



# ESTABLISHING A CITYWIDE WATERSHED MASTER PLAN

*TO DELIVER STRATEGIC  
FLOODING SOLUTIONS*

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*Presented by:  
Sheila Thomas-Ambat  
Ed Dickson*

*October 2020*

**SESWA**



# AGENDA

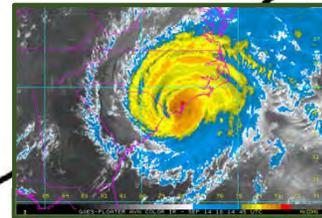
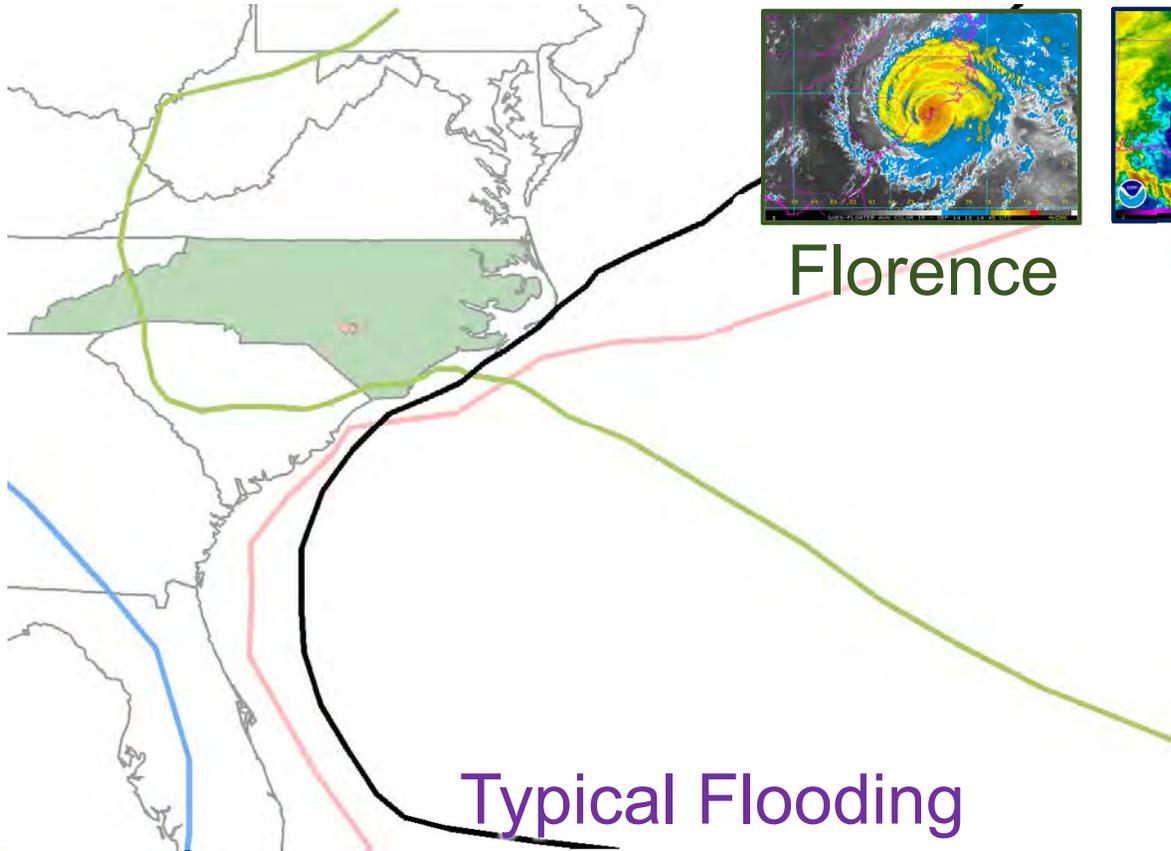
- Background
- Plan Framework
- Prioritization
- Data Maintenance
- Next Steps



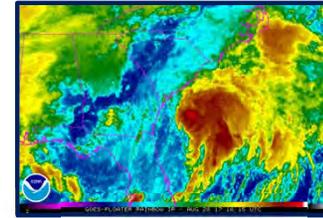
# BACKGROUND



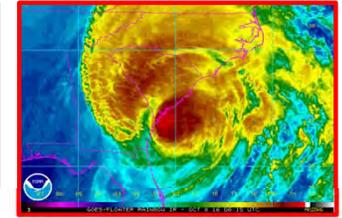
# PROJECT DRIVERS



Florence



Irma



Matthew



Dorian

# PROJECT DRIVERS

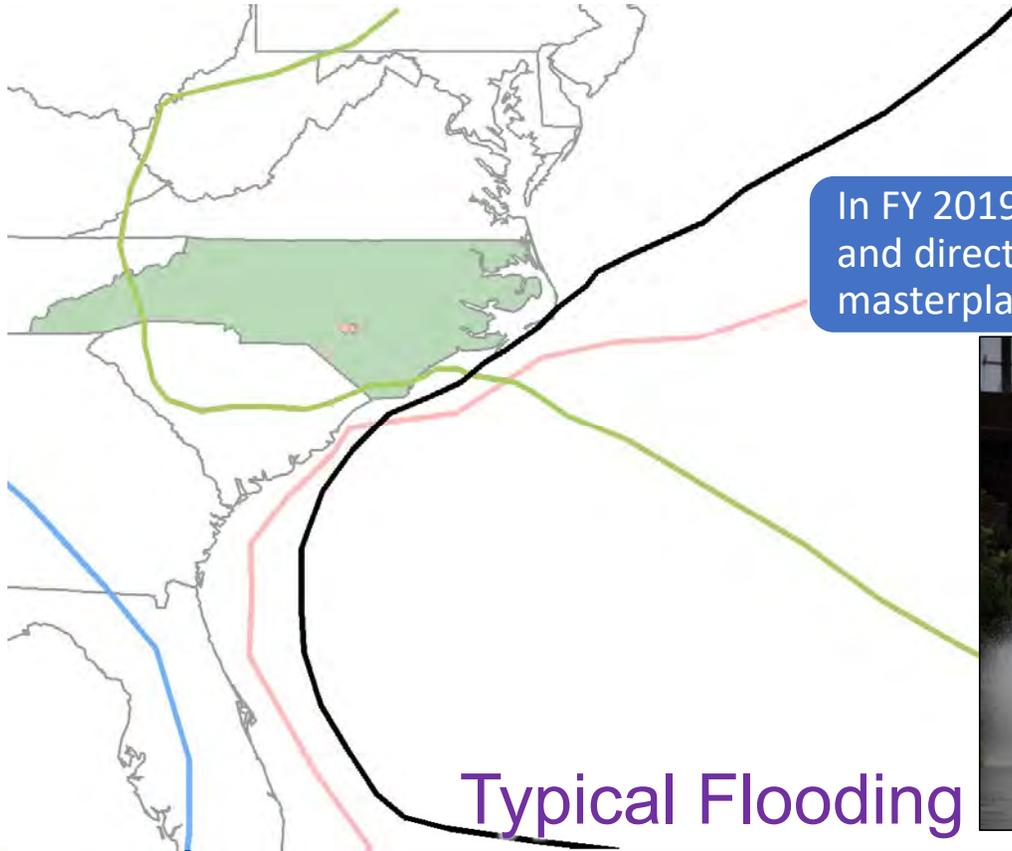


In FY 2019, City Council authorized a fee increase and directed staff to complete a stormwater masterplan for the entire City within five years.



Typical Flooding

# PROJECT DRIVERS



In FY 2019, City Council authorized a fee increase and directed staff to complete a stormwater masterplan for the entire City within five years.



# ORIGINAL PLAN

## Stormwater utility fee increase

- Citywide Stormwater Master Plan
- Study all the Watersheds

## Pros

- Comprehensive

## Cons

- Slow Process
- Expensive
- Some Areas May Not Need to Be Studied



Stormwater

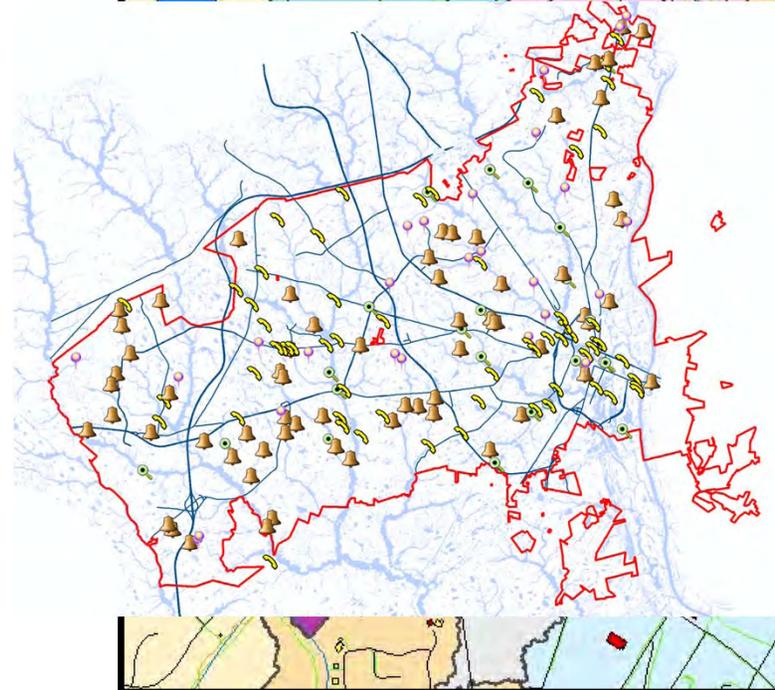
# NEW PLAN

## Challenges with Original Plan

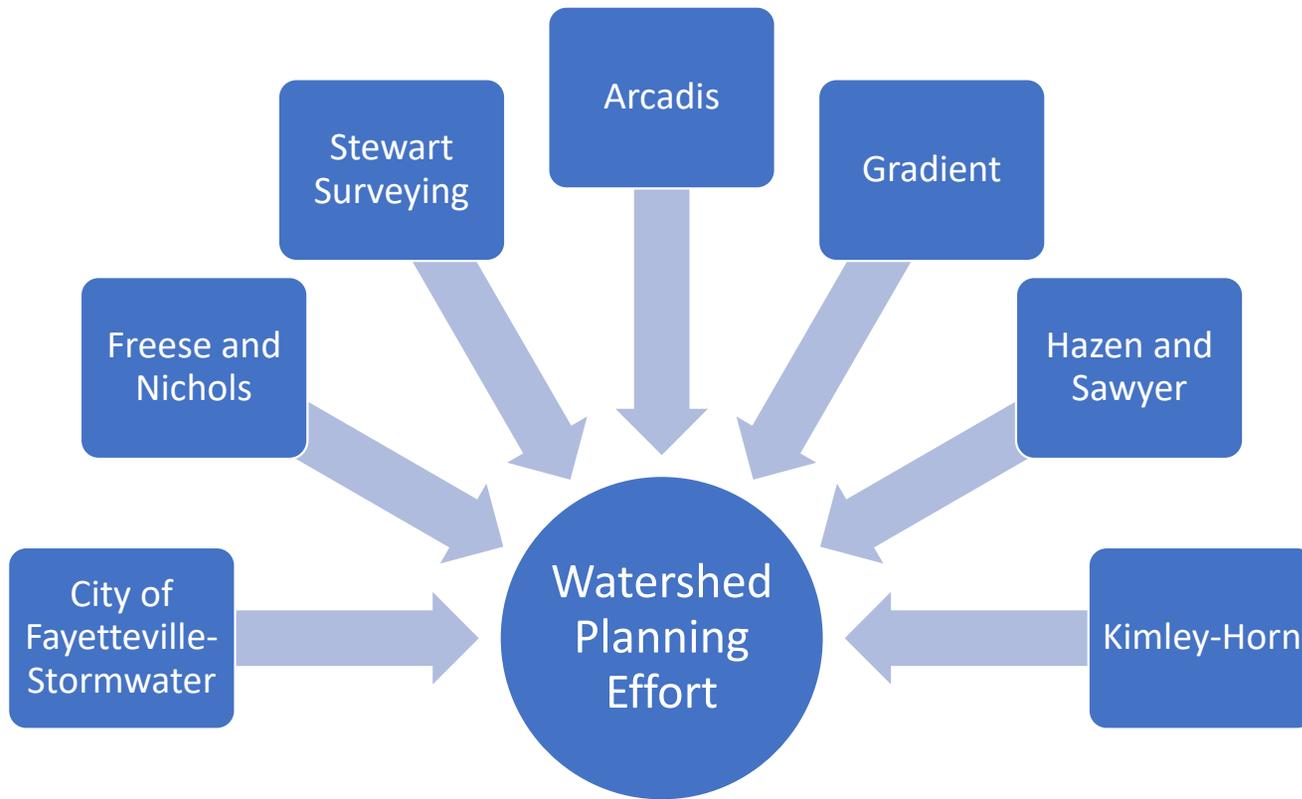
- Minimal data
- Limited resources
- No models

## Path Forward

- Focus available resources
- Gather/update existing data
- Perform high-level analyses
- Prioritize study areas



# TEAM EFFORT



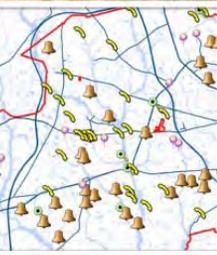
# PLAN FRAMEWORK



# PLAN MISSION / CHARTER



**PROGRAM**

**Citywide Program**

**City of Fayetteville**

## 1.00 PROGRAM CHARTER

### 1.01 PURPOSE AND OVERVIEW

With the recent hurricanes and gr... identified a need to establish a lon... watershed projects. This foundat... prepare for future challenges by ir...

### 1.02 MISSION

- Better manage the runoff fro... mitigation opportunities and... public safety and resiliency of...
- Leverage partnerships with M... and other external funding so...
- Plan for existing aging infrast... plan that integrates the need...

### 1.03 GOALS AND OBJECTIVES

- Formulate a comprehensive... damage locations and priorit... years
- Identify and prioritize potent... plan
- Begin design and developme... comprehensive watershed pl...
- Research and identify mitigat... incentive for economic devel...
- Leverage current City resourc...
- Optimize opportunities to au... information on aging stormw...
- Develop a communication pl... funding for safety mitigation
- Evaluate and identify Commu... insurance rates for citizens
- Enhance and integrate water...
- Identify opportunities to exp...
- Develop an educational volunte... monitoring program for citizens to monitor and track rain gauge and flood information

**City of Fayetteville**

## 1.04 KEY PERFORMANCE INDICATORS (KPI)

Key Performance Indicators (KPIs) will be tracked throughout the program lifecycle as specified in applicable sections of the PMP. They will be used to set specific goals and track progress across various aspects of the program, including efficiency, effectiveness, risk, quality and overall project performance. By utilizing KPIs we will be able to proactively manage the program and projects, anticipating potential issues, and maintaining a comprehensive view of the entire program.

## 1.05 KEY STAKEHOLDERS

Sponsor	Kristoff Bauer
City Program Director	Sheila Thomas-Ambat
City's Core Team Members	John Larch, Byron Reeves
FNI Program Director	Mike Wayts
FNI Program Manager (Technical)	Ed Dickson
FNI Program Manager (Controls)	Morgan McIlwain

Key City Stakeholders

Fayetteville City Council, Stormwater Advisory Board (SWAB), Fayetteville Mayor's Stormwater City Council Committee (MS3C), Public Services, Community and Economic Development, Development Services, Fire, Information Technology, Parks and Recreation, Police, Fayetteville Public Works Commission, North Carolina Department of Transportation

## 1.06 APPROVAL SIGNATURES

*Kristoff Bauer*  
Kristoff Bauer (City)

*Mike Wayts*  
Mike Wayts (FNI)



# FLOOD RISK ASSESSMENT

## Modeling Concepts

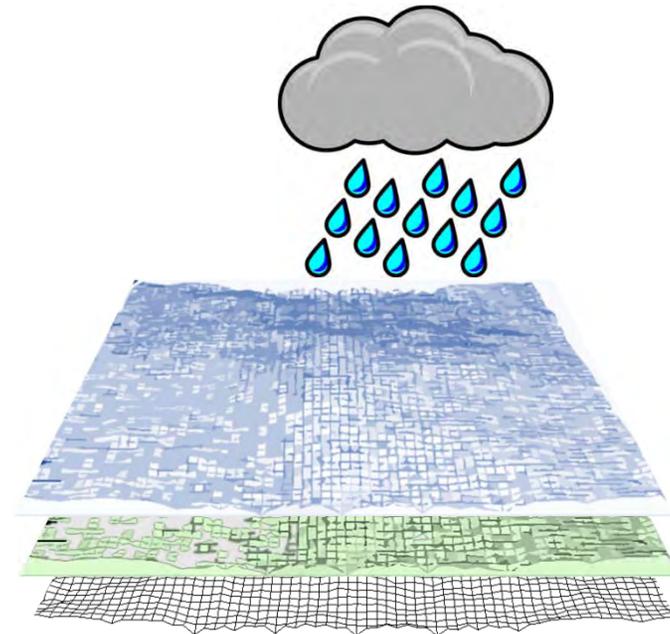
### Rain on Mesh

#### Direct Benefits:

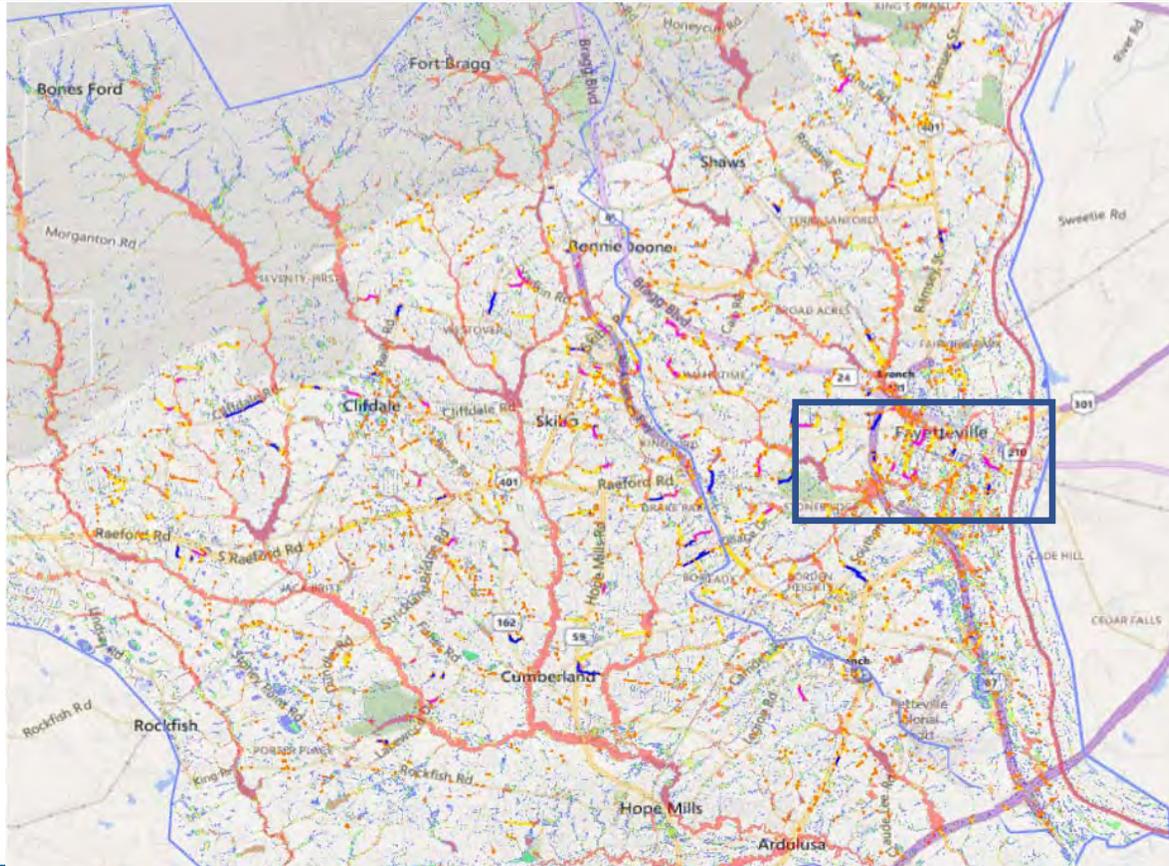
- High level planning
- Validation
- Identify problem locations

#### Additional Benefits:

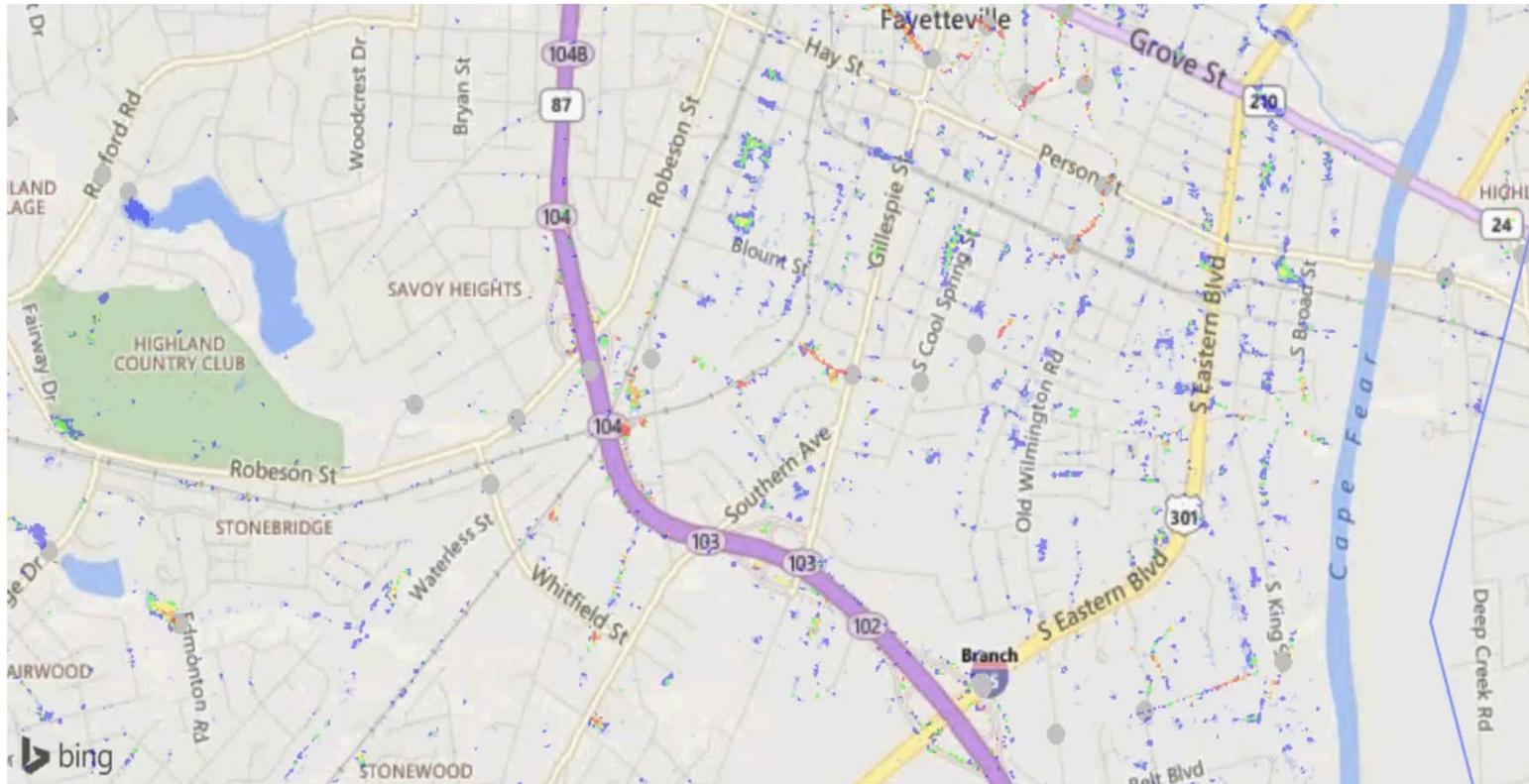
- Emergency forecasting
- Development tool



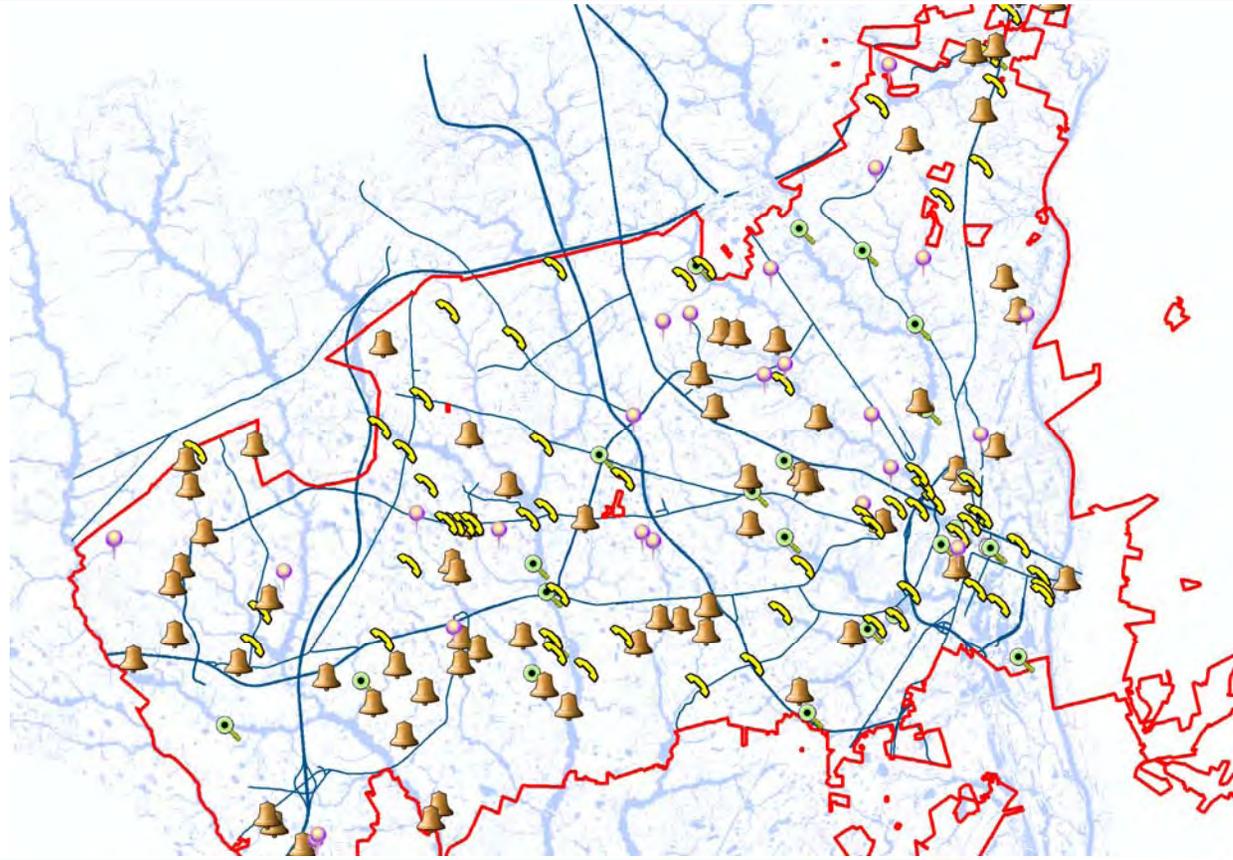
# CITYWIDE RAIN ON MESH MODEL



# CITYWIDE RAIN ON MESH MODEL



# INTEGRATION & VALIDATION

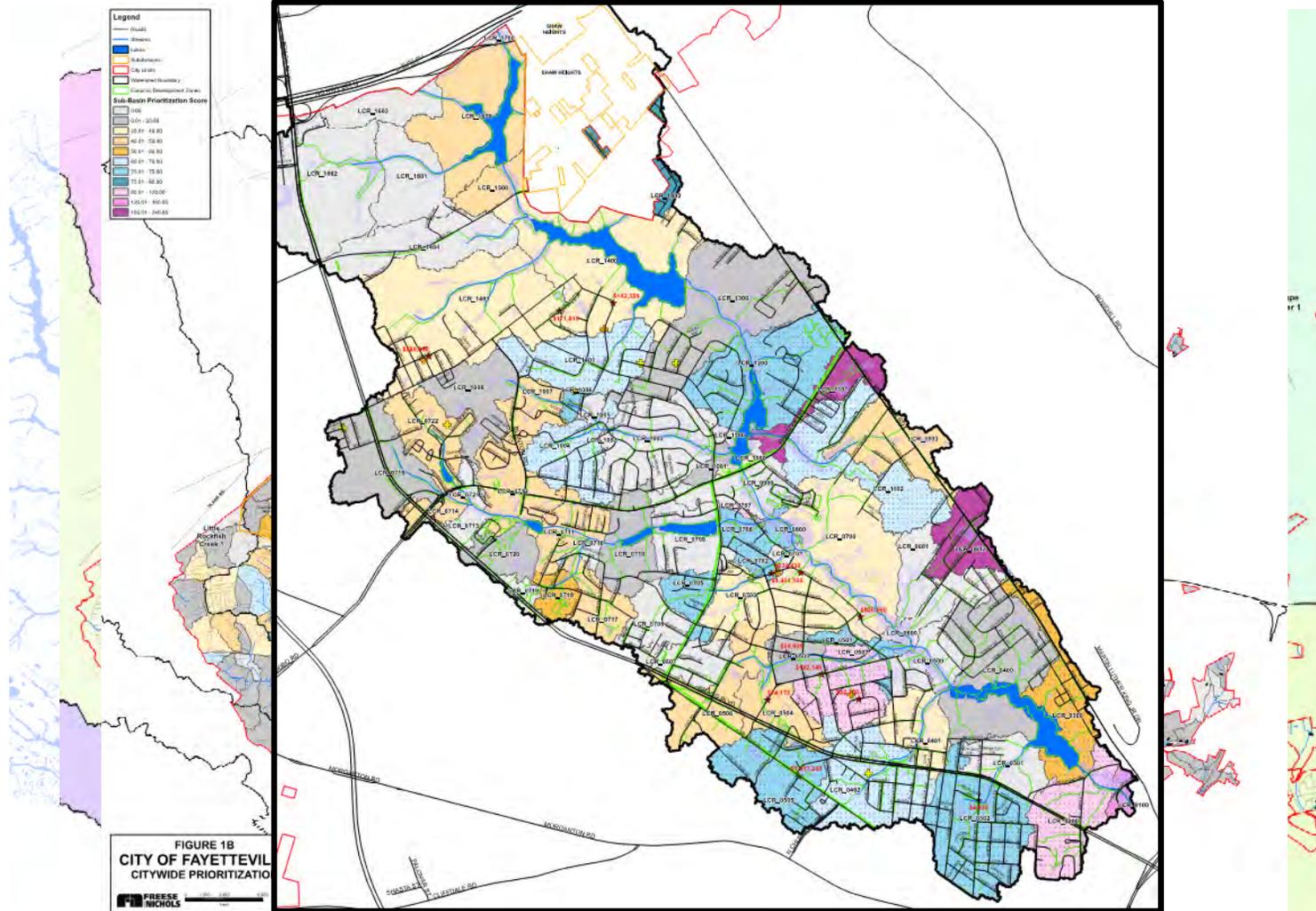


- ◆ HWMs
- 📞 911 Calls
- 🔔 CityWorks
- 📍 MainTrac
- 🔍 Interviews

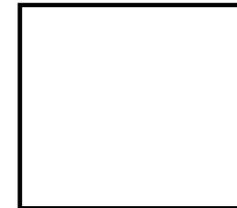
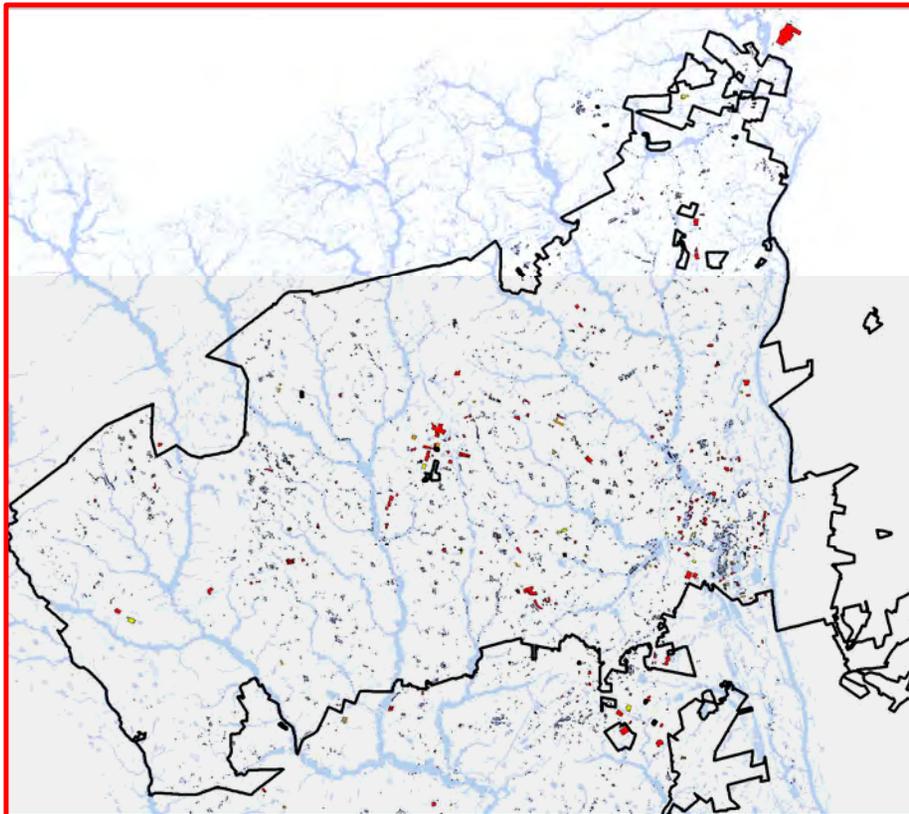
# PRIORITIZATION



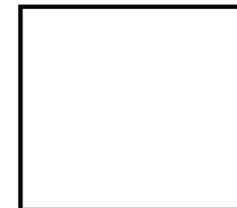
# METHODOLOGY



# SCORING CRITERIA



Structures



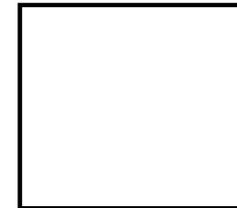
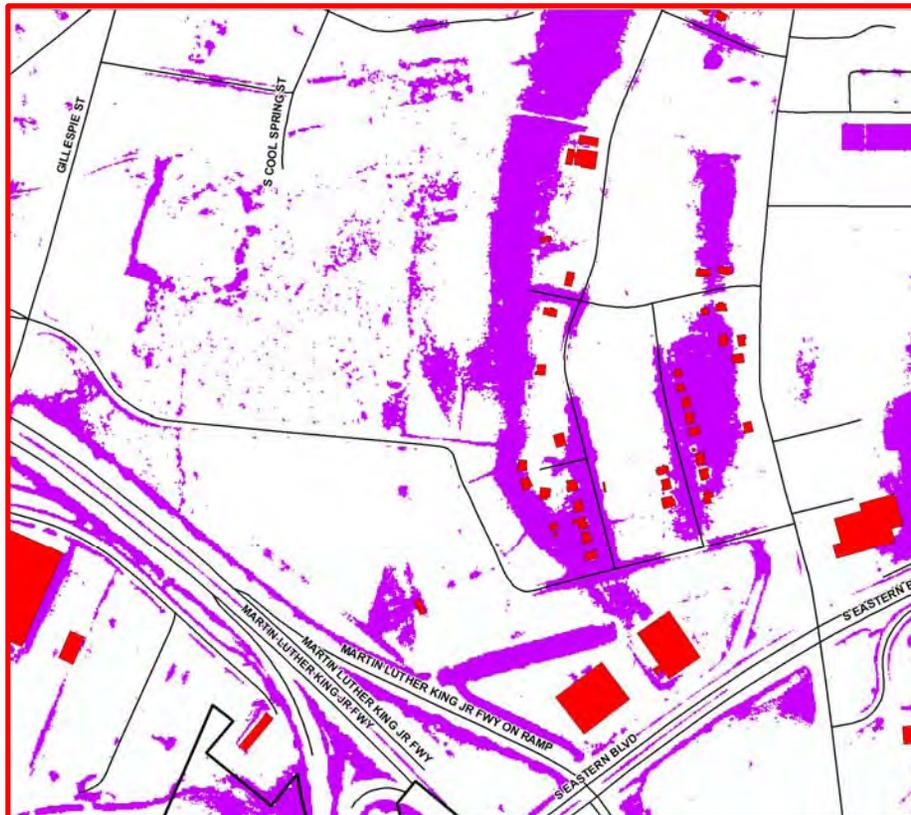
Crossings



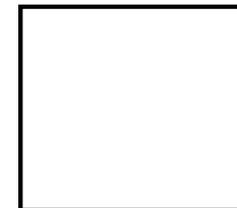
Facilities

Impacted Structures

# SCORING CRITERIA



Structures



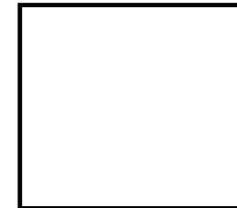
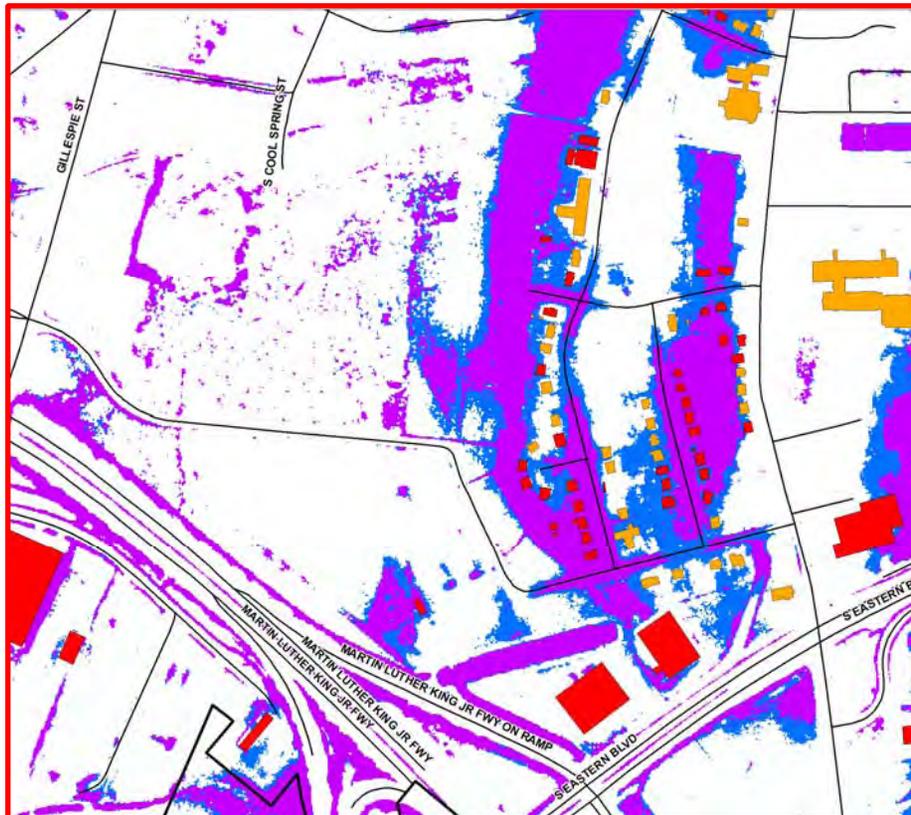
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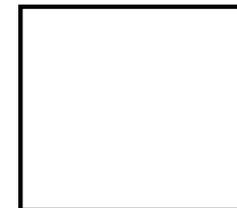
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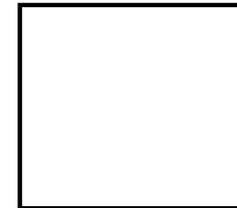
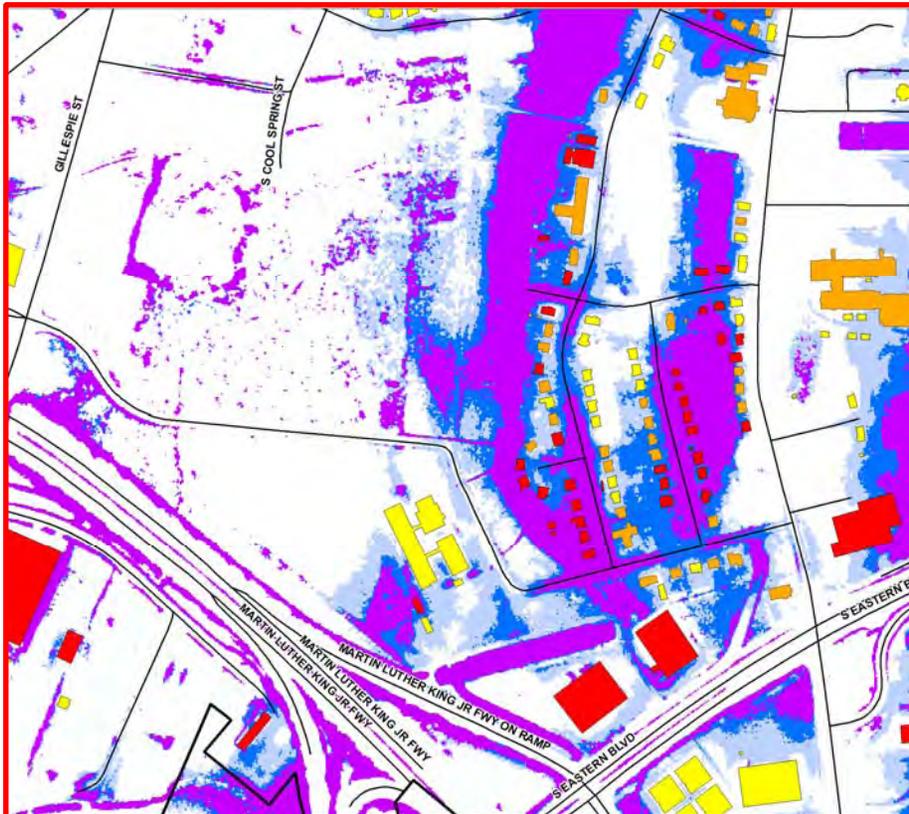
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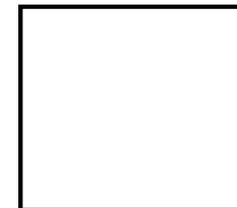
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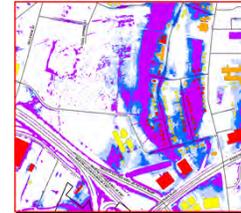
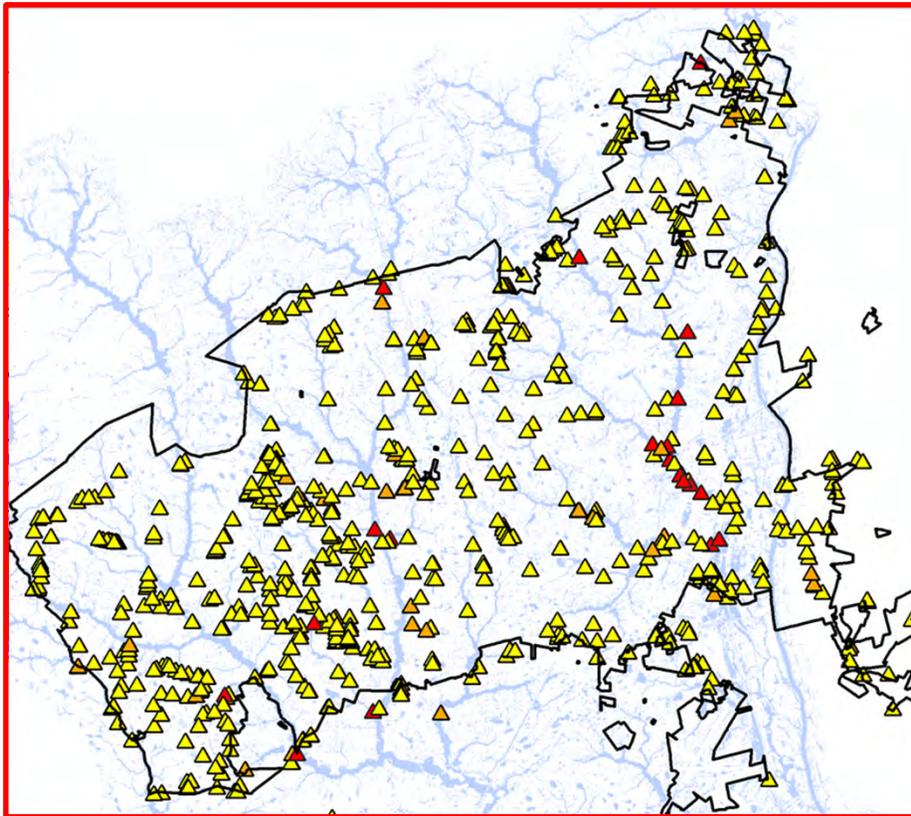
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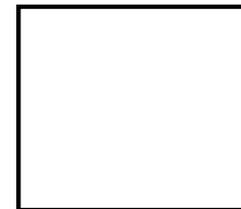
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Impacted Structures

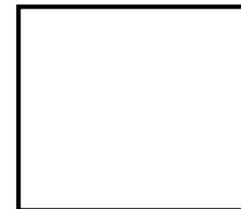
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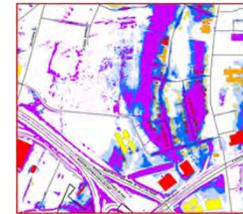
Crossings



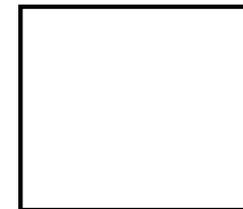
Facilities

Road Crossing Risk

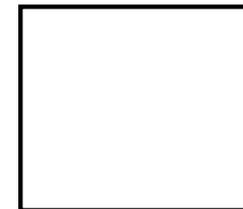
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Structures



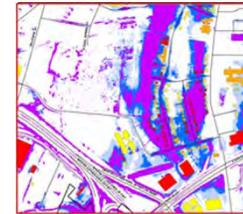
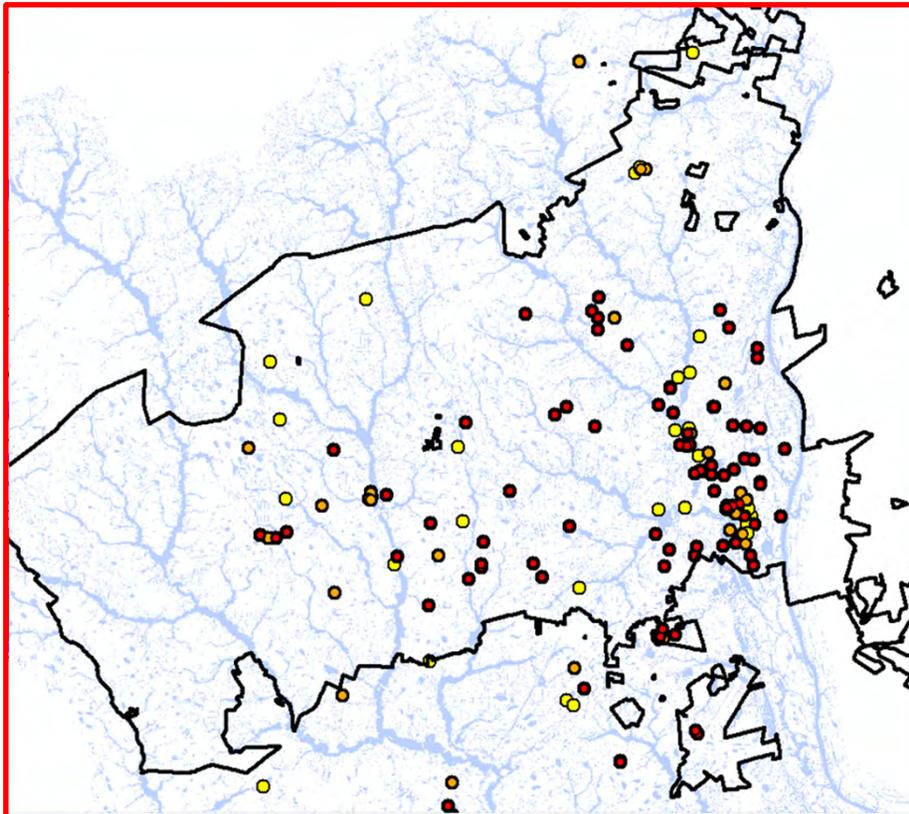
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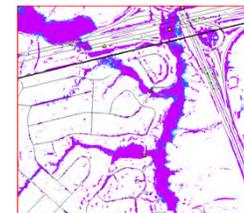
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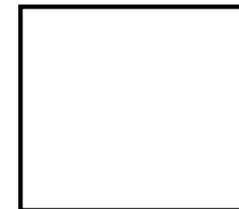
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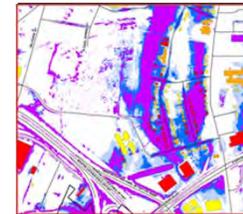
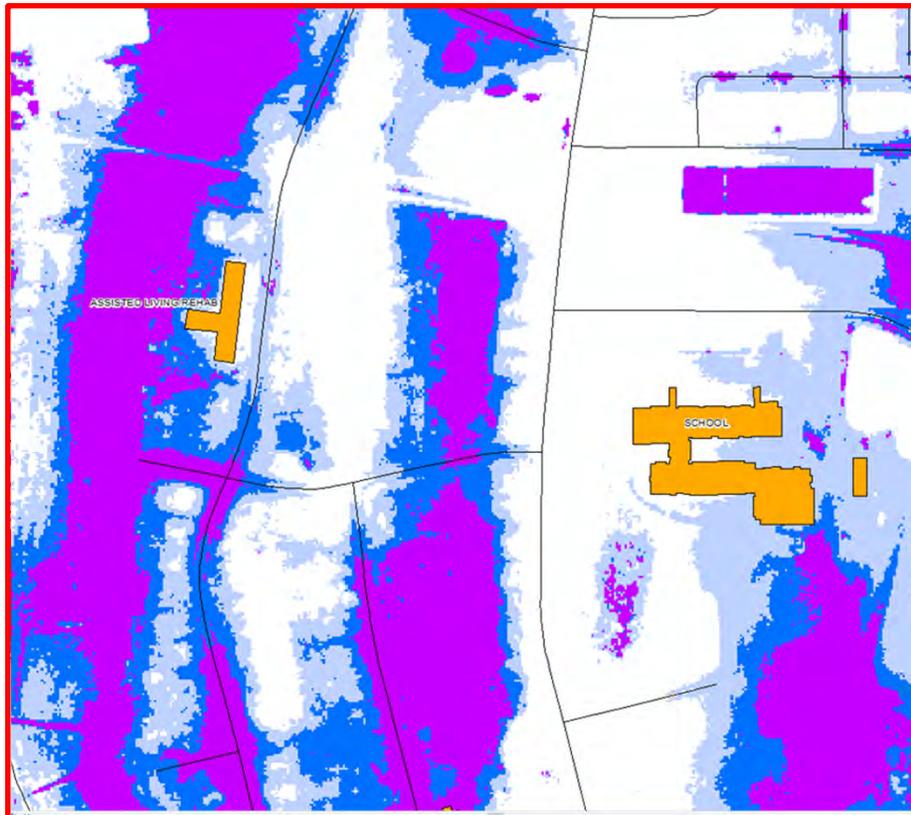
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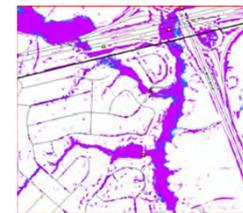
Facilities

Essential Facilities

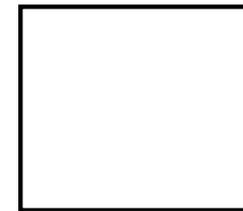
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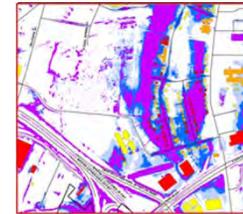
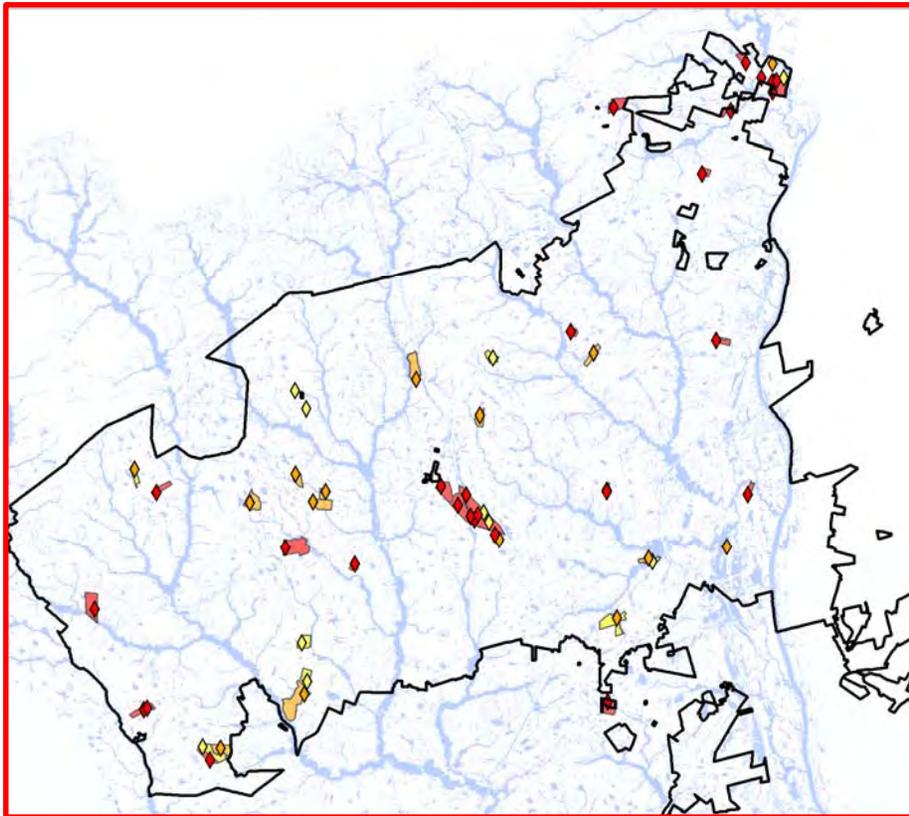
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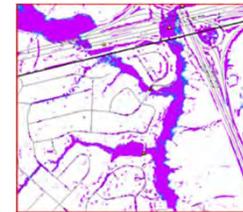
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Essential Facilities

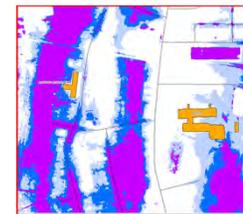
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Structures



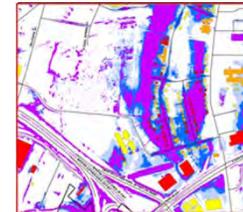
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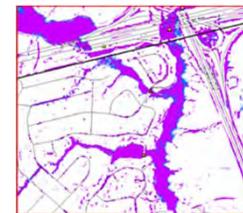
Facilities

Disconnected Areas

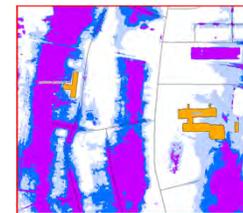
# SCORING CRITERIA



Structures



Crossings



Facilities

Disconnected Areas

# SCORING



Structures  
Criteria

Information				10 - year event		25 - year event		100 - year event	
Sub-Basin	Area	Impacted	Blds per	Impacted	Blds per	Impacted	Blds per	Impacted	Blds per
Sub-Basin Information				Structures	Acre	Structures	Acre	Structures	Acre
Sub-basin	Watershed	Area (ac)	Stream Length (LF)						
BKH_0501	BKH	138.31	1248.21	51	0.375	90	0.662		
BKH_0603	BKH	114.85	72.28	15	0.041	18	0.050		
BKH_0700	BKH	70.26	1845.38	2	0.016	4	0.033		
STW_1300	STW	371.43	4151.19	0	0.000	0	0.000		
STW_1301	STW	758.61	1633.65						
STW_1400	STW	291.62	0.00						

~1,000 City Sub-Basins  
Ranked

Final score for  
structures criteria

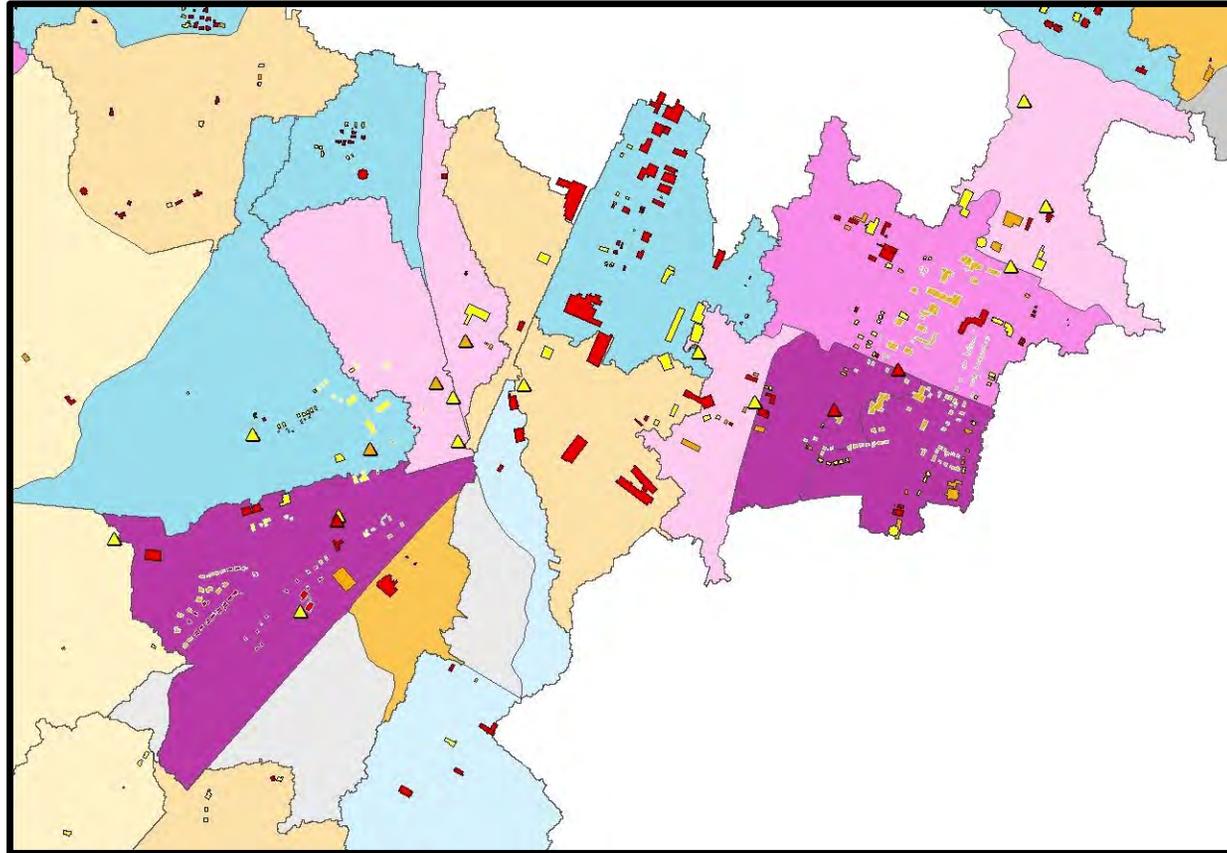
Sub-Basin	Criteria Scoring (Normalized)				Sub-Basin	Criteria Scoring (Weighted)			
	10-yr	25-yr	100-yr	TOTAL		10-yr	25-yr	100-yr	TOTAL
BLN_0600									
RCK_0823									
BKH_1004									
STW_0800									

Sub-Basin	Criteria Totals				Combined Totals	Criteria Scoring (Weighted)		
	Impacted Structures	Road Crossing	Essential Facilities	Disconnected Areas		10-yr	25-yr	100-yr
BLN_0600	72	19	16	30	137	24	14	72
RCK_0823	43	0	0	0	43	5	0	43
STW_0800	0	19	0	0	19			
BKH_1004	14	0	0	0	14			

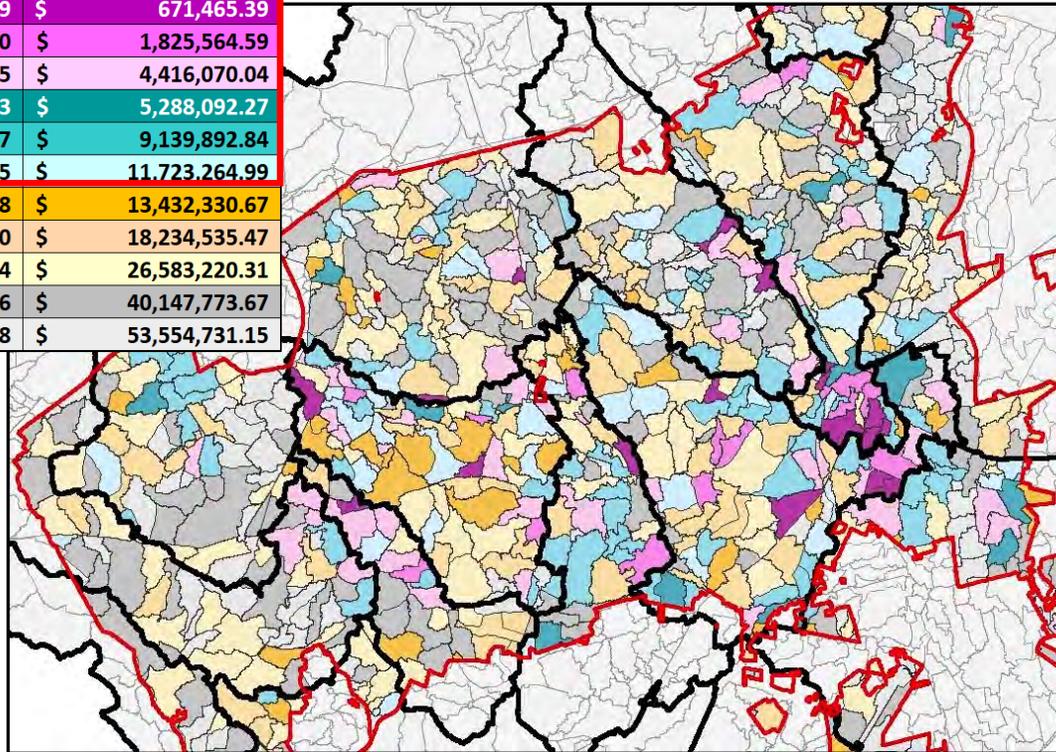
considered when  
determining thirds

# SUB-BASIN PRIORITIZATION

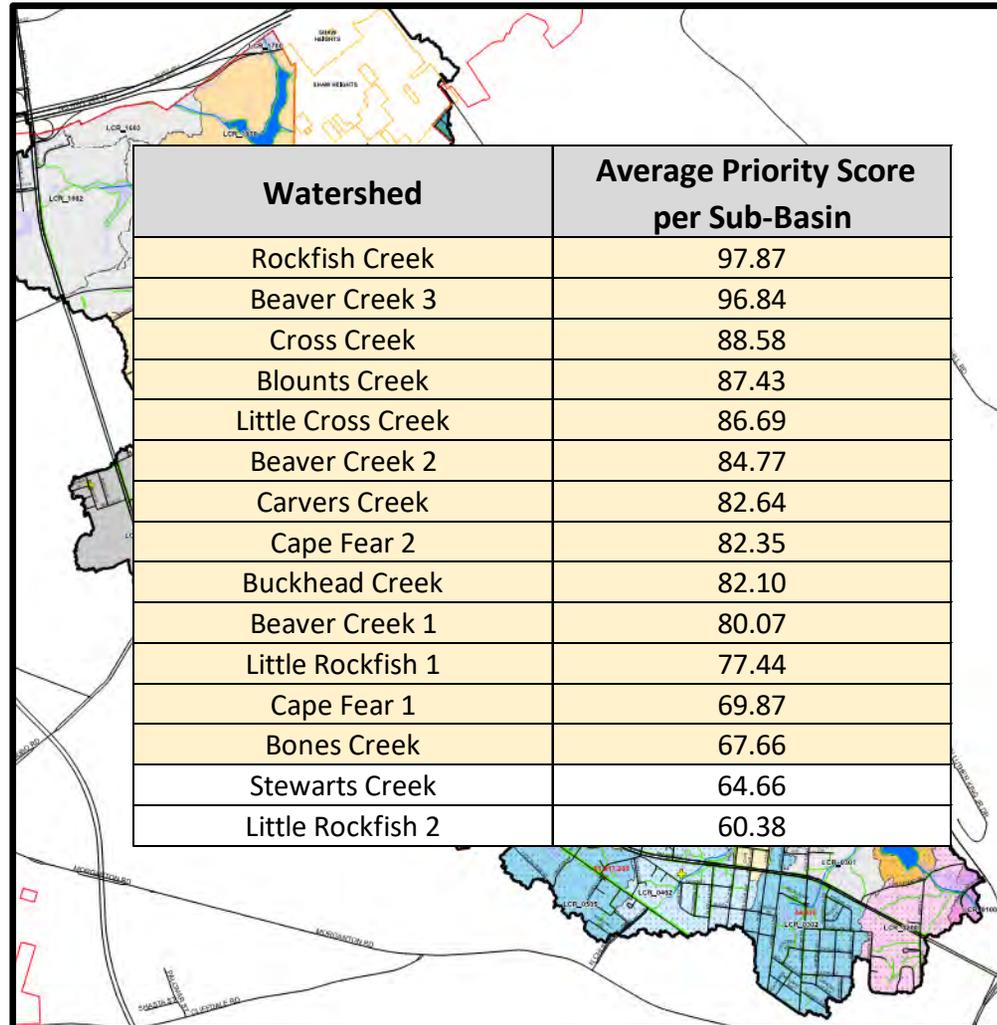


# SCORING SUMMARY

Score	Cost per Category	Cumulative Cost
106.01-240.00	\$ 671,465.39	\$ 671,465.39
120.01-160.00	\$ 1,154,099.20	\$ 1,825,564.59
80.01-120.00	\$ 2,590,505.45	\$ 4,416,070.04
75.07-80.00	\$ 872,022.23	\$ 5,288,092.27
70.01-75.00	\$ 3,851,800.57	\$ 9,139,892.84
60.01-70.00	\$ 2,583,372.15	\$ 11,723,264.99
50.01-60.00	\$ 1,709,065.68	\$ 13,432,330.67
40.01-50.00	\$ 4,802,204.80	\$ 18,234,535.47
20.01-10.00	\$ 8,348,684.84	\$ 26,583,220.31
0.01-20.00	\$ 13,564,553.36	\$ 40,147,773.67
0.00	\$ 13,406,957.48	\$ 53,554,731.15



# WATERSHED PRIORITIZATION



SubbasinID	Weighted Score
LCR_0100	134.15
LCR_0200	99
LCR_0300	38.49
LCR_0302	72.45
LCR_0402	62.79
LCR_0501	74.32
LCR_0502	90.96
LCR_0505	177.9
LCR_0602	160.45
LCR_0702	86.94
LCR_0705	43.47
LCR_0707	33.81
LCR_0708	72.45
LCR_0800	239.6
LCR_1004	77.3
LCR_1006	176.45
LCR_1101	115.47
LCR_1102	43.47
LCR_1200	72.45
LCR_1401	14.49
LCR_1402	20.66
	86.7

# PROGRAM DEVELOPMENT



		Watershed				Average Priority Score per Sub-Basin				
CALENDAR YEARS	2020		2021				2022			
QUARTERS	Jul - Sep	Oct - Dec	Jan - Mar	Apr - Jun	Jul - Sep	Oct - Dec	Jan - Mar	Apr - Jun	Jul - Sep	Oct - Dec
Rockfish Creek										
Beaver Creek 3										
Cross Creek										
Blounts Creek										
Little Cross Creek										
Beaver Creek 2										
Carvers Creek										
Cape Fear 2										
Buckhead Creek										
Beaver Creek 1										
	Bones Creek				67.66					
	Stewarts Creek				64.66					
	Little Rockfish 2				60.38					

# DATA MAINTENANCE



# SCHEMA AND GEODATABASE



- FayettevilleNCAssetManagement.gdb
  - IDCA
    - IDCA\_BMP
    - IDCA\_BRIDGE
    - IDCA\_CULVERT
    - IDCA\_DAM
    - IDCA\_General
    - IDCA\_SWCHANNEL
    - IDCA\_SWCONDUIT
    - IDCA\_SWNODE
  - Modeling
    - \_1D\_MannN
    - \_1D\_StrLn
    - \_1D\_XS
    - \_2D\_BreakLn
    - \_2D\_MannN
    - \_2D\_MeshShp
    - HydroBasin
    - HydroLink
    - HydroNode
  - Dam\_Channel
  - MainTrac\_SW\_Pipes
  - MainTrac\_SW\_Structures
  - Output\_1D\_DEP
  - Output\_1D\_VEL
  - Output\_1D\_WSE
  - Output\_2D\_DEP
  - Output\_2D\_VEL
  - Output\_2D\_WSE
  - Summ\_Q

Field Name	Attribute Domain Value	Description
REVISED	Yes No N/A	<b>Revised.</b> Domain values in this field reflect whether the feature information has been updated following field inspection.
REV_DAT	None [Last Revision Date]	<b>Revision Date.</b> This value reflects the date of each feature's most recent revision. This value is to be updated every time
REV_NOTES	None [Free Text Field for Revision Notes]	
CON_SCORE	None [Integer space for CityWorks import]	
GENERAL_CO	None [Free text field for comment]	
LASTUPDATE	None [Last Revision Date]	automatically updated every time an update is made to each feature's geometry or attribute values.
LASTEDITOR	None [Name of the User to make the Last Revision]	<b>Last Editor.</b> This value identifies the user responsible for each feature's most recent revision. This value is automatically updated every time an update is made to each feature's geometry or attribute values.

Field Name	Required / Required if Applicable / Calculated	Type
FACILITYID	R	Integer
GRIDID	R	Text
STRUCT_TYP	R	Text
STR_TYP_OT	A	Text
MATERIAL	R	Text
MAT_OTHER	A	Text
CONSTR_BY	A	Text
CONSTR_DAT	A	Date
OWNED_BY	A	Text
OWNER_TYPE	A	Text
MAINT_BY	A	Text
LOS_CAP	R	Text

**NEXT STEPS  
&  
LONG TERM  
SOLUTIONS**



# NEXT STEPS

Execution of Studies

Development of Project Prioritization

Project Identification

Leverage Funds

Project Execution

## ADDITIONAL INITIATIVES

---

### Watershed Studies

- Develop Solutions
- Prioritize Implementation

### Economic Incentive Analysis

- Evaluate Existing Processes
- Provide Capacity for New Development

## Public Outreach

### Downtown Riverine Assessment

- Evaluate Capacity and Options
- Develop Unique Opportunities

### Flood Warning System

- Gauge System
- Road Crossings
- Leverage Grants

# QUESTIONS?

