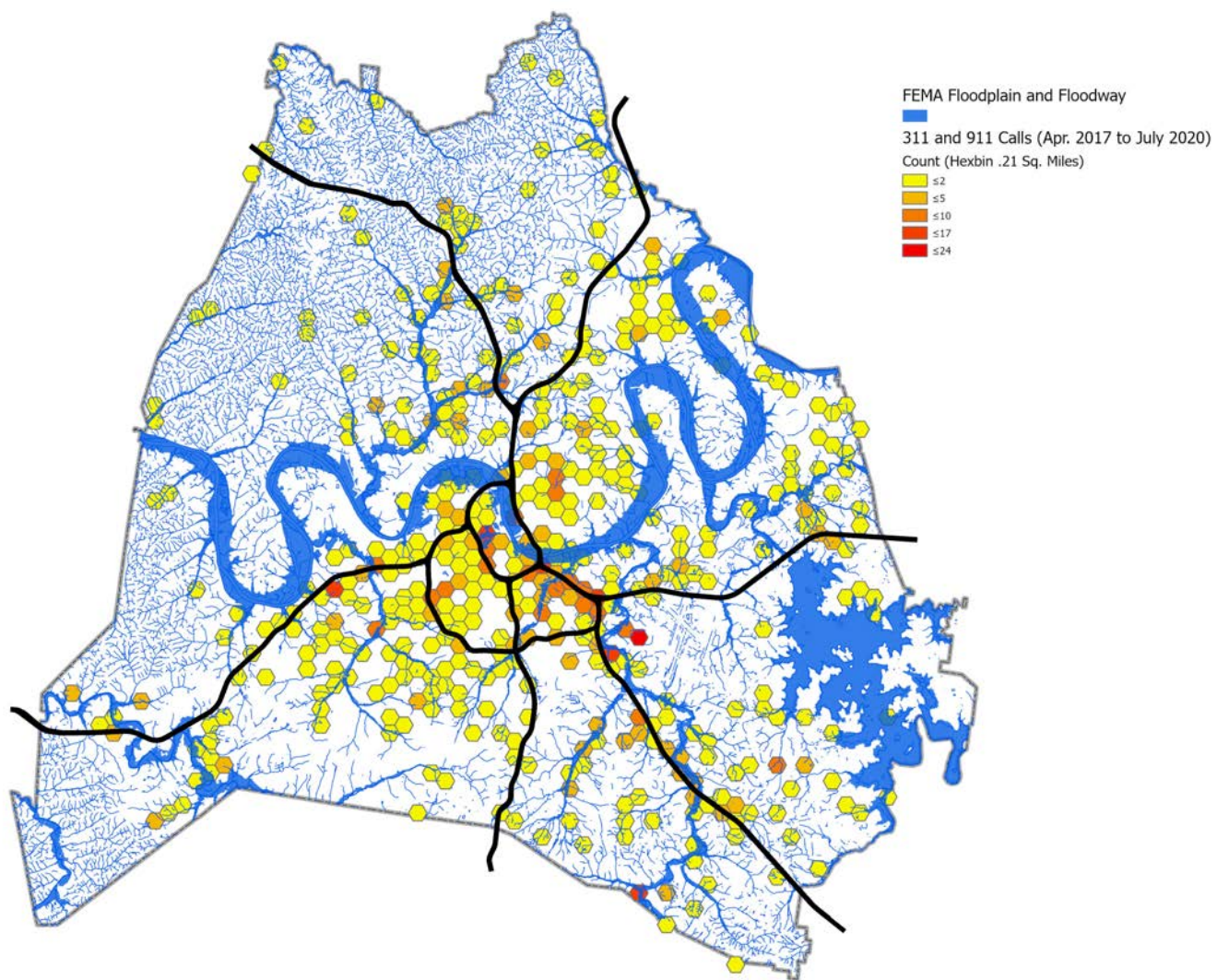




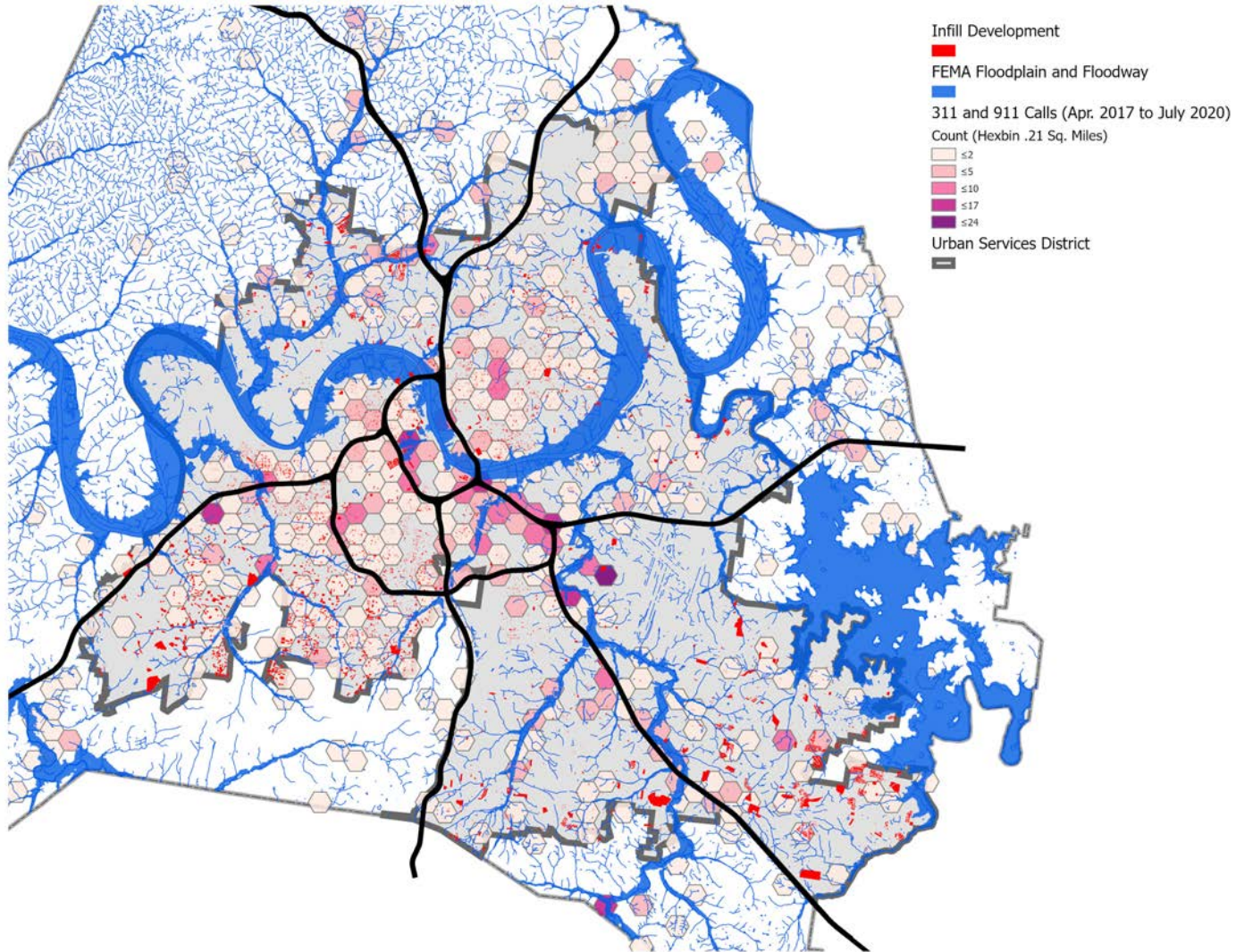














### 911 and 311 Flooding Reports



### Infill Development



### FEMA Floodplain and Floodway



### CDC Social Vulnerability Index (2018)

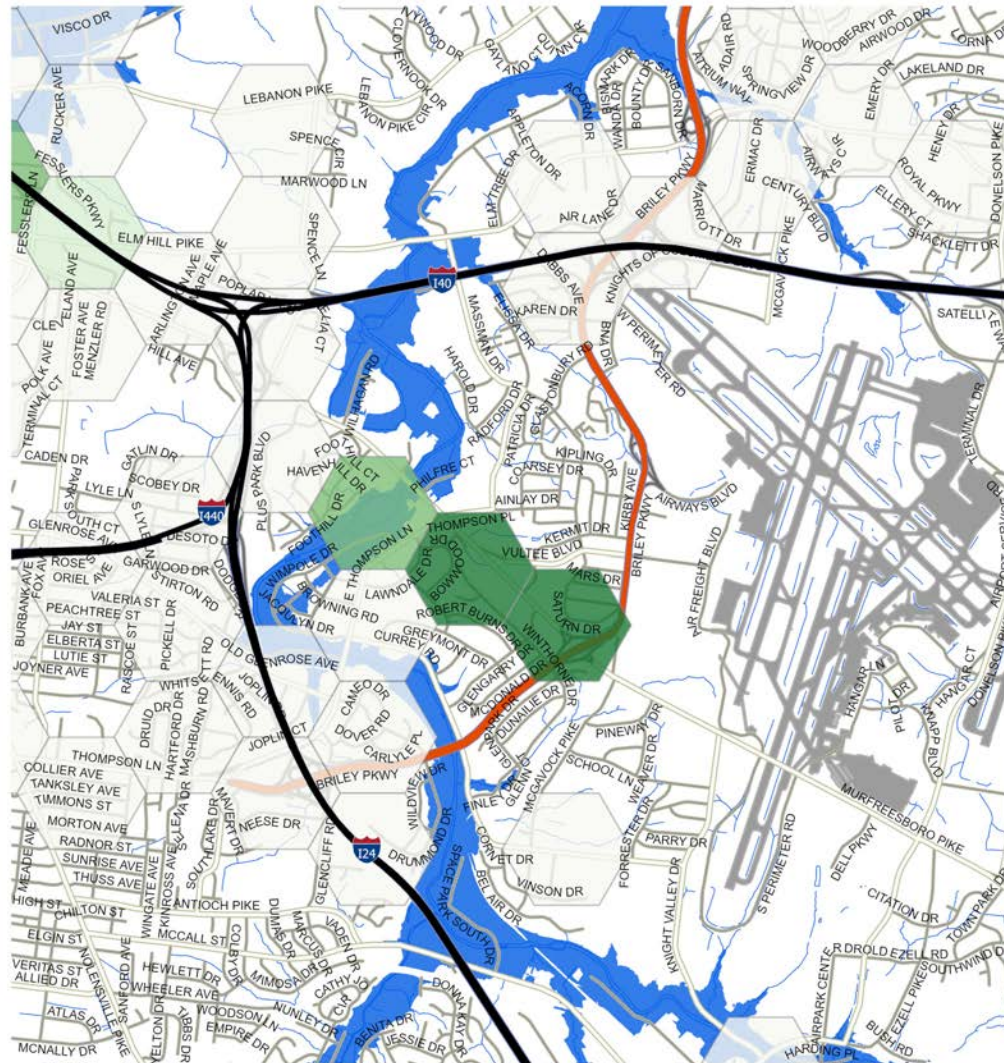
≤0.25

≤0.50

≤0.75

≤1.00





## 311 and 911 Flooding Calls

### Trend

- Up Trend - 99% Confidence
- Up Trend - 95% Confidence
- Up Trend - 90% Confidence
- No Significant Trend
- Down Trend - 90% Confidence
- Down Trend - 95% Confidence
- Down Trend - 99% Confidence

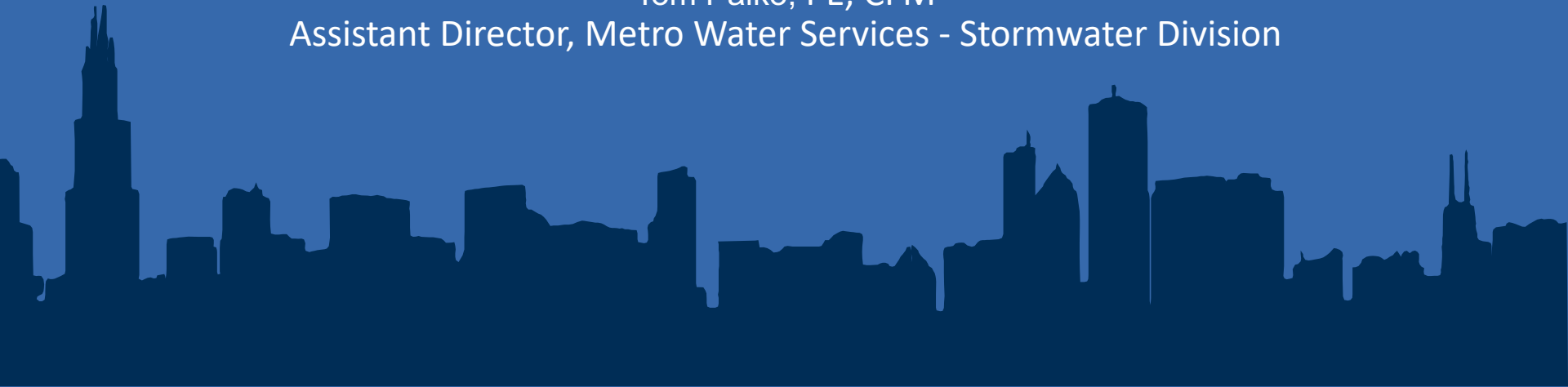
### FEMA Floodplain and Floodway





# Future Considerations, Questions, and Needs

Tom Palko, PE, CFM  
Assistant Director, Metro Water Services - Stormwater Division



# Changing Course – Planning for the Future

- What approaches and criteria have been used historically to inform decisions regarding flood mitigation in the area (e.g., home buyouts and infrastructure investment)?
- To what extent/how have vulnerable populations been considered in these efforts?
- What data/information/tools are needed for future urban flood mitigation considering the following:
  - Future climate and extreme events
  - Vulnerable populations and social fabric
  - Strategic planning – policies, infrastructure (green and/or grey) investment policies, etc.

# Upcoming Schedule

Participation	Date	Topic	Description
Public	Tuesday October 20	Nashville approach to mitigating impact of urban flooding	Nashville goals and objectives for this project
Public	Tuesday October 27	Cities helping cities	Break- outs
Cities welcome Others, invitation only*	November 17*	Sensor solutions	Expertise about sensors and edge devices
	December 1*	Data Modeling	Expertise about data sharing and modeling
	January 5*	Review Activator Plan	Review all inputs and determine what is still needed.
	January 19*	Publish Plan	

\*If you seek to participate, please email – [Philip.Bane@smartcitiescouncil.com](mailto:Philip.Bane@smartcitiescouncil.com)