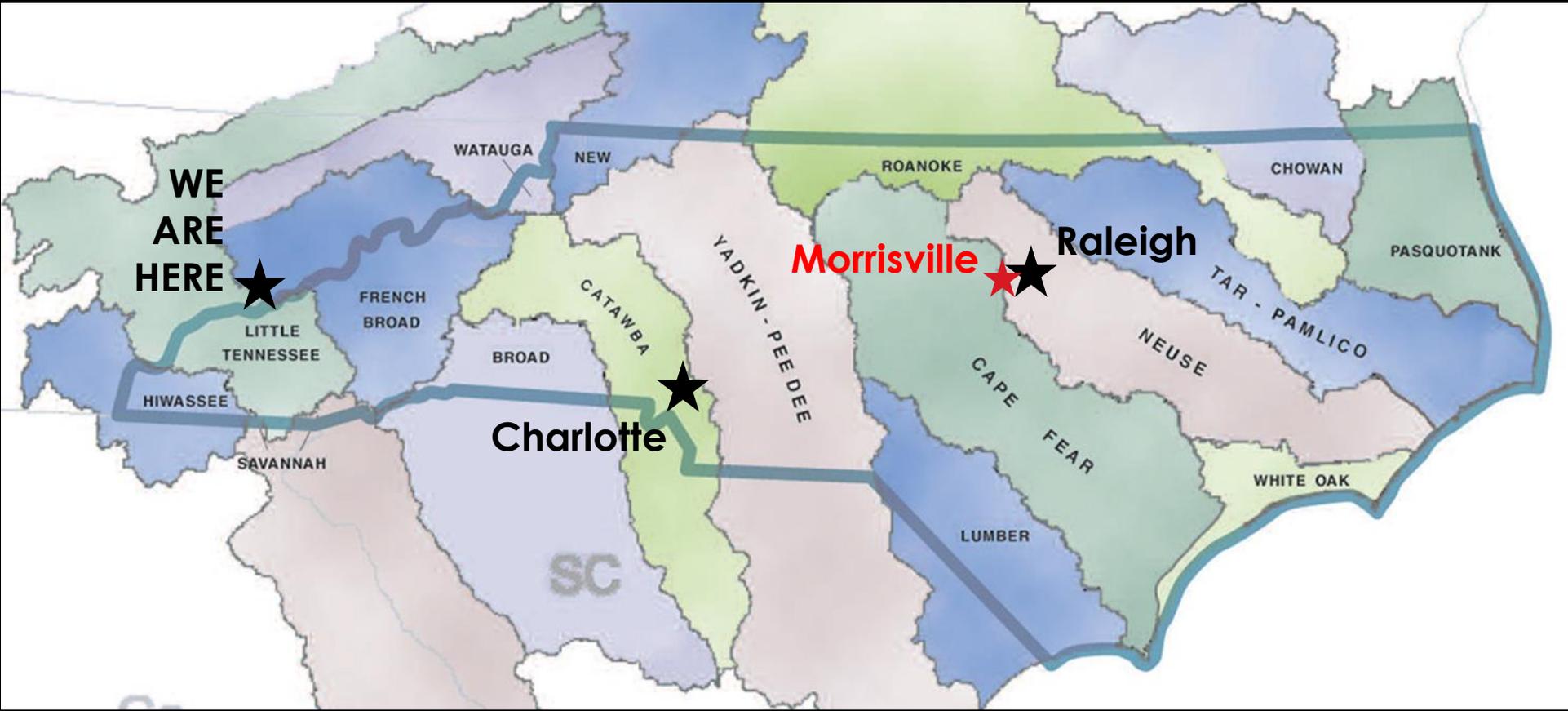




Urban Stream Search and Rescue: Watershed Assessment in Morrisville, NC

April 21, 2016

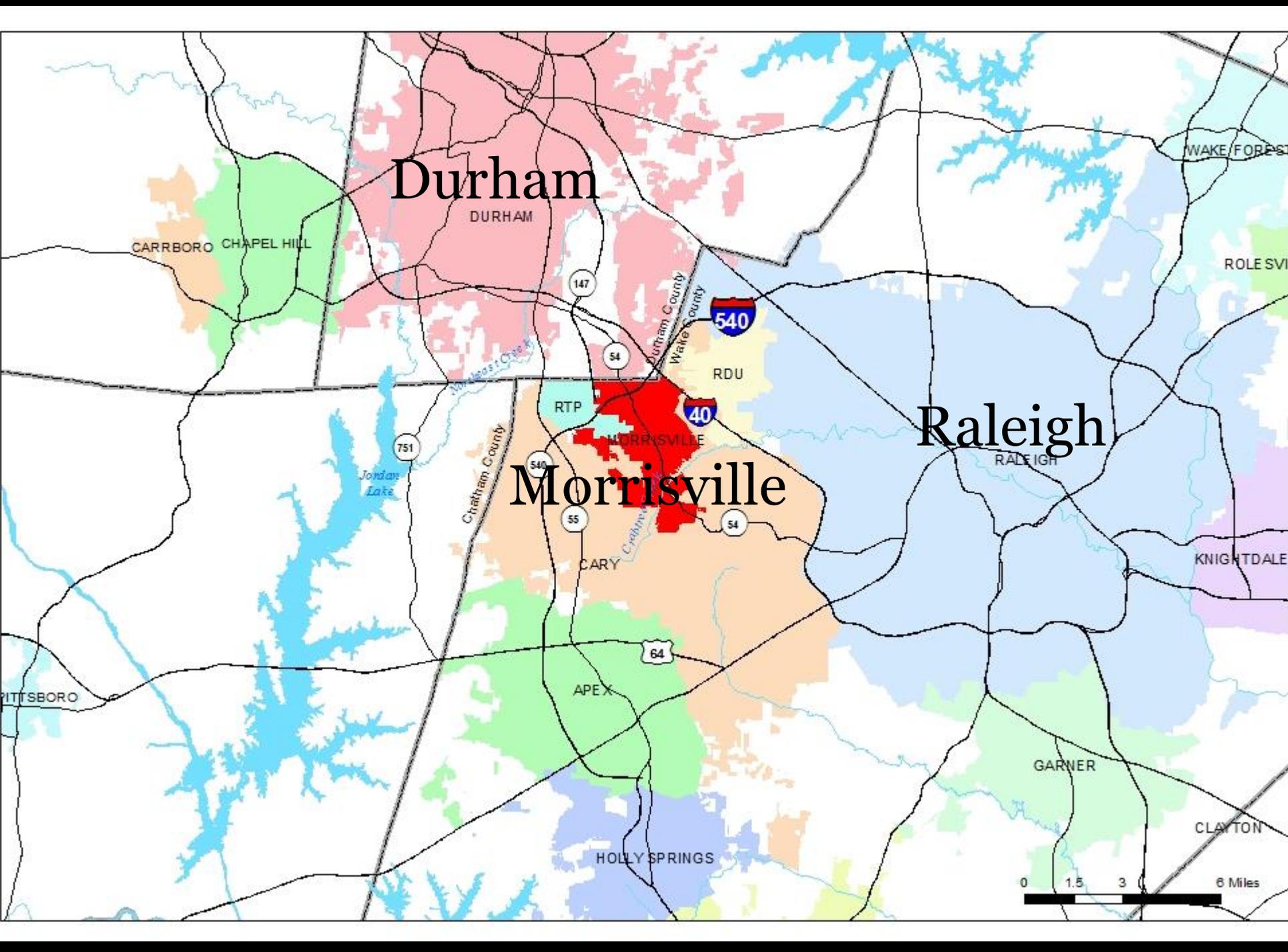




JORDAN LAKE

- Water Supply
- Recreation
- Critical Habitat





Durham

DURHAM

CARRBORO CHAPEL HILL

147

54

Durham County
Wake County

540

RDU

RTP

40

MORRISVILLE

Morrisville

751

Chatham County

540

55

CARY

54

Raleigh

RALEIGH

KNIGHTDALE

PITTSBORO

APEX

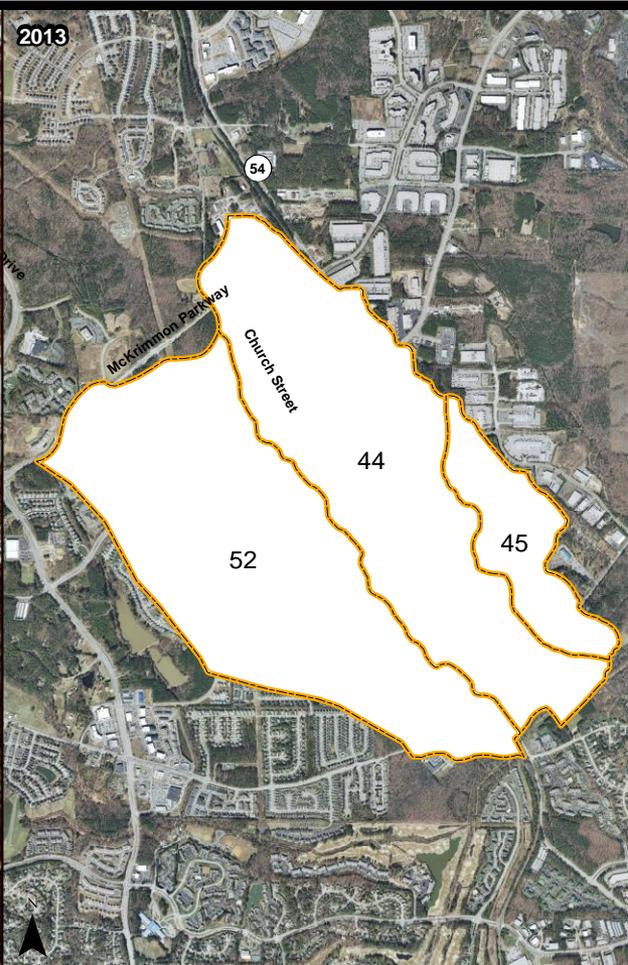
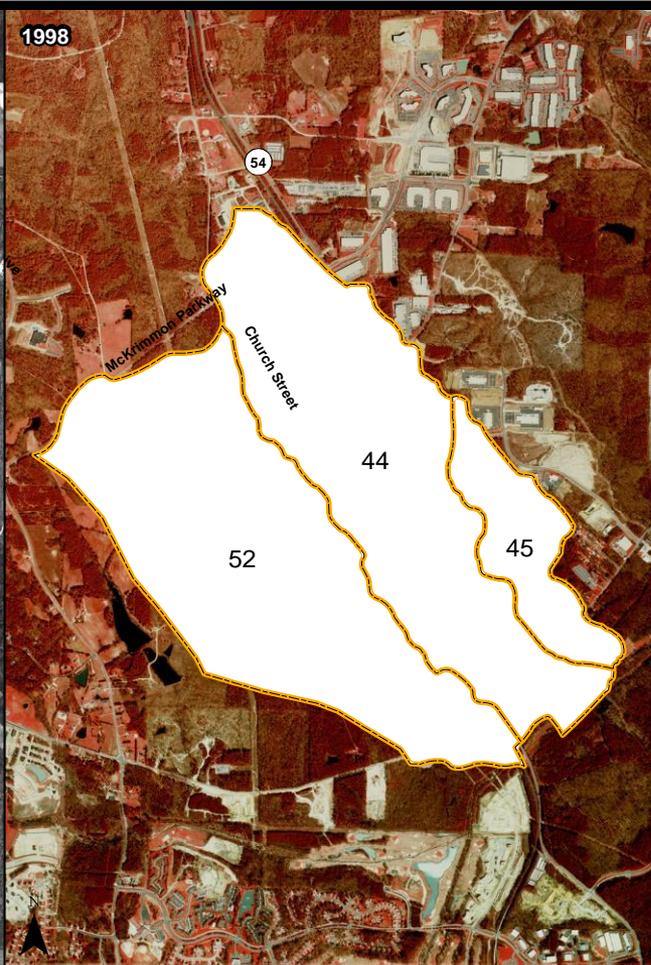
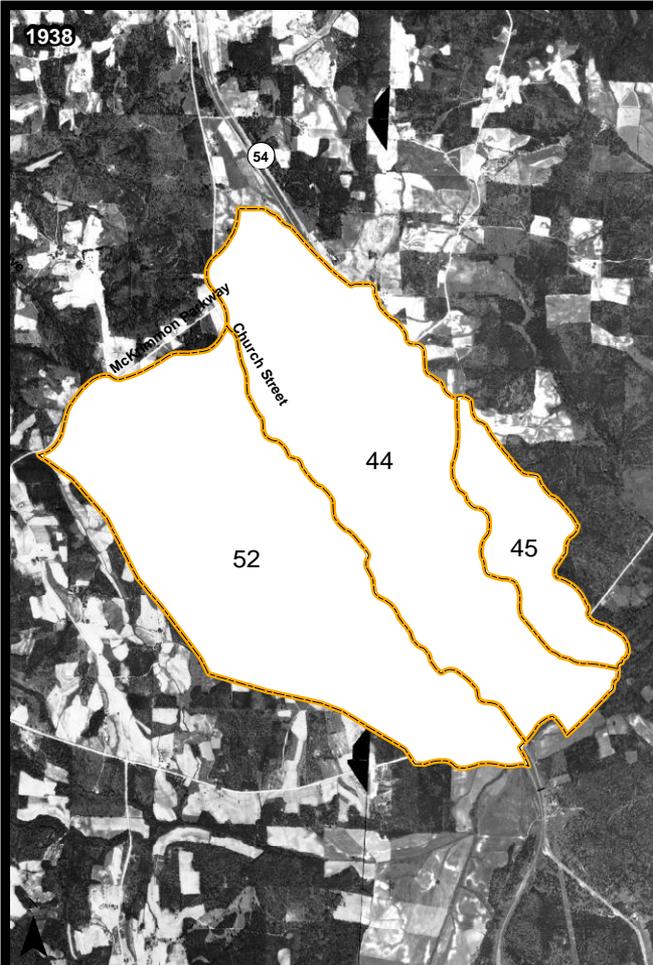
64

HOLLY SPRINGS

GARNER

CLAYTON

0 1.5 3 6 Miles

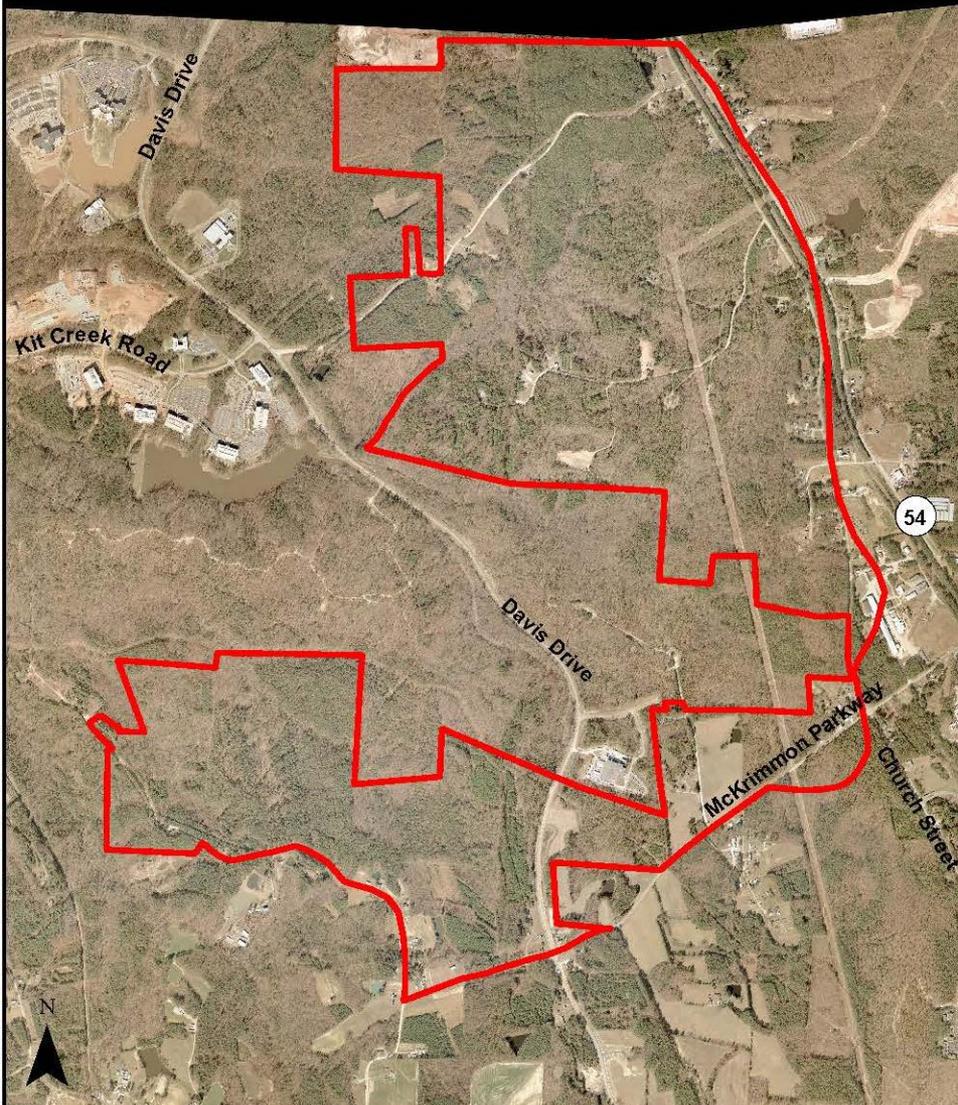


 Subbasins Neuse Phase 2 and Subbasin Boundary
 Aerial photography:
 1938 USDA Historical Aerial Photos
 1998 USGS Color Infrared DOQQ
 2013 NCCGIA Orthophotography

0.5 0.25 0 0.5 1 Miles




1999



2012



Kit Creek Watershed Assessment

Morrisville, North Carolina

Figure 3. Land Use Comparison Map



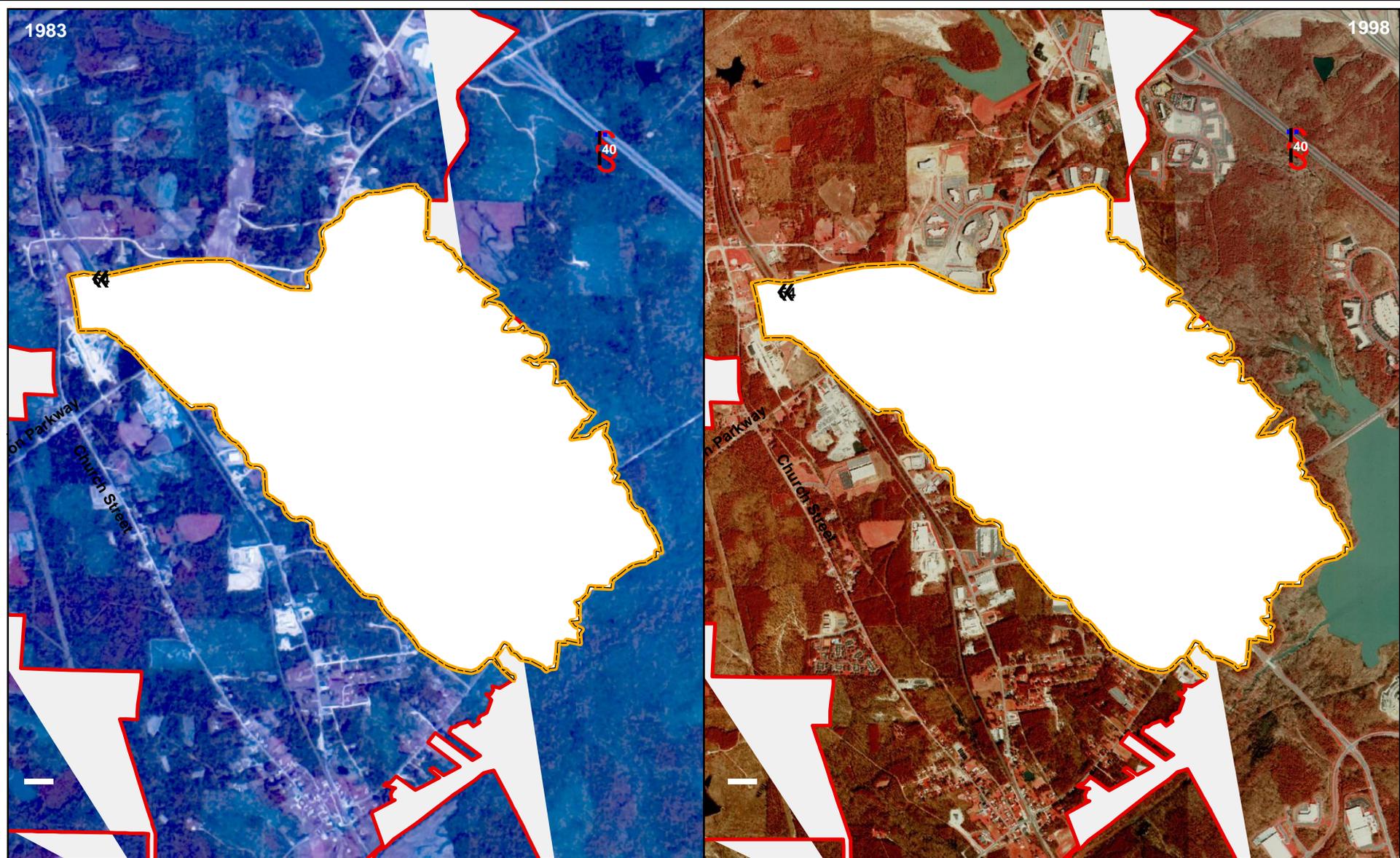
 Kit Creek Study Area

Aerial photography:
1999 Wake County
2012 National Agriculture Imagery
Program (NAIP)

0 1,000 2,000 4,000
 Feet

1983

1998



Neuse Phase 1 Watershed Assessment
Morrisville, North Carolina

Figure 3. Land Use Comparison Map



-  Project study area
-  Morrisville Town Limits
- Aerial photography:
1983 NHAP
1998 USGS DOQQ

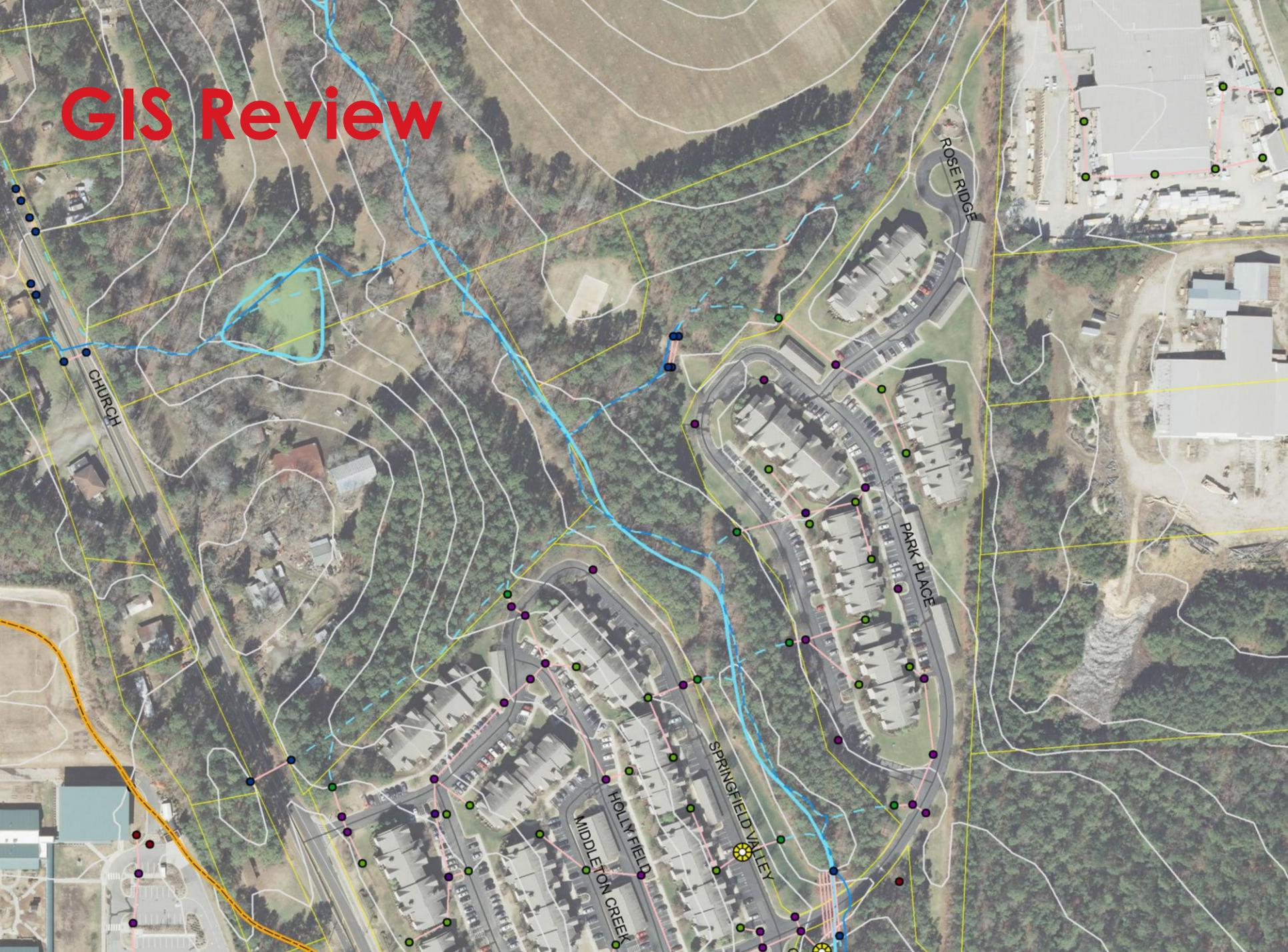
Agenda

- 1** What we set out to do
- 2** What we found
- 3** Our proposed solutions
- 4** What's next

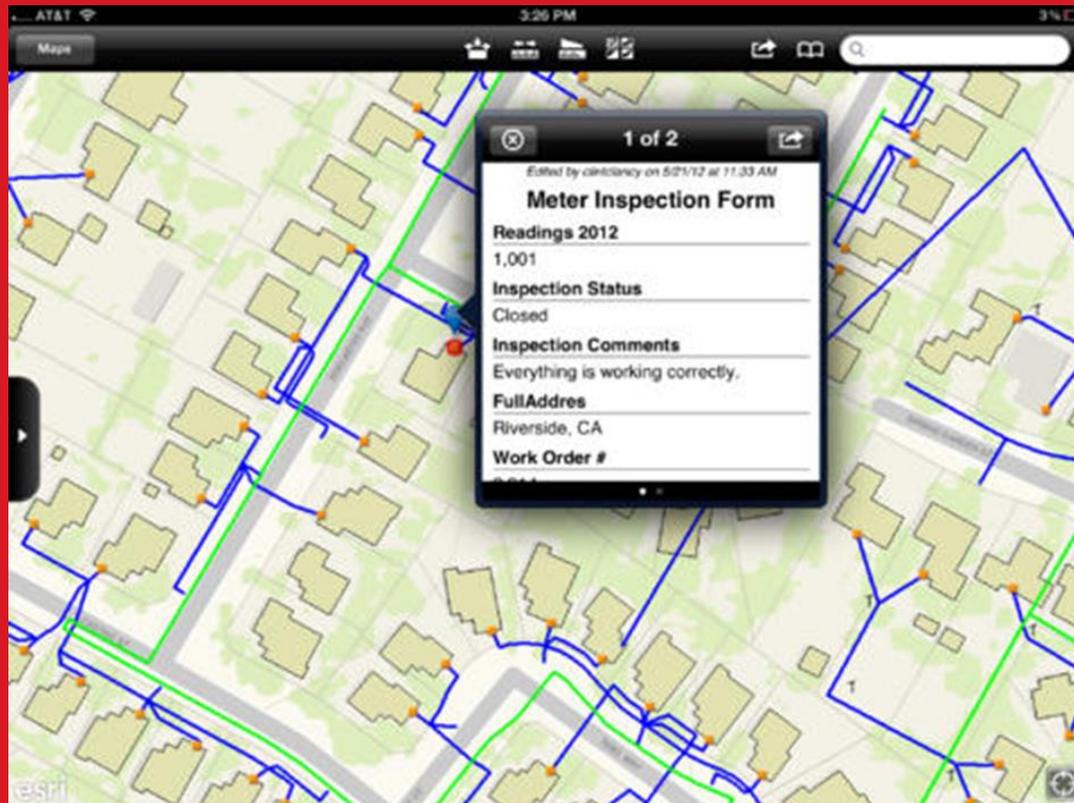
1 What we set out to do:

- GIS Review
- Field Investigation
- Report of Findings
- GIS data

GIS Review



Field Investigation



Streams



Outfalls



Stream Origin

NC DWQ Stream Identification Form Version 4.11

| | | |
|--|--|--------------------------------------|
| Date: <u>Oct. 1, 2013</u> | Project/Site: <u>Da</u> | Latitude: |
| Evaluator: <u>KLW</u> | County: <u>Wake</u> | Longitude: |
| Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ <u>22.5</u> | Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial | Other e.g. Quad Name: <u>Cary</u> |

A. Geomorphology (Subtotal = 8)

| | Absent | Weak | Moderate | Strong |
|---|---------------|----------|----------------|----------|
| 1 ^a Continuity of channel bed and bank | 0 | <u>1</u> | 2 | 3 |
| 2. Sinuosity of channel along thalweg | 0 | <u>1</u> | 2 | 3 |
| 3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence | 0 | <u>1</u> | 2 | 3 |
| 4. Particle size of stream substrate | 0 | 1 | 2 | <u>3</u> |
| 5. Active/relict floodplain | 0 | <u>1</u> | 2 | 3 |
| 6. Depositional bars or benches | <u>0</u> | 1 | 2 | 3 |
| 7. Recent alluvial deposits | <u>0</u> | 1 | 2 | 3 |
| 8. Headcuts | <u>0</u> | 1 | 2 | 3 |
| 9. Grade control | <u>0</u> | 0.5 | 1 | 1.5 |
| 10. Natural valley | 0 | 0.5 | <u>1</u> | 1.5 |
| 11. Second or greater order channel | <u>No = 0</u> | | <u>Yes = 3</u> | |

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

| | | | | |
|--|---------------|----------|----------------|----------|
| 12. Presence of Baseflow | 0 | 1 | 2 | <u>3</u> |
| 13. Iron oxidizing bacteria | <u>0</u> | 1 | 2 | 3 |
| 14. Leaf litter | 1.5 | <u>1</u> | 0.5 | 0 |
| 15. Sediment on plants or debris | 0 | 0.5 | <u>1</u> | 1.5 |
| 16. Organic debris lines or piles | 0 | 0.5 | <u>1</u> | 1.5 |
| 17. Soil-based evidence of high water table? | <u>No = 0</u> | | <u>Yes = 3</u> | |

C. Biology (Subtotal = 5.5)

| | | | | |
|---|---|-----|----------|-----|
| 18. Fibrous roots in streambed | 3 | 2 | <u>1</u> | 0 |
| 19. Rooted upland plants in streambed | <u>3</u> | 2 | 1 | 0 |
| 20. Macroinvertebrates (note diversity and abundance) | <u>0</u> | 1 | 2 | 3 |
| 21. Aquatic Mollusks | <u>0</u> | 1 | 2 | 3 |
| 22. Fish | <u>0</u> | 0.5 | 1 | 1.5 |
| 23. Crayfish | <u>0</u> | 0.5 | 1 | 1.5 |
| 24. Amphibians | <u>0</u> | 0.5 | 1 | 1.5 |
| 25. Algae | <u>0</u> | 0.5 | 1 | 1.5 |
| 26. Wetland plants in streambed | FACW = 0.75; <u>OBL = 1.5</u> Other = 0 | | | |

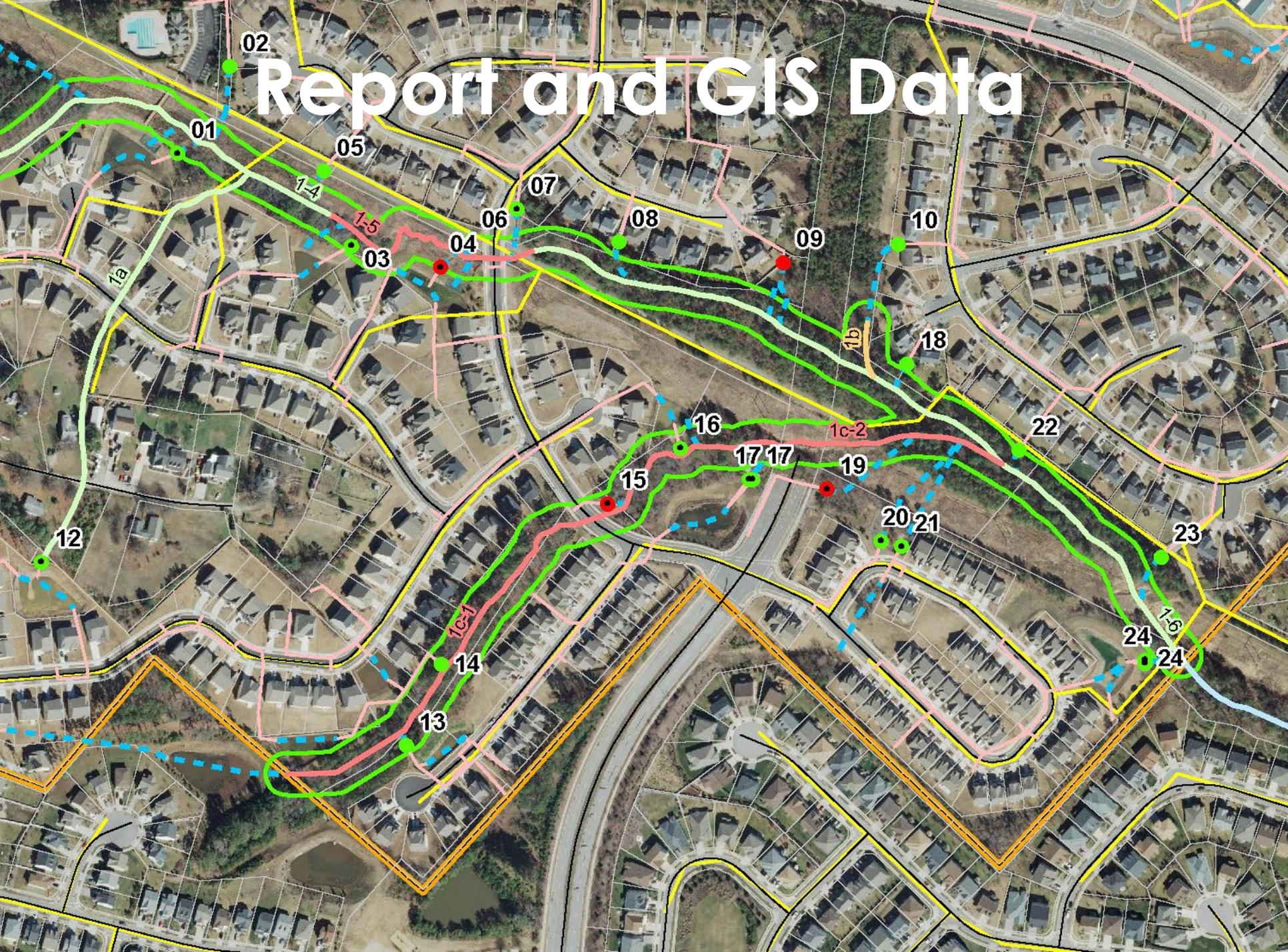
*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Stormwater Retrofits



Report and GIS Data



2 What we found:

- Streams
- Outfalls
- Buffers

Streams



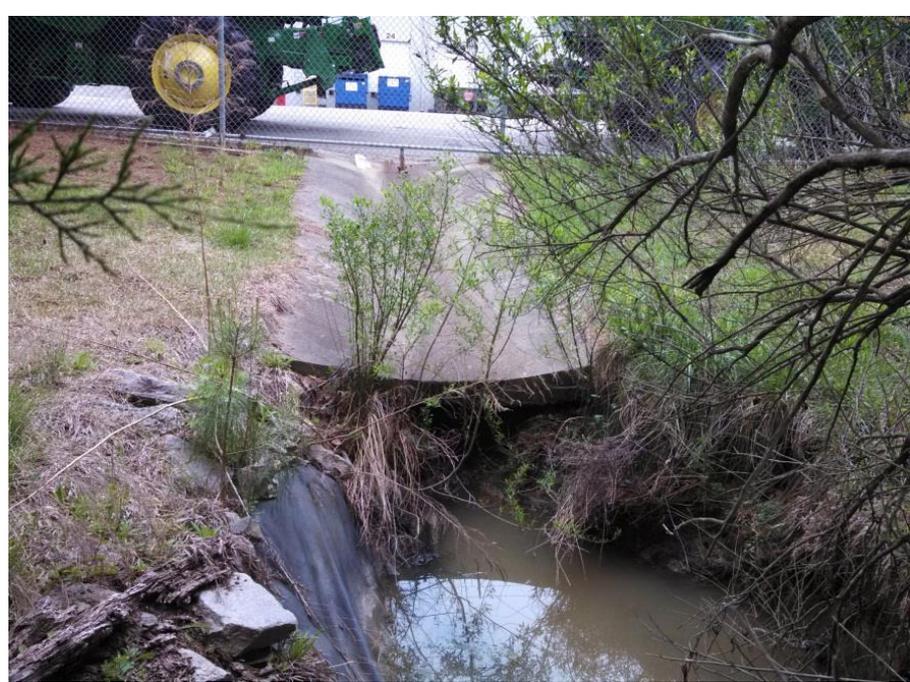
Streams

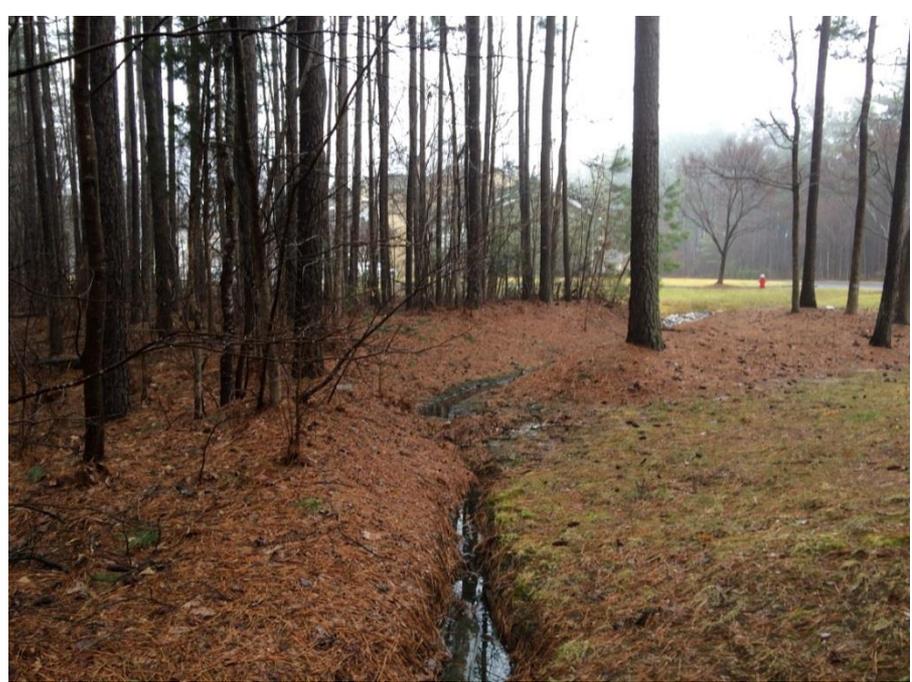






Outfalls





Riparian Zone



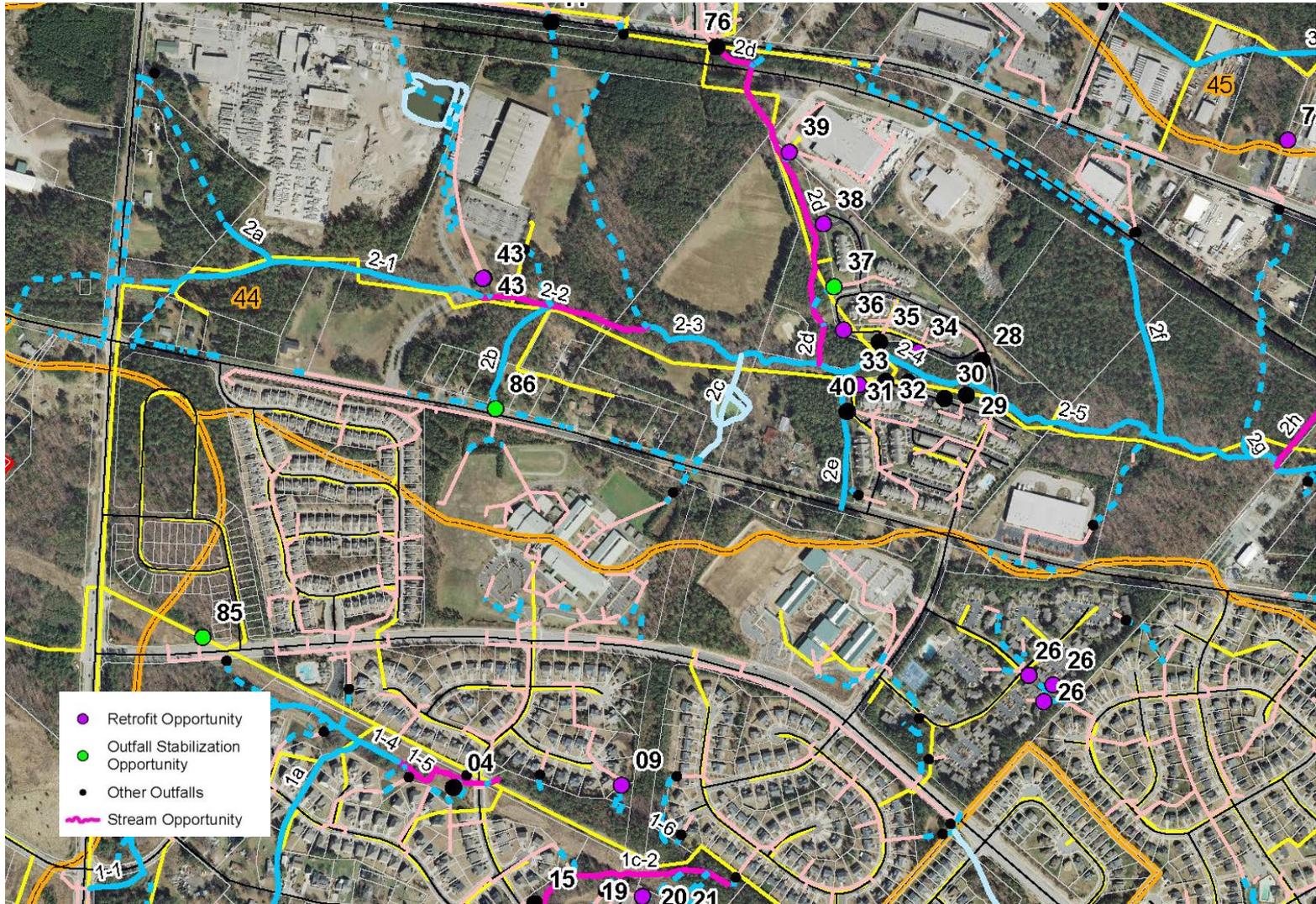
3 Our proposed solutions:

- Simple fixes
- Restoration
- Retrofit

Simple Fixes

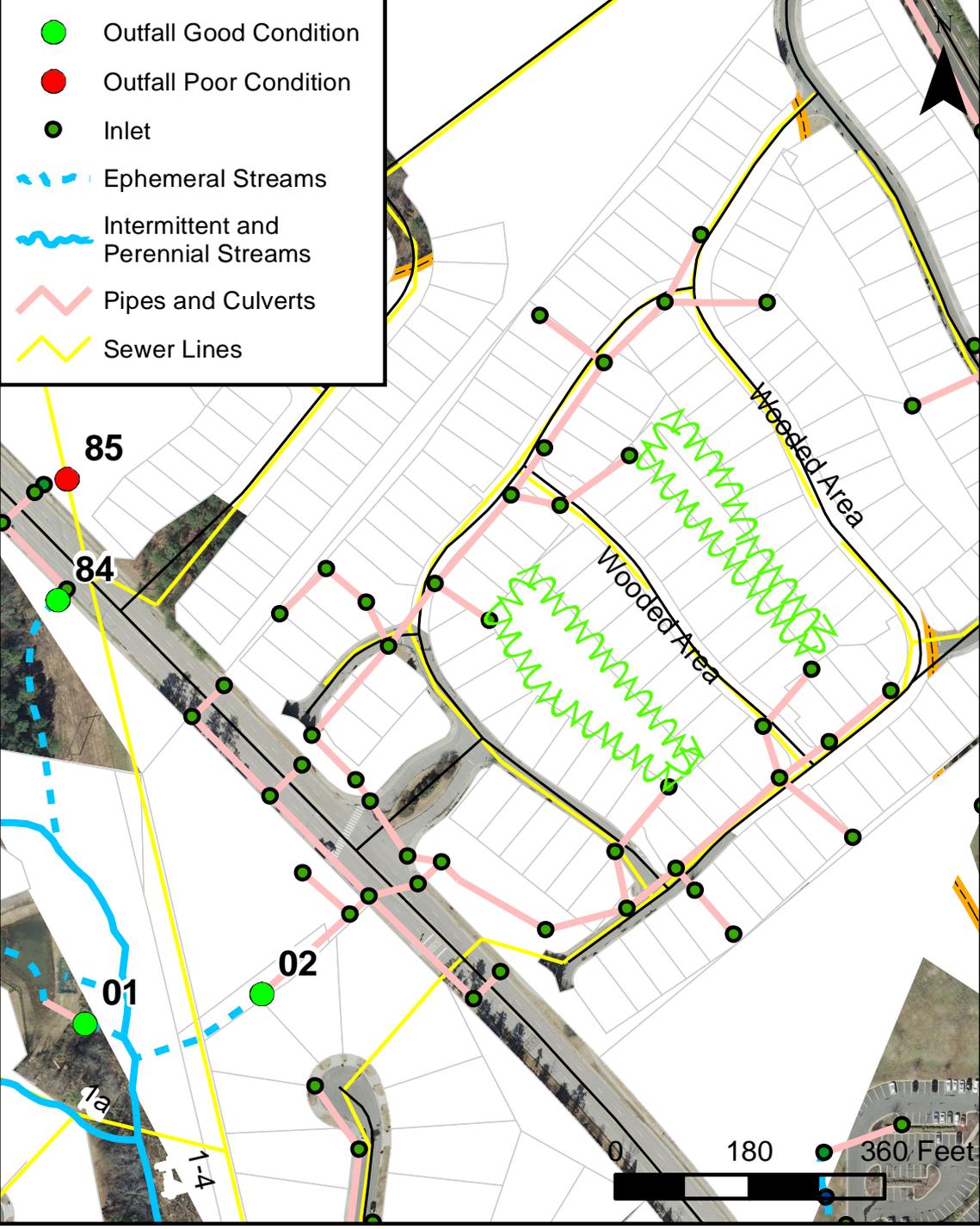


Restoration Opportunities



Example: Page Street





Stormwater BMP Opportunities



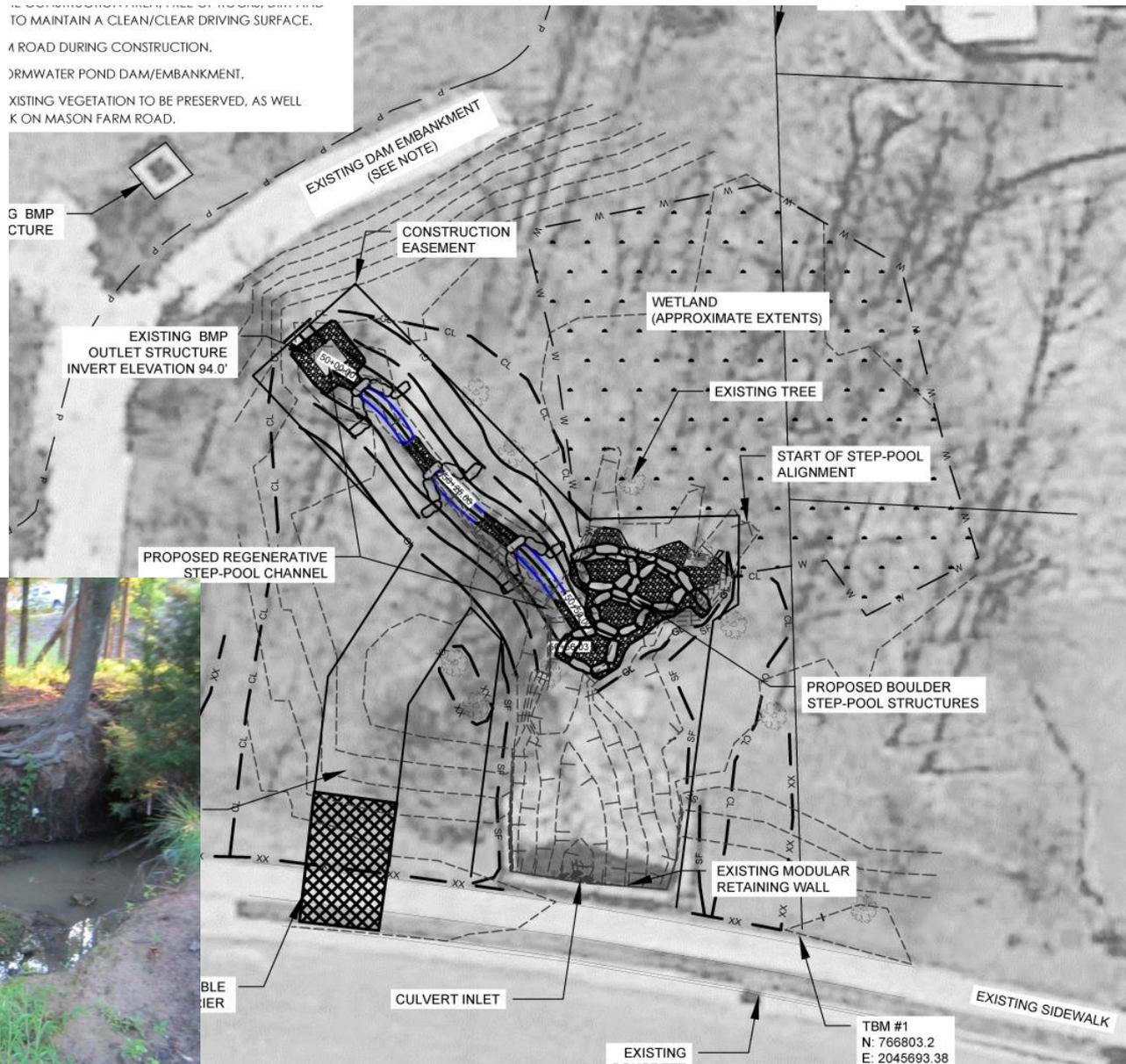
Stormwater Retrofits



Stormwater Retrofits

Example: Mason Farm

TO MAINTAIN A CLEAN/CLEAR DRIVING SURFACE.
 A ROAD DURING CONSTRUCTION.
 DRAINAGE POND DAM/EMBANKMENT.
 EXISTING VEGETATION TO BE PRESERVED, AS WELL
 AS WORK ON MASON FARM ROAD.



4 What's next:

- Ranking
- Incorporate into Town CIP
- Compile GIS

Questions?

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919-815-4544

melissa.ruiz@stantec.com