Development of the Foe Killer Creek Watershed Improvement Plan

Presentation for: SESWA Conference 2016

Presented by:
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Tetra Tech

21 October 2016

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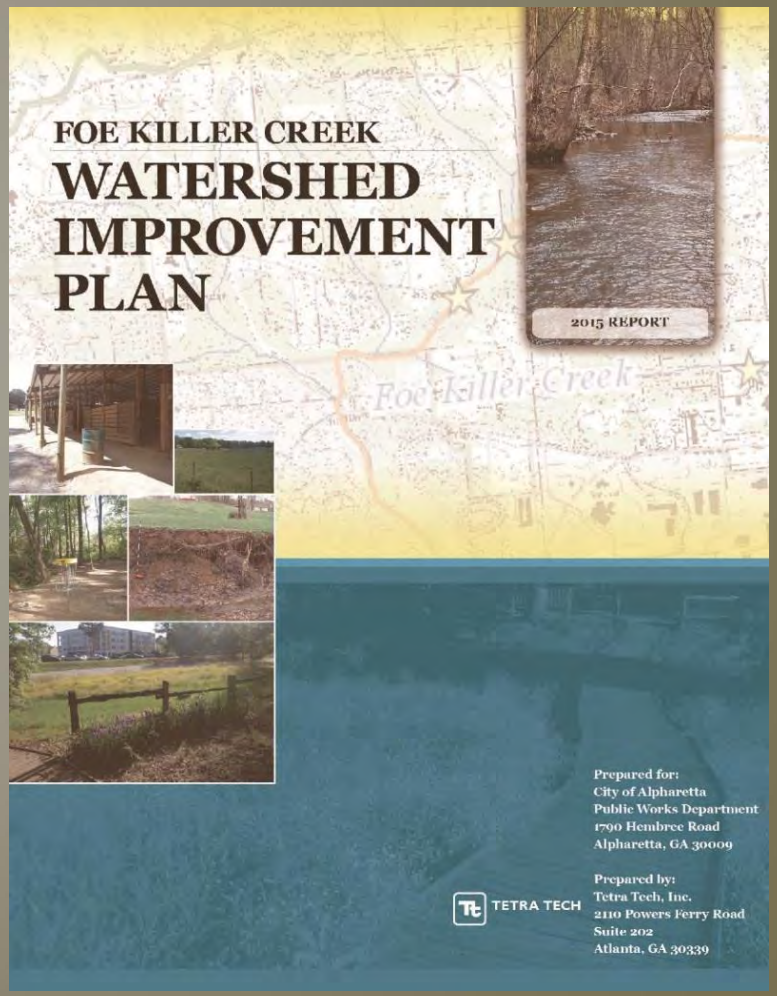
Foe Killer Creek Watershed Improvement Plan

- Project of the City of Alpharetta, Georgia
- Stream impaired for fecal coliform bacteria and biota (fish community)
- WIP involved a watershed assessment and identification of improvement measures



Watershed Assessment Approaches

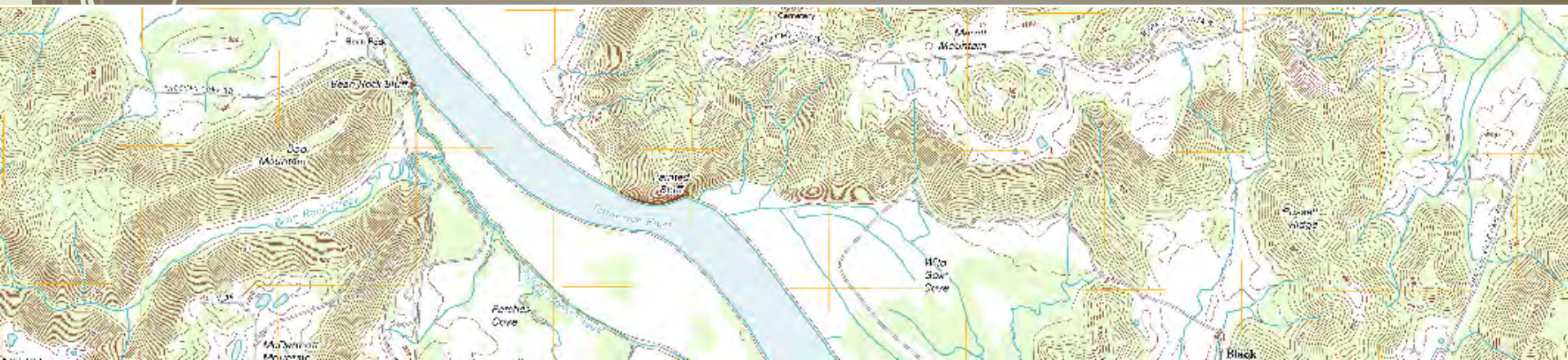
- Goal dependent
  - Comply with Georgia EPD permit requirements for wastewater treatment facilities
  - Meet MS4 permit requirements for Impaired Waters Monitoring Plan
  - Meet requirements of Metropolitan North Georgia Water Planning District's Watershed Management Plan
  - Apply for 319(h) Nonpoint Source Implementation Grant
  - Address a targeted issue/problem in the watershed

NONPOINT SOURCE MANAGEMENT PROGRAM
GEORGIA
SECTION 319(h)

Watershed Assessment…

Watershed Assessment Process

- Review Available Info and Data
- Identify Data Gaps
- Collect Supplemental Data
- Conduct Data Analysis
- Perform Hydrology and Water Quality Modeling
- Identify Management Needs



Types of Info and Data Useful for a Watershed Assessment

- Physical and Natural Features
- Land Use and Population Characteristics
- Waterbody Conditions
- Pollutant Sources
- Waterbody Monitoring Data
- Watershed History
- Regulations

Gather…
Process…
Present in figures…
Present in tables…
Summarize…
Identify Gaps…

Existing Data

- 2006 Watershed Study and SWMM model
- 2010 City of Roswell Foe Killer Creek WIP
- Impervious surfaces
- Land Use
- Sewer-stream crossings and septic parcels
- Significant facilities
- 303(d) listed waterbodies
- Water quality data
  - Impaired Waters Monitoring
  - Long-Term Ambient Water Quality Monitoring
  - Biological monitoring

Additional Assessments

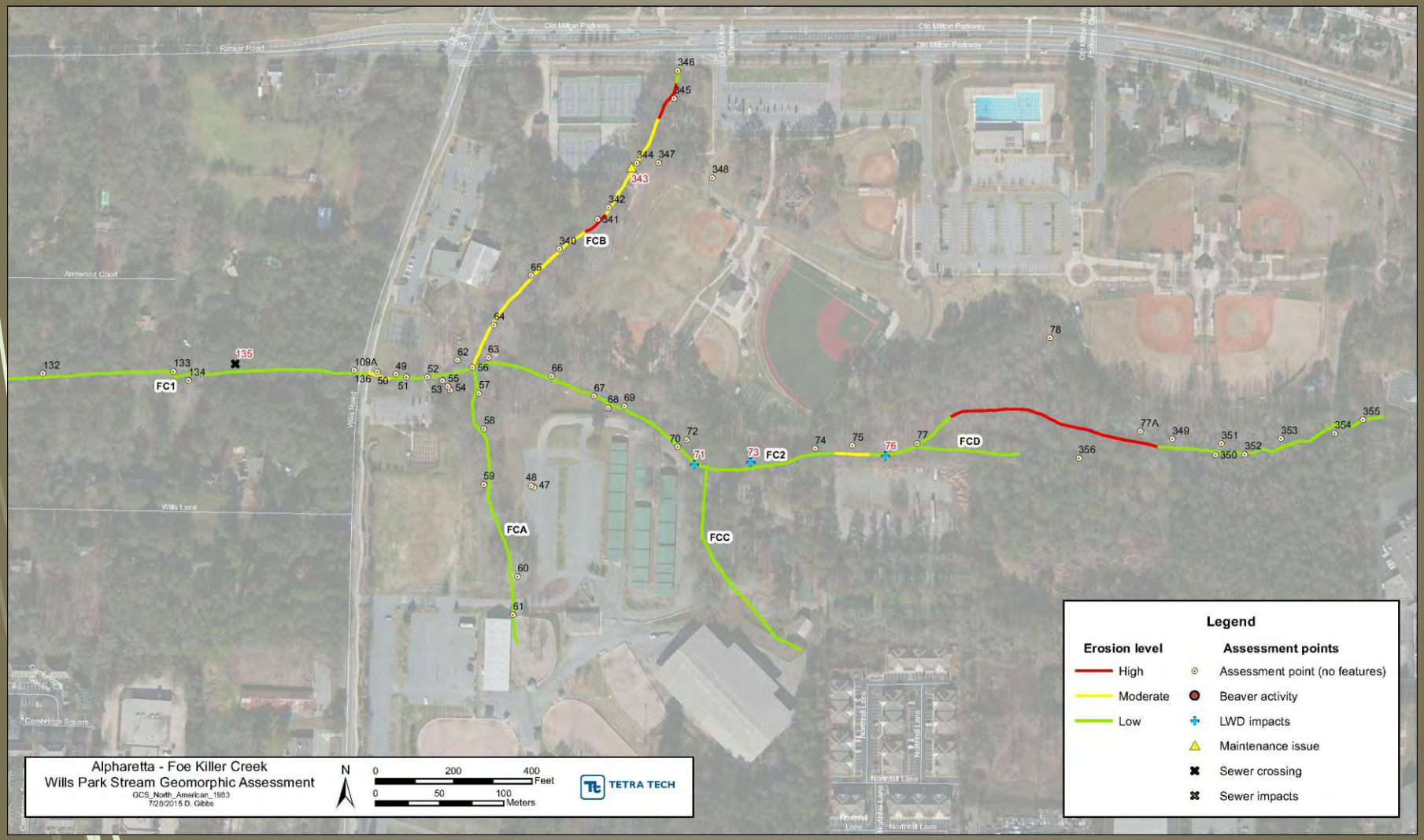
- Stream assessment
- Upland assessment
- Detailed review of Wills Park and areas of concern
- Stormwater inventory (over 900 pipes and structures)
- Impervious surface delineation
- Hydrology and water quality modeling

Stream Assessment

- Stream walk of Foe Killer Creek and Tributaries
- Rapid Geomorphic Assessment (RGA)
- Characterized channel bed, stream banks, and riparian buffer
- Took photos
- Identified maintenance needs and restoration/preservation opportunities

Stream Assessment

Stream Assessment



Upland Assessment

- Targeted windshield survey based on land use types
- Drainage patterns
- Stormwater management
- Sediment sources
- Evidence of polluted runoff

Upland Assessment

Data analysis

- Summaries by basin
  - Land use
  - Impervious area
  - Water quality
  - Hydrology
- Trends over time

Summary of Fecal Coliform Geometric Mean Data

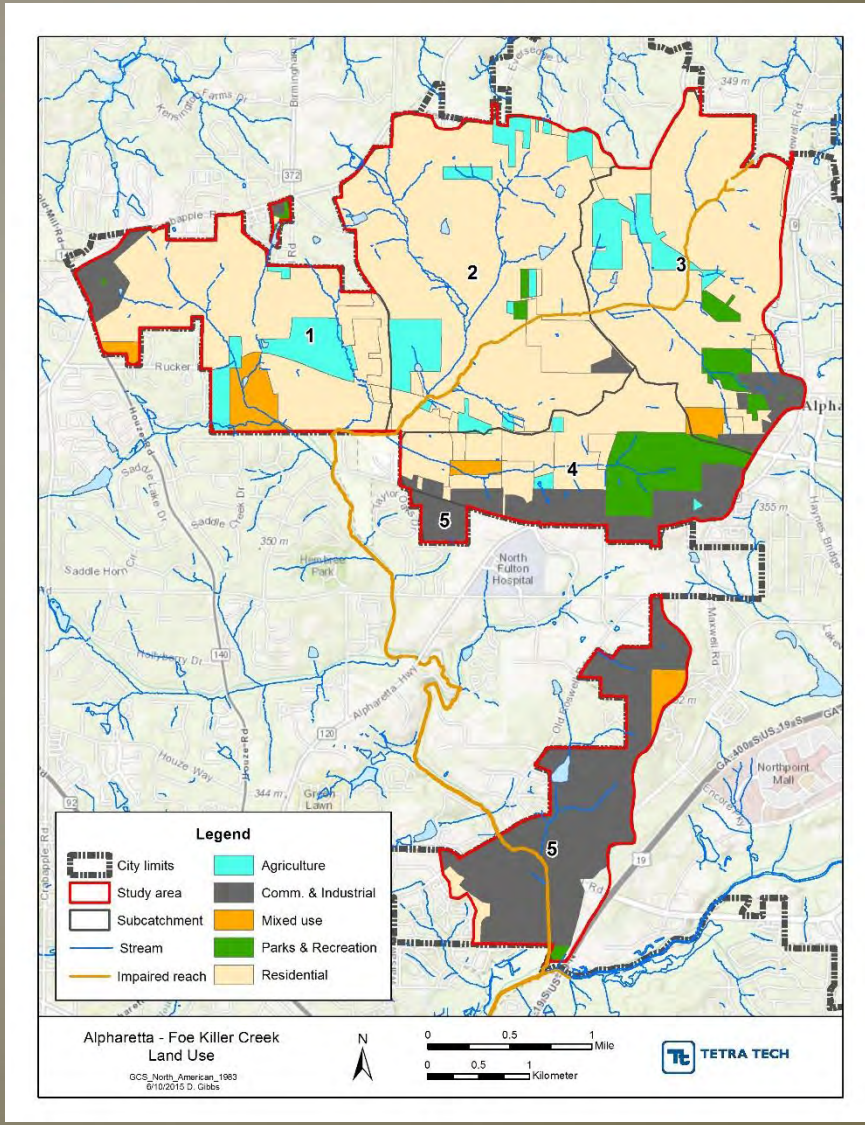
Date	Segment 03 Rucker Road SQAP SITE 2	Segment 20 Old Roswell Rd/Rock Mill Way SQAP SITE 5	Segment 44 Mid-Broadwell Rd SQAP SITE 1	Segment 56 Upper Hembree Rd (Roswell) SQAP SITE 3	Segment 57 Greenhous Rd (Roswell) SQAP SITE 4
Jun-10	**343**	**2489**	**461**	183	**250**
Sep-10	141	**1724**	**293**	198	132
Dec-10	53	13	35	62	52
Mar-11	94	15	134	52	91
Jun-11	**193**	**891**	**351**	100	159

Land Use Breakdown by Subcatchment

Subcatchment	Percent of study area	Agriculture	Comm. and Industrial	Mixed use	Parks and Recreation	Residential
Subcatchment 1	19%	12%	6%	9%	1%	72%
Subcatchment 2	30%	10%	1%	0%	1%	89%
Subcatchment 3	22%	8%	5%	2%	6%	78%
Subcatchment 4	15%	2%	28%	2%	22%	46%
Subcatchment 5	14%	0%	88%	4%	1%	3%
Total study area	100%	7%	19%	3%	5%	64%

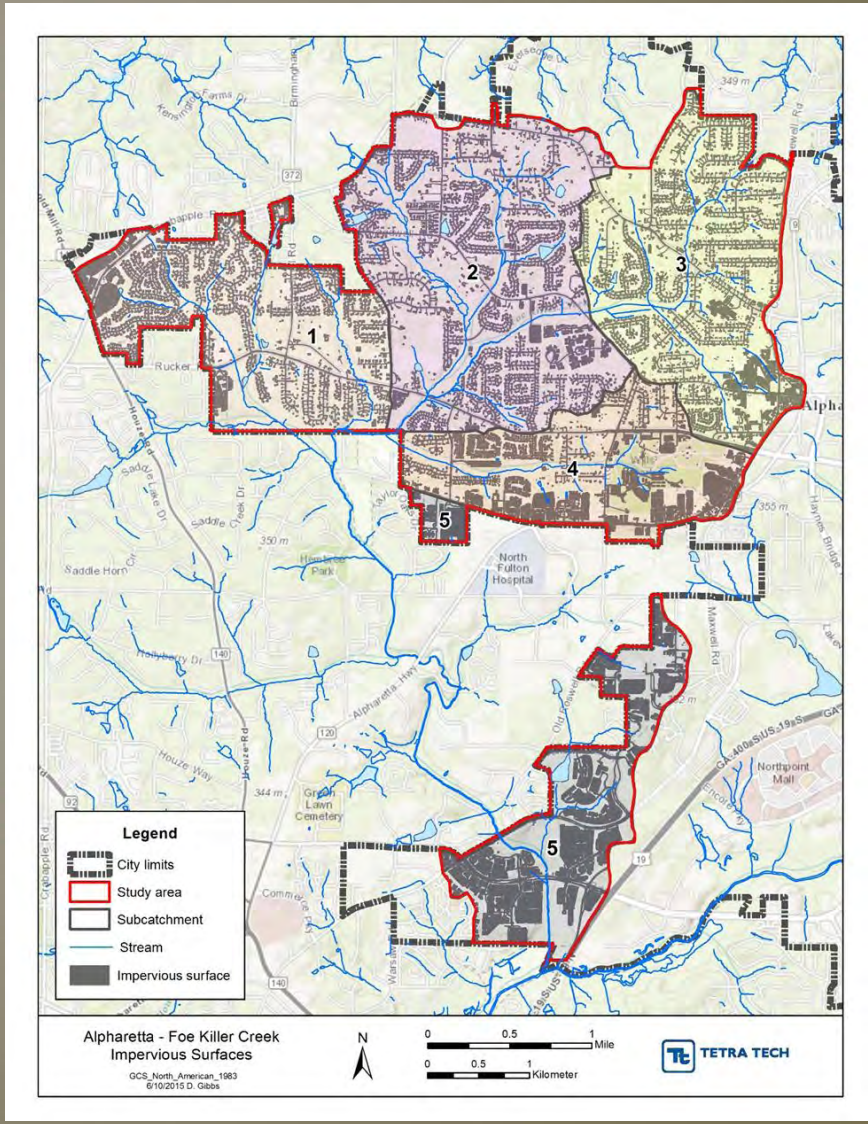
Land Use and Land Cover

- Sources: National Land Cover Database (NLCD) or local land use /zoning data
- How does your land use relate to watershed health and opportunities for protection or improvement?



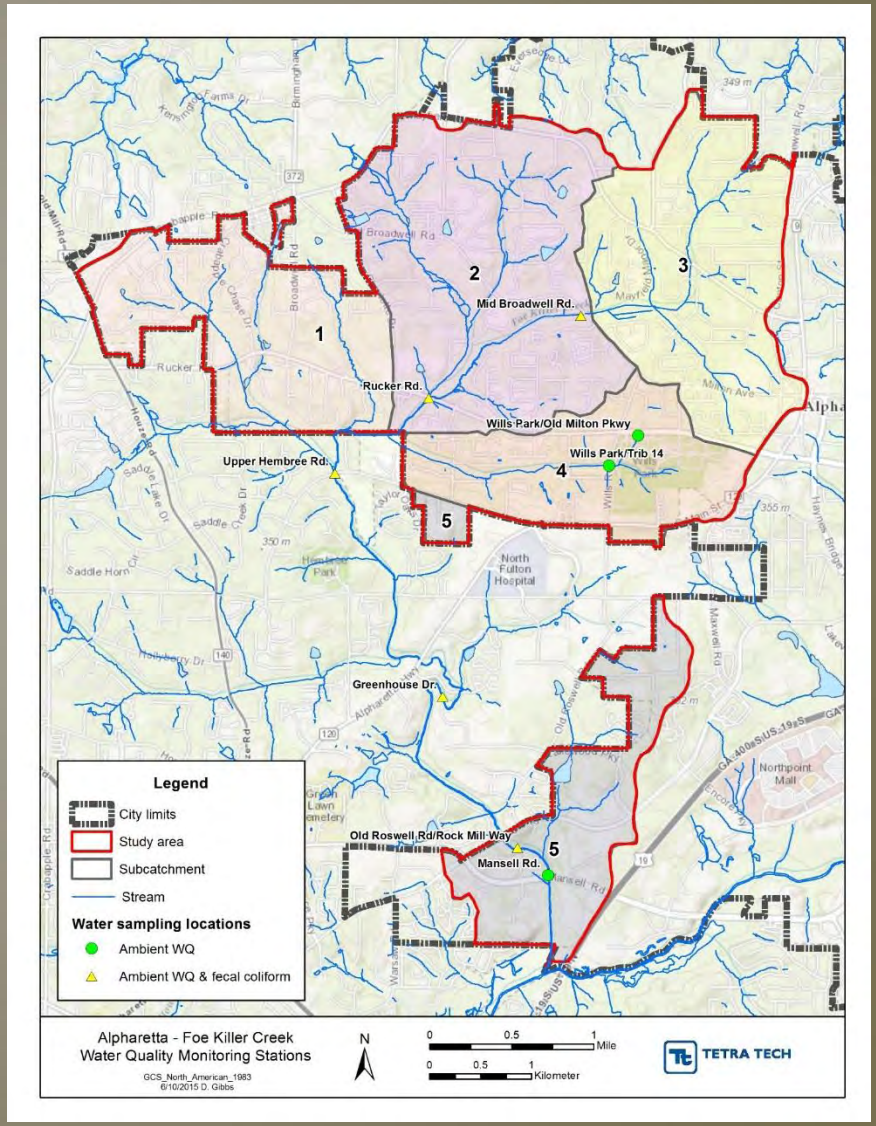
Impervious Cover

- Sources: State and local GIS layers
- What is the percent cover of impervious surface in each sub-basin?
- How is stormwater managed in these areas?



Monitoring

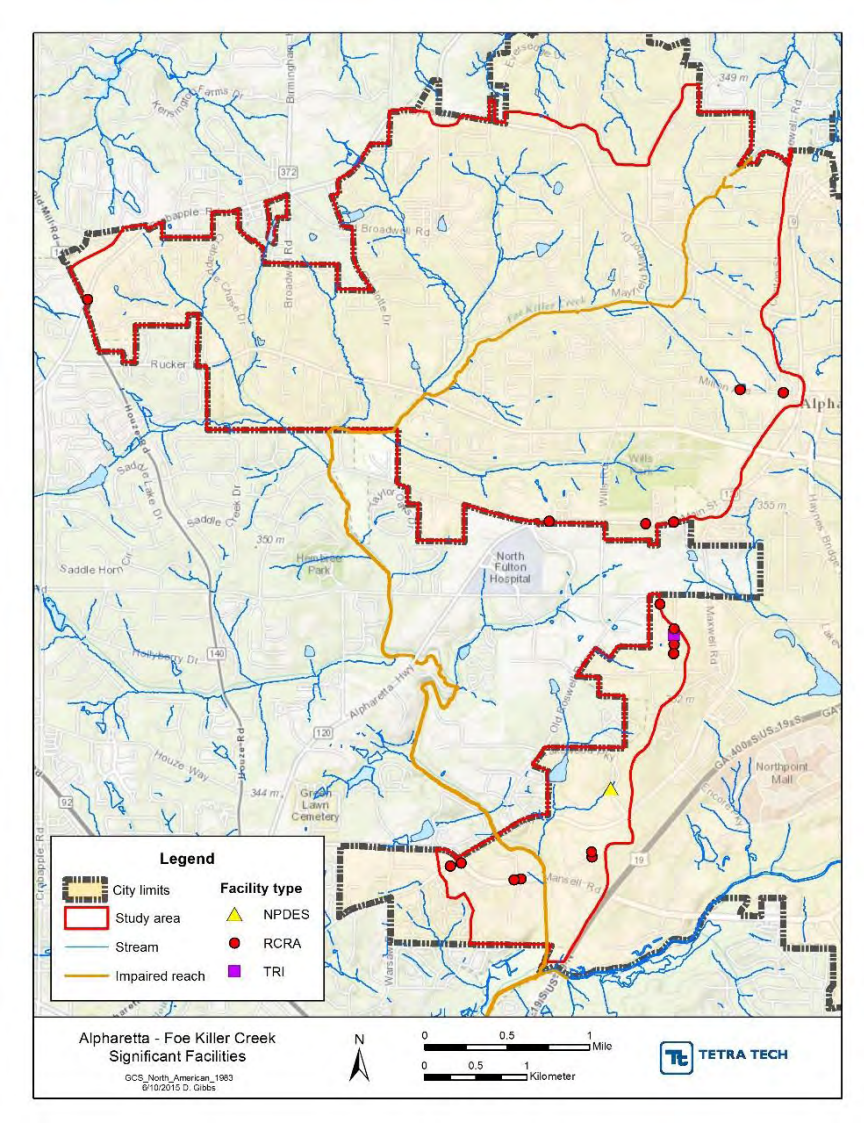
- What are the data quality objectives?
- Do you have a comprehensive picture?
- How old are your sampling results?
- Can you move forward with what you have?



Point Sources of Pollution

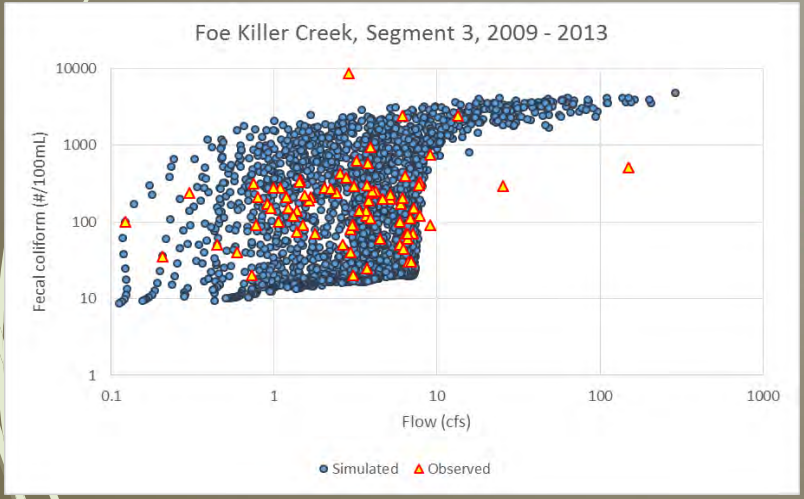
Identify significant facilities

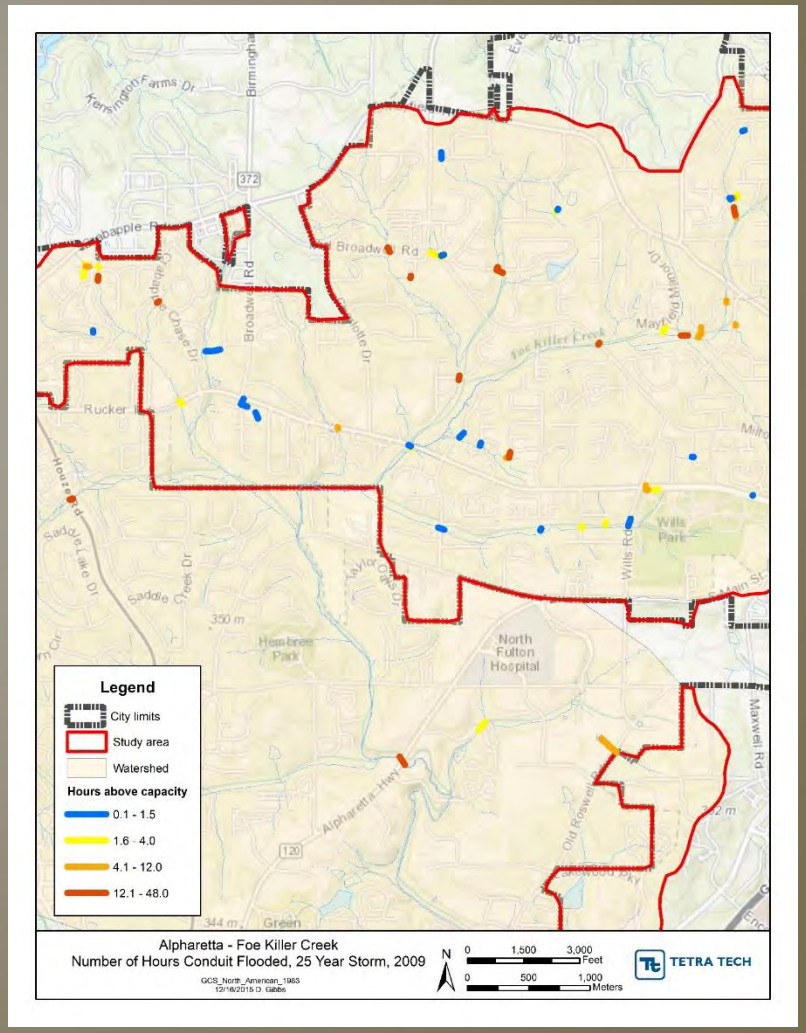
EPA Envirofacts
- Multisystem search



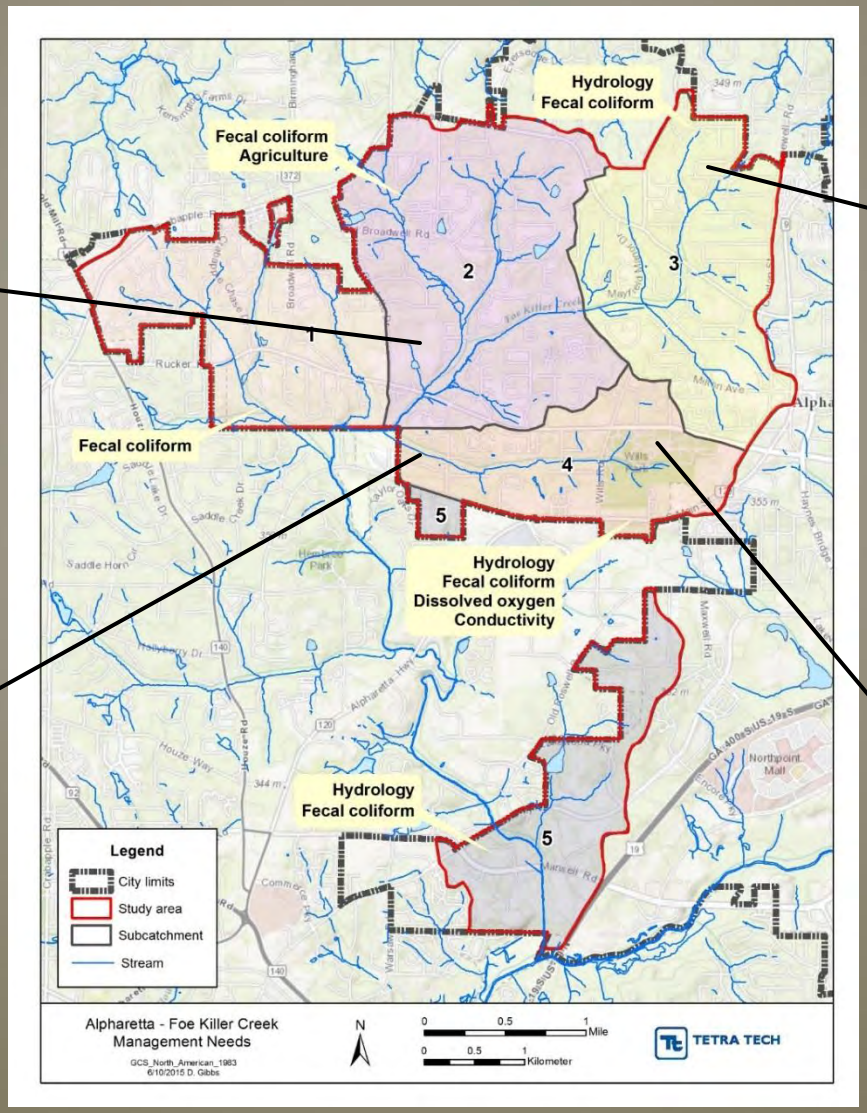
Hydrology and Water Quality Modeling

- Built on existing model using PCSWMM
- Added stormwater infrastructure
- Evaluated conduit capacity
- Calculated pollutant loads





Management Needs



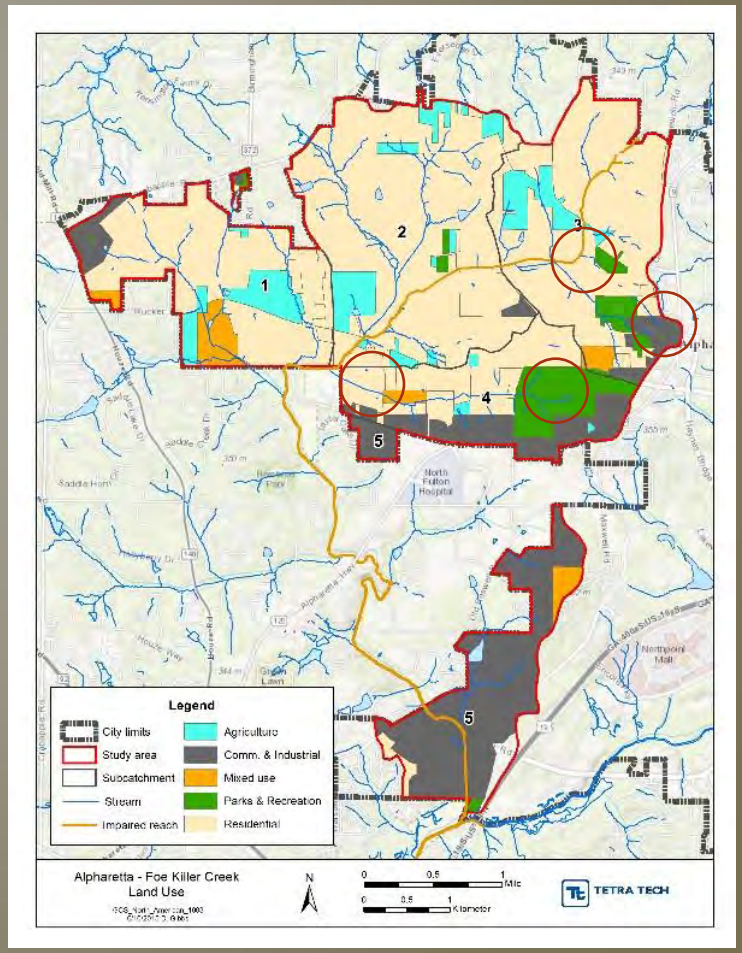
Identification of Improvement Measures…

Process of Identifying Improvement Measures

- Identify potential watershed improvement opportunities through GIS assessment and field assessment
- Perform hydrologic assessments to quantify benefit
- Rate and prioritize projects
- Prepare concept plans, cost estimates, and project information sheets

Identify Areas of Focus

- Downtown area
- Wills Park
- Public land
- Known problem areas
  - Flood-prone areas
  - Pollutant sources
    - Agriculture
    - Industry

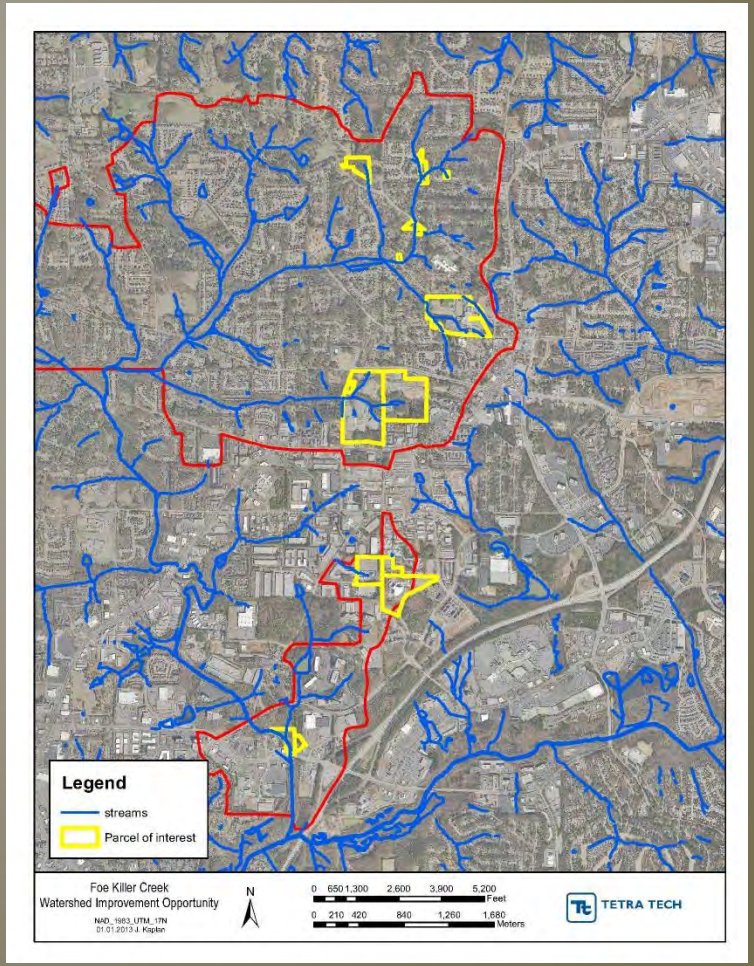


Management Solutions for Nonpoint Sources

- Programmatic
- Structural
- Agricultural

Conduct GIS Assessment of Improvement Opportunities

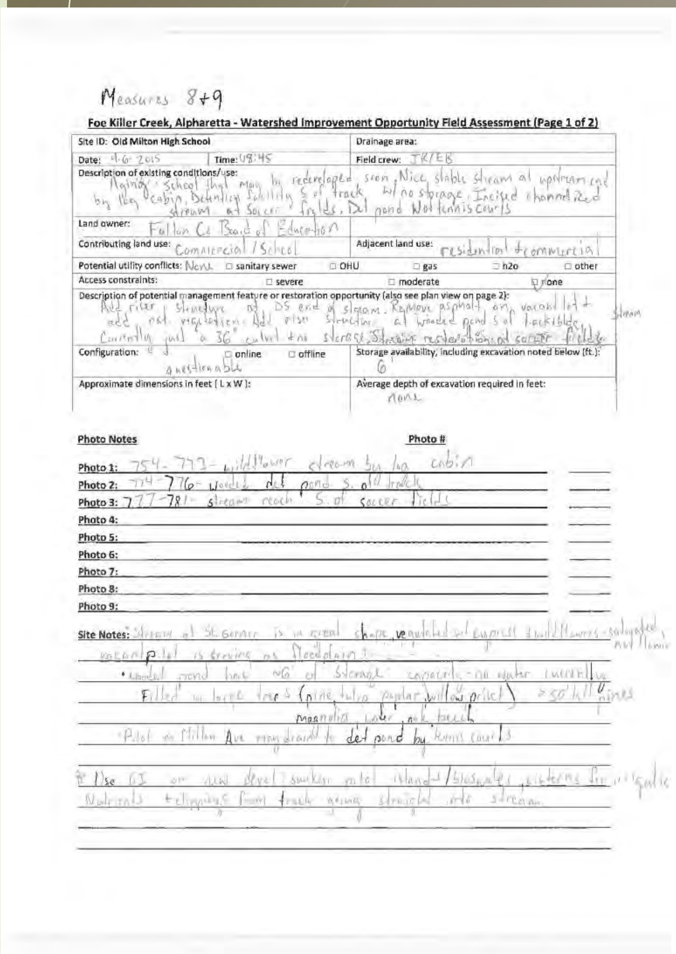
- Identify:
  - Open land
  - Public parcels
  - Channelized streams
  - Highly impervious areas
  - Flood-prone areas



Conduct Field Assessment of Improvement Opportunities

- Characterize the site
- Identify access and construction constraints
- Take photos
- Sketch potential improvement measures

Field Assessment



Measures 8+9

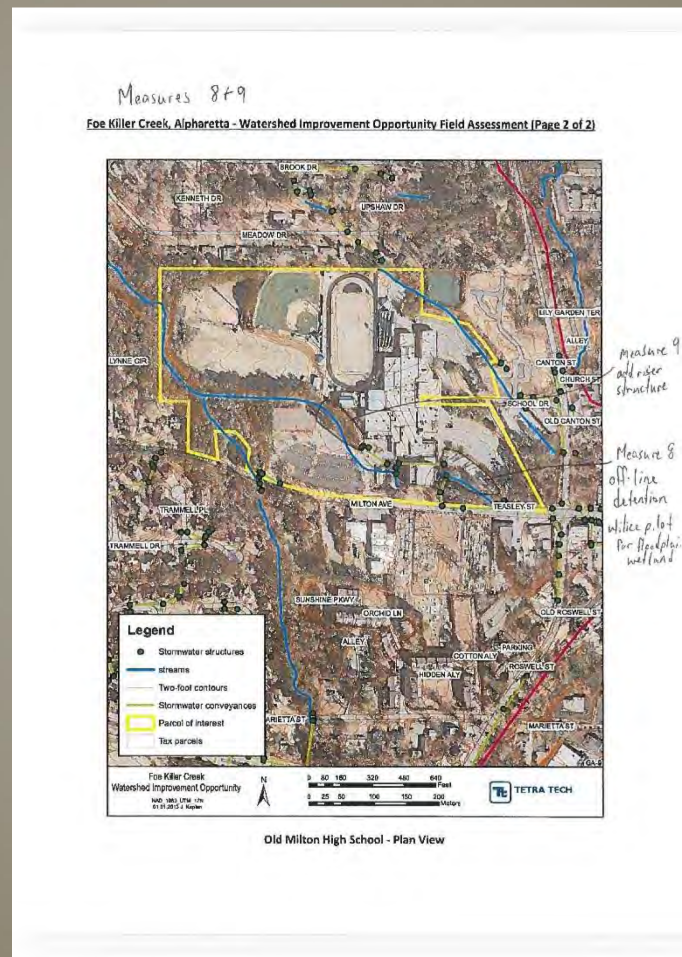
Foe Killer Creek, Alpharetta - Watershed Improvement Opportunity Field Assessment (Page 1 of 2)

Site ID: Old Milton High School	Drainage area:
Date: 4-6-2015 Time: 08:45	Field crew: JR/EB
Description of existing conditions/use: Aging school that may be redeveloped soon. Nice stable stream at upstream end by log cabin. Detention facility S of track w/ no storage. Incised channelized stream at soccer fields. Det pond N of tennis courts	
Land owner: Fulton Co Board of Education	
Contributing land use: Commercial / School	Adjacent land use: residential + commercial
Potential utility conflicts: None ☐ sanitary sewer ☐ OHU ☐ gas ☐ h2o ☐ other	
Access constraints: ☐ severe ☐ moderate ☑ none	
Description of potential management feature or restoration opportunity (also see plan view on page 2): Add riser structure at DS end of stream. Remove asphalt on vacant lot + add nat. vegetation. Add riser structure at wooded pond S of track. Currently just a 36" culvert + no storage. Stream restoration at soccer fields	
Configuration: ☐ online ☐ offline questionable	Storage availability, including excavation noted below (ft.): 6'
Approximate dimensions in feet [L x W]:	Average depth of excavation required in feet: none

Photo Notes **Photo #**

Photo 1: 754-773 - wildflower stream by log cabin
Photo 2: 774-776 - wooded det pond S. old track
Photo 3: 777-781 - stream reach S. of soccer fields
Photo 4:
Photo 5:
Photo 6:
Photo 7:
Photo 8:
Photo 9:

Site Notes:

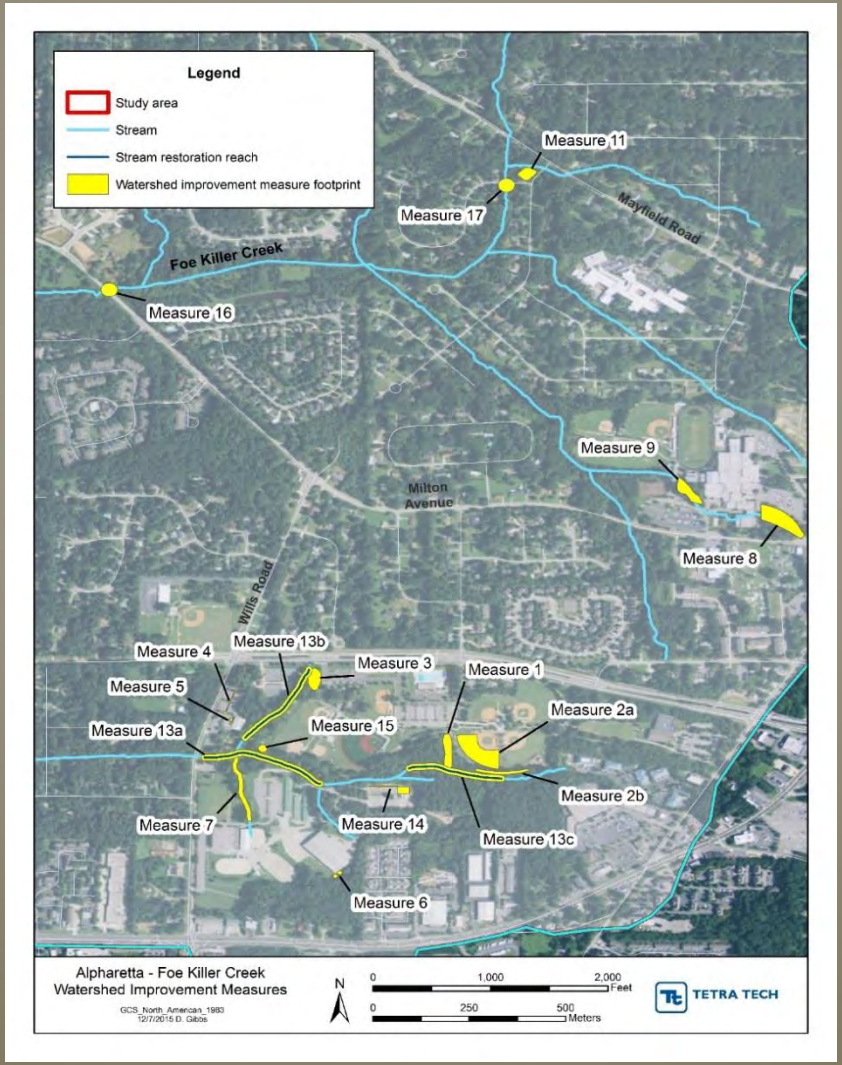


Measures 8+9

Foe Killer Creek, Alpharetta - Watershed Improvement Opportunity Field Assessment (Page 2 of 2)

Old Milton High School - Plan View

Watershed Improvement Measures



Rank and Prioritize Projects

- Develop evaluation criteria
- Consider cost and benefits
- Develop a scoring system
- Weight the criteria based on importance
- Obtain a total score for each project based on sum of scores for individual criteria
- Rank and prioritize projects based on total scores

Prioritized and ranked structural projects

- Determined evaluation criteria and scoring system
- Used criteria that were important to the City

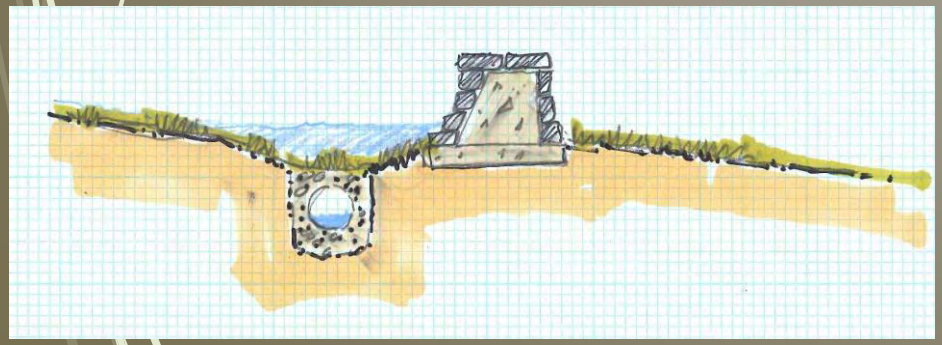
Criteria	0	1	2
Leverage dollars. (Project cost can be combined with another agency or already funded project to realize cost benefit. Alternative funding source is available such as a grant).	There are no other funding sources and no chances for funding partnerships. If deferred, the increase in project costs would be less than the rate of inflation.	There is opportunity to reduce costs by partnering with other agencies or finding funding from outside sources. If deferred, the increase in project costs would be greater than the rate of inflation.	Funding source or project partner is very likely.
Repeat or frequent work orders in the same area.	There are no work orders in the area related to this job.	Crews have been to the area on a work order that relates to the job at least once.	Crews return to the area repeatedly for repairs. This project will address the problem and reduce the need for future repairs / maintenance.
Ease of constructability. (Utility conflicts, access constraints, earthwork).	Significant utility conflicts, access constraints, or earthwork requirements	Moderate utility conflicts, access constraints, or earthwork requirements	Minimal or no utility conflicts, access constraints, or earthwork requirements
Reduces sedimet loads	Not a primary purpose. Minimal benefit	Moderate load reduction	Significant load reduction
Reduces fecal coliform bacteria	Not a primary purpose. Minimal benefit	Moderate load reduction	Significant load reduction
Improves hydrology	Not a primary purpose. Minimal benefit	Moderate hydrology benefits	Significant hydrology benefits
Improves aesthetic of area	Not a primary purpose. Minimal benefit	Moderate improvement in aesthetics	Significant improvement in aesthetics
Reduces long-term operation costs or maintenance needs	Negligible or no reduction in long-term operation costs or maintenance needs	Moderate reduction in long-term operation costs or maintenance needs	Significant reduction in long-term operation costs or maintenance needs
Public perception of need. (Including drainage complaints or inquiries).	Project has no public support and is not identified by the citizenry as a need.	Project has been identified by citizenry as a need in the community.	Project has strong public support and has been identified by the citizenry as a need in the community.
Permitting requirements.	USACE, EPD, FEMA, GDOT, or other outside agency review and approval is necessary for this work.	Only city permits are needed for this work.	No permits are needed for this work.
Use for education / demonstration / example.	There is not an education or outreach component to this project.	Demonstration or education would be limited and passive.	City can use this to teach property owners, business owners, developers, school children, other stormwater professionals about ways to comply with regulations.
Cost/benefit score	Greater than $10,000 cost/benefit value	$5,000-$10,000 cost/benefit value	Less than $5,000 cost/benefit value

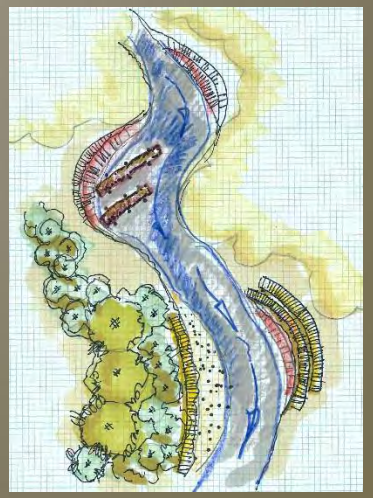
Prioritized and ranked structural projects

	Leverage dollars	Repeat or frequent work orders	Ease of constructability	Reduces sedimet loads	Reduces fecal coliform bacteria	Improves hydrology	Improves aesthetic of area	Reduces long-term operation costs or maintenance needs	Public perception of need	Permitting requirements	Use for education/demonstration	Cost/benefit score	Total raw score	Total weighted score	Prioritization ranking (lowest number is highest priority)
Weighting factor	*5*	*10*	*1*	*10*	*10*	*5*	*5*	*5*	*5*	*1*	*8*	*8*			
Measure 1- Vault and step-pools for main parking lot	0	1	0	2	0	2	2	1	1	0	2	1	12	84	1
Measure 13a- Wills Park stream restoration (720 feet buffer enhancement)	1	0	1	2	0	0	2	0	1	0	2	2	11	73	2
Measure 6- Cistern at equestrian arena	0	0	2	1	0	2	0	2	0	2	2	2	13	66	3
Measure 14- Waste containment	0	0	2	0	2	0	1	0	0	0	2	2	9	59	4
Measure 13b- Wills Park stream restoration (840 feet channel and bank restoration)	1	0	1	2	0	0	2	0	1	0	2	0	9	57	5.5
Measure 13c- Wills Park stream restoration (840 feet channel and bank restoration)	1	0	1	2	0	0	2	0	1	0	2	0	9	57	5.5
Measure 15- Frisbee golf and trail management	1	0	1	1	0	0	2	0	1	1	2	1	10	56	7
Measure 7- Rock filter dams by equestrian center parking	0	0	2	2	0	1	1	1	0	0	0	2	9	53	8
Measure 9- Detention at Old Milton High School (wooded basin south of building and track)	1	0	0	2	0	2	0	0	0	0	0	2	7	51	9
Measure 8- Detention at Old Milton High School (by log cabin)	1	0	0	2	0	2	0	0	0	0	0	1	6	43	10
Measure 3- Dry detention for northwest parking lot	0	0	1	1	0	2	0	1	0	0	0	1	6	34	11
Measure 2b- Multiple outfalls below baseball fields	0	0	1	1	0	1	0	0	0	2	0	1	6	26	12
Measure 2a- Underground storage below baseball fields	0	0	0	1	0	2	0	0	0	0	0	0	3	20	13

Recommended Projects

- Develop concept plans and cost estimates for highest priority projects
- Demonstrate how each project will address a management need
- Show cost effectiveness

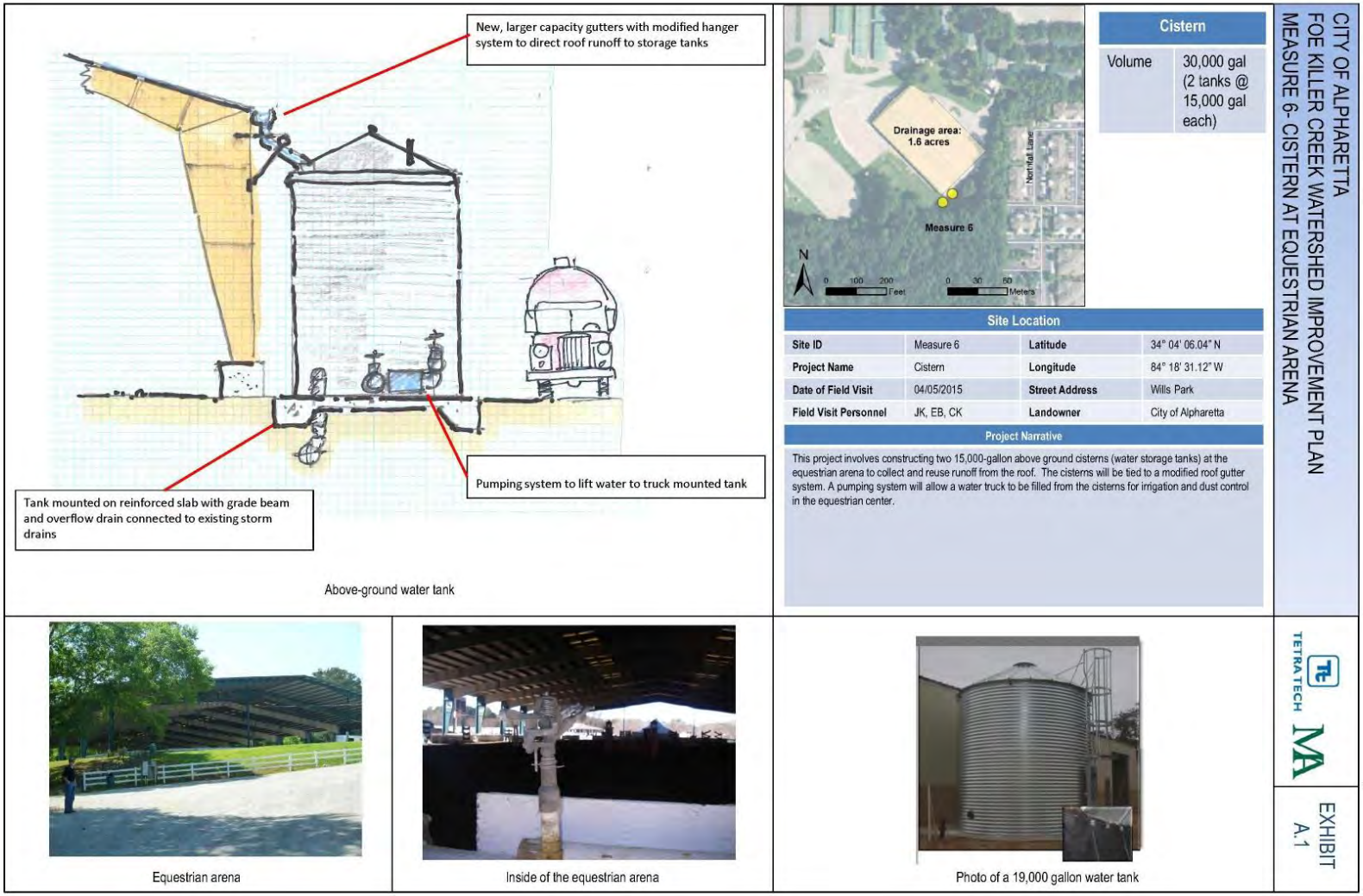




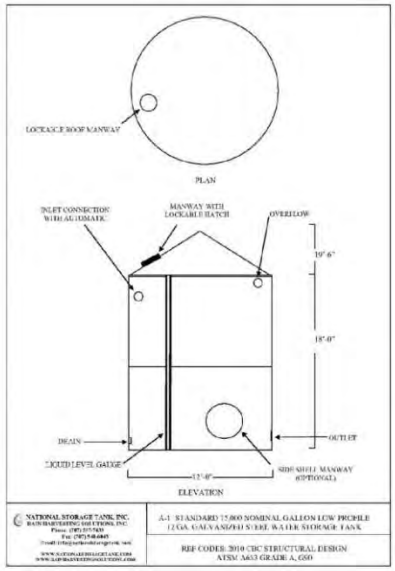
Cost Estimates

Foe Killer Creek Measures - Preliminary Cost Estimates					
Measure NO. 1 STILLING BASIN AND CHECK DAMS					
ELEMENT	COST	UNIT	COST/UNIT	QUANT	
SURVEY	$6,000.00	AC	$3,000.00	2	
DESIGN	$34,200.00	12% OF CONST.EST.			
CONTINGENCY	$28,500.00	10% OF CONST. EST.			
MOBILIZATION	$14,250.00	5% OF CONST. EST.			
CONSTRUCTION	$285,000.00				
20 YEAR O&M	$100,000.00	ESTIMATED AT TWO INSPECTIONS PER YEAR FOR DEBRIS REMOVAL AT $2,500 EA.			
TOTAL Measure #1	$467,950.00				
Measure NO. 2A UNDERGROUND STORAGE AT BALL FIELDS					
ELEMENT	COST	UNIT	COST/UNIT	QUANT	
SURVEY	$6,000.00	AC	$3,000.00	2	
DESIGN	$75,600.00	12% OF CONST.EST.			
CONTINGENCY	$63,000.00	10% OF CONST. EST.			
MOBILIZATION	$31,500.00	5% OF CONST. EST.			
CONSTRUCTION	$630,000.00				
20 YEAR O&M	$60,000.00	ESTIMATED AT TWO INSPECTIONS PER YEAR FOR DEBRIS REMOVAL AT $1,500 EA.			
TOTAL Measure #2A	$866,100.00				
Measure NO. 2B ENHANCED STORM WATER OUTFALL BELOW BALL FIELDS					
ELEMENT	COST	UNIT	COST/UNIT	QUANT	
SURVEY	$6,000.00	AC	$3,000.00	2	
DESIGN	$8,100.00	18% OF CONST.EST.			
CONTINGENCY	$4,500.00	10% OF CONST. EST.			
MOBILIZATION	$2,250.00	5% OF CONST. EST.			
CONSTRUCTION	$45,000.00				
20 YEAR O&M	$40,000.00	ESTIMATED AT TWO INSPECTIONS PER YEAR FOR DEBRIS REMOVAL AT $1,000 EA.			
TOTAL Measure #2B	$105,850.00				

Concept plans



Concept plans



Schematic of a 15,000 gallon water storage tank

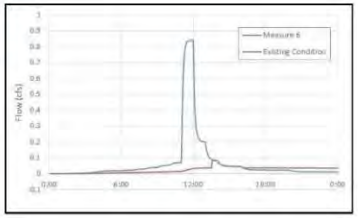
Plan view of water storage tanks and gutter system

Benefits
• Volume Reduction
• Peak Flow Reduction
• Water Re-use
• Improved Stream Function

Costs	
Survey	$3,000
Design	$12,000
Contingency	$10,000
Mobilization	$5,000
Construction	$100,000
20-year O&M	$20,000
Total Cost	**$150,000**

CITY OF ALPHARETTA
FOE KILLER CREEK WATERSHED IMPROVEMENT PLAN
MEASURE 6- CISTERN AT EQUESTRIAN ARENA

Constituent	1.2-inch, 24-Hour Storm Event		Reduction	
	Pre-BMP	Post-BMP	Reduction	Percent
Peak Flow (cfs)	0.84	0.04	0.8	95%



1.2-Inch, 24-Hour Storm Hydrograph

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EXHIBIT A.2

Summarized Programmatic Measures

Programmatic Measure	Estimated Cost
Bacterial Source Tracking- entire watershed	$20,000-$30,000
Nutrient and Total Suspended Solids (TSS) Monitoring- entire watershed	$9,000
Ordinance Update (approved by council for implementation in 2015-2016)	$100,000
Improved Site Planning (to be completed by staff)	$ negligible
Stream Buffer Preservation (buffer clean-up on city property)	$ negligible
Education/Outreach	$ negligible
Private Property Recommendations- These are projects recommended for private property owners. They should be constructed and managed at the property owners' expense and should not include city fiscal impacts.	
Beaver Control	$ negligible
Agricultural Measures	$ negligible
Private Pond Maintenance (based on recommended city involvement)	$ negligible
Wildlife Habitat and Buffer Protection (NRC – Alpharetta's Wild Side)	$ negligible

Implementation Schedule

Fiscal Year (July 1-June 30)	Management Action	Estimated Cost
2015-16	Ordinance Update	$100,000
2016-17	Develop and implement a bacterial source tracking program	$25,000
2016-17	Design BMP Measure 1 to address runoff and erosion issues from the main parking lot at Wills Park	$34,200
2016-17	Begin monitoring TN, TP, and TSS	$3,000
2016-17	Revisit and update plan review process to reflect ordinance updates and emphasis on LID practices	N/A
2016-17	Address high priority maintenance issues identified in the geomorphic assessment (Appendix E, Table 5-1)	N/A
2017-18	Design a Frisbee golf and trail management plan for Wills Park	$21,600
2017-18	Address medium and low priority maintenance issues identified in the geomorphic assessment (Appendix E, Table 5-1)	N/A
2017-18	Design and construct Measure 13a stream restoration/ buffer enhancement (cost includes design, contingency, mobilization and construction)	$20,320
2018-19	Complete construction of BMP Measure 1 (cost includes survey, contingency, mobilization, and construction)	$333,750
2019-20	Initiate first phase of construction activities associated with stream buffer enhancement and trail management plan for Wills Park	TBD

Questions?

For More Information:

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