Forsyth County Procurement
Greg Bridges, Procurement Agent III

October 20, 2021

ADDENDUM #1

RFP No. 21-150-3150

For: Environmental Monitoring and Watershed Support Services

This addendum supersedes and supplements all portions of the bidding documents and becomes part of the contract documents for the above-referenced project.

Where any item called for in the specifications or indicated on the drawings is supplemented hereby, the original requirements shall remain in effect.

Where any original item is amended, voided or superseded hereby, the provision of such item not so specifically amended, voided or superseded shall remain in effect.

Clarification on Bidder Questions:

1. **Q: Is this a new service for the county or a renewal of an existing contract? If a renewal, what firm has been doing the work previously?**
   A: ***Renewal of an existing contract. Jacobs Engineering***

2. **Q: Will there be a uniform price/cost sheet on which to submit our pricing?**
   A: ***No uniform price/cost sheet is provided.***

3. **Q: Will we be able to obtain a copy Environmental Monitoring Plan?**
   A: ***Yes. See below as an attachment.***

4. **Q: Does the County have page limits regarding the proposal?**
   A: ***No.***

5. **Q: Does the County have a specific pricing/cost format?**
   A: ***No.***

   Attachment: 2020 Environmental Monitoring Plan

Forsyth County

Environmental Monitoring Plan

Updated August 2021

Table of Contents

Appendices

Electronic Attachments

1. Introduction

As part of Forsyth County's Watershed Assessment and Management Plan (WAMP), completed in 2000 and updated in 2006 as the Watershed Protection Plan (WPP), an Environmental Monitoring Plan (EMP) was developed to identify water quality impairments and improvements, as well as to evaluate the effectiveness of the County's stormwater and watershed management activities. Physical, chemical, and biological data were collected and as part of assessing representative stream locations throughout the County. The WAMP was used along with existing data about watershed characteristics to identify primary factors causing any stream impairment with respect to water quality standards and designated uses. Data collected during the development of the WAMP aided in the initial selection of sites and strategy for future sampling efforts that were incorporated into the subsequent WPP.

Since 2003, the County has conducted water quality monitoring following the EMP, which is updated periodically based on these results and latest guidelines from GAEPD and the Metropolitan North Georgia Water Planning District (District). Trends in the data provide information on the effectiveness of the County's management strategies, as well as the effectiveness of structural and non-structural Best Management Practices (BMPs) toward meeting water quality standards. In addition, multiple regulatory requirements are met by the EMP, including the National Pollutant Discharge Elimination System (NPDES), Municipal Separate Storm Sewer System (MS4) program, Georgia Environmental Protection Division (GAEPD) watershed assessment and protection plan guidance, District guidance, and the GAEPD Total Maximum Daily Loading (TMDL) program. During odd-numbered monitoring years, monitoring will include water quality, MS4 outfall screening, and biological monitoring to be consistent with previous monitoring and GAEPD requirements. During even-numbered years, monitoring will consist of only water quality and MS4 outfall screening activities. Major components of the watershed monitoring activities include in situ, chemical and bacteria water quality monitoring, MS4 outfall screening, and biological sampling. The following plan presents the overall technical approach to the environmental monitoring efforts and provides a description of field methods to be used.

In 2013, in an effort to develop a more enhanced level of understanding and coordination to protect the Upper Etowah River Watershed, counties and water/sewer authorities (including Forsyth County) in the Lake Allatoona/Upper Etowah River Watershed (LAUE) worked together to comprehensively assess the area's water resources. This voluntary alliance was established to facilitate the collection and analysis of regional, consistent water resources data that should provide the basis for more informed decisions regarding sustainable management of the area's water resources. Forsyth County currently participates by collecting and submitting water quality samples from two locations and through participation in inter-governmental coordination meetings and workshops.

1.1 Forsyth County Watersheds

Forsyth County contains two major river basins (**Figure 1-1**), the "ACT," which consists of the Alabama, Coosa, and Tallapoosa Rivers; as well as the "ACF," which consists of the Apalachicola, Chattahoochee, and Flint Rivers. Both river basins ultimately drain to the Gulf of Mexico. The northwestern corner of the County, representing approximately 30 percent of total area, is within the Etowah River Watershed (03150104). Streams in this area flow into Settingdown Creek, the Etowah River, or Little River. The remaining 70% of the County is within the Upper Chattahoochee Basin (03130001) and drains into Lake Lanier, the Chattahoochee River, or Big Creek (**Table 1-1**).

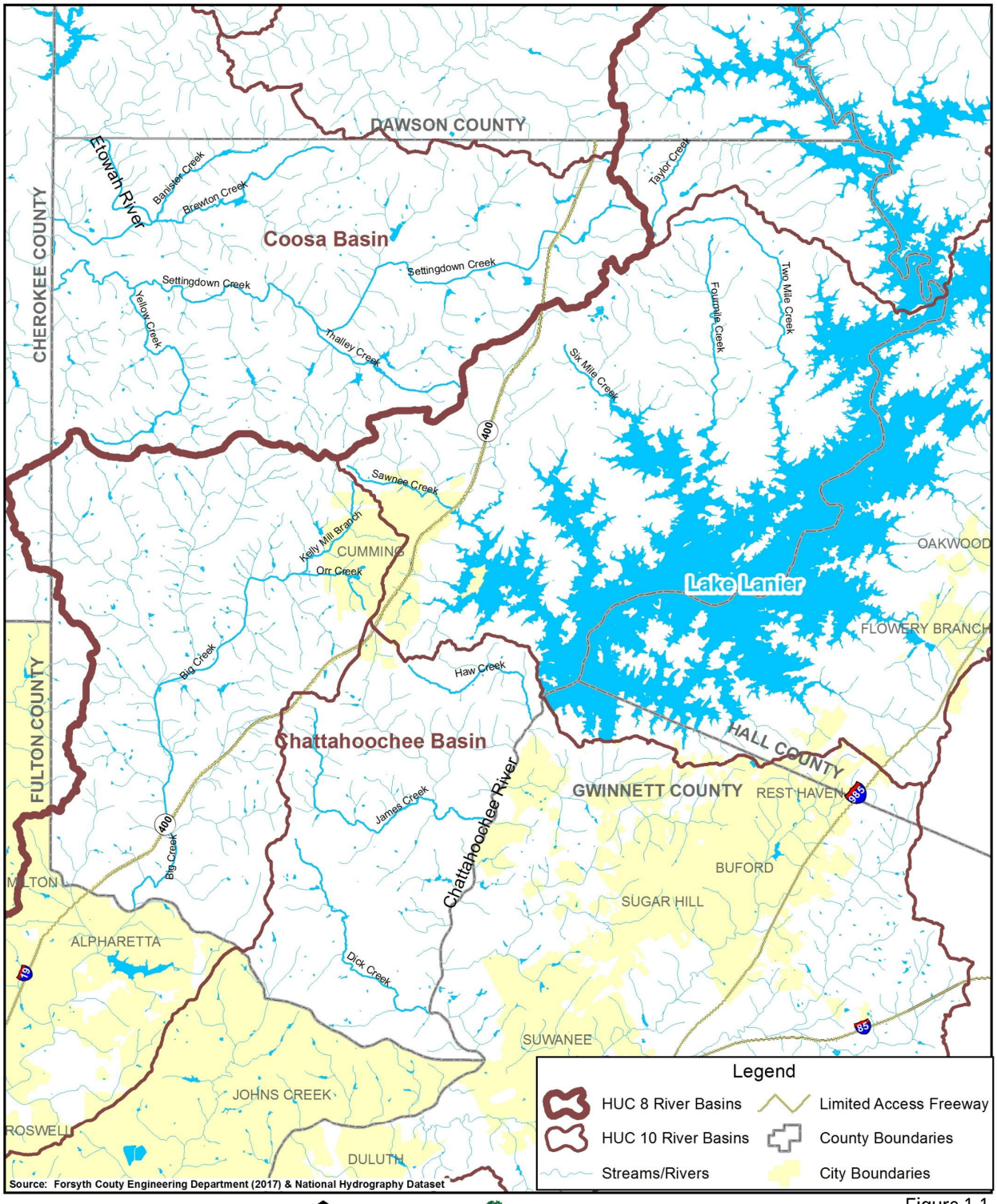


Figure 1-1
Forsyth County Watershed Map

Table 1-1. Distribution of the County across Major Watersheds

Major Watershed	Acres	Square Miles	Percent of County
ACT River Basin			
Etowah River	44,358	69.3	28 %
Little River	1,732	2.7	1 %
ACF River Basin			
Lake Lanier	53,361	83.4	34 %
Upper Chattahoochee River	22,912	35.8	14 %
Big Creek	35,731	55.8	23%
Total	**158,094**	**247.0**	**100 %**

1.2 Forsyth Streams Included on Georgia's Integrated 305(b)/303(d) Report

GAEPD identifies stream segments in Georgia's Integrated 305(b)/303(d) Report in accordance with Section 305(b) of the Clean Water Act. Section 305(b) requires states to monitor and report water quality conditions biannually. The 305(b)/303(d) Report provides an assessment of surface water quality by listing streams as either "supporting" or "not supporting" a designated use and, for waters not supporting a designated use, identifying the criterion exceeded and potential causes of impairment. The 305(b)/303(d) Report places waters into one of five categories, which indicate the development status of a TMDL by GAEPD. A TMDL (Total Maximum Daily Load) is the amount of a pollutant which can be introduced to a stream without causing the stream to violate its designated use.

Table 1-2 summarizes the Forsyth County streams identified as not supporting the referenced designated use, based on Georgia's Draft 2020 Integrated 305(b)/303(d) Report (GAEPD, 2020). Sixteen stream segments as well as areas in in Lake Lanier were listed on the report as not meeting their designated uses due to violations of one or more criteria. These included:

- Three were listed for violating State biological standards for impacted fish communities
- Two were listed for violating State biological standards for impacted macroinvertebrates.
- Eight were listed for violating fecal coliform standards due to nonpoint sources of pollution and urban runoff.
- Two were listed for violating standards for both fecal coliform and impacted fish communities.
- One was listed for violating standards for both fecal coliform and *E. coli*.
- Two Lake Lanier areas were listed for violating standards for chlorophyll-a.

For the stream segments on the 303(d) list, the U.S. Clean Water Act requires a TMDL be developed for each pollutant. GAEPD is in charge of developing segment-specific TMDLs, or the maximum amount of a pollutant which can be introduced to a stream without causing it to not meet a designated use. TMDLs estimate the sum of the individual waste load allocations from point sources, waste load

allocations from stormwater runoff associated with MS4s, and load allocations from nonpoint sources, as well as natural background (40 CFR 130.2) for a given waterbody. The TMDL must also include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the water quality response of the receiving waterbody. TMDLs have been developed for all Forsyth County stream segments on the 303(d) List except for the Chattahoochee river.

Table 1-2. Impaired Streams in Forsyth County Included on Georgia's Integrated 2020 305(b)/303(d) Report

Stream Name/ Location	Water Use Classification	Criterion Violated[a]	Evaluated Causes[b]	Stream Miles	Category[c]	TMDL [d]
Chattahoochee River Basin						
Big Creek - Headwaters to Cheatham Creek	Fishing	FC	UR	3	4a	FC 2003 (revised 2008); Cu 2003
Chattahoochee River – Dick Creek to Johns Creek	Recreation / Drinking Water	FC, *E. Coli*	UR	12	5	N/A
Fourmile Creek - Lake Lanier Tributary	Fishing	FC	NP	3	4a	FC 1998
James Creek - Daves Creek to the Chattahoochee River	Fishing	FC	NP, UR	2	4a	FC 1998
Johns Creek – Headwaters to Chattahoochee River	Fishing	FC, Bio F	UR	4	4a	FC 2003 (revised 2008). Bio F 2018
Kelly Mill Branch – Headwaters to Orr Creek	Fishing	FC	UR	2	4a	FC 2003 (revised 2008)
Lake Lanier – Browns Bridge Road (SR 369)	Drinking Water, Recreation, Fishing	Chlorophyll-a	NP, UR	6201 acres	4a	Chlorophyll-a 2018
Lake Lanier – Flowery Branch	Drinking Water, Recreation, Fishing	Chlorophyll-a	NP, UR	101102 acres	4a	Chlorophyll-a 2018
Orr Creek - Upstream of Castleberry Rd. (Tyson Foods) to Big Creek[e]	Fishing	FC	UR	3	4a	FC 2003 (revised 2008); Cu 2003
Sawnee Creek - Lake Lanier Tributary	Fishing	FC	NP	2	4a	FC 1998
Six Mile Creek - Headwaters to Lake Lanier	Fishing	FC, Bio F	UR, NP	2	4a	FC 1998; Bio F 2008
Taylor Creek - Headwaters to Lake Lanier	Fishing	FC	NP	3	4a	FC 1998
Two Mile Creek - Headwaters to Lake Lanier	Fishing	FC	NP	5	4a	FC 1998
Coosa River Basin						
Bannister Creek - Reservoir #4 to Etowah River	Fishing	Bio M	NP	2	4a	Bio M 2004
Settingdown Creek - Squattingdown Creek to Thalley Creek	Fishing	Bio F	NP	3	4a	Bio F 2009

Stream Name/ Location	Water Use Classification	Criterion Violated[a]	Evaluated Causes[b]	Stream Miles	Category[c]	TMDL [d]
Settingdown Creek –Thalley Creek to Hurricane Creek	Fishing	Bio M	NP	8	4a	Bio M 2004
Thalley Creek – Headwaters to Settingdown Creek	Fishing	Bio F	NP	4	4a	Bio F 2016
Yellow Creek – Headwaters to Settingdown Creek	Fishing	Bio F	NP	4	4a	Bio F 2016

Source: Georgia Department of Natural Resources (GADNR), August 2020

[a] FC = fecal coliform bacteria, Bio F = impacted biota (fish community); Bio M = impacted biota (macroinvertebrate community)

[b] UR = urban runoff/urban effects; NP = nonpoint sources/unknown sources

[c] Category 1 indicates that waters are supporting their designated use(s); Category 2 indicates that a waterbody has more than one designated use and data indicate that at least one designated use is being met, but there is insufficient evidence to determine whether all uses are being met. Category 4a indicates that a TMDL has been developed for parameter violated; Category 5 indicates that a TMDL has not been developed for parameter violated.

[d] Proposed year by which a TMDL was or will be developed for the pollutant of concern.

[e] TMDL completed for copper, de-listed for copper since 2008.

2. Water Quality and Biological Monitoring

Watershed monitoring as described in this plan includes long- and short-term water quality and biological monitoring at stations established throughout the County. Water quality sampling will be used to gather in situ, chemical, and bacteriological data. If improvements in water quality or biological communities are observed on 303(d)-listed streams, the County will develop a Sampling Quality Assurance Plan with a more intensive sampling regime, as required. Additional sampling may also be conducted in streams if water quality or biological conditions indicated deteriorating conditions to isolate reaches/potential sources.

2.1 Monitoring Stations

The County has selected and refined the list monitoring stations since regular sampling began in 2003. This list is routinely updated based on sampling results/trends and the and latest guidance from GAEPD, such as the 305(b)/303(d) list. Trends in the data provide information on the effectiveness of the County's management strategies.

2.1.1 Forsyth County Monitoring Stations

The current list of monitoring stations is depicted on **Figure 2-1** and shown in **Table 2-1**. The County's 18 monitoring stations include a combination of water chemistry, bacteria, and biological parameters as described below:

- Six long-term water quality chemistry stations that represent the different geographies, watersheds, and land uses in the County. Monitoring at these stations includes insitu water quality and water chemistry.
- Thirteen stations where insitu water quality and bacteria sampling is conducted.
- Eight monitoring stations where insitu water quality and biological monitoring (fish and macroinvertebrates) is conducted.
- One station (Johns Creek (JNF-1) where insitu water quality and biological monitoring is conducted. Note that a single TSS sample is collected at this station in lieu of formal biological monitoring.
- Two stations sampled as part of the LAUE alliance. These two stations include Settingdown Creek at John Burruss Road (004c), which also serves as one of the County's long-term monitoring stations (referred to as SDF-4); and, the Etowah River at Yellow Creek Road (004d). In situ water quality, water chemistry (includes additional parameters in addition to those required at the County's long-term monitoring stations), and bacteria (fecal coliform only).

Figure 2-1: Environmental Monitoring Stations

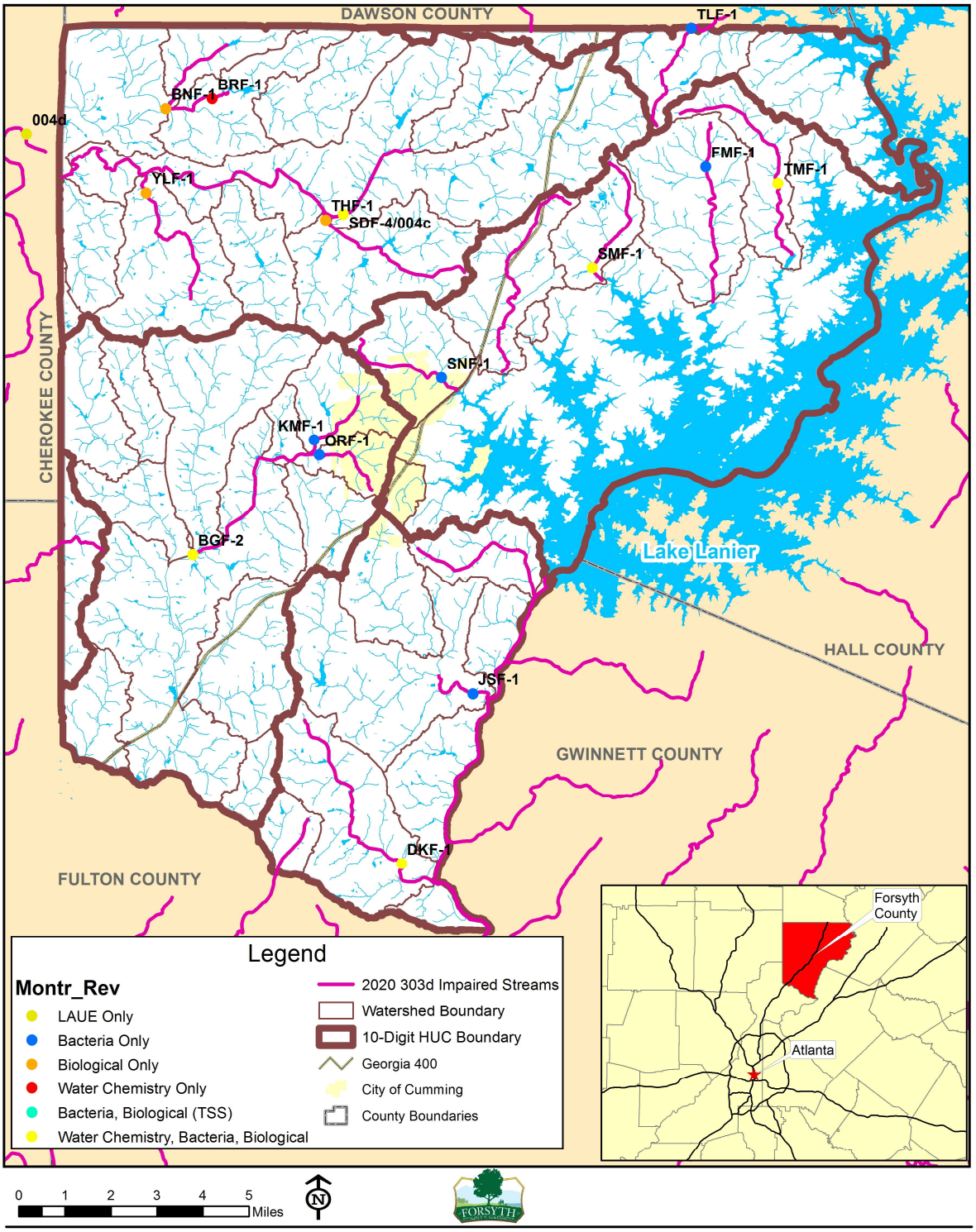


Table 2-1. Summary of Locations, Selection Rationale, and Type of Sampling Conducted at Forsyth County Monitoring Stations.

Station ID	Station Location	Station Rationale	Bacteria	Long-term Water Quality	LAUE	Biota
BGF-2	Big Creek at Majors Road	Long-term monitoring station representing the central and western portions of the County; potential for watershed management to affect data; changing upstream land use. 305(b)/303(d) listed for fecal coliform.	X	X		X
BNF-1	Bannister Creek at Nicholson Road	Added in 2009 as a biological monitoring station due to new 305(b)/303(d) listing for impacted biota (macroinvertebrates).				X
BRF-1	Brewton Creek at Mount Tabor Road	Long-term water chemistry station that represents relatively undeveloped watershed in the northwestern portion of the County.		X		
CHF-1	Chattahoochee River at McGinnis Ferry Road	Added in 2018 (sampling starting 2019). 305(b)/303(d) listed for fecal coliform and *E. coli*	X			
DKF-1	Dick Creek at Old Atlanta Road	Long-term monitoring station in the southeastern portion of the County; direct tributary to the Chattahoochee River.		X		X
FMF-1	Fourmile Creek at Keith Bridge Road	Pollutant loads already characterized, similar watershed and upstream land use types as TMF-1 and SMF-1, 305(b)/303(d) listed for fecal coliform.	X			
JNF-1	Johns Creek at McGinnis Ferry Road	Added in 2018 (sampling starting 2019). 305(b)/303(d) listed for fecal coliform and impacted biota (fishing).	X			X[1]

Station ID	Station Location	Station Rationale	Bacteria	Long-term Water Quality	LAUE	Biota
JSF-1	James Creek at James Burgess Road	Pollutant loads already characterized, similar watershed and upstream land use to DKF-1, 305/303(d) listed for fecal coliform.	X			
KMF-1	Kelly Mill Branch at Kelly Mill Road	305(b)/303(d) listed for fecal coliform.	X			
ORF-1	Orr Creek at Jason Drive	305(b)/303(d) listed for fecal coliform.	X			
SDF-4 (LAUE 004c)	Settingdown Creek at John Burruss Road	Long-term monitoring station since 2003, represents watershed conditions in north Forsyth County, 305(b)/303(d) listed for impacted biota (fish and macroinvertebrates). Also a LAUE monitoring site that represents water quality of the main Etowah River tributary in Forsyth County. It is listed as station 004c for sampling specific to that program.	X	X	X	X
SMF-1	Six Mile Creek at Burruss Mill Road	Biological monitoring station since 2003, represents less developed watershed with potential to change, direct tributary to Lake Lanier in the eastern portion of the County, 305(b)/303(d) listed for fecal coliform and impacted biota (fish).	X	X		X
SNF-1	Sawnee Creek at Pilgrim Mill Road	Pollutant loads already characterized, land-use unlikely to change due to Sawnee Mountain Park, 305(b)/303(d) listed for fecal coliform.	X			
THF-1	Thalley Creek at Memphis Street	Added in 2012 as a biological monitoring station due to new 305(b)/303(d) listing for impacted biota (fish).				X

Station ID	Station Location	Station Rationale	Bacteria	Long-term Water Quality	LAUE	Biota
TLF-1	Taylor Creek at Highway 53	Pollutant loads already characterized, relatively small proportion of County, 305(b)/303(d) listed for fecal coliform.	X			
TMF-1	Two Mile Creek at Wallace Wood Road	Long-term monitoring station since 2003, less developed watershed with potential to change, direct tributary to Lake Lanier in the northeast portion of the County. 305(b)/303(d) listed for fecal coliform.	X	X		X
YLF-1	Yellow Creek at Hurt Bridge Road	Added in 2012 as a biological monitoring station due to new 305(b)/303(d) listing for impacted biota (fish).				X
004d	Etowah River at Yellow Creek Road	Designated as a LAUE sampling station and represents water quality in the Etowah River leaving Forsyth County.	X		X	

[1] A single TSS sample will be collected annually in lieu of formal fish and macroinvertebrate sampling.

2.2 Water Quality Monitoring

Water quality monitoring includes water chemistry and/or bacteria parameters at stations described in **Table 2-1** to satisfy NPDES, MS4, and LAUE sampling requirements. **Table 2-2** provides a summary of the parameters, number of sampling stations, and number of sampling events for all water quality monitoring activities. In situ measurements of pH, dissolved oxygen (DO), conductivity, temperature, and turbidity will be collected during all water quality sampling events. As further described in **Section 2.2.4** (QA/QC), a field duplicate is collected during each sample event.

2.2.1 Precipitation Monitoring

Monitoring stations are distributed across the County, so precipitation can vary at each one, particularly during the summer convective storms. Precipitation is tracked through a number of real-time gages from the USGS and the Georgia Environmental Monitoring network. A list of these and the nearest County monitoring station is provided in **Appendix A**. Additionally, radar-derived precipitation from the National Weather Service is also consulted.

2.2.2 Water Chemistry Monitoring

Wet-weather and dry-weather long-term monitoring events will include in situ monitoring of pH, DO, specific conductivity, temperature, and turbidity, and grab samples at the six long-term monitoring stations and the two LAUE stations. Eight water chemistry samples will be collected during the year. Baseflow samples will be collected two times per year during dry weather as well as six samples during rain events. In addition, a single TSS sample will be collected at Johns Creek during the wet event.

Water chemistry grab samples will be collected in well-mixed stream flow, at approximately midstream and mid-depth, where feasible. Dry-weather samples will be collected after 72 hours with less than 0.1 inch of rain. The wet-weather events will be preceded by 72 hours of dry weather (less than 0.1 inch of rainfall per day) and will be conducted during a single storm event with a minimum of 0.2 inch of rainfall. Single grab samples will be collected to represent the rising limb of the hydrograph.

2.2.3 Bacteria Sampling

Bacteriological parameters will be collected at the County's long-term monitoring stations, LAUE stations, and eight of the short-term water quality stations. A total of eight bacteria grab samples will be collected at each station per year to calculate two 30-day geometric means. Four samples will be collected over a 30-day period (at intervals not less than 24 hours) between May and October to account for more stringent seasonal State water quality criteria. Each set of four samples will be used to calculate a geometric mean (Standard Methodologies, 2007). Samples will be collected regardless of the weather conditions on the scheduled sample date. The County has historically collected four samples in May and four in October. As with water chemistry sampling, bacteria samples will be single grabs collected in well-mixed stream flow, at approximately midstream and mid-depth, where feasible.

Table 2-2. Water quality parameters and summary of sampling events.

Water Quality Parameters	Stations	Dry-weather Events	Wet-Weather Events	Duplicate Samples[1]	Total Samples
	Chemical Parameters				
Total Suspended Solids (TSS)[2,3]	8	2	6	8	**65[4]**
Nitrate-Nitrite (NO_2- NO_3) [2,3]	7	2	6	8	**64**
Ammonia[2,3]	7	2	6	8	**64**
Total Kjeldahl Nitrogen (TKN)[2,3]	7	2	6	8	**64**
Total Phosphorus (TP)[2,3]	7	2	6	8	**64**
Total Organic Carbon (TOC)[2,3]	7	2	6	8	**64**
Dissolved Copper (Cu)[2,3]	6	2	6	8	**56**
Ortho-phosphorus[3]	2	3	1	0	**8**
Biochemical Oxygen Demand (BOD_5) [3]	2	3	1	0	**8**
Chemical Oxygen Demand (COD)[3]	2	3	1	0	**8**
Alkalinity[3]	2	3	1	0	**8**
Total Hardness[2,3]	7	2	6	8	**64**
Dissolved Metals (Cd, Cu, Pb, Zn)[3]	2	3	1	0	**8**
	Bacteriological Parameters				
Fecal Coliform (8 events to calculate two 30-day geometric means)	13	N/A	N/A	8	**112**
E.coli (8 events to calculate two 30-day geometric means)	13	N/A	N/A	8	**112**

[1] One duplicate sample at one randomly selected station collected during each event except for the LAUE stations.
[2] Water quality parameter collected at a Forsyth County long-term water quality station.
[3] Water quality parameter collected at a LAUE Station.
[4] A single TSS sample is collected at JNF-1 (Johns Creek) once annually.

2.2.4 Field Equipment

Equipment that will be used during water quality sampling events is listed below. Equipment will be gathered, checked, and loaded into the vehicles the day before each event.

- YSI ProPlus or similar multi-parameter meter for in situ measurements
- Hach 2100P or similar meter for turbidity measurements
- Cooler(s) with ice
- Extra batteries, screw drivers, calibration solutions
- Pens and sharpies
- Clipboard with water quality data sheets, health and safety plan, and field sampling letter from the County. An example water quality data sheet and field sampling letter are included in **Appendix B**.
- Camera and GPS or smart phone loaded with coordinates of each sample location
- Waders, boots, rain gear, safety vest, hat, additional PPE as needed
- Nitrile gloves for handling samples
- Sample bottles from the laboratory as listed in **Table 2.3**

Table 2-3. Sample bottles, laboratory analysis, and test detection limits for water quality parameters.

Parameter(s)	Test(s)	Detection Limit (mg/L)[3]	Bottle Type	Bottle Size (ml)	Preservative
Total Phosphorus Nitrate-Nitrite	E365.1 E353.2	0.01 0.050	Plastic	250	H_2SO_4
Total Organic Carbon	SM5310B	0.137	Glass	250	H_2SO_4
Ammonia Total Kjeldahl Nitrogen	E350.1 E351.2	0.050 0.124	Plastic	500	H_2SO_4
Dissolved Metals	E200.7	0.0034 (Cd) 0.0054 (Cu) 0.0420 (Pb) 0.0018 (Zn)	Plastic	500	None
TSS	SM2540D	1.0	Plastic	500	None
Biochemical Oxygen Demand[1]	SM5210B	5.0	Plastic	1,000	None
Chemical Oxygen Demand[2]	E410.4	5.37	Plastic	250	H_2SO_4
Ortho-phosphorus Alkalinity	E365.1 SM2320B	0.00380 1.68	Plastic	500	None
Hardness	SM2340B	0.0400	Plastic	250	HNO_3

Parameter(s)	Test(s)	Detection Limit (mg/L)[3]	Bottle Type	Bottle Size (ml)	Preservative
Fecal Coliform	SM9222D-1997	20 – 200 (variable) Colonies/100 ml	Plastic	100	$Na_2S_2O_3$
E. coli	SM9223B-1997	1 – 10 (variable)MPN/100ml	Plastic	100	$Na_2S_2O_3$

[1] BOD in same bottle with TSS if collected at same time (1L bottle)
[2] COD in same bottle with Ammonia and TKN if collected at same time (500 ml bottle)
[3] The recommended methods have different detection limits, some lower than those provided here. However, these detection limits are considered achievable for all laboratories.

2.2.5 Quality Assurance/Quality Control

QA/QC is designed to assure the reliability and quality of the analysis and data and to identify any contamination that may result from lab methods, equipment, or sample collection. Sample collection, preservation, handling and storage, and analytical procedures will be conducted in accordance with standard methods and practices. Three types of QA/QC will be performed as part of the water quality monitoring. Type 1 includes regular checks of water quality meters and proper documentation of sampling activities and field conditions by the field team members. Type 2 consists of sampling procedures intended to identify the type and estimate the level of contamination.

Type 1: Field Surveys

Type 1 QA/QC encompasses field monitoring activities and calibration of field equipment. Field personnel for this project will be experienced in the calibration and operation of each piece of field equipment used on the project.

Field instruments will be calibrated according to manufacturers' specifications, and these procedures will be documented in a field notebook or on specially prepared field sheets. Type 1 activities include documenting other pertinent data concerning the sampling events such as weather conditions and time of sampling. Type 1 documentation can be summarized as follows:

- Instrument identification
- Calibration information (standards used and results)
- Date and time of calibrations and measurement

Type 2: Field Sampling

Two personnel with experience or special training in water quality sampling techniques will conduct field sampling. Type 2 QA/QC activities include sample procedures designed to detect contamination from sampling equipment resulting from improper sample collection. Type 2 activities also include collection of QA/QC duplicate samples, use of trip blanks, preparation of equipment blanks (only if decontamination of equipment is performed), and proper labeling of all samples. For this project, field duplicates are collected to measure the precision of the sampling process. The field team leader will choose one station at random per trip to collect duplicate samples for each water quality parameter.

For each water quality sample, the following information will be clearly marked and labeled on the sample container:

- Forsyth County

- Sample or Station Number
- Location
- Analyses
- Preservative
- Date and Time
- Sampled by

During sampling, filled and labeled containers will be stored in coolers on ice to maintain a temperature of less than four degrees Celsius. The coolers will remain in the custody of the field team leader until the end of the sampling event, and the samples will be shipped, transported, or delivered to a laboratory courier in a cooler, on ice. If used, glass containers will be wrapped in bubble-wrap to prevent breakage. All coliform samples will be stored on ice and hand-delivered to the appropriate laboratory within 6-hours from collection of the first sample. If samples are collected on Friday, the laboratory(s) will be notified ahead of time .

Coolers prepared for shipping will be lined and packed with ice in double-wrapped Ziploc bags so that movement of samples will be minimized. A COC form will be included in each shipment container describing: the type of sample, number of containers, type and kind of analysis, QA/QC instructions and samples, and special processing and handling procedures. It is imperative that the samples taken to fulfill the QA/QC requirements to be completed by the lab are included on the COC. The field team leader will keep the copy of the COC form.

To establish the documentation necessary to trace sample possession from the time of collection, a Chain-of- Custody (COC) record, which can be obtained from the laboratory, will be completed for every sample event. In order to maintain the COC record, every person who has custody of the sample at any time will sign, date, and note the time on the COC record. Samples will not be left unattended unless placed in a secured and sealed container with the COC record inside the container. The COC record will include special instructions for the laboratory to follow, such as composite preparation or clean metal analysis, which will be consistent with the contract. If discrepancies are identified, the field team leader will inform the Project Manager before the samples are analyzed.

Type 3: Laboratory Analysis

Laboratory analysis will be conducted by a contracted laboratory using EPA-approved analysis methods (40 CFR Part 136). The methods and detection limits that will be used for each parameter to ensure proper QA/QC are listed in **Table 2-3**. The County has been employing Analytical Environmental Services (AES) to process water quality samples. AES maintains a number of certifications and accreditations, including Georgia Department of Natural Resources Certificate #800 and employee Georgia Certified Water Laboratory Analysts.

2.2.6 Water Quality Data Analysis and Reporting

When water chemistry results are received from the laboratory, they will be analyzed for trends and indicators of watershed improvements and localized problems. Data will be entered into the County's historic database (Excel) as well as into the Watershed Assessment and Protection Plan Data Reporting Template (in Excel format) provided by GAEPD (https://epd.georgia.gov/watershed-assessment-and-protection-plan-guidance-documents). This template is required for all NPDES

permit holders who are required to complete a Watershed Assessment and Watershed Protection Plan. The spreadsheet will be used to report all water quality data collected as part of the EMP, including in situ measurements, water chemistry data, and bacteriological data. It is provided as electronic **Attachment 1**.

2.3 Biological Monitoring

Biological monitoring will be conducted at the monitoring stations as listed in **Table 2-1** for fish or macroinvertebrates. Sampling will be conducted by at least two or more aquatic biologists according to the most current GADNR sampling and data analysis protocols including Standard Operating Procedures for Conducting Biomonitoring on Fish Communities in Wadeable Streams of Georgia (GADNR, 2020) and Standard Operating Procedures-Macroinvertebrate Biological Assessment of Wadeable Streams (GADNR, 2007). These procedures and forms are provided as electronic **Attachment 2** and **Attachment 3**. Biological monitoring methods will include:

- Physical habitat assessments
- Benthic macroinvertebrate community assessments
- Fish sampling

Fish sampling will be conducted during a separate event from macroinvertebrate sampling and physical habitat assessments in accordance with respective GADNR recommended sampling periods. According to GADNR protocols, benthic macroinvertebrate sampling should occur between mid-September and February, while fish sampling should occur between April and mid-October. Biological monitoring activities will be scheduled to occur within these seasons and also during a similar time period to previous sampling years in order to reduce environmental variations inherent in the datasets (fish sampled in August, benthic macroinvertebrates sampled in October). In situ water quality measurements will be made during both events to represent water quality conditions at the time of sampling.

2.3.1 Biological Monitoring Equipment

In accordance with the most current GADNR sampling and data analysis protocols including Standard Operating Procedures for Conducting Biomonitoring on Fish Communities in Wadeable Streams of Georgia (GADNR, 2020) specific equipment will be required for fish community monitoring. Backpack electrofishing units with be used to sample for fish communities and will be adjusted to appropriate voltages to sample effectively without causing any permanent damage to fish. Dip nets or seines will be required to collect the momentarily stunned fish for identification. Fish captured in nets must be transferred to large buckets with freshwater that are either changed regularly and/or have portable aerators to maintain dissolved oxygen. Collection jars with 10% formalin solution will be required for any specimen taken to the lab for further analysis.

In accordance with Standard Operating Procedures-Macroinvertebrate Biological Assessment of Wadeable Streams (GADNR, 2007) specific equipment will be required for sampling. Samples must be collected with standard D-frame nets or dip nets. Sieve buckets with 500µ opening mesh are required to rinse the sample of fine sediment. Macroinvertebrate samples must be transferred to sample containers and preserved with 10% formalin solution. Forceps may be needed to remove any specimens remaining in sieve screens or nets.

2.3.2 Data Analysis and Reporting

Biological monitoring data will be used to calculate metrics for the habitat assessment score, benthic macroinvertebrate index (BMI) score, and the Index of Biotic Integrity (IBI) for fish. All metrics and scores will be calculated and measured according to the most recent GADNR protocols, referenced previously. The habitat assessment score involves a qualitative rating of ten metrics based on categories included in GADNR protocols to evaluate substrates, habitat availability, riparian corridors and streambank conditions. Methodologies for benthic macroinvertebrates and fish involve species identification, enumeration, and external examination of collected fish to assign ratings or metrics based on a variety of community characteristics that indicate the level of stream biological integrity, such as presence of sensitive or intolerant species. Metrics are summed or averaged to obtain a score or an overall measure of biotic integrity.

3. MS4 Outfall Screening

As part of its Stormwater Management Program (SWMP) in compliance with its Phase I MS4 permit under the NPDES, Forsyth County maintains and regularly updates an inventory of stormwater infrastructures, which includes MS4 outfalls (**Figure 3-1**). The compilation of a digital infrastructure inventory started in May 2004 and was completed in 2008. The inventory continues to be updated to reflect the changes in the system and is intended to provide an interactive platform to evaluate system growth and improvement projects. The inventory is reflective of the most current definition of an MS4 outfall is "the most downstream point (i.e., final discharge point) on an MS4 where it discharges to the receiving waters." Data collected during dry weather screenings each year are used to further refine the inventory, which currently includes **4,109** outfalls (May 2020).

The County's Illicit Discharge Detection and Elimination Plan (IDDEP) has the following objectives:

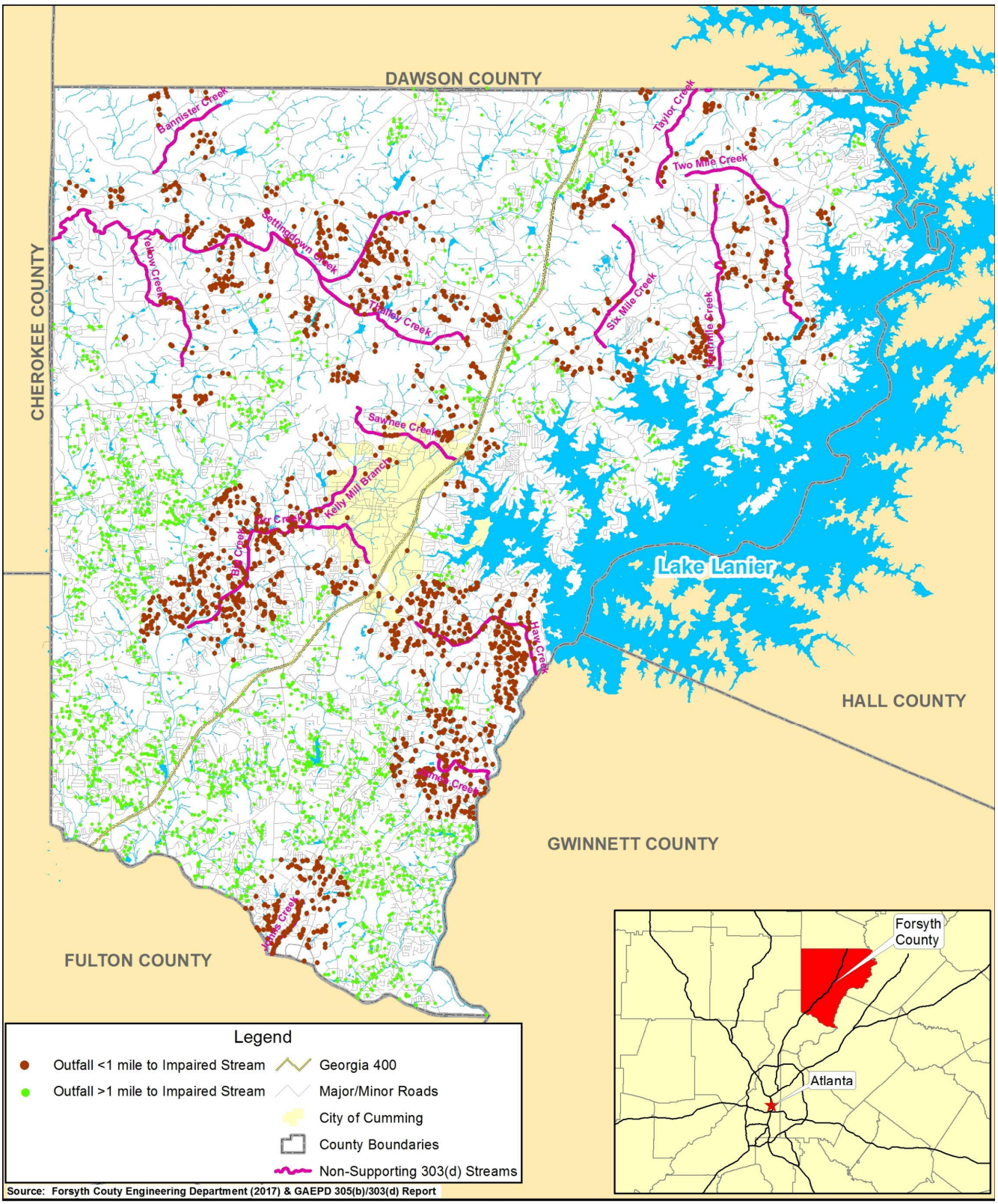
- Control illicit discharges by conducting field inspections of the MS4 and identify and eliminating the sources of non-stormwater discharges.
- Detect and eliminate illicit discharges and illegal connections to the MS4 through a program that combines education, alternative disposal options, and enforcement.
- Effectively coordinate spill response and cleanup with other existing programs.
- Optimize illicit discharge control activities through planning and prioritization.
- Partner with other agencies and groups to increase public awareness for prevention of pollutant discharges to the storm drains.

3.1 Inspection Schedule

Forsyth County conducts screenings for illicit discharges at outfalls based on the location and date of the last inspection, and in response to reported releases. As required, the County inspects 100 percent of stormwater structures over a 5-year period, with a percentage of these inspections conducted each year. The County generally inspects outfalls by geographic area (watershed) and targets approximately 20 percent of the total inventory each year.

The current five-year outfall inspection plan targets the following areas:

- **Year 1 (2017)** – Southern and southwestern portions of the County – Bagley, Big (south of Atlanta Hwy), Camp, Caney, Chicken, Johns, and Saw Mill Creeks.
- **Year 2 (2018)** – Southeastern portion of County – Dick and James Creeks as well as the Chattahoochee River tributaries.
- **Year 3 (2019)** – Eastern portion of the County – Daves, Haw, Little Ridge, Two Mile, Fourmile, Six Mile, Baldridge, Young Deer, Sawnee, and Taylor Creeks as well as the Lake Lanier tributaries.
- **Year 4 (2020)** – Central and western portions of the County – Kelly Mill, Orr, Big (north of Atlanta Hwy), Bentley, Harris, Cheatham, and Cobb Creeks.
- **Year 5 (2021)** – Northern portion of the County – Hurricane, Yellow, Starr, Brewton, Banister, Cogburn, Settingdown, Squattingdown, Black Mill, Thalley, and Etowah River tributaries.



Source: Forsyth Couty Engineering Department (2017) & GAEPD 305(b)/303(d) Report

Figure 3-1
MS4 Outfalls and 303(d) Listed Streams

3.2 Illicit Discharge Concerns

Water quality concerns can indicate pollutants from a number of illicit discharge sources such as sanitary sewer, septic tanks, sulfides and organics from industries, petroleum products from vehicle maintenance areas, food waste from residents or restaurants, sediment from construction, water from car washes, wastewater discharge (e.g. stone/granite cutting), vehicle wash-out (e.g. construction vehicles), direct dumping into the storm sewer, among others. The following is a list of observations that will be considered while conducting a field screening to indicate water quality concerns:

- **Floatables:** Floatables such as oil sheens, sewage, and sanitary trash found in the storm sewer system will be considered evidence of a problem. If sewage and/or sanitary trash are observed, it is an indicator that a sanitary system is connected to the stormwater system; however, some floatables may occur naturally such as algae, bryozoans, pollen, and oil-like sheens may be caused by bacteria.
- **Odor:** Strong chemical or sewage odors may indicate a potential illicit connection or discharge. If odors are detected, it is recommended to look for other indicators including floatables, dry weather flow, water color, and/or stains inside the manhole or pipes.
- **Foam:** The accumulations of foam in a storm sewer system may indicate an illicit connection or discharge. Foam can be a natural occurrence in streams and lakes, but if the foam is concentrated around a storm outfall, or appears to be originating from a structure, it may be an indication of an illicit connection or discharge in that system.
- **Other Indicators:** Other indicators, which may not be significant by themselves, include color, turbidity, the existence of stains or deposits, and the occurrence of excessive vegetation at the discharge point. If dry weather flow is not observed, other indicators will be explored to provide evidence of illicit connections or discharges. If the initial field screening indicates that no flow is present, yet there is evidence of toilet paper, staining, grease deposits, or excessive plant growth, it is assumed that an illicit discharge has occurred. Further investigation of the drainage system will be conducted to identify the source. If there is no indication of an illicit connection or discharge, then the appropriate results will be recoded into a database.

If any one of the water quality concerns listed above are present during a field inspection, an investigation is immediately initiated to identify any illicit discharges according to procedures in above. If readings indicate a potential water quality issue in the field, an investigation is initiated by the field crew.

3.3 Outfall Screening Methods

Outfall screening is conducted during dry weather, which is defined as at least 72 hours with less than 0.1 inch of precipitation per day.

- Field crews use maps (digital and paper) to locate outfalls.
- Other equipment includes: pens and sharpies; clipboard with blank DMS data sheets, health and safety plan, and field sampling letter from the County; camera and GPS or smart phone; boots, rain gear, safety vest, hat, additional PPE as needed; and a tape measure.
- The outfalls are assessed to determine whether or not dry weather flow is present.

- Weather conditions, location information, assessor names are entered into the County's electronic field database.
- The outfalls are assessed to determine whether or not dry weather flow is present. The electronic field inspection form is filled out for all outfalls inspected, regardless if dry weather flow was noted or not.
- The outfall is measured with a tape and recorded on the electronic field form.
- The condition of the outfall and need for maintenance is recorded and prioritized.
- A photograph of the outfall is taken to document the conditions at the time of inspection.
- If dry weather flow is encountered, the crew traces the source of the flow to determine whether it is "natural" (i.e. piped stream, detention pond, groundwater) or potentially "illicit" (**Section 3.3.1**).
- If a "new" outfall (one not in the database) is identified, the crew will record the location (latitude/longitude, nearest address, parcel, general description), type of outfall, size, fill out the inspection information on a paper form, and take a photograph (photo should be named with the address and date).

3.3.1 Dry Weather Discharge Present

The following procedures used when a dry weather discharge is identified by either Forsyth County, reported by private citizens, or observed during outfall screenings. Every dry weather flow will be source traced and field tested (as needed) to determine whether it is "natural" (i.e. piped stream, detention pond, groundwater) or potentially "illicit".

Source Tracing

- Review the field maps that contain the stormwater infrastructure and hydrography to determine potential sources for the flow.
- Look for illicit connections and record any observations. Flow will be evident in the storm sewer system, even though no storm events have occurred in the past 72 hours.
- If applicable, walk the segment of stream contrary to the direction of the flow.
- If applicable, follow-up the stormwater network "upstream" and investigate at available points until the location of the flow is isolated to a particular segment. If necessary, the building owners and/or tenants must be contacted to acquire available building plans and to set up an appointment to conduct the site visit. This notification and other permits should be coordinated through the appropriate authorities.
- The crew must record detailed notes in the field log book on source tracing activities of dry weather flows investigated. Additionally, potential sources should be annotated on the field map(s) and photographs taken to document findings.

Field Testing

If after source tracing and the discharge is believed to be illicit, then it is tested for pH, specific conductance, surfactants (detergents), turbidity, fluoride, and possibly fecal coliform (if other parameter indicates potential presence of elevated bacteria). In the instances where the discharge is originating from a detention pond or possibly piped stream, and there are no other potential inputs (i.e. drop inlet, catch basin, another headwall/pipe), then no field testing is required. When a dry-weather flow is recorded as a live stream or detention pond, there must be documented evidence of a direct

connection to an upstream waterbody (in many cases, flowing streams are documented to occur at outfall structures that are no longer operational and do not control stormwater).

Specific field testing equipment includes a LaMotte Stormwatch Drain Monitoring Kit and a Hach Pocket Colorimeter II for fluoride. These are often supplemented by a YSI Pro Plus insitu meter and/or a Hach 2100P turbidimeter when more accurate measurements are required. Instruments are calibrated regularly per manufacturer guidelines.

Samples may also be collected for subsequent laboratory testing for fecal coliform according to standard EPA methods. Fecal coliform will be collected only where there is evidence of sewage spills or water quality concerns, as described below:

- Visible sewage or sewage odor
- Physical indicator of a potential illicit discharge (color, odor, turbidity, or floatables)
- pH lower than 6.5 or higher than 7.5 standard units
- Specific conductance greater than 300 µmhos/cm
- Presence of surfactants (>0.2 mg/L)

Results of dry weather screening are documented on the electronic field inspection form and the team leader must notify the County immediately if it is the flow is believed to be illicit.

Appendix A

Forsyth County Monitoring – Precipitation Gages (October 2, 2018)

USGS 02335580 BIG CREEK AT GA 9, NEAR CUMMING, GA
https://waterdata.usgs.gov/nwis/uv?site_no=02335580
- Real-time precipitation, stage, discharge.
- Primary gage for BGF-2, KMF-1, ORF-1, SNF-1.

USGS 02390140 SETTINGDOWN CREEK NEAR BALL GROUND, GA
https://waterdata.usgs.gov/nwis/uv?site_no=02390140
- Real-time precipitation, stage, discharge.
- Primary gage for 004d, YLF-1, BNF-1, BRF-1, SDF-4/004c, & THF-1.

USGS 02389150 ETOWAH RIVER AT KELLY BRIDGE RD, NEAR MATT, GA
https://waterdata.usgs.gov/nwis/uv?site_no=02390050
- Real-time precipitation, stage, discharge.
- Secondary gage for 004d, YLF-1, BNF-1, BRF-1, SDF-4/004c, & THF-1.

USGS 02389150 ETOWAH RIVER AT GA 9, NEAR DAWSONVILLE, GA
https://waterdata.usgs.gov/nwis/uv?site_no=02389150
- Real-time precipitation, stage, discharge.
- Primary gage for TLF-1.

Weather Underground KGAGAINE80 Riverstone Plantation off Jot Em Down Rd
https://www.wunderground.com/personal-weather-station/dashboard?ID=KGAGAINE80#history/s20180925/e20181002/mweek
- Real-time precipitation.
- Primary gage for TMF-1, FMF-1, SMF-1.
- Secondary gage for TLF-1.

USGS 02334400 LAKE SIDNEY LANIER NEAR BUFORD, GA
https://waterdata.usgs.gov/nwis/uv?site_no=02334400
- Real-time precipitation.
- Primary gage for HWF-1 & JSF-1.
- Secondary gage for BGF-2, KMF-1, ORF-1, SNF-1.

USGS 02334653 CHATTAHOOCHEE R 0.76 MI US MCGINNIS FY SUWANEE GA
https://waterdata.usgs.gov/nwis/uv?site_no=02334653
- Real-time precipitation, stage, discharge.
- Primary gage for DKF-1, CHF-1, JNF-1.

USGS 02334620 DICK CREEK AT OLD ATLANTA RD, NEAR SUWANEE, GA
https://waterdata.usgs.gov/nwis/uv?site_no=02334620
- Real-time stage & discharge.
- Use as primary to determine when stage rising for wet samples for DKF-1, SMF-1, TMF-1.

UGA Weather Network – Alpharetta Station
http://www.georgiaweather.net/index.php?content=calculator&variable=CC&site=ALPHARET

- Real-time precipitation.
- Use as a secondary for DKF-1, JNF-1, CHF-1.

UGA Weather Network – Oakwood Station
http://www.georgiaweather.net/index.php?content=calculator&variable=CC&site=OAKWOOD
http://www.georgiaweather.net/index.php?variable=HI&site=OAKWOOD

- Real-time precipitation.
- Use as a secondary for SMF-1, FMF-1, TMF-1.

National Weather Service – NOWData – Cumming Station
http://w2.weather.gov/climate/xmacis.php?wfo=ffc

- Use as precipitation tracker as part of the long-term record (this one is not real-time).

National Weather Service AHPS – Radar-derived precipitation estimate
https://water.weather.gov/precip/index.php?analysis_date=1490572800&lat=34.1975630204&location_name=CONUS__Puerto_Rico&location_type=us&lon=-84.1042134623&precip_layer=0.75&product=observed&recent_type=false&rfc_layer=-1&state_layer=-1&hsa_layer=-1&county_layer=0.75&time_frame=1day&time_type=day&units=eng&zoom=11&domain=current

US Climate Data – Avgs for Cumming, GA
https://www.usclimatedata.com/climate/cumming/georgia/united-states/usga1415

Appendix B

Watershed Assessment Biological *In situ* and Grab Sample Water Chemistry Field Sheet (Front)

STREAM NAME:	**LOCATION DESCRIPTION:**	
WA SITE ID:	**DATE:**	**GPS ERROR (+/-) ft:**
LATITUDE (DD):	**LONGITUDE (DD):**	
START TIME:	**END TIME:**	**TIME ZONE: EST or EDT**
INVESTIGATORS:		
FIELD MEASURER/COLLECTOR:	**FIELD RECORDER:**	
SAMPLE TYPE: Targeted	**ACTIVITY TYPE:** Field Measurement/Observation	Field Replicate Msr/Obs
COMPOSITE TYPE: Horizontal Single Horizontal Multi None (Grab)		**PROJECT:** Forsyth WPP
PROJECT/REASON FOR SURVEY:		
COMMENTS:		

***In-situ* Field Chemistry Data**	
Water Temperature: **º C**	**Model of Sonde:**
Air Temperature: **º C**	**Serial # of Unit:**
Specific Conductance: **(µmhos/cm)**	**Salinity:** **PPT**
Dissolved Oxygen (mg/L):	**Dissolved Oxygen:** **%**
pH:	**Battery Volts:**
Turbidity: **NTU**	**Turbidity Instrument #:**

STREAM CHARACTERIZATION (Circle All that Apply)									
WATER APPEARANCE:	Blackwater	Clearwater	Unsure	Unsure/Black	Unsure/Clear				
WATER CLARITY:	Clear	Slightly Turbid	Turbid	Stained	Opaque	Other_____			
TIDAL CYCLE:	1/4 ebb	1/2 ebb	3/4 ebb	Low Tide	1/4 flood	1/2 flood	3/4 flood	High Tide	N/A
WATER COLOR:	Clear	Foamy (natural or pollution)	Green (algal coloration evident)	Other_____					
	Tannic (Tea-colored)	Muddy (cloudy brown)	Milky (cloudy white or gray)	Other_____					
DOMINANT SUBSTRATE(S):	Bedrock	Boulders	Cement	Clay	Cobble	Boulders/RipRap			
	Concrete	Fines	Gravel	Hardpan	Sand	Silt	Other_____		

VISUAL CONDITIONS (Circle Items from List)			
WATER LEVEL/FLOW:	Normal	Above Normal	Normal, but no Velocity
	Low	Flood	Drought Impact
WEATHER PAST 24 HOURS (circle and fill in all that apply):	_____% Cloud Cover	Clear (0% cloud cover)/Sunny	Rain (Steady Rain)
	Showers (intermittent)	Storm (heavy rain)	Snow
	Unsure (past)		
WEATHER NOW (circle and fill in all that apply):	_____% Cloud Cover	Clear (0% cloud cover) /Sunny	Rain (Steady Rain)
	Showers (intermittent)	Storm (heavy rain)	Snow

Grab Water Quality Chemistry Samples Collected		
Parameters (Circle All that Apply)		
Total Suspended Solids	Metal Blank	Chlorophyll *a*
Alkalinity	TKN	Ortho-Phosphorus
Total Hardness	Ammonia	Total Phosphorus
Metals (Dissolved Cd, Cu, Pb, Zn)	Nitrate-Nitrite	Fecal
E. Coli	Biological Oxygen Demand	Chemical Oxygen Demand
Total Organic Carbon	Others:_____	Others:_____

FORSYTH COUNTY, GEORGIA
Your Community. Your Future.

Forsyth County Department of Engineering

JOHN V. CUNARD, Director

March 2018

Dear Forsyth County Resident:

Please be advised that staff from Jacobs Engineering may be observed working for Forsyth County in your area. They will be conducting activities which support permits required for the County to provide water and sewer services to residents. Field crews may be observed filling bottles with water, taking photos and notes, measuring stream channels or pipes, gaging flow, or using various pieces of equipment to determine the health of our creeks. The field crews will not stay long and will make every effort not to disturb any property or landscaping. In fact, there should not be any signs that field crews ever passed through your property.

If you have any questions about this project, please contact Stormwater Division Manager, Steve Dempsey at 770-781-2165.

Sincerely yours,

John Cunard

Director, Forsyth County Department of Engineering

110 East Main Street, Suite 120 | Cumming, Georgia 30040 | (770) 781-2165 | (770) 781-2104 *fax* | forsythco.com