WATERSHED IMPROVEMENT PLAN

ET Creek

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INTRODUCTION

PURPOSE

This document is the 2011 edition of a Watershed Improvement Plan (WIP) for the identified segment of ET Creek. The objective of a WIP is to identify and prioritize significant sources of pollution causing impairment in a watershed, determine effective management practices that will reduce pollutant loads from those sources, and seek funds and other resources to install the pollution controls and restore water quality in the impaired water body.

ET Creek is a minor tributary to the Upper Oconee River and is currently listed as an impaired water body. The targeted segment has been identified as contaminated/partially contaminated by the Georgia Department of Natural Resources (DNR) and in need of remediation. The degree of impairment is classified as not supporting use and the TMDL for the Chattahoochee River is set at a target level of 150 cfu/100 ml of water, a level that will allow the water body to achieve water quality standards necessary for the ecological health of the stream.

In this particular instance, the contamination stems from non-point sources and has been added to the list of streams for Total Maximum Daily Load (TMDL) planning and water quality restoration. An original TMDL assessment and Implementation Plan has already been developed and some progress made with regards to remediation measures by the City and Elachee Nature Center to keep the watershed clean and undisturbed. This WIP will provide a summary of progress and of recent monitoring efforts, then produce an updated Implementation Plan for ultimately achieving water quality. The results of this WIP will be used to coordinate local and State assisted remediation measures for the next 5-10 years.

PROJECT SCOPE AND REQUIREMENTS

This project focuses on a small creek located entirely within Hall County. The watershed serves as a transitional space from industrial Gainesville and the fully wooded area within the Chicopee Woods Nature Preserve. It features a major power line easement running parallel with the stream's main artery for some distance, and also includes some woodland trails used for biking, hikers and the occasional classroom field trip.

The stream segment was listed on the Georgia 303 (d) list of impaired water bodies due to high fecal coliform readings obtained during sampling events in 1999. In 2003, the Georgia EPD revised total maximum daily loads (TMDLs) for impaired stream segments addressed in the Upper Oconee River Basin Fecal Coliform TMDLs and in Fecal Coliform TMDLs developed by USEPA prior to 2002 which includes ET Creek. A total maximum daily load (TMDL) was developed by the USEPA in 2002 to address pollutant loads in the watershed. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. Sources of impairment for this segment and recommended reduction in the fecal coliform loading are noted below. The 2003 TMDL implementation plan document states that this reach is not supporting its designated use due to fecal coliform impairment, and as of 2010 this stream was still listed as out of compliance.

THE GMRC

This report was developed by the Georgia Mountains Regional Commission (GMRC). The GMRC is one of 12 regional government offices within Georgia working to foster economic development and to provide community planning and information services. The GMRC provides services and technical assistance directly to its 13 counties and 38 municipalities as well as developing regional initiatives and supporting the programs of various State Departments. Originally founded as the Georgia Mountains Area and Planning Development Center in 1962, the GMRC has evolved in the common services provided but continually works to assist its member governments in efforts that preserve local character, encourage sustainable resource management and progressive economies, and contribute to improving the overall well being of the region and its communities.

Currently the GMRC employs 13 staff in the realms of planning, economic development, information technology, human resources and general administration. The Council for the GMRC consists of two representatives from each county, one from the County Commission and one mayoral representative from all the cities within that county, as well as 5 appointees from the State legislature.

As the contractor for this project, the GMRC was responsible for carrying out the tasks and duties necessary to complete this document, including but not limited to the following:

- Outreach to local stakeholders;
- Survey the watershed to identify possible causes/sources of pollution, as well as opportunities for remediation;
- Perform water sampling to gauge the current level of contamination;
- Produce the final WIP.

WATERSHED IMPROVEMENT PLAN

WATERSHED LOCATION & DESCRIPTION

The Hall County portion of the Upper Oconee River Basin consists of several small streams and their tributaries, none of which are considered navigable. The area is predominantly rolling hills with moderate tree cover, and has been subject to increases in developmental pressure over the past 20 years. The general area includes a nature preserve, volumes of residential development and an array of industrial and commercial activity. The headwaters in the northwest portion of the watershed in particular are in more densely developed areas, with higher levels of impervious surfaces and several stream crossings.

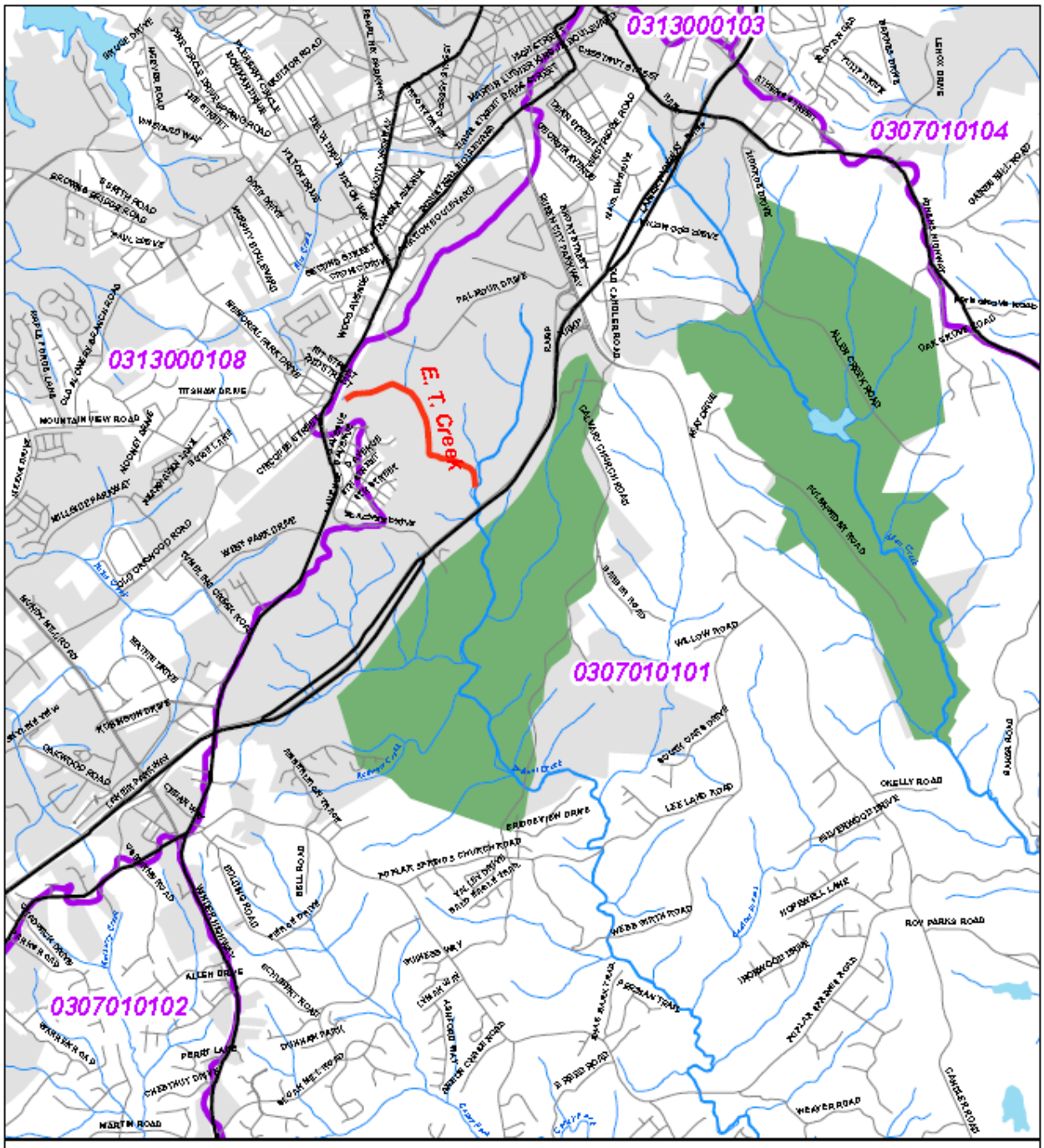
ET Creek is a headwater tributary to Walnut Creek located wholly within the City of Gainesville, eventually draining into the Oconee River. It is situated just southeast of Gainesville and northeast of Oakwood, nestled mostly within the Elachee Nature Center. ET creek itself meanders through mostly wooded area preserved as part of the nature center. It's only major clearing occurs where a utility easement runs almost parallel along the main body of the creek. Some minor paths or access points have been suggested where the stream is closest to development, but for the most part the banks themselves remain undisturbed.

There is some residential development and portions of urban residential and institutional development near the headwaters for ET Creek. Portions of a nearby golf course also drain into the creek. A northern tributary also reaches into a light industrial area.

Land Cover* - ET Creek

	%
Forest	78.7
Other Grasses (Urban, Rec, Parks, Etc)	6.6
Low Intensity Residential	6.3
High Intensity Commercial, Ind, trans	3.5
High Intensity Residential	2.1
Pasture, Hay	1.7
Bare Rock, sand, clay	1.4
Transitional	0.4
Row Crops	0.0
Open Water	0.0
Woody Wetlands	0.0
Quarries, Strip Mines, Gravel Pits	0.0
Emergent Herbacious Wetlands	0.0
Total (acres)	***287***

**=The land use characteristics shown above were pulled from the Revised TMDL for ET Creek, and were determined using data from Georgia's Multiple Resolution Land Coverage (MRLC). This coverage was produced from Landsat Thematic Mapper digital images developed in 1995.*



E T Creek Location Map

Georgia Mountains Regional Commission

Legend

- *TMDL Stream Segment*
- *Major Roads*
- *Lakes and Ponds*
- *HUC 10 Watershed*
- *Conservation Lands*

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WATER QUALITY IMPAIRMENTS AND TMDLS

A Total Maximum Daily Load (TMDL) is a calculation of the maximum amount of a pollutant, from both point and non-point sources, that a waterbody can receive and still meet water quality standards. The Clean Water Act, section 303, establishes the water quality standards and the TMDL programs. TMDLs are simply the implementation of rules included in Section 303(d) of the Clean Water Act of 1972. The resulting inventory of impaired streams and water bodies – called the 303(d) list – provides a basis for decisions related to restoring water quality. Although some TMDLs are aimed at managing all sources of pollution which affect beneficial uses of water, the focus of the implementation plan discussed here relates primarily to nonpoint water sources including contamination from diffuse sources such as agricultural and urban runoff.

Impairment Sources and Recommended Loading Reduction			
Stream	**Impairment**	**Possible Sources of Contamination**	**Recommended Reduction**
ET Creek	Fecal Coliform	Nonpoint source pollution: Urban development, with leaking or damaged sewer lines, urban runoff, storm sewers, illicit discharges and leaking or failed septic tanks.	67%

EXISTING LOAD (1999)	TARGET TMDL	NEEDED REDUCTION
2015 cfu/100 ml	150 cfu/100 ml	1865 cfu/100 ml

VISUAL FIELD SURVEYS AND TARGETED MONITORING RESULTS

Visual Field Survey

Assessment of the watershed was done throughout the 1.5 years of the project, involving GMRC staff touring the watershed, identifying and noting land use and development trends and surveying the river and stream banks for general integrity. Where possible, GMRC staff also walked stream banks for closer examination of the water clarity and quality. Throughout the process, sites and land uses suspected of contributing to the impairment of the river were noted.

ET Creek and its main tributary comprise a very small watershed, most of which is wooded and within the Elachee Nature Center property or surrounding development buffers. Only at the extreme headwaters is either stream bank subject to encroachment from roadways, and no structure is within a hundred feet of the stream.

At either end of the watershed's northern end is the only significant development – Some older industrial facilities to the north and some older housing and two holes of a golf course to the south. With only limited exception all runoff from these properties must flow through wooded or heavily vegetated areas. Palmour Drive, which feeds traffic through the industrial area, comes close as the tributary runs within the right-of-way of the road. Additionally, there are some dirt roads and paths that come alongside and at one point cross over the streams.

GMRC staff drove and walked around the watershed at various points during the weeks of May 11 and August 10, 2009, noting conditions and looking for signs of land disturbance or changes to the watershed. At no point was severe erosion or human disturbance of the stream banks visible, with the

exception of some wear occurring along dirt roads reaching into the utility easement, which runs near parallel to the bottom half of ET Creek.

Observation of the industrial and residential areas did not reveal any visible evidence of failing septic or sewerage systems. Many of the residential structures are older (1950's?), however, and the age possible lack of maintenance of their utilities could have been a contributing factor to the original TMDL listing of the stream.

The bulk of the watershed is generally clear and thick with vegetation, the only evidence of disturbance stemming from the bike trails, clearing for the utility towers and their access roads, and the one sewerage life station. The roads and vegetation has received less maintenance during the past year, leading to thick overgrowth in many places.

Water looks relatively clear and the stream banks are intact. Some fish and turtles were spotted during most sample collections.

Targeted Monitoring Results

Between June 1, 2010, and September 30, 2011, GMRC staff collected samples at four previously identified sampling sites within the ET Creek watershed. Using Adopt-A-Stream guidelines and recommended materials, GMRC staff performed in-house testing to monitor bacterial levels for each water sample. They also performed updated field surveys of the watershed and discussed the preliminary results of the data with local stakeholders.

Sampling locations were originally identified last year, but have been slightly adjusted based on changes in accessibility. The proposed point furthest downstream had become more difficult to attain due to less maintenance of the utility easement during the current recession. Much of the power line corridor had become thick with vegetation and access roads and bike trails had become more difficult to manage. As an alternative, a 4th point was added along a small tributary within the woods, one that had not been shown on previous GIS files of streams in the area.

Specific sampling locations and GPS coordinates for each site are listed below. Samples were collected on the upstream side of the bridges and road crossings.

Sampling Stations			
Station Number	**General Location**	**Sampling Site Coordinates**	**Sample Parameters**
1	Tributary stream south of Palmour Drive	-83.837666 34.261771	*E. coli*
2	ET Creek at just below pump station	-83.936806 34.259882	*E. coli*
3	ET Creek midway point at utility easement	-83.835152 34.257042	*E. coli*
4	Tributary stream from western side of creek	-83.836755 34.258428	*E. coli*


X=-83.837666
Y=34.261771
X=-83.836806
Y=34.259662
X=-83.836755
Y=34.258428
X=-83.835152
Y=34.257042
X=-83.833444
Y=34.254356
Sampling Site Locations
ET Creek - Hall County
Georgia Mountains
Regional Commission
Legend

General results of the monitoring over the two year period suggests ET Creek is healthier than indicated in the original TMDL. Raw petrifilm bacterial counts were relatively low throughout, and reflect almost normal conditions expected for this size stream. Occasional dates display higher numbers due possibly to lingering effects of rain and runoff, especially downstream from the wastewater pipes. No other major trends were identified as part of the testing, however, and it is recommended that efforts to delist the stream be considered in the near future.

Though the sample sites downstream of the pump station routinely yielded the highest counts, no significant leaks or discharges were identified during collections. This facility will remain a high priority due to its location and nature but its impact downstream appears to diminish very rapidly, suggesting a prevalent issue would come from another source. Or that when there is accidental leakage from this facility it causes significant spikes in contaminant levels that such singular incidents can alter the overall average.

There were no visible incidents of significant animal intrusion or localized land disturbance. Nor were there regular signs of litter, debris or signs of visitations (apart from the bike trails) to indicate the stream banks had been disturbed. By all indications, anything reaching into the creek is doing so through runoff conditions or via a direct point not visible to the casual observer.

Dates and temperatures for the sample collections

			Temperature				
			Air	Water			
	Time	Conditions		1	2	3	4
7/11/10	12-2 PM	Clear	87.2	69.9	69.8	71.7	68.5
7/27/10	12-2 PM	Clear	88.3	71.1	71.0	72.2	68.8
8/20/10	1-3 PM	Lt. Clouds	86.7	71.3	71.4	72.5	68.9
9/3/10	1-3 PM	Clear	91.2	71.5	71.6	72.5	69.1
9/17/10	12-2 PM	Clear	84.3	71.8	71.7	72.6	69.3
5/21/11	12–1 PM	Lt. Clouds	75.7	64.8	64.8	65.0	64.7
6/22/11	12–1 PM	Clouds; Lt. shower	85.1	67.6	67.7	67.9	67.5
7/22/11	12–1 PM	Clear	91.3	71.2	71.4	71.9	69.0
8/20/11	12–1 PM	Cloudy	81.5	72.2	72.3	73.0	72.0
9/17/11	12–1 PM	Lt. Clouds	59.7	70.1	70.2	71.1	69.5

Raw petrifilm bacterial counts for each site and sample

Site	Draw Date	Sample Number			Avg.
		1	2	3	
1	**7/11/10**	1	1	0	0.67
	7/27/10	0	1	1	0.67
	8/20/10	0	0	1	0.33
	9/3/10	0	0	1	0.33
	9/17/10	2	0	3	1.67
	5/21/11	0	2	2	1.33
	6/22/11	1	0	2	1.00
	7/22/11	1	1	0	0.67
	8/20/11	2	1	2	1.67
	9/17/11	0	0	1	0.33
2	**7/11/10**	7	9	9	8.33
	7/27/10	4	10	7	7.00
	8/20/10	10	9	8	9.00
	9/3/10	19	19	12	16.67
	9/17/10	2	0	4	2.00
	5/21/11	4	6	4	4.67
	6/22/11	3	9	7	6.33
	7/22/11	7	10	9	8.67
	8/20/11	5	8	7	6.67
	9/17/11	5	3	4	4.00
3	**7/11/10**	4	3	3	3.33
	7/27/10	3	5	2	3.33
	8/20/10	3	8	12	7.67
	9/3/10	3	7	3	4.33
	9/17/10	2	4	7	4.33
	5/21/11	1	3	3	2.33
	6/22/11	2	5	5	4.00
	7/22/11	4	5	5	4.67
	8/20/11	3	3	5	3.67
	9/17/11	3	2	3	2.67
4	**7/11/10**	1	0	1	0.67
	7/27/10	2	0	2	1.33
	8/20/10	0	1	0	0.33
	9/3/10	2	2	2	2.00
	9/17/10	3	4	0	2.33
	5/21/11	1	1	0	0.67
	6/22/11	2	1	1	1.33
	7/22/11	1	0	3	1.33
	8/20/11	2	1	1	1.33
	9/17/11	2	2	1	1.67

RANKING AND PRIORITIZING OF SOURCES OF IMPAIRMENT

This element includes an accounting of the significant point and nonpoint sources in the watershed, in addition to the natural background levels that make up the pollutant loads causing problems in the watershed. The analytical methods did include mapping, modeling, monitoring, and field assessments to make the link between the sources of pollution and the extent to which they cause the water to exceed relevant water quality standards.

The original TMDL listed contributions to impairment coming from variants of agricultural activity and as a result of urban runoff. These were based in part due to a macro-scale assessment done for the watershed using older land cover maps and aerial imagery. The particular contributing factors and their recommended load reductions, as shown in the TMDL from 2001, are shown below.

Source	Extent	Magnitude	Permit (Y/N)	Estimated Contribution (Rank 1-5)	Stakeholder Priority (Rank 1-5)	Comments
Agriculture						
Diffuse runoff of animal waste associated with erosion	Med	Med	N	4	4	See Below
Runoff from concentrated animal operations	Low	Low	Y	1	1	Not applicable
Spreading of animal waste or municipal sludge on fields	Low	Med	Y	2	1	Not identified in watershed
Failing septic systems	Low	Med	Y	1	1	Se Below
Urban Runoff						
Intense urban land uses with impervious surfaces	Med	Med	N	3	2	See Below
Illicit discharges	Low	High	Y	3	3	See Below
Leaking sanitary sewer lines	Low	High	Y	3	3	See Below
Failing septic systems	Low	Med	Y	1	1	See Below

Recent surveys of the watershed reveal a starkly different array of potential contaminants, specifically the absence of any significant agricultural activity. Most of the watershed is an undeveloped utility easement and nature preserve, with almost all developed properties being urban-scale residential or industrial in use. Most notably, there are no concentrated animal operations within the watershed, so whatever human directed activity might be introducing animal waste into the watershed would be in the form of manure applications to assist plant growth. Even then such applications would likely be minimal at best, given the watershed's compactness and the nature that the developed portions feature

urban scales of activity.

Based upon current surveys of the watershed and inspection of other data, the updated description of probable impairment sources reflects the urban character of the watershed.

- *Leaking Sewer Lines*
  At least one sewer main runs through the watershed and across the stream, providing an opportunity for any leaks to directly enter the surface water. While preliminary investigation of the maintenance of this pipe revealed no major incidents, the potential severity of impact from any leaks means this remains a significant possible source for impairment.

- *Failing Septic Systems*
  While there are some properties within the watershed that once featured septic systems, all are now suspected to be on the City sewer system. Further, none of the structural development is within close proximity of the actual streams to facilitate impairment from failing systems. The two perennial arteries of the stream are separated from development through highly vegetated buffers and undisturbed woodlands. This will remain a possible cause, however, until it can be eliminated with more certainty.

- *Illicit Discharges*
  No illegal discharges were discovered as part of the GMRC's field survey, but this remains a potential source until it can be verified with more certainty. There are several industrial operations with private, screened properties that are within or abutting the watershed, as well as several residential properties adjacent to the nature preserve that could harbor activity not readily seen from public access points.

- *Urban Runoff*
  This is a strong candidate for source of impairment given the nature of the watershed, the northernmost portion of which includes some of the industrial activity around the city airport. The western edge, meanwhile, features a dense urban neighborhood and some commercial and institutional activity right up against the Chicopee Woods Nature Preserve. While there is typically an abundance of densely vegetated slope between the urbanized development and the stream banks, the likely strength and frequency of stormwater runoff within this watershed is considered high.

- *Diffuse Animal Waste*
  Another strong candidate for possible contaminant source is that of wildlife. There is a suspected deer population within the nature preserve as well as other wildlife native to northeast Georgia. Included within this is the likely presence of stray dogs and chickens (kept by many residents in their yards) that can readily be found in this part of Gainesville. While no animals were identified in significant numbers during the field surveys by GMRC staff, the ability for wildlife to easily reach the stream (which would be a likely water source for the area) makes this a possible source for contamination.

IDENTIFICATION OF APPLICABLE EXISTING MANAGEMENT MEASURES

This element describes the management measures that need to be implemented to achieve the load reductions estimated above, as well as to achieve any additional pollution prevention goals called out in

the watershed plan (e.g., habitat conservation and protection). Pollutant loads will vary even within land use types, so the plan should also identify the critical areas in which those measures will be needed to implement the plan.

The City of Gainesville maintains many policies and programs which illustrate their commitment to environmental stewardship in general. Many of these measures apply to ET Creek, though the specific activity may not have occurred during this planning time frame. However, as these actions benefit all of the City and its properties, they are being presented to demonstrate the type of watershed management already in place in Gainesville for ET Creek.

With regards to regulations to protect natural resources, the City of Gainesville has adopted and enforces all applicable "Part V" ordinances. These ordinances, called the Environmental Planning Criteria, include Water Supply Watersheds, Protection of Groundwater Recharge Areas, Wetlands Protection, River Corridor Protection and Mountain Protection. The Environmental Planning Criteria was establish through the Georgia Planning Act as a method of identifying minimum standards that should be implemented to protect Georgia's most sensitive natural resources, known as State Vital Areas. These include wetlands, water supply watersheds, protected rivers, groundwater recharge areas, and mountain protection areas. Local governments are encouraged to adopt regulations for the protection of relevant natural resources to maintain their eligibility for certain state grants, loans, and permits. The Georgia Department of Natural Resources has developed model ordinances to be used as guides for local governments as they develop the necessary regulations to meet EPD standards.

Both Hall County and Gainesville have ordinances protecting all surface waters with setbacks ranging from 25 to 150 feet, depending on the stream classification. Enforcement of these regulations, along with erosion and sedimentation control and development regulations assist both in preserving water quality, stable stream banks and shorelines, and with flood management. The City of Gainesville has the required environmental regulations for development in place and identifies wetlands based on the national Wetlands Inventory Maps prepared by the U.S. Department of the Interior. The inventory of wetlands is monitored in conjunction with the Hall County GIS department.

As an additional measure, the City of Gainesville Public Utilities Department has been completing environmental monitoring and public education around our water resources since 1987. Since the program's inception the city has won numerous awards and recognitions, including being certified in 2008 as a 'WaterFirst' Community, one of only eighteen municipalities so recognized in Georgia. Each week, Environmental Specialists from the Department perform visual inspections along area streams and routinely collect chemical data. This information allows the City to assess the health of our waterways and address any sources of pollution that might be present. Most importantly, this monitoring allows the City to quickly know if there is a problem.

Additional programs or measures employed by Gainesville to assist with resource protection include:

- **Adopt-a-Stream Program-** This state-wide program allows community groups of all ages to receive chemical, biological and visual training to 'adopt' any stream or stream segment that is not currently being monitored. After training, groups can monitor their waterway throughout the year to ensure that it remains healthy.

- **Annual Stream Cleanup**- Each year, a stream cleanup is held at various sites to remove litter and other debris that have been thrown or washed into the waterways. In the past, shopping carts,

tires, car parts and even toilets have been found. The 2011 Rivers Alive Cleanup was a huge success. Thanks to 150 volunteers, 3,120 pounds of trash was removed from Longwood Park Cove in only a few hours.

- **Presentations in Local Schools and Community Groups –** Each year, over 200 presentations are given to classrooms and community groups. Presentations are offered to all ages and can be tailored to any curriculum or agenda. In the past, lessons have been given on water conservation, environmental assessments, storm water pollution, and the water and wastewater treatment process. These lessons can be hands on or lecture based.

- **Captain Conservation -** Gainesville's very own superhero. Captain Conservation visits elementary students and adult groups to spread the word about the importance of water conservation. He can even be seen around town from time to time.

- **Storm Drain Stenciling-** Environmental Specialists accompany citizen groups to spray paint "no dumping drains to stream" (In English and Spanish) signs on area storm drains. These drains are not treated before they discharge into streams and these signs act as a reminder that waste should not be poured down the drains.

The City of Gainesville also provides water and sewer service to residents and businesses within and outside of the City, including to all developed properties within the ET Creek watershed. The City's Environmental Services Section administers the Industrial Pretreatment Program as mandated by the Federal Clean Water Act. This program regulates local businesses and industries and provides information to them concerning their wastewater discharges. This section also inspects and monitors these discharges in order to protect the wastewater treatment plants, workers, sewer system and the receiving stream.

All new commercial businesses wishing to locate within the City of Gainesville must complete an Industrial Pretreatment Permit application. After reviewing the application, the Environmental Services staff will make a decision as to what level permitting is required. The City of Gainesville has two classifications of industrial users; the first classification is a Significant Industrial User, and the second is an Industrial User. All prospective users that meet any of six designated categories shall be subject to both Permitting and Industrial Pretreatment. If the prospective user does not meet the categories listed, the application will be reviewed to determine what level of management will be required to comply with local ordinances.

Any nonresidential user of a publicly owned treatment works which discharges up to the equivalent of 25,000 gallons per day of process wastewater and/or contaminated non-process wastewater and in the opinion of the Director may have a significant impact, either singly or in combination with other contributing industries, on the treatment works or upon the quality of effluent from the treatment works.

The City of Gainesville also complies with the federal Clean Water Act with regards to discharge management. Title IV of the Clean Water Act establishes the National Pollutant Discharge Elimination System (NPDES) permit program. Basically, there are two categories of NPDES permits: 1) municipal and industrial wastewater treatment facilities and 2) regulated storm water discharges. The City's wastewater discharge is regulated under this standard, but is not included within the ET Creek Watershed.

Some storm water runoff is covered under the NPDES Permit Program. It is considered a diffuse source of pollution. Unlike other NPDES permits that establish end-of-pipe limits, storm water NPDES permits establish controls. Currently, regulated storm water discharges that may include discharges with fecal coliform bacteria consist of those associated with industrial activities, including construction sites five acres or greater, and large and medium municipal separate storm sewer systems (MS4s) that serve populations of 100,000 or more.

As of March 10, 2003, small MS4s serving urbanized areas are required to obtain a storm water permit under the Phase II storm water regulations. An urbanized area is defined as an area with a residential population of at least 50,000 people and an overall population density of at least 1,000 people per square mile. Gainesville is considered an MS4 Phase II community, and is considered fully compliant with this program.

In addition to the City, the Elachee Nature Center and the Board for the Chicopee Woods Nature Preserve also support resource protection efforts within their lands. Elachee hosts more than 80,000 people per year, reaching as many as 35 different school systems, to provide educational and instructional programs about habitat preservation, natural resource protection and other wildlife and naturalist programs. The facility and staff work to improve awareness, respect and preservation of the Chicopee Woods Nature Preserve and all of northeast Georgia's natural lands.

Staff and volunteers from Elachee have supported formal TMDL implementation measures for ET Creek in the past, including stream bank clean-up and restoration that was part of a previous 319 grant project. From 2004-2006 this helped the Center organize stakeholders for special efforts to remove litter from stream banks, shore up walking trails and areas of exposed earth, as well as surveying the watershed for environmental integrity and identification of possible sources of contamination. Elachee has hosted Adopt-a-Stream classes and done sampling using Adopt-A-Stream standards, hosted instructional forums on environmental protection as well as hands-on stream bank clean up and restoration projects.

RECOMMENDATIONS FOR ADDITIONAL MANAGEMENT MEASURES

On the basis of the existing source loads estimated above, this element discusses various management measures that will help to reduce the pollutant loads and estimate the load reductions expected as a result of these management measures to be implemented, recognizing the difficulty in precisely predicting the performance of management measures over time. The estimate should account for reductions in pollutant loads from point and nonpoint sources identified in the TMDL as necessary to attain the applicable water quality standards.

The recommended load reductions with this WIP are representative of the projected share each potential source contributes to the overall impairment. It has also been selected based on the probable impact of remediation measures.

BMP	Pollutant Source	Estimated Effectiveness	Estimated Load Reduction (%)	Cost Estimate	Public Support (1-5)	Install Priority	Comment
Update GIS information	Urban runoff; Leaking sanitary sewer lines	Low	0%	NA	5	5	
Utility Corridor BMPs	Urban Runoff; Diffuse runoff of animal waste	Low	<5%	$3,000	4	3	
Review sewer tap/ septic permit records	Failing septic systems	Med	20%	$5,000	4	4	
Review/inspect sewer line status	Leaking sanitary sewer lines	High	25%	$5,000	5	5	
Targeted surveys and clean-up events	Diffuse runoff of animal waste	Med	10%	$5,000	5	4	
Investigate permits	Illicit discharges	Low	<5%	$5,000	4	3	
Impervious Surface BMPs	Urban Runoff	Med	10%	TBD	4	3	
Targeted sampling	All	NA	0%	$30,000	5	4	

Proposed Management Measures

- *Update map of sewer lines and/or septic systems by parcels*
  The City's GIS database is already pretty accurate and reflects the sewage/septic use for each property within the watershed. This must be maintained to high levels of detail should conditions change in the future. Efforts should also be made to introduce watershed specific information with regards to the locations of any identified leaks, discovery of contaminants, reports of significant wildlife habitat, etc. A developing catalog of geospatial data related to potential point and non-point data would assist in protecting the stream from further contamination.

  For ET Creek, the City Departments of Environmental Health and Public Utilities can work to confirm that all records of sewer taps are correct and research records concerning older properties that may have once featured on-site septic systems. City staff have indicated that properties older than 1970, including the residences within the watershed, do not have complete records on their network and would need to be researched through archived files. This effort would confirm the existence of any on-site septic systems in the area, and whether or not those systems have been properly flushed and decommissioned. If any septic systems are discovered in the watershed, this effort would identify the need for remediation measures and allow the City to pursue assistance to have such systems properly decommissioned.

- *Review of BMPs regarding power line utility easement within the watershed*
  The City should work with the EMC and Georgia Power to ensure the awareness of latest and greatest practices with regards to maintaining easements for lattice power line towers. This

should be followed up with a review with the utility companies about historic maintenance practices within the ET Creek watershed, noting any incidents that might have contributed to disturbance of the stream bank, recognition of any possible sources of contamination, etc. The City should then work with the companies in asking for reports from any and all maintenance along utility easements so as to help record the ongoing integrity of the watershed.

Further, the City should make sure the BMPs practiced within ET Creek help retain the integrity of the local vegetation and do not contribute to adverse runoff conditions. This could include a review of the particular topography along the exact utility corridor and the access roads. Any identified areas where the utility corridor may contribute to exacerbated erosion and runoff conditions should be addressed as quickly as possible. Gainesville should also investigate the applicability of the Better Back Roads program BMPs with the utilities, and begin to ensure these practices are the norm for all easement areas within the City.

- *Investigate discharge permits and property records*
  The proximity of industrial uses to the stream, and particularly given that such activity is immediately uphill from the stream, lends credibility to the potential for any illicit discharge to reach the creek. The City should review all records of industrial discharge permits, on site storage of chemicals and any records on on-site package treatment of wastewater. There are no properties currently suspected of violating codes and discharging into the stream, but a review of records and investigation of properties could be pursued to ensure this isn't occurring.

- *Targeted water sampling for delisting*
  Due to the projected relative improvement of water quality based upon GMRC sampling, the ET Creek watershed should receive a more focused water sampling to officially confirm the level of any contamination and possibly have the stream removed from the lists of impaired waters. In the interim while pursuing the means and approval to formally test for delisting, there should be ongoing monitoring of the stream for ecoli to track the general health of the water and identify and problem areas within the watershed.

  The City and local stakeholders should pursue the development of a Sample Quality Assurance Program (SQAP) for ET Creek that would support monitoring for the express purposes of possible delisting. This could be done in coordination with the City's existing lab and environmental health programs, with support from the GMRC or other stakeholders.

- *Review and update maintenance of the sewer lines within the ET Creek watershed*
  The City maintains a general record of all sewer line inspections and maintenance actions. These records could be given an additional review for any activity or notes for events within the past 5 years. The City should also schedule future inspections with regards to the need for vigilance within the ET Creek, and keep a record of those as part of an ongoing watershed monitoring report. This may be a small measure regarding immediate needs, but would assist in mitigating future issues much more quickly and efficiently.

- *Targeted stream bank surveys and clean-ups*
  In addition to routine observation and surveys of the watershed, a concentrated effort to walk as much of the stream as possible at least once per year would help confirm the integrity of the stream banks and identify possible points of animal intrusion. This could coincide with efforts to maintain the cleanliness of the watershed, and would increase public awareness of the need to

sustain healthier watersheds. These could be coordinated with Adopt-A-Stream to both benefit Gainesville and also provide an additional opportunity for volunteer training and participation.

- *Review and update of education programs and materials*
  The City of Gainesville currently employs several methods to engage area residents, employers and developers on the rules and efforts behind maintaining local water quality. A specialized approach for ET Creek could aid in this effort by providing targeted information to critical stakeholders, building a stronger sense of vested interest among property owners and business owners and hopefully increasing awareness and support for BMPs and mitigation measures. This could include promotional material illustrating the health of the ET Creek watershed and special guidance about WIP related activities and issues. This material could be distributed through the City, the Elachee Nature Center and the local chapter of SORBA that helps maintain the bike trails within the Chicopee Woods preserve.

- *Urban Runoff Management BMPs*
  For the urbanized areas with a high degree of stormwater runoff, additional reviews to ensure the highest degree of BMPs are in place would assist in controlling the effect of diffuse runoff that could introduce animal wastes and other contaminants into the stream. Proper use of swales, detention ponds, warning signage about illicit dumping or litter and other measures are called for through existing City regulations or promoted through City offices, but it is unsure to the extent these measures are practiced/enforced within the ET Creek watershed. A concerted effort to survey and rate the application of such BMPs would identify any issues or confirm this is not the chief concern for ET Creek.

Many of the measures proposed here can be wholly or partially addressed through existing City programs and resources, provided the work is coordinated with existing and routine tasks. Items such as sewer line inspections and reviewing records, for instance. This may not expedite progress but would allow the City to maximize cost savings, and the only new task would be recording everything as related to this management plan.

Efforts to give the watershed special attention may require additional time or could be done in conjunction with partner organizations like Elachee Nature Center, SORBA and the GMRC.

The targeted monitoring would require the most expense and outside assistance, based upon the level of technical expertise required. The City and/or GMRC should pursue financial assistance to cover the costs of affiliated lab work and extensive field sampling required to meet EPA standards for delisting. Should continued watershed monitoring identify new sources of probable contamination, such as an illicit discharge, then additional outside assistance would be required to pursue specific remediation.

Where some projects may entail the need for critical investment, some outside funding sources should be called upon to assist local efforts. The following list identifies potential funding sources that the City or other stakeholders could pursue to assist with financing special projects and efforts, paying for materials, manpower or specialized lab testing. As the stakeholders begin to address specific tasks, each potential outside funding source should be considered for support. Further, the GMRC and local stakeholders should routinely consult EPA and other organization to learn about other opportunities or funding resources not listed here.

Georgia Environmental Facilities Authority - GEFA's program focus areas are water, wastewater, solid waste, recycling, land conservation, energy efficiency and fuel storage tanks for local governments, other state agencies and non-profit organizations.

Clean Water State Revolving Fund - Programs cover the cost of engineering, planning, and design, construction, and contingencies.

Southeastern Regional Water Quality Assistance Network - Can provide funding to assist communities in water quality and related projects.

NRCS: Environmental Quality Incentives Program (EQIP) - Page maintained by NRCS that contains information on this program that provides monetary and technical assistance.

NRCS: Wildlife Habitat Incentives Program (WHIP) - Page maintained by NRCS that contains information on this program that provided monetary and technical assistance for habitat conservation for fish and wildlife.

US EPA Section 319 Grant Program - Under Section 319, states, territories and tribes receive grant money that supports a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to assess the success of specific nonpoint source implementation projects.

Community Action for Renewed Environment (CARE) Grants - Projects to help communities reduce toxics in their environment and to solve environmental problems.

5-Star Restoration Program - Must have five or more project partners. Provides environmental education through streambank and wetland restorations.

PARTNERSHIP ADVISORY COUNCIL AND PARTNER ORGANIZATIONS

Any successful environmental protection and mitigation program requires a level of public outreach, education and involvement. This ensures the community is receiving the most information possible to correctly assess the situations and make wise decisions. This also ensures the widest number and variety of stakeholders and potential contaminant contributors are being presented with the information necessary to implement any improvement measures.

The City currently maintains general promotional material within their offices regarding environmental protection standards, best management practices and water preservation measures for homes and businesses. Part of their development/land disturbance permitting process involves reviews for compliance with minimum standards and the employment of best practices to protect water resources. This process should continue regarding ET Creek and all other sensitive areas.

The City can consider providing additional reports and other information regarding the health of TMDL streams and efforts related to their protection and remediation. A list of reports such as this WIP, TMDL Implementation Plans and other resource studies should be advertised as available to the public and made accessible through web sites and City offices.

The City also provides several avenues for actively engaging the public, educating citizens about natural resource issues and distributing material at public events. Public Works staff and other City officials regularly give presentations to school groups and other civic clubs, including the use of their Captain Conservation character to promote awareness and understanding of water resource protection. Incorporating the specific measures and issues related to ET Creek should be included in these efforts as needed.

Specific measures regarding ET Creek will include regular communication and meetings with the Partnership Advisory Council (PAC) and other stakeholders. At least one formal meeting per year should be provided for this group, giving them updates on progress with implementation efforts and any water monitoring. Coordination of special implementation measures, such as stream bank clean ups, should be guided by PAC members. The PAC should also advise on how better to reach additional stakeholders in the future regarding soliciting public input or notifying area residents and businesses about the WIP.

NAME/ORG	ADDRESS	CITY	ZIP	PHONE	E-MAIL
Adam Hazell; GMRC	PO Box 1720	Gainesville	30503	770.538.2617	ahazell@gmrc.ga.gov
Barbara Stitt-Allen; EPD	4220 International Parkway, Suite 101	Atlanta	30354	404-675-1745	barbara_stittallen@dnr.state.ga.us
Ga. Water Coalition	817 W. Peachtree St.; Suite 200	Atlanta	30305	866-889-2837	sudvardy@gaconservancy.org; sbarmeyer@gwf.org
Brooks Corely; Public Works Department		Gainesville	30503	770.532.7462	bcorley@gainesville.org
Cynthia Taylor, Elachee Nature Center	2125 Elachee Drive	Gainesville	30504	770.535.1976	cynthia@elachee.org
Rusty Ligon; City of Gainesville		Gainesville	30503		rligon@gainesville.org
Randy Knighton; Hall County	116 Spring Street; PO Drawer 1435	Gainesville	30503	770.531.6809	rknighton@hallcounty.org
Hall County Farm Bureau	2405 Lighthouse Manor	Gainesville	30501	770.536.3461	
*SORBA – Gainesville Chapter		Gainesville	30501		Gainesvillesorba.org
*Margi Flood, Gainesville State College	P. O. Box 1358	Gainesville	30503	678.717.3743	mflood@gsc.edu
Environmental Services Division, City of Gainesville	757 Queen City Parkway, SW	Gainesville	30501	770-532-7462	jflowers@gainesville.org

***=Recommended partner, but no confirmation of commitment**

SCHEDULE OF SEQUENTIAL MILESTONES

The following table presents the recommended implementation schedule for to-be-completed actions or newly proposed remediation measures. This assumes the City and other stakeholders are continuing with existing and ongoing measures already discussed in this WIP and/or all previous TMDL plans and reports for ET Creek.

	Timeline	
Action Item	**Begin**	**End**
Promulgation of the WIP	1/12	NA
Update map of sewer lines and/or septic systems by parcels (As needed)	1/12	6/12
Review of BMPs regarding power line utility easement within the watershed	3/12	9/12
Convene PAC; Review progress with implementation (1x per year)	6/12	NA
Review and update maintenance of the sewer lines within the ET Creek watershed	6/12	6/13
Targeted stream bank surveys and clean-ups (2 x per year)	2012	2017
Targeted water sampling for delisting	2013	TBD

Interim Measureable Milestones

Part of this process included the development of interim, measurable milestones to gauge progress in implementing the management measures for the watershed. These milestones will measure the implementation of the management measures, such as whether they are being implemented on schedule, as identified and without difficulty.

Action Item	**Date**	**Milestone**
Promulgation of the WIP	NA	Summary memo re: distribution
Update map of sewer lines and/or septic systems	6/12	Copy of latest map for files
Review of BMPs re: power line utility easements	9/12	Summary of discussions w/ utilities
Convene PAC	NA	Copy of minutes
Review/ update maintenance of sewer lines	6/13	Summary memo of effort
Targeted stream bank surveys and clean-ups	2017	Copies of promotional material
Targeted water sampling for delisting	TBD	Application for assistance

In addition to the identified milestones, the GMRC and City of Gainesville could collaborate in producing a simple, annual memorandum identifying progress with implementation measures for use in reporting to the PAC, EPD and other stakeholders.

PUBLIC INVOLVEMENT

During this planning process, public comment and input was solicited through a combination of email notifications to select stakeholders, distribution of notices and two open forums.

Once preliminary stakeholder groups were identified, GMRC staff reached out to those parties and invited further nominations for inclusion in general communications. This led to the creation of an email list used for announcements of the public forums and comment opportunities.

Additional notices were distributed at select locations for posting in public locations or copying and handing out. These notices were provided to the Elachee Nature Center, Jones Elementary School, the City of Gainesville (Planning Department and the Public Utilities Department), and were posted on the Gainesville SORBA managed bulletin board at the trailheads feeding into the Chicopee Woods preserve. Notices were also provided to the GMRC Council at select council meetings.

Only 2 phone calls and 3 new interested parties were identified as part of this process for ET Creek. Comments from these and other stakeholders established consensus that the likely cause is a combination of diffuse animal waste (likely wildlife) reaching the stream through runoff and the lower potential of sewer leaks or unknown illicit discharges. No one was aware of any operating on-site septic use in the watershed, nor are there any confined animal operations, crop plantings or pastures in the watershed.

Future public involvement will be more aggressively encouraged through specialized promotional and educational material, as well as efforts to include ET Creek sampling and monitoring within proposed training programs for Adopt-A-Stream and the Elachee Nature Center outreach programs. Classes from Gainesville State College will also be invited to participate in remediation and monitoring projects. Notices about efforts to pursue delisting of ET Creek will be featured within environmental notices shared by Elachee Nature Center and the City of Gainesville, raising awareness about both ET Creek and the overall stewardship programs of local stakeholders.

It has also been suggested that, since the previous environmental advisory committees did not stay together after the Elachee Nature Center's 319 project was completed, that a comparable body of local stakeholders be convened once per year to address watershed management throughout Hall County in an ongoing basis, beginning with ET Creek.

RECOMMENDATIONS FOR MONITORING AND CRITERIA FOR MEASURING SUCCESS

Watershed management plans must include a monitoring component to determine whether progress is being made toward attaining or maintaining the applicable water quality standards. There must be water quality benchmarks to track progress, and the monitoring program should ideally be integrated with the established schedule and interim milestone criteria.

One facet of criteria should be the confirmation of data and conditions through City programs, utilities or efforts. This can hopefully be done at little to no extra cost by the verification and update of select of records and special actions for ET Creek as part of routine maintenance. This would include the following items:

- Confirmation that no septic tanks are in operation within the watershed, and that any old systems have been properly flushed and decommissioned;
- Confirmation of no leaks from sewer lines and pump station within the watershed;
- Confirmation of no suspected illicit discharges within the watershed;
- Confirmation that all applicable BMPs are being practiced by the City, business and property owners and the utility managers.

These actions can be scheduled for the convenience of City staff where applicable. Any activities requiring additional financial support or additional manpower can be pursued as grant opportunities or the City can ask other partners (GMRC) to assist. Achievement of the above will at least rule out the probability that any lingering pollution would stem from those sources, and allow the City and other stakeholders to concentrate on animal waste within runoff. Such measures would also ensure the long-term integrity of the stream is more secure due to the overall vigilance and increased knowledge available to the City.

The next foremost criteria for monitoring progress would be the eventual development of a SQAP and pursuit of formal testing to have ET Creek officially removed from the 303(d) list. Should this be performed and the delisting accomplished, then the watershed efforts for ET Creek can focus on maintenance. Should the effort reveal a continuing problem, the new data can be used to further isolate the probable cause. The City lab is certified to process samples for delisting purposes, and it is hoped this could be accomplished at minimal cost.

All other measures and criteria can be pulled from the list included within the **SCHEDULE OF SEQUENTIAL MILESTONES**.

APPENDICES

A. USEPA Guidelines for Watershed Planning

B. Watershed Maps

C. Land Use Maps

D. Field Notes and Pictures

E. Copies of Public Notices and Other Literature

F. Meeting Minutes

G. Targeted Monitoring Program

APPENDIX A - USEPA Guidelines for Watershed Planning

GA EPD recommends that the Watershed Improvement Plan include the following elements to comply with USEPA Guidelines (9 Key Elements):

1) An identification of the sources or groups of similar sources contributing to nonpoint source pollution to be controlled to implement load allocations or achieve water quality standards. Sources should be identified at the subcategory level with estimates of the extent to which they are present in the watershed;

   Addressed in "Ranking and Sources of Impairment," pages 10-11.

2) An estimate of the load reductions expected for the management measures described under paragraph (3) below;

   Addressed in "Recommendations for Management Measures," pages 14-18

3) A description of the NPS management measures that will need to be implemented to achieve the load reductions established in the TMDL or to achieve water quality standards;

   Addressed in "Recommendations for Management Measures," pages 14-18

4) An estimate of the sources of funding needed, and/or authorities that will be relied upon, to implement the plan;

   Addressed in "Recommendations for Management Measures," pages 14-18

5) An information/education component that will be used to enhance public understanding of and participation in implementing the plan;

   Addressed in "Public Involvement," page 21

6) A schedule for implementing the management measures that is reasonably expeditious;

   Addressed in "Schedule and Sequential Milestones," page 20

7) A description of interim, measurable milestones (e.g., amount of load reductions, improvement in biological or habitat parameters) for determining whether management measures or other control actions are being implemented;

   Addressed in "Schedule and Sequential Milestones," page 20

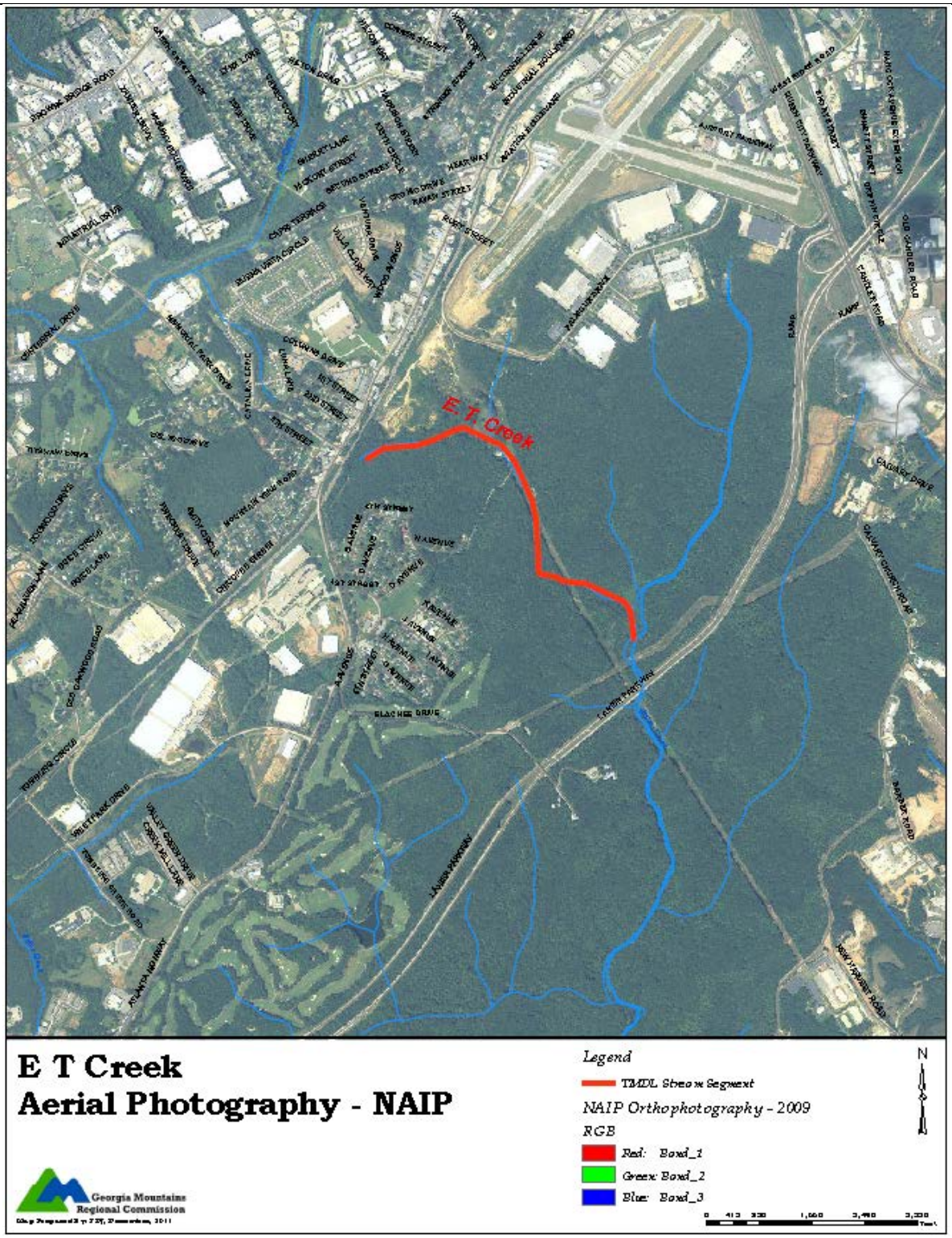
8) A set of criteria that can be used to determined whether substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether the plan needs to be revised; and;

   Addressed in "Recommendations for Monitoring and Criteria for Measuring Success," pages 21, 22

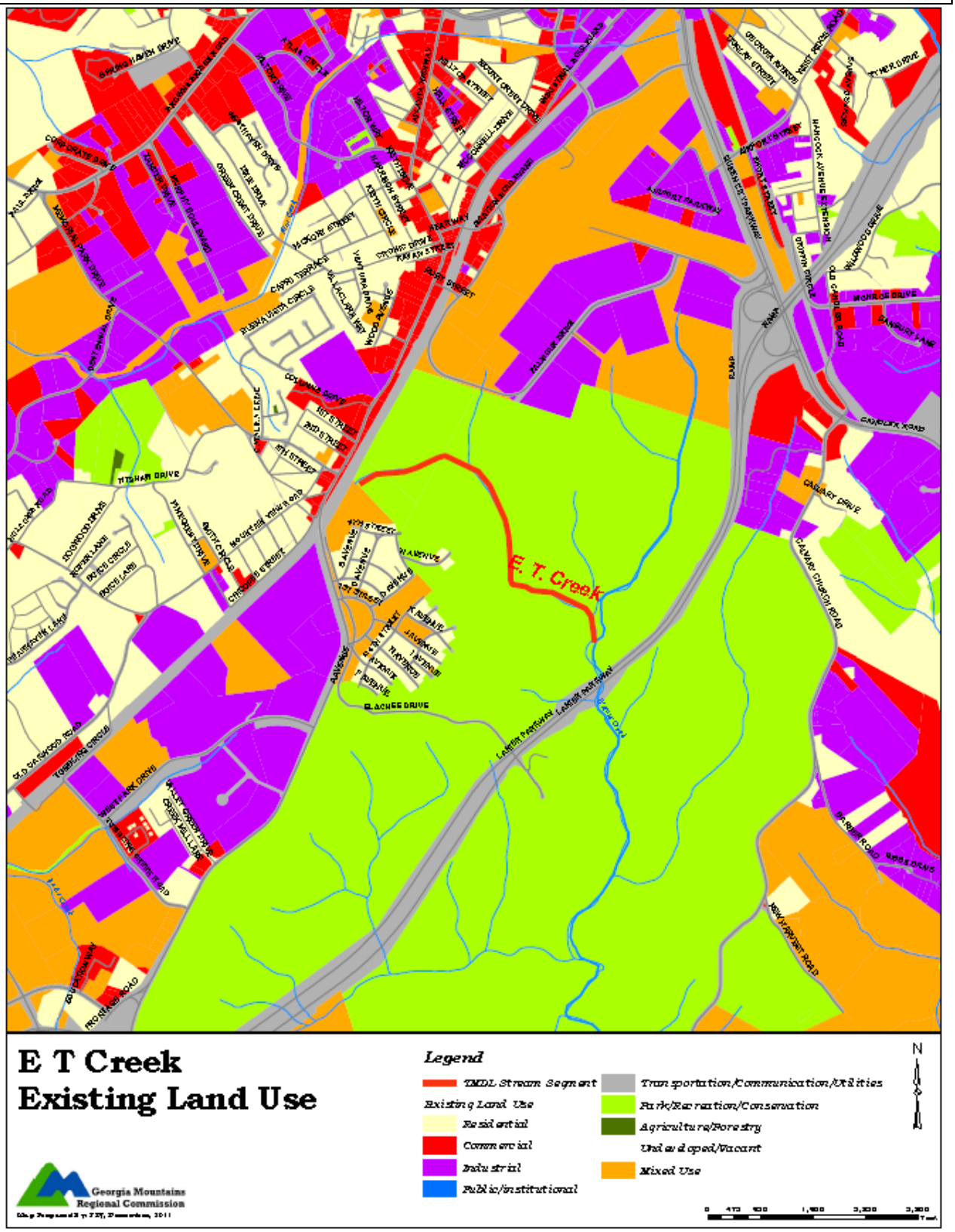
9) A monitoring component to evaluate the effectiveness of the implementation efforts, measured against the criteria established under item (8).

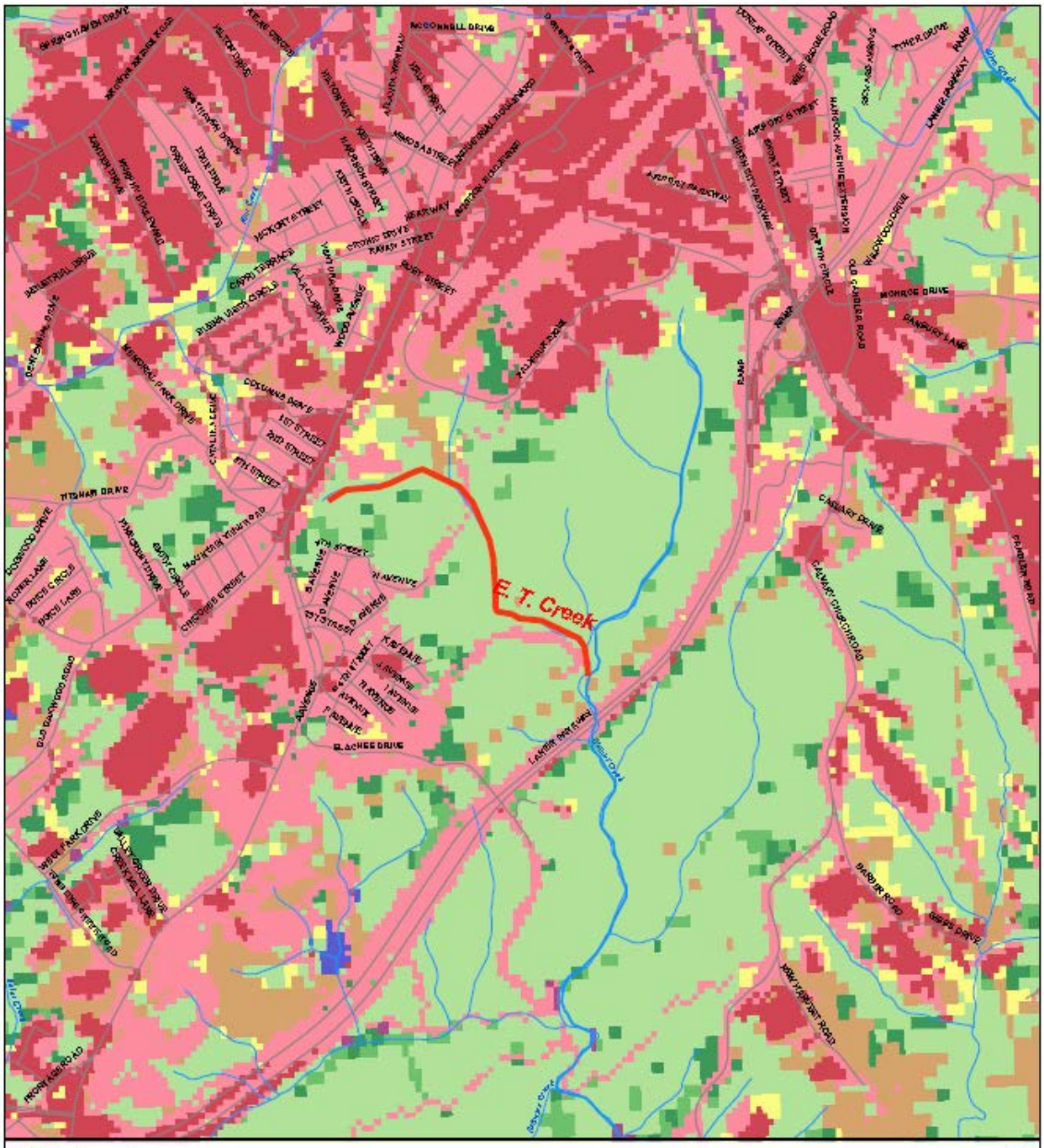
Addressed in "Recommendations for Monitoring and Criteria for Measuring Success," pages 21, 22

APPENDIX B - Watershed Map



APPENDIX C - Land Use Maps





E T Creek
Georgia Land Use Trends -
Land Cover of Georgia 2008

Legend

TMDL Stream Segment

N

Georgia Mountains Regional Commission

0 450 900 1,800 2,700 3,600 Feet

APPENDIX D - Field Notes, Maps and Pictures

Additional comments and survey observations have been included within the main text of the document.

Sample Site #1 – Facing Upstream

This area is upstream from the pump station and near the base of the 40' slope between the easement/wilderness area and the roadway through the industrial park. Roadways in the area are unpaved, and the access road along this stretch is approximately 10' to the right of the picture.

Most of the grass and weeds are high throughout the season except for on the roadways, bike paths and select foot paths.

Sample Site #2 – Facing Upstream

This sample site is immediately downstream from the pump station, where the road crosses a culvert over the main artery of ET Creek.

There is a small parking spot and loop road for vehicles accessing the station to the right of the picture. The terrain here is comparably flat for about 30' on either side. Further downstream, however, the east side becomes much steeper within 10' of the stream bank, and the corridor carved through the wooded areas by the utility towers mean this run of the creek is relatively devoid of tree cover.

Sample Site #3 – Facing Upstream

At this point the stream has meandered along a shallow slope on the valley floor, merged with one other small tributary (Sample 4's stream) and is about to return to the tree cover of Chicopee Woods, before later emerging into the open utility corridor once more about 1 mile downstream.

At this point the growth along the stream banks is more dense, save for the one point shown where one access road cuts directly through the water. At this point depth ranges from 1 -7", approximately.

Sample Site #4 – Facing Upstream

This feeder stream lies within the northern woodlands between the utility corridor and the established residences of the Chicopee Community. Here the one formal access road is routine crossed by footpaths and bike trails that are prevalent throughout the preserve. The road crosses through the stream, which appears 3" at its deepest.

Here the slope is much steeper than the main artery of ET Creek, and while the stream is in a densely wooded area, the stream banks at this point show the wear of being in a higher trafficked area.

APPENDIX E - Copies Of Public Notices And Other Literature

The following announcement was shared via email and posted in various locations around the watershed.

PUBLIC REVIEW AND HEARING OPPORTUNITY

to discuss

WATERSHED IMPROVEMENT PLANS

~

for ET Creek (Hall County) and the Chattahoochee River (White County)

DATE	**LOCATION**
6/28/11 – Tuesday	GMRC offices
1-3 PM	1720 West Ridge Road, Gainesville, GA 30503

The above listed water bodies have been the target of recent remediation efforts to remediate previous concerns regarding possible bacterial contamination. As part of continuing efforts to ensure progress is being made to sustain water quality, the State and other stakeholders are now updating surveys and knowledge about the watersheds.

This session will be an open forum to discuss developments and conditions within the respective watersheds, focusing on the identification of any possible sources for bacterial pollution. Participants will have the opportunity to view material, provide comment, offer suggestions for updating documents and learn of other measures for future public input.

For additional information please contact
ahazell@gmrc.ga.gov
770.538.2617

Or visit www.gmrc.ga.gov for copies of material and directions to the GMRC offices

APPENDIX F - Meeting Minutes

There were no appearances at either public comment opportunity. Comments provided by stakeholders identified within the plan (as received during phone and personal communications with GMRC staff throughout the planning period) have been included within the general text.

APPENDIX G - Targeted Monitoring Program

TMDL Implementation
Targeted Monitoring Plan

for

ET Creek in Hall County, Georgia
HUC #0307010101

September 2009

Prepared and Submitted by the

Georgia Mountain Regional Commission
P.O. Box 1720
Gainesville, GA 30503
www.gmrdc.org/Planning.htm

Table of Contents

I. INTRODUCTION

A. Watershed Profile

ET Creek is a headwater tributary to Walnut Creek, located entirely within Hall County. It is situated just southeast of Gainesville and northeast of Oakwood, nestled mostly within the Elachee Nature Center. Walnut creek eventually drains into the Oconee River.

ET creek itself meanders through mostly wooded area preserved as part of the nature center. It's only major clearing occurs where a utility easement runs almost parallel along the main body of the creek. Some minor paths or access points have been suggested where the stream is closest to development, but for the most part the banks themselves remain undisturbed.

There is some residential development and portions of urban residential and institutional development near the headwaters for ET Creek. Portions of a nearby golf course also drain into the creek. A northern tributary also reaches into a light industrial area.

Table 1.1 Impairment Sources and Recommended Loading Reduction

Stream	Impairment	Possible Sources of Contamination	Recommended Reduction
ET Creek	Fecal Coliform	Nonpoint source pollution: Urban development, with leaking or damaged sewer lines, urban runoff, storm sewers, illicit discharges and leaking or failed septic tanks.	67%

B. Monitoring Objectives

Objective - Monitor for pollutants or constituents contributing to impairment within ET Creek in Hall County and the Upper Oconee River Basin.

All sample collection, field parameters, and lab analysis will be conducted in accordance with Ga EPD guidelines and by GMRC staff with proper certification

Background – This effort is a follow-up measure to several previous TMDL planning measures, most recently the TMDL Status Reports completed in 2008. The original plans were developed in response to the designation of several streams within the watershed being identified as either non-supporting or partially supporting their designated use by the Georgia Environmental Protection Division (EPD). Those plans addressed the general mitigation measures needed and proposed monitoring plan required for several streams in Hall County within the Upper Oconee River Basin. Based on the changes in land use and the implementation of select improvement measures by various stakeholders, EPD and the GMRC have identified ET Creek as viable candidates for an Extended Revision and targeted monitoring.

C. Project Organization

Georgia Environmental Protection Division (GAEPD)

- Will reimburse expenses incurred for this project with Section 106 grant funds under a contract with the Georgia Mountains Regional Commission (GMRC); will use this data to update the 303(d) List and TMDL implementation plans and for water quality management; and will review this data when evaluating the stream segments for water quality compliance.

Mary Gazaway
Contract Advisor
Georgia Environmental Protection Division
404-675-1745
mary.gazaway@dnr.state.ga.us

Georgia Mountains Regional Development Center (GMRDC) - Will coordinate the project; will administer the grant budget; will collect the samples and perform the bacteria sample analysis.

Adam Hazell
Project Manager
GMRDC Planning Director
770-538-2617
ahazell@gmrdc.org

Additional GMRDC Staff to be involved in collecting samples –

Chip Wright, Historic Preservation Planner	770.538.2626	cwright@gmrdc.org

Hall County/ Elachee Nature Center – Will use this data to update TMDL implementation plans and for water quality management.

II. SAMPLING METHODOLOGY

a. Targeted sites

Sampling locations were identified based on accessibility. Being a small stream and small watershed, a tributary was also selected for targeted monitoring based on accessibility and the impact of the airport area. Specific sampling locations and GPS coordinates for each site are listed below in Table 2.1. A map of the sampling locations may be found in Figure 1. Samples will be collected on the upstream side of the bridges at road crossings.

Table 2.1 Sampling Stations

Station Number	General Location	Sampling Site Coordinates	Sample Parameters
1	Tributary stream at Palmour Drive	-83.836894 34.264279	*E. coli*
2	Tributary Stream at utility easement	-83.837604 34.262547	*E. coli*
3	ET Creek midway point at utility easement	-83.835601 34.258057	*E. coli*
4	ET Creek at utility easement, near confluence with Walnut Creek	-83.833444 34.254356	*E. coli*

a. Procedures for E. coli Monitoring

1. 4 sites will be monitored, with each sampled once a month between September 2009 and August 2010. One (1) sample will be collected per site per month over a 12-month period, producing a total of four (4) samples per month and 48 samples over a 12-month period.

2. Staff from the Georgia Mountains Regional Commission, who will collect *E. coli* samples, were trained by GA EPD Adopt-a-Stream personnel on January 7, 2009 in *E. coli* sampling and testing.

3. Equipment used for sampling and testing is as follows:

   a. 3M™ *E. coliform* Count Plates, product #6404, 3M Company, http://solutions.3m.com/wps/portal/3M/en_US/Microbiology/FoodSafety/products/petrifilm-plates/*e-coli*-count/
   b. Genesis Hova-Bator Incubator with circulation fan, product #1588, calibrated to 35° C. G.Q.F. Manufacturing, http://www.fqfmfg.com/store/comersus_viewItem.asp?idProduct=77
   c. Fixed-volume pipettor 1000uL, product #EW-21600-06. Cole Parmer, http://www.coleparmer.com/catalog/product_view.asp?sku=2160006
   d. Pipette tips, 200-1300uL, product #EW-25711-50, Cole Parmer, http://www.coleparmer.com/catalog/product_view.asp?sku=2571150
   e. MicroLite USB Temperature Data Logger, product #LITE5008. The Data Logger Store, http://www.microdaq.com/fourier/microlite_usb_logger.php
   f. Armored Thermometer, Lamotte, http://www.lamotte.com/pages/aqua/sampling.html
   g. Whirl-Pack® sterile sampling bag, 2 oz., product #EW-06499-60, Cole Parmer
   h. 90% Isopropyl Alcohol
   i. Latex Gloves
   j. Bleach

4. Documents and Records

   a. Georgia Adopt-a-Stream *E. coli* Data Form- to record official field notes for current weather, air and water temperature, previous 48 hours rainfall (yes or no), date and time.

c. Schedule

II. Schedule

Month	Sampling Site	Parameter
September	1-4	*E. coli*
October	1-4	*E. coli*
November	1-4	*E. coli*
December	1-4	*E. coli*
January	1-4	*E. coli*
February	1-4	*E. coli*
March	1-4	*E. coli*
April	1-4	*E. coli*
May	1-4	*E. coli*
June	1-4	*E. coli*
July	1-4	*E. coli*
August	1-4	*E. coli*

One sample for *E. coli* will be collected at each station once a month from September 2009 through August 2010. Samples will be collected at least 48 hours after a rainfall event, and will be targeted for the middle of the month in approximate consistency with other samples.

III. QUALITY ASSURANCE

A. Field Quality Assurance

1. The following sampling protocol will be used for each sample:

    a. The Grab samples for quantification of E. coli bacteria will be collected at 6 stations on the Chattahoochee River between GA Hwy 17 in Helen and SR 255.

    b. Prior to sample collection:
        1. 1 Whirl-Pak® bag per site.
        2. Using a Sharpie, label each bag as follows:
        3. Stream Name
        4. Collection Site Number
        5. Date of Collection
        6. Time of Collection
        7. Collector

    c. Record the following on the Georgia Adopt-a-Stream E. coli Data Form at each sample site:
        1. Current Weather Conditions
        2. Overcast
        3. Partly Cloudy
        4. Clear/Sunny
        5. Air Temperature
        6. Water Temperature
        7. Date and Time

    d. Sample Collection
        1. Put on latex gloves for protection and to limit sample contamination.
        2. Tear off top of bag along perforation. Avoid touching the inside of the bag.
        3. Select a spot in the middle of the flow channel.
        4. Open the Whirl-Pak® bag by taking hold of the white tabs on either side of the bag, one in each hand. If you accidentally touch the inside of the collection bag, use another one.
        5. Keep the bag upright and use a scooping motion to submerge the top under the water.
        6. At mid-depth, pull both white tabs apart to open the mouth. Allow water to pour into the mouth until the bag is ¾ full.
        7. Pull the bag out of the water, take the yellow ties on either side, one in each hand, and flip or fold the top of the bag twice to wrap up the top.
        8. Twist the yellow ties to seal the top and place the bag in a cooler with ice or frozen packs.

2. Sample Handling and Custody Requirements

    a. *E. coli* samples will be stored for no longer than 6 hours after collection in a cooler with ice or frozen packs.
        1. Within 6 hours of collection, the Georgia Mountain Regional Commission staff will utilize the Adopt-a-Stream Bacterial Monitoring methods and procedures to process and analyze the samples.
        2. Petrifilm plates shall be labeled with a Sharpie pen as follows:

a. Stream name
b. Site number
c. Date of collection
d. Collector

3. The Georgia Adopt-a-Stream *E. coli* Data Form found in the Appendix will be completed by Georgia Mountain Regional Commission staff for petrifilm results.
4. Utilizing a fixed volume pipette, a sample from each site will be placed on 3 petrifilm plates according to the instructions on the GA EPD Adopt-a-Stream Bacterial Monitoring Manual.
5. Plates will be stacked and placed in the Hova-Bator incubator calibrated to 35° C for 24 hours.
6. 10% of the processed samples will be field blanks- petrifilm plates treated with distilled water. These plates should be labeled as "Blanks". These plates should be stacked and placed in the Hova-Bator incubator calibrated to 35° C for 24 hours.
7. Incubator temperature will be monitored over a 24-hour period with a Microlite USB Temperature Data Logger.
8. After 24 hours, plates (3 per site) will be removed from the incubator and E. coli colonies will be counted. The sum of the colonies found on 3 plates prepared for each site will be multiplied by 33 to calculate a total colony count per 100/mL per site.

b. GMRC staff will collect the samples with equipment obtained by the Georgian Mountains Regional Commission. Volunteers will be trained by GA EPD staff prior to any collection. To ensure safety, volunteers will choose a sample

FIELD DATA SHEET
TMDL SAMPLING – 2009
GMRC

~ FECAL COLIFORM TESTING ~

STREAM SEGMENT: ET Creek (Hall County, Oconee River Basin)

Date: _____

Time: _____

Weather: _____

Air Temperature: _____

Water Temperature: _____

Previous Rainfall (w/in 48 hrs): _____

Signed: _____