



County
Effingham
Georgia



POND

Effingham County Stormwater Master Plan Presentation

Agenda

- Introductions
- Project Understanding & Approach
- Initial Data Gathering
- Project Study Area
- Field Data Collection
- Rehabilitation Plan Results
- Model Development
- Expansion Plans Results
- Cash Flow Analysis
- Future Recommendations
- Questions

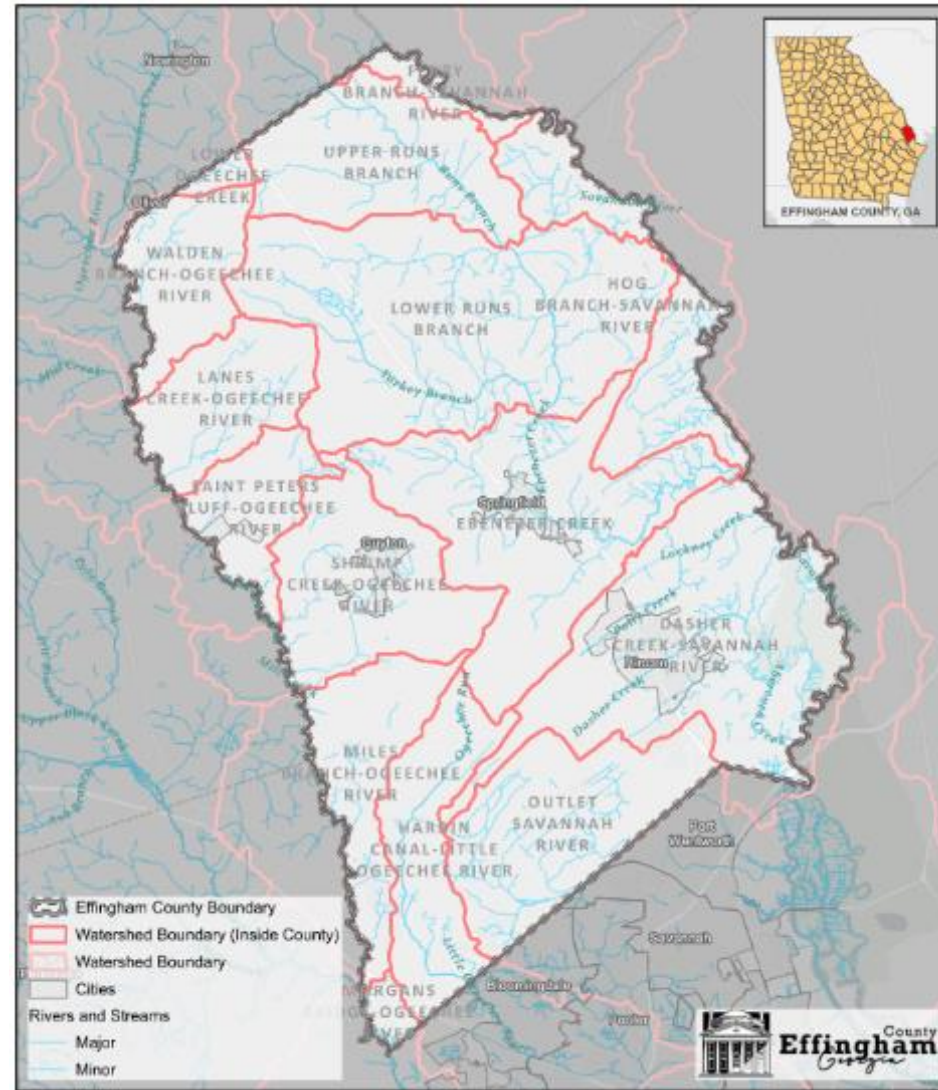
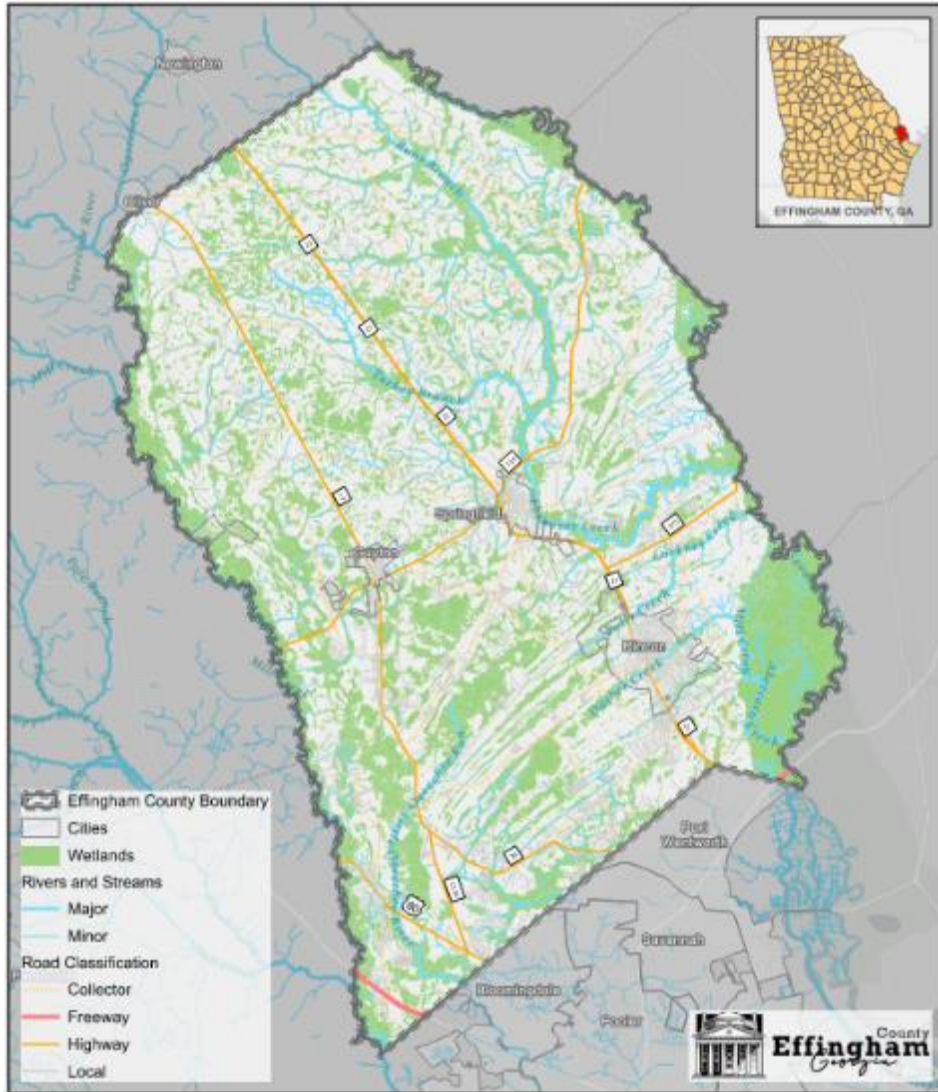


Project Understanding

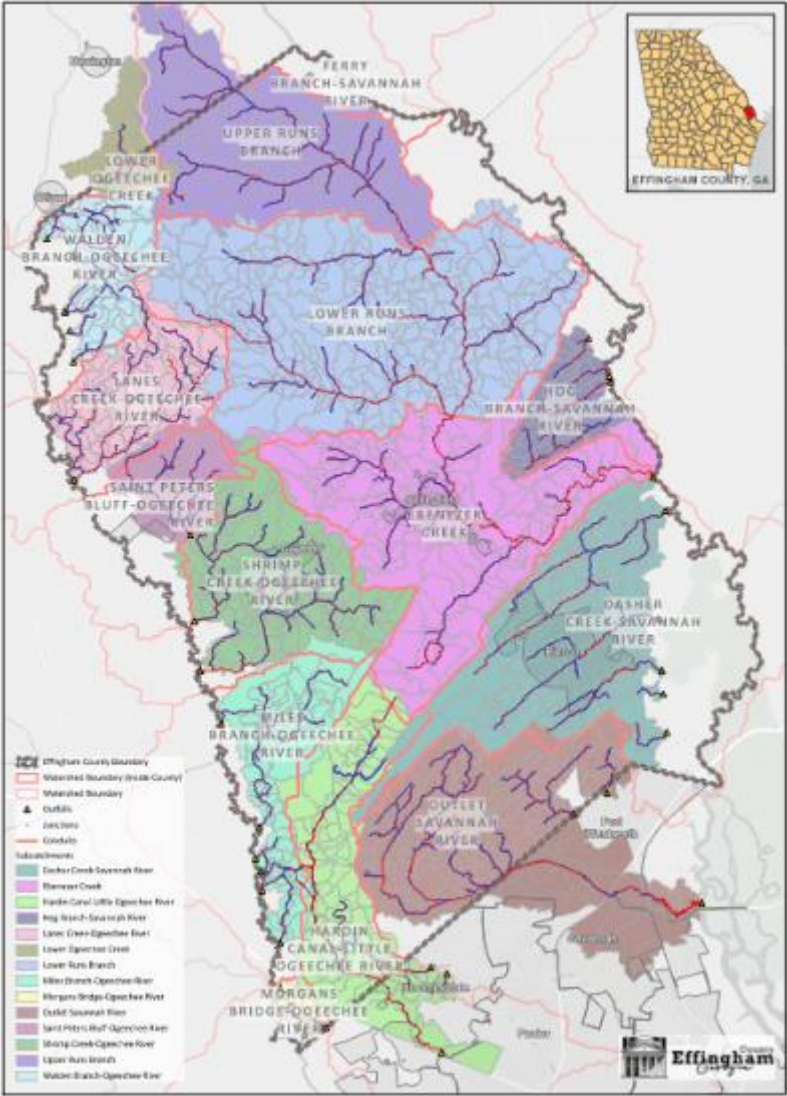
- Establish a high-level assessment of the County's infrastructure for potential flooding.
- Provide recommendations to better control impacts of stormwater.
- Establish an existing conditions H&H model that could be used as a baseline to:
 - Flooding Conditions & Future Improvements
 - Assess future development impacts.



Project Study Area



Effingham County - Watersheds



HUC-12 Watersheds

- Dasher Creek-Savannah River
- Ebenezer Creek
- Hardin Canal-Little Ogeechee River
- Hog Branch-Savannah River
- Lanes Creek-Ogeechee River
- Lower Ogeechee Creek
- Lower Runs Branch
- Miles Branch-Ogeechee River
- Morgans Bridge-Ogeechee River
- Outlet Savannah River
- Saint Peters Bluff-Ogeechee River
- Shrimp Creek-Ogeechee River
- Upper Runs Branch
- Walden Branch-Ogeechee River

Project Approach



Initial Data
Gathering



LiDAR Processing



Data Gap Analysis



Field Data Collection



Model Development



Problem Area
Identification



Rehabilitation
& Expansion
Plan



Cash Flow Analysis

Initial Data Gathering

- Project Kick-off meeting with County Personnel
- Data needs assessment & coordination
- Public Stakeholder Coordination
- Independent data collection

Data Sources



Public Stakeholder Engagement

Effingham County

Drag to comment > Flooding Concern Maintenance Concern General Comment Ideas and Suggestions

About

Welcome to the online mapping activity for the Effingham County Stormwater Master Plan!

This plan will include a county-wide inventory and assessment of primary bridge and culvert crossings maintained by the County. Additionally, basin-wide hydrologic and hydraulic modeling will be utilized to analyze the inventoried culverts to identify potential flooding concerns and provide the County with a list of stormwater capital improvement projects focused on the reduction of floodwaters and overtopping of key road and infrastructure during heavy rain events. Your assistance with locating and identifying possible flooding locations within the County will be greatly appreciated.

In this activity you can place pins on the map to indicate where you see specific needs and where you have other comments.

To place a comment, drag one of the markers from the top bar to the appropriate location. There are four markers:

- Flooding Concern** - Please identify known/possible flooding concerns where roads overtop or creeks overflow their banks during heavy rain events. This marker should focus primarily on primary and secondary roads in the County.
- Maintenance Concern** - Please identify known/possible maintenance concerns. This could be deteriorating culverts or road encroachments, stream/tracks or significant debris jams.

During heavy rain events water cannot drain quickly enough, flooding yards in this area.

[Start a discussion](#)

Like | Dislike

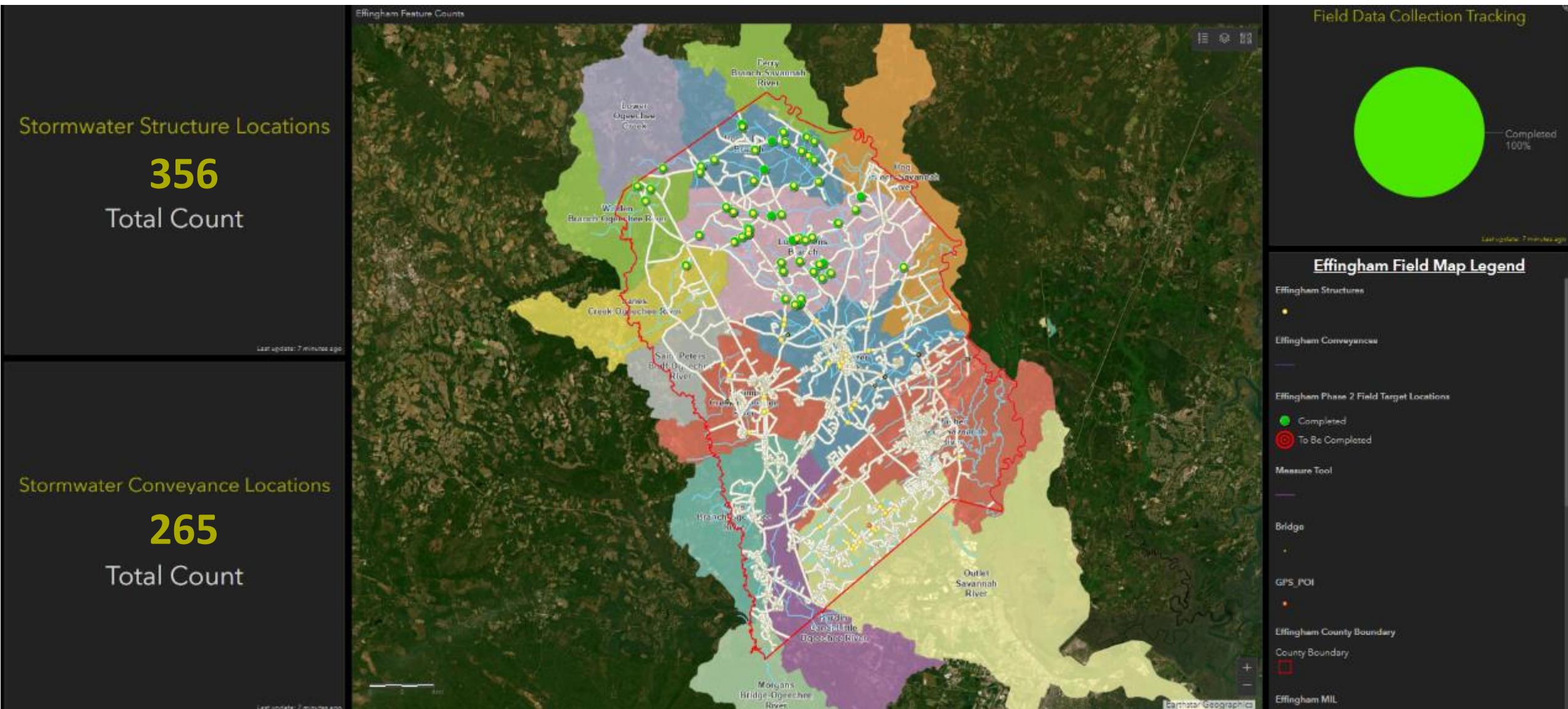
Zoom in 3 months ago

Social Pinpoint

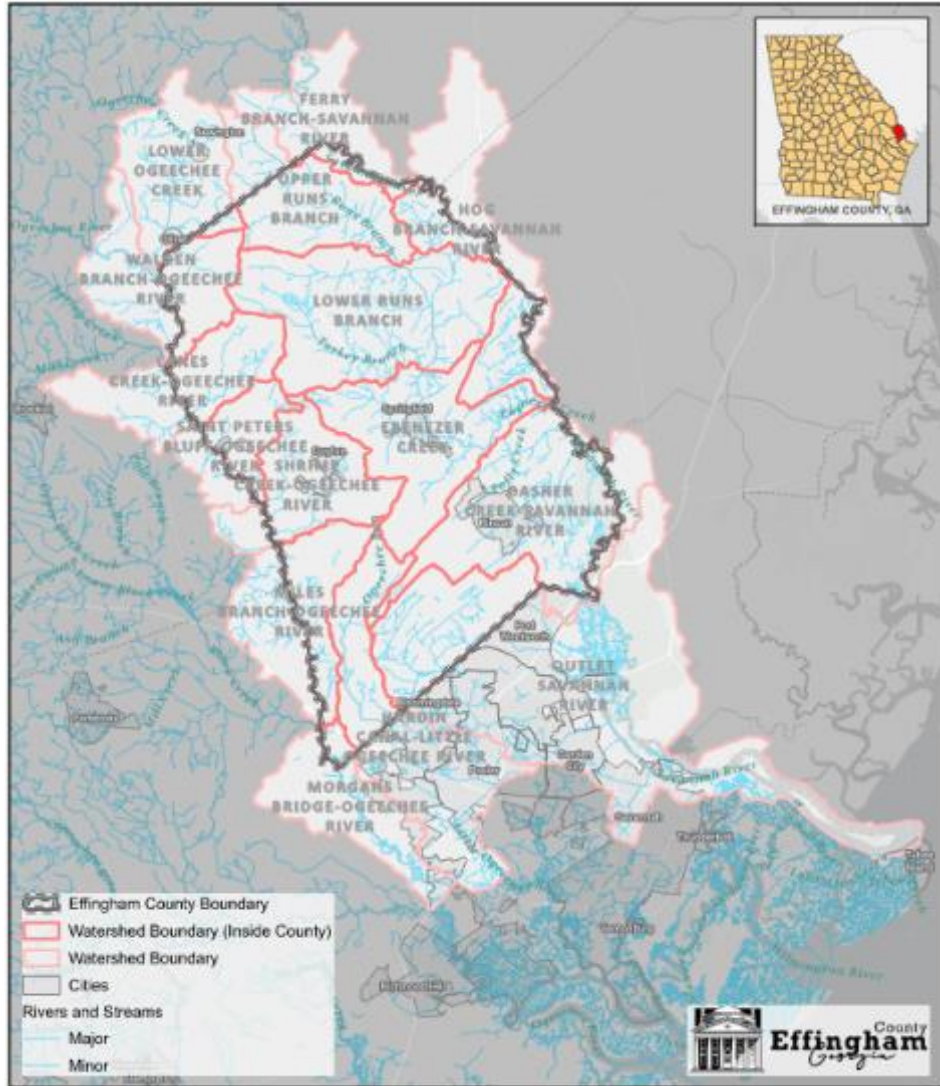
Field Data Collection



Field Data Collection – Dashboard



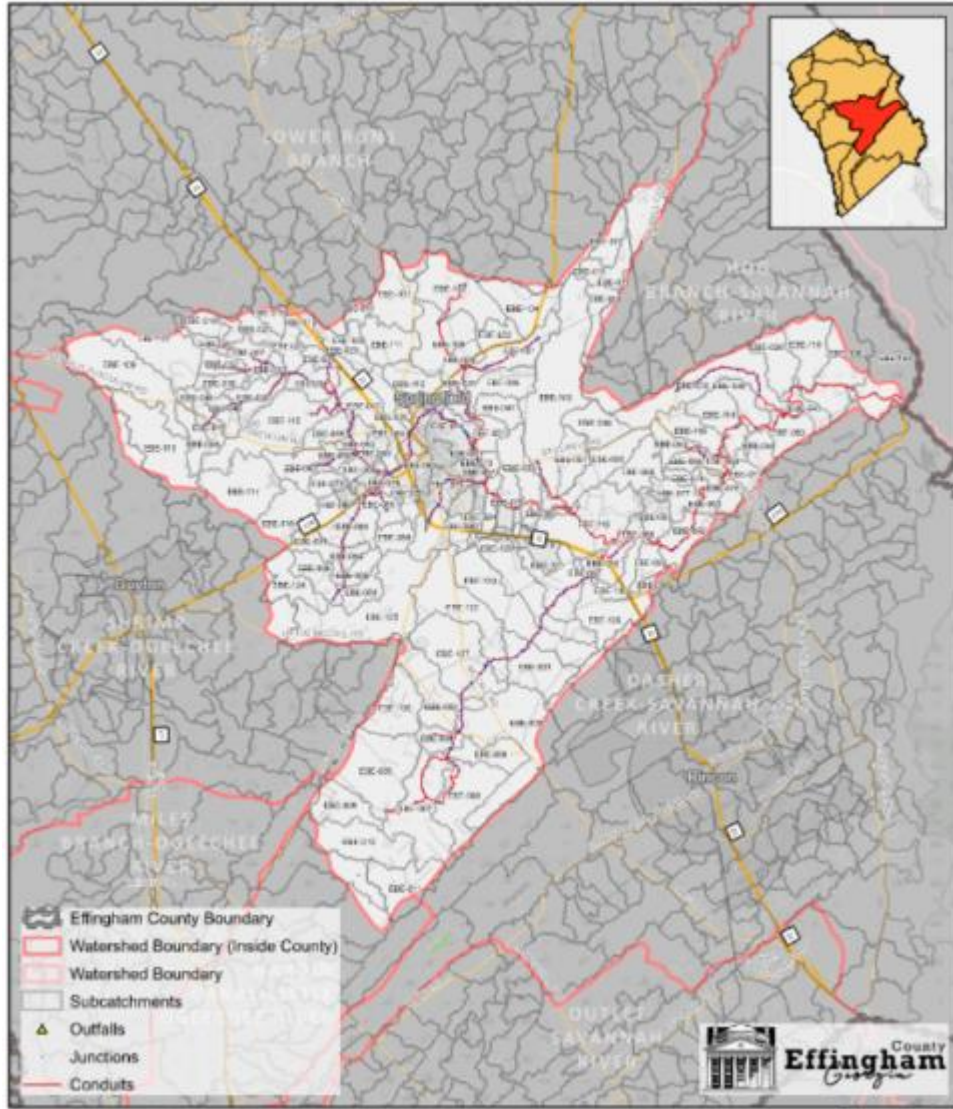
Model Development - Watershed



12-digit HUCS

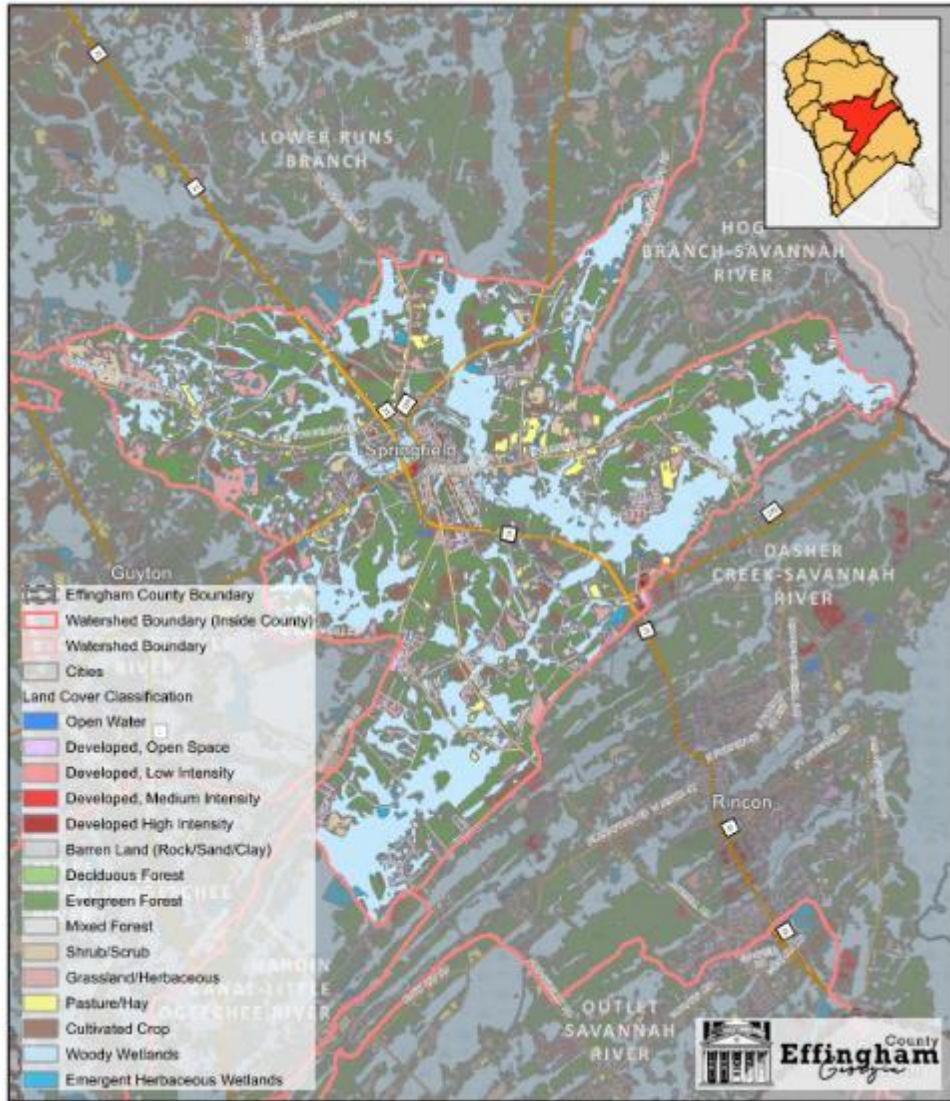
Watershed Name	Watershed Area Inside County (Acres)	% of Total Area
Dasher Creek-Savannah River	45,587	14.7%
Ebenezer Creek	39,595	12.8%
Ferry Branch-Savannah River	3,005	1.0%
Hardin Canal-Little Ogeechee River	17,347	5.6%
Hog Branch-Savannah River	18,231	5.9%
Lanes Creek-Ogeechee River	14,808	4.8%
Lower Ogeechee Creek	1,414	0.5%
Lower Runs Branch	55,917	18.1%
Miles Branch-Ogeechee River	15,935	5.2%
Morgans Bridge-Ogeechee River	1,948	0.6%
Outlet Savannah River	25,251	8.2%
Shrimp Creek-Ogeechee River	23,496	7.6%
Saint Peters Bluff-Ogeechee River	10,582	3.4%
Upper Runs Branch	22,936	7.4%
Walden Branch-Ogeechee River	13,022	4.2%

Model Development – Subcatchments



- Each HUC-12 Watershed was broken down into Subcatchments
- 1,327 County-wide ranging in size from 0.3 to 1,571 acres

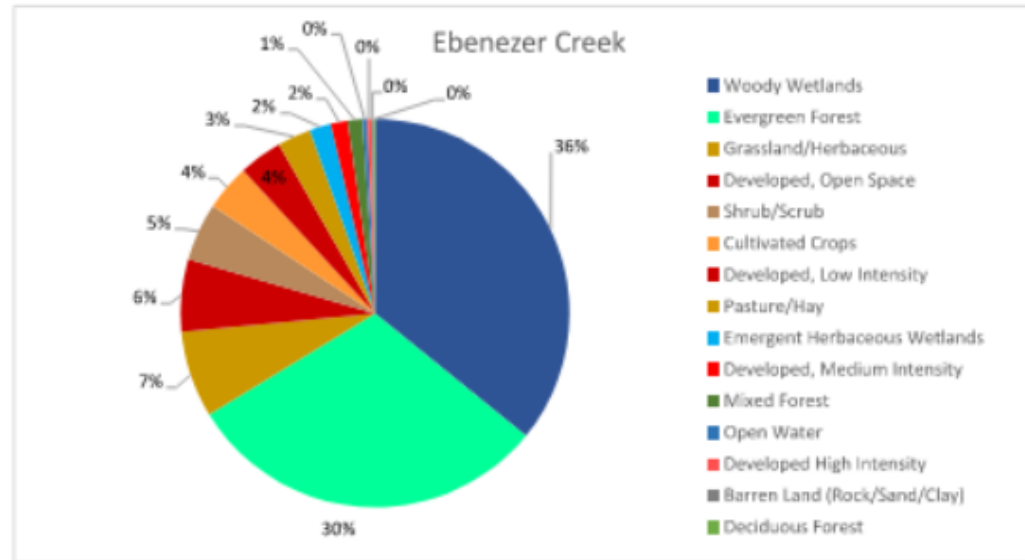
Model Development – Land-use



Watershed	Developed Area (Acres)	% of Total	Undeveloped Area (Acres)	% of Total
Dasher Creek-Savannah River	6,694	14.7%	38,854	85.3%
Ebenezer Creek	4,507	11.4%	35,088	88.6%
Ferry Branch-Savannah River	18	0.6%	2,980	99.4%
Hardin Canal-Little Ogeechee River	1,620	9.3%	15,728	90.7%
Hog Branch-Savannah River	713	3.9%	17,488	96.1%
Lanes Creek-Ogeechee River	456	3.1%	14,352	96.9%
Lower Ogeechee Creek	46	3.2%	1,368	96.8%
Lower Runs Branch	2,503	4.5%	53,414	95.5%
Miles Branch-Ogeechee River	1,839	11.5%	14,096	88.5%
Morgans Bridge-Ogeechee River	256	13.1%	1,693	86.9%
Outlet Savannah River	4,430	17.5%	20,820	82.5%
Saint Peters Bluff-Ogeechee River	321	3.0%	10,260	97.0%
Shrimp Creek-Ogeechee River	1,946	8.3%	21,550	91.7%
Upper Runs Branch	868	3.8%	22,068	96.2%
Walden Branch-Ogeechee River	327	2.5%	12,696	97.5%

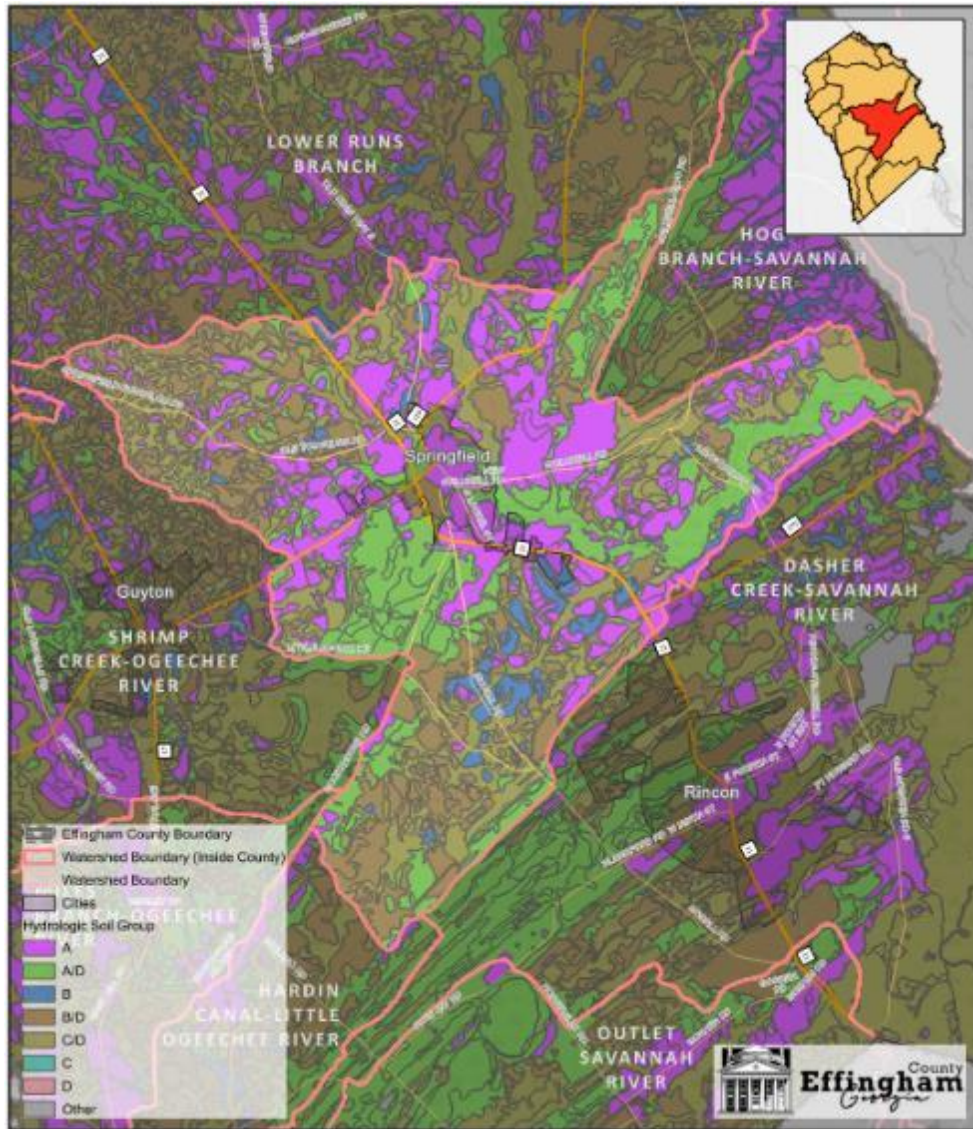
NLCD (2019) data
obtained from USGS

Model Development – Land-use



Code	Class Description	Area (Acres)	Area (%)
Ebenezer Creek			
90	Woody Wetlands	14,203.5	35.9
42	Evergreen Forest	12,028.9	30.4
71	Grassland/Herbaceous	2,859.7	7.2
21	Developed, Open Space	2,389.5	6.0
52	Shrub/Scrub	1,900.2	4.8
82	Cultivated Crops	1,516.3	3.8
22	Developed, Low Intensity	1,435.6	3.6
81	Pasture/Hay	1,103.3	2.8
95	Emergent Herbaceous Wetlands	710.0	1.8
23	Developed, Medium Intensity	557.5	1.4
43	Mixed Forest	475.6	1.2
11	Open Water	159.9	0.4
24	Developed High Intensity	124.3	0.3
31	Barren Land (Rock/Sand/Clay)	72.8	0.2
41	Deciduous Forest	58.1	0.1

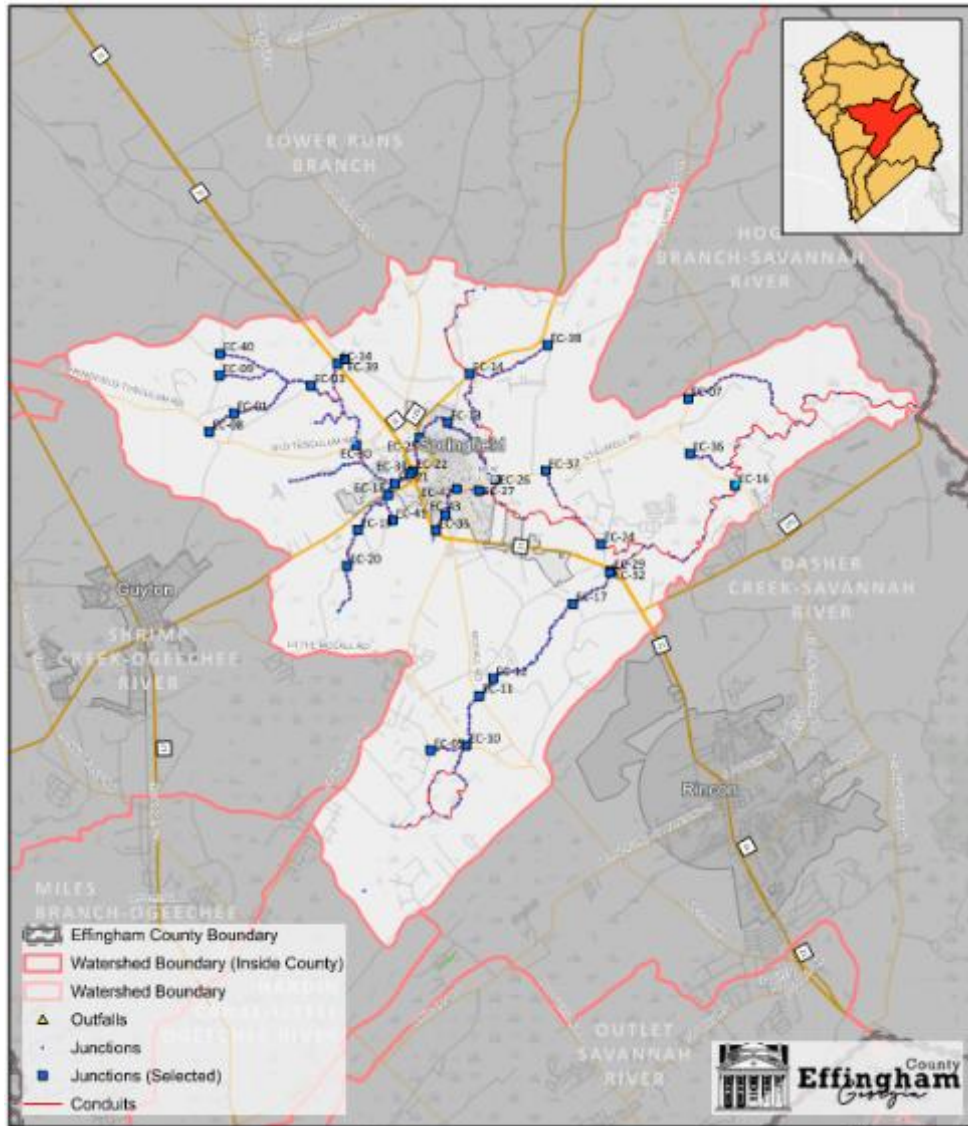
Model Development – Soils



Hydrologic Soil Group	Area (Acres)	Area (%)
A	9836.86	24.84
A/D	8895.97	22.47
B	1576.72	3.98
B/D	9084.34	22.94
C	-	-
C/D	9989.86	25.23
D	-	-
Not Rated (Udorthents/Water)	209.83	0.53

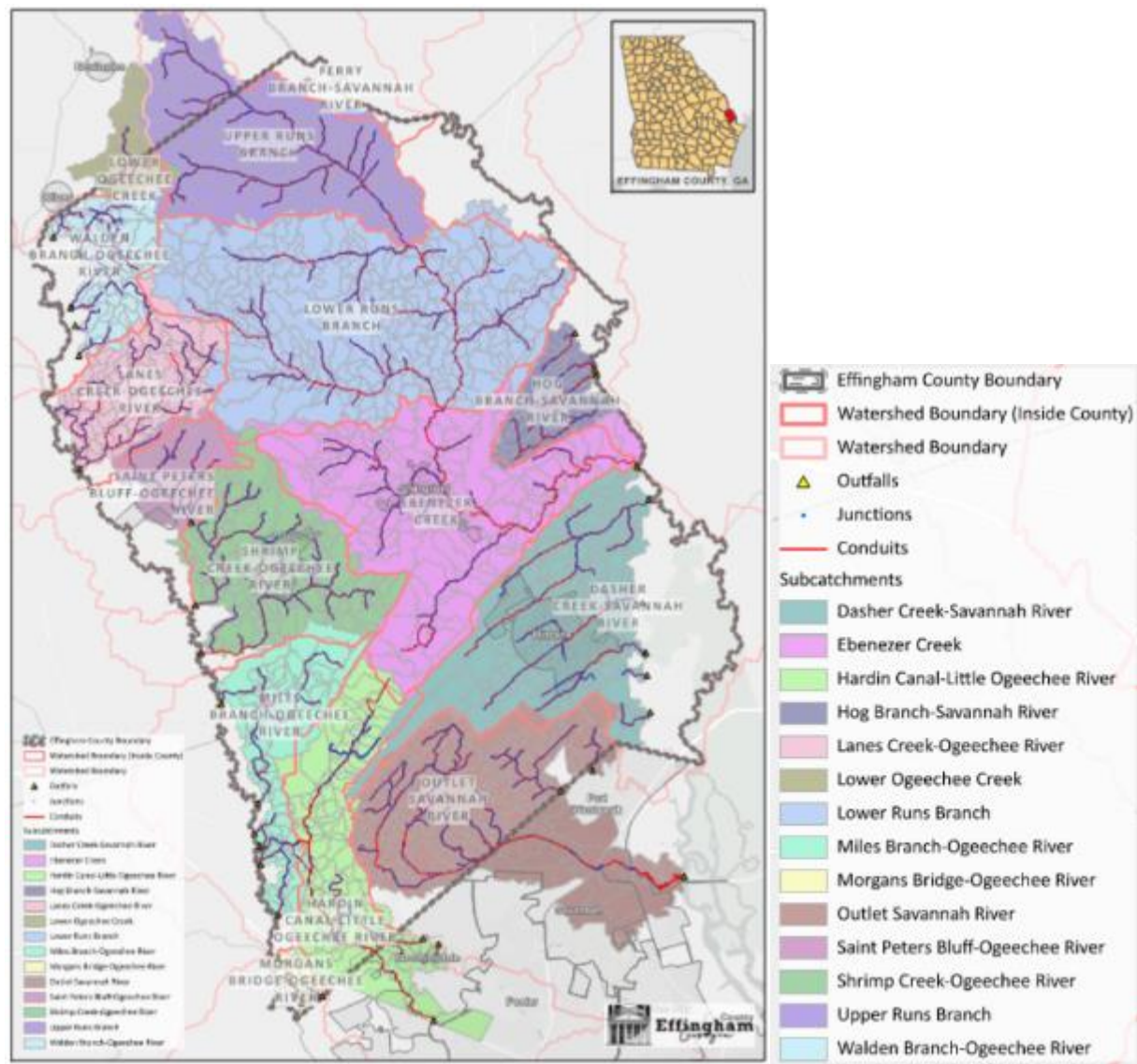
Soils data obtained from NRCS

Model Development – Components



- Nodes
 - Stage Area
 - Time Stage
 - Headwall/Endwall
- Links
 - Natural Channel
 - Pipes
 - Weirs

Model Development – Complete Model



- Developed using PCSWMM software.
- Model consist of 1,325 subcatchments, 5,082 nodes, and 5,282 links.
- 10-, 25-, 50-, & 100-year 24-hours SCS Type II storms were modeled.

Rehabilitation Plan – Conditions Assessment

Structures Summary

A total of 126 structures were identified for inspection. The structures were initially classified as follows:

- Structures not able to be inspected because they were not accessible for inspection: 32 structures (25%).
- Structures requiring no maintenance currently: 59 structures (47%).
- Structures requiring some type of maintenance: 35 structures (28%).

Conveyances Summary

A total of 264 conveyances were located and inspected. The conveyances were initially classified as follows:

- Pipes not able to be inspected because they were not accessible for inspection: 11 pipes (4%).
- Pipes requiring no maintenance currently: 111 pipes (42%).
- Pipes requiring some type of maintenance: 142 pipes (54%).

Rehabilitation Plan – Conditions Assessment

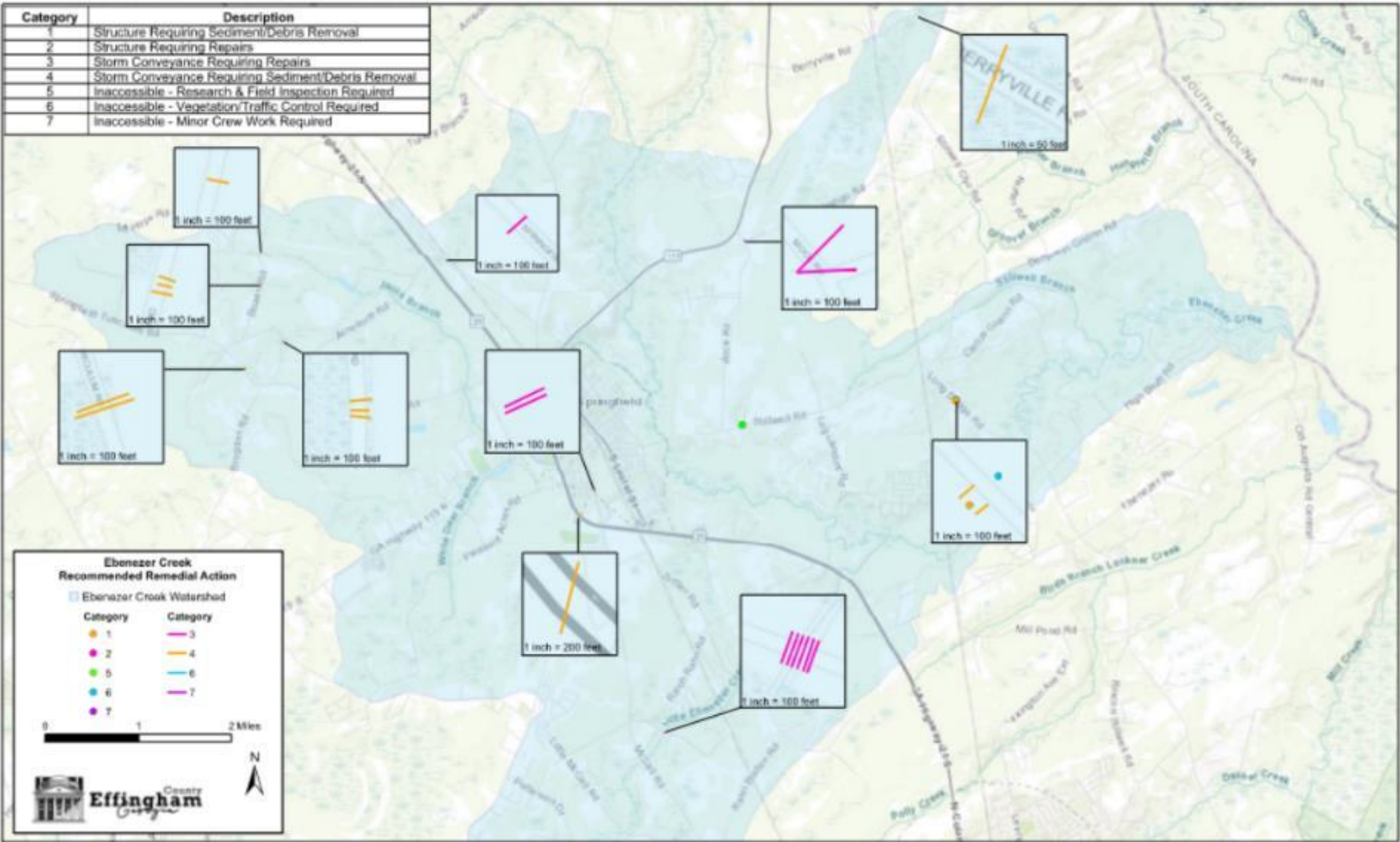
Categories of Repair and Maintenance Work

As the inventoried structure and pipe conditions were assessed, the maintenance needs were divided into the following general repair and maintenance categories:

- Inaccessible infrastructure not yet inspected.
- Stormwater structures requiring sediment and/or debris removal.
- Stormwater conveyances requiring sediment and/or debris removal.
- Stormwater structures requiring repair or replacement.
- Stormwater conveyances requiring repair or replacement.



Rehabilitation Plan – Conditions Assessment



Rehabilitation Plan – Inaccessible Structures

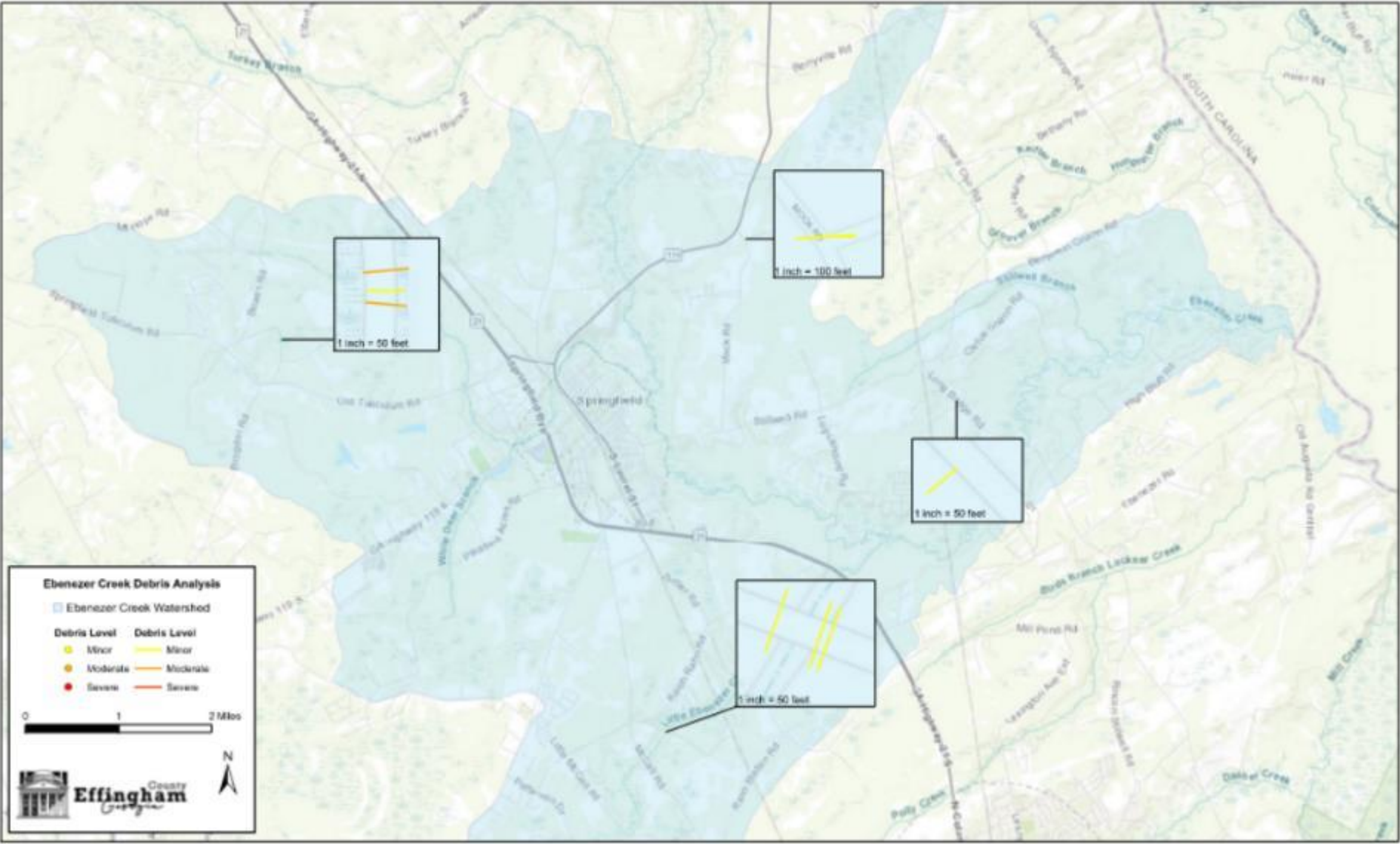
Item	Number of Occurrences	Cost Per Occurrence	Total Estimate (Rounded)
Inaccessible Research & Field Inspection Required	10	\$750	\$7,500
Inaccessible Because of Landscaping/Wildlife Control Required	16	\$1,000	\$16,000
Inaccessible Because of Traffic Control Required	1	\$1,000	\$1,000
Inaccessible Because of Stuck/Damaged of Structure Lid – Minor Construction	2	\$1,000	\$2,000
Inaccessible Because of Miscellaneous Reasons	3	\$1,000	\$3,000
TOTAL			\$29,500

*Mobilization estimates were reduced on the assumption that many pipe segments or structures would be packaged into a single project.

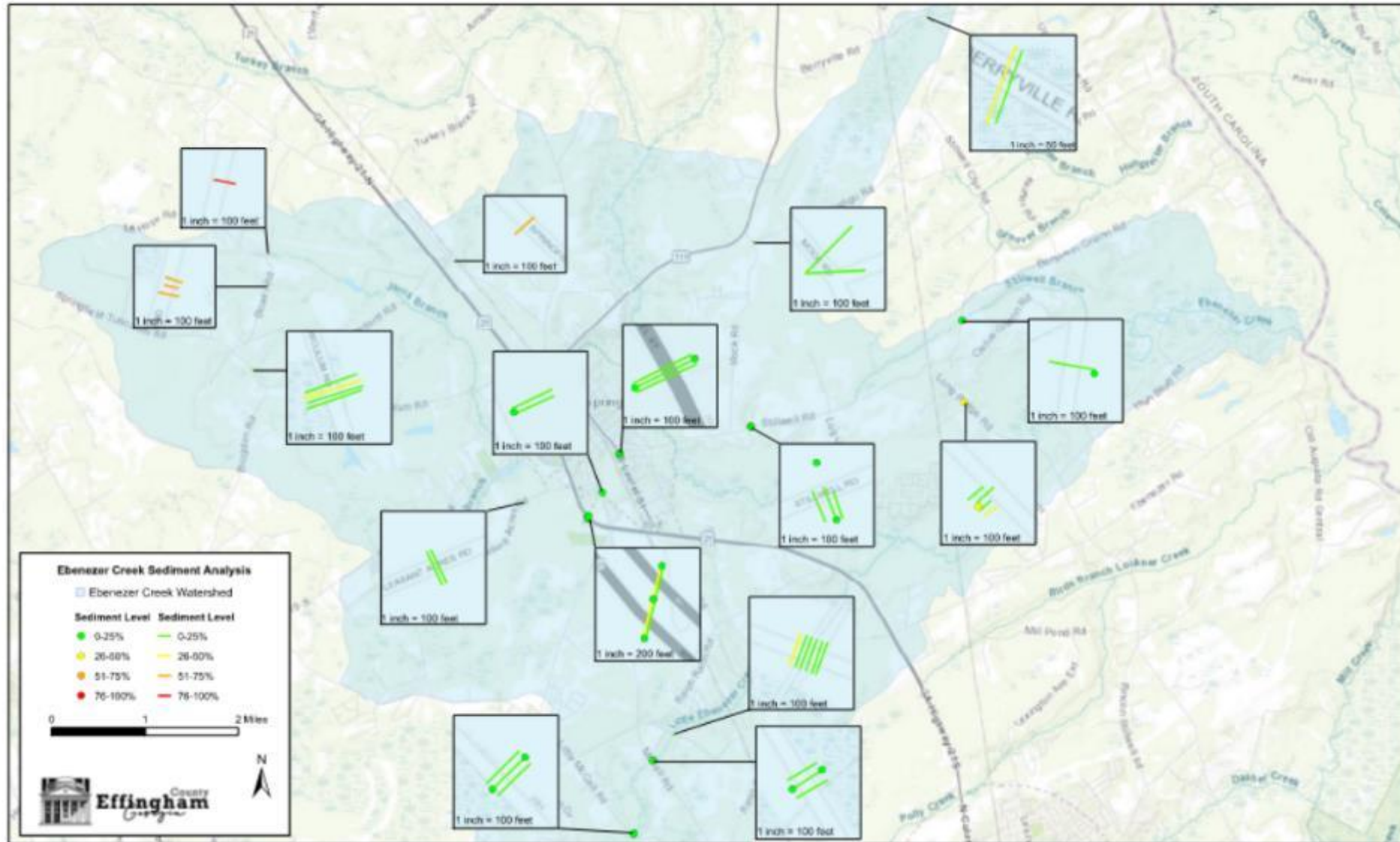
Rehabilitation Plan – Sediment/Debris Removal

Item	Number of Occurrences	Cost Per Occurrence	Total Estimate (Rounded)
Structure Sediment/Debris Removal Required	31	\$8,300	\$257,300
Conveyance Sediment/Debris Removal Required	99	\$5,000 (average)	\$495,000
TOTAL			\$752,300

Rehabilitation Plan – Sediment/Debris Removal



Rehabilitation Plan – Sediment/Debris Removal



Rehabilitation Plan – Maintenance/Repair

Item	Number of Occurrences	Cost Per Occurrence	Total Estimate (Rounded)
Structure Requiring Repair	4	\$18,000	\$72,000
Conveyance Replacement	34	\$22,000 (average)	\$748,000
Erosion Repair	9	\$4,000 (average)	\$36,000
TOTAL			\$856,000

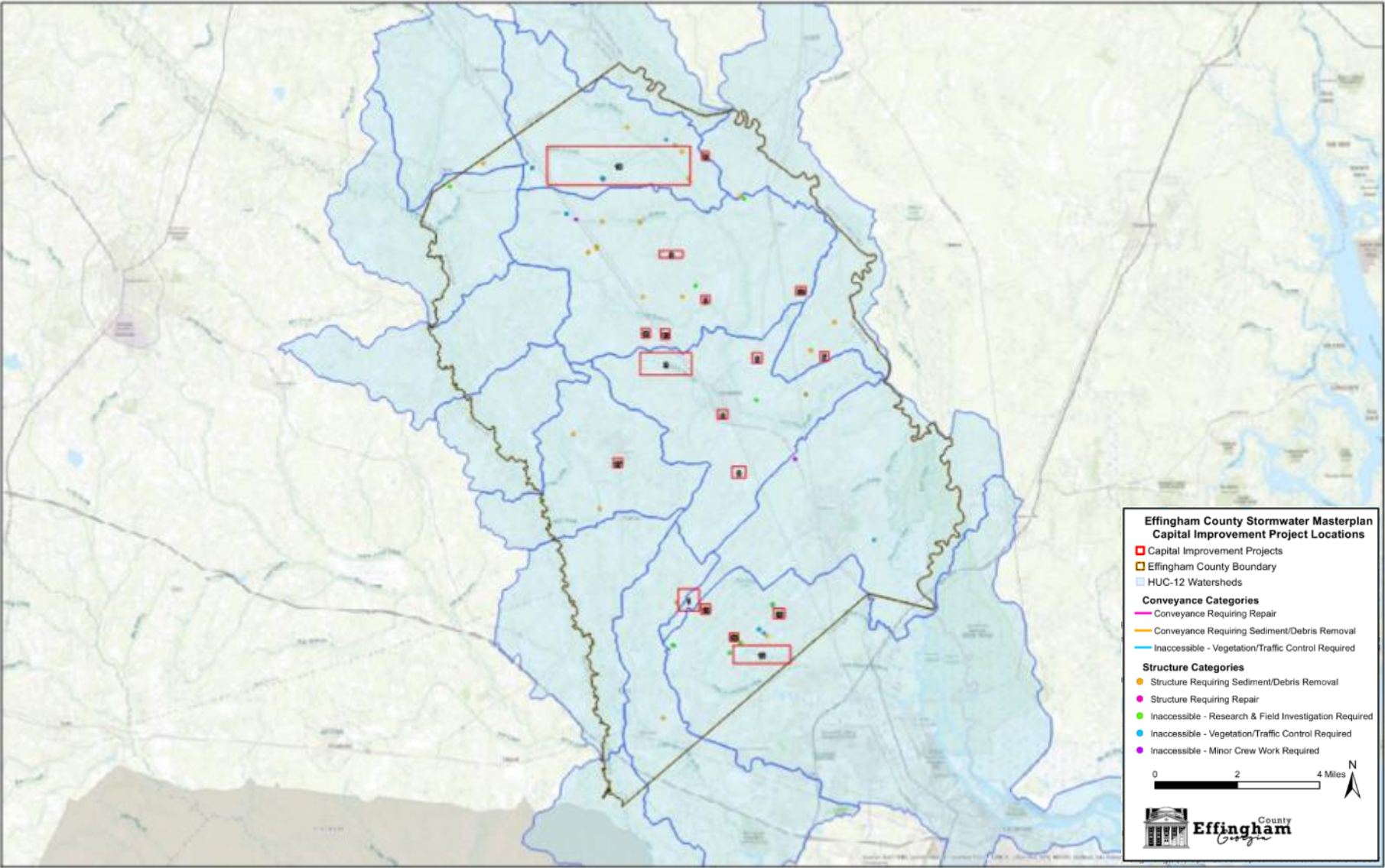
Rehabilitation Plan – Capital Improvement Plan

- Project Area 1: Dasher Creek-Savannah River
 - ❖ CIP 1 – Midland Road and Blue Jay Road*
- Project Area 2: Ebenezer Creek
 - ❖ CIP 2 – Jacks Branch*
 - ❖ CIP 3 – Race Path Road
 - ❖ CIP 4 – McCall Road
 - ❖ CIP 5 – Mock Road
- Project Area 3: Hog Branch-Savannah River
 - ❖ CIP 6 – Mount Pleasant Road
 - ❖ CIP 7 – Keiffer Road
- Project Area 4: Lower Runs Branch
 - ❖ CIP 8 – Arnsdorff Loop*
 - ❖ CIP 9 – Clyo Shawnee Road*
 - ❖ CIP 10 – Eugene Gnann Road*
 - ❖ CIP 11 – Springfield Egypt Road*
 - ❖ CIP 12 – Lower Ferry Road
- Project Area 5: Outlet Savannah River
 - ❖ CIP 13 – Midland Road*
 - ❖ CIP 14 – Black Creek*
 - ❖ CIP 15 – Hodgeville Road
 - ❖ CIP 16 – St Augustine Creek
- Project Area 6: Shrimp Creek-Ogeechee River
 - ❖ CIP 17 – Central Avenue
- Project Area 7: Upper Runs Branch
 - ❖ CIP 18 – Runs Branch*
- Sediment/Debris Removal
 - ❖ CIP 19 – North Sediment Removal
 - ❖ CIP 20 – South Sediment Removal

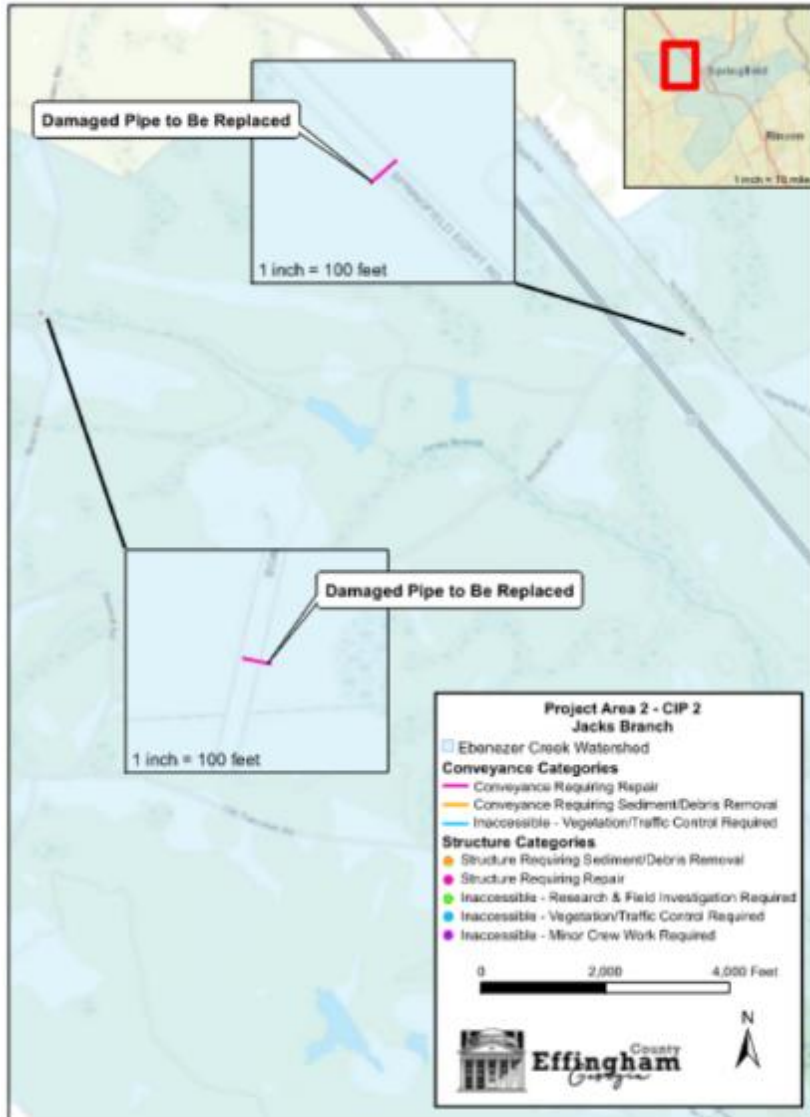
Project with * are highest priority projects requiring major construction.

Capital Improvement Projects		
CIP	Description	Project Cost
CIP 1	Midland Road/Blue Jay Road	\$ 66,885.00
CIP 2	Jacks Branch	\$ 48,232.50
CIP 3	Race Path Road	\$ 114,997.50
CIP 4	McCall Road	\$ 63,960.00
CIP 5	Mock Road	\$ 66,900.00
CIP 6	Mount Pleasant Road	\$ 30,375.00
CIP 7	Keiffer Road	\$ 30,787.50
CIP 8	Arnsdorff Loop	\$ 50,055.00
CIP 9	Clyo Shawnee Road	\$ 33,294.00
CIP 10	Eugene Gnann Road	\$ 25,860.00
CIP 11	Springfield Egypt Road	\$ 95,220.00
CIP 12	Lower Ferry Road	\$ 125,220.00
CIP 13	Midland Road	\$ 81,750.00
CIP 14	Black Creek	\$ 20,000.00
CIP 15	Hodgeville Road	\$ 32,760.00
CIP 16	St. Augustine Creek	\$ 22,575.00
CIP 17	Central Avenue	\$ 13,710.00
CIP 18	Runs Branch	\$ 247,987.50
CIP 19	North Sediment Removal	\$ 42,795.00
CIP 20	South Sediment Removal	\$ 57,210.00
TOTAL		\$ 1,270,574.00

Rehabilitation Plan – Capital Improvement Plan



Rehabilitation Plan – Capital Improvement Plan



Project Area 2 - CIP 2					
Item No.	Description	Est. Quantity	Measured Units	Unit Price	Total Amount
1	Mobilization	1	LS	\$ 6,431.00	\$ 6,431.00
2	Traffic Control	1	LS	\$ 3,000.00	\$ 3,000.00
3	Erosion and Sediment Control	1	LS	\$ 2,000.00	\$ 2,000.00
4	30" RCP	53	LF	\$ 135.00	\$ 7,155.00
5	30" Headwall	4	EA	\$ 5,000.00	\$ 20,000.00
				25% Contingency	\$ 9,646.50
				Sub-Total	\$ 48,232.50

*Note that mobilization and traffic control costs were provided for each CIP as lump sum items which are independent from the traffic control and mobilization fees estimated for each inventory asset in the previous sections of this document

Expansion Plan – Level of Service Assessment

Effingham County's 2015 Stormwater Management Local Design Manual (LDM) establishes LOS standards.

Type of Conveyance	Roadway Classification / Use	24-Hour Design Storm Frequency
Bridges	Evacuation Route	100-year
	Non-Evacuation Route	Can be designed to reduced conveyance
Culverts & Pipe Systems: <ul style="list-style-type: none"> - Inlets (Catch Basins, Yard Inlets, Drop Inlets, Hooded Grate Inlets and Flumes) - Inlets (Headwalls, Flared End Sections, etc.) - Roadside Ditches - Drainage Channels 	Arterial / Emergency Evacuation Route	50-year
	Collector Roads	25-year
	Neighborhood Roads	10-year
	Roads With No Other Outlets	50-year
	Parking Lots / Material Storage Areas / Landscape Areas	10-year

Type of Conveyance	Roadway Classification / Use	Flooding Depth LOS
Inlets (Catch Basins, Yard Inlets, Drop Inlets, Hooded Grate Inlets and Flumes)	Arterial / Emergency Evacuation Route	One Lane Width Open
	Collector Roads	One Lane Width Open
	Neighborhood Roads	8.0 ft Lane Width Open
	Roads With No Other Outlets	One Lane Width Open
	Parking Lots /	Maximum 0.5 ft Depth
	Detention Areas Utilized For Other Purposes With Flood Warning Sign	Maximum 1.5 ft Depth
	Material Storage Areas / Landscape Areas	Maximum 2.0 ft Depth

Expansion Plan – Level of Service Assessment



County-wide Roads LOS Assessment Results

Total number of roads with a 50-year LOS	50
50-year LOS not met	10
Total number of roads with a 25-year LOS	73
25-year LOS not met	27
Total number of roads with a 10-year LOS	122
10-year LOS not met	47

Cash Flow Analysis

Rehabilitation Plan (10-year Period)

10-Year Cash Flow for Rehabilitation and Maintenance Plan											
Inflation	4.00%										
10- Year Plan plus 4% yearly Inflation		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Yearly Cost Adjustment		1.0400	1.0816	1.1249	1.1699	1.2167	1.2653	1.3159	1.3686	1.4233	1.4802
Complete Inspection of inaccessible Structures		\$33,280	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
High Priority Structures Repair and Replacement		\$114,400	\$118,976	\$123,735	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Low Priority		\$62,920	\$65,437	\$68,054	\$70,776	\$73,608	\$76,552	\$79,614	\$82,798	\$86,110	\$89,555
Maintenance -Debris and Sedimentation Removal, Erosion Repair		\$115,679	\$81,369	\$84,624	\$88,008	\$91,529	\$95,190	\$98,998	\$102,957	\$107,076	\$111,359
Yearly Inspection and Basic Maintenance Budget		\$41,600	\$43,264	\$44,995	\$46,794	\$48,666	\$50,613	\$52,637	\$54,743	\$56,932	\$59,210
Total Cost		\$368,000	\$309,000	\$321,000	\$206,000	\$214,000	\$222,000	\$231,000	\$240,000	\$250,000	\$260,000

Expansion Plan (20-year Period)

20-Year Cash Flow Expansion Plan (2024-2033)											
Inflation	4.00%										
20- Year Plan plus 4% yearly Inflation		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Yearly Cost Adjustment		1.04	1.08	1.12	1.17	1.22	1.27	1.32	1.37	1.42	1.48
Annual Cost Per Expansion Plan***		\$624,000	\$648,960	\$674,918	\$701,915	\$729,992	\$759,191	\$789,559	\$821,141	\$853,987	\$888,147
Total Cost		\$624,000	\$649,000	\$675,000	\$702,000	\$730,000	\$759,000	\$790,000	\$821,000	\$854,000	\$888,000

20-Year Cash Flow Expansion Plan (2034-2043)											
Inflation	4.00%										
20- Year Plan plus 4% yearly Inflation		2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Yearly Cost Adjustment		1.54	1.60	1.67	1.73	1.80	1.87	1.95	2.03	2.11	2.19
Annual Cost Per Expansion Plan***		\$923,672	\$960,619	\$999,044	\$1,039,006	\$1,080,566	\$1,123,789	\$1,168,740	\$1,215,490	\$1,264,110	\$1,314,674
Total Cost		\$924,000	\$961,000	\$999,000	\$1,039,000	\$1,081,000	\$1,124,000	\$1,169,000	\$1,215,000	\$1,264,000	\$1,315,000

Future Recommendations

- Additional analysis is recommended for the 27 collector roads not meeting the LOS.
- Additional Model Refinement Could Include:
 - Survey Information
 - Calibration Data
 - Flow or water level monitoring
- Complete Future Land-use Analysis so that model can be updated.

Questions

