2015

Turkey Creek Watershed Improvement Plan

Developed by:

Heart of Georgia Altamaha Regional Commission

331 West Parker Street

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1.0 SUMMARY

This document describes an interim framework for the implementation of Total Maximum Daily Loads (TMDLs). This interim framework is intended to guide and document the evolving local policies and procedures for advancing consistency with water quality standards. This documentation will promote internal coordination among local, state, and federal agencies and help inform the general public and commercial interests.

For waters that do not meet water quality standards due to an excessive pollutant load, the State must conduct a scientific study to determine the maximum amount of the pollutant that can be introduced to a waterbody and still meet standards. That maximum amount of pollutant is called a Total Maximum Daily Load (TMDL). A TMDL may provide the means for recommending controls needed to meet water quality standards. These standards are set by the state and determine how much of a pollutant can be present in a waterbody. If the pollutant is over the set limit, a water quality violation has occurred. There cannot be any new additions (or "loadings") of the pollutant into the stream until a TMDL is developed. Pollutants can come from point source and non-point source pollution. Point Source Pollution – any direct deposit into the waterway such as wastewater treatment plant discharges and Non-point Source Pollution – runoff from urban, agricultural, and forested area, such as animal waste, litter, antifreeze, gasoline, motor oil, pesticides, metals, and sediment. The purpose of developing a watershed improvement plan for Turkey Creek is to provide a tool that demonstrates a holistic approach to water quality management.

The Turkey Creek Watershed Improvement Plan defines the approach to planning, implementing, and evaluating the effectiveness of best management practices (BMPs) with the goal to achieve the TMDL's for fecal coliform (FC) and restore the beneficial uses of the Turkey Creek watershed (Figure 1).

Restoring a watershed to its intended use requires the development of a process to prepare and implement a plan document for the purpose of: 1) creating the local network of partners; 2) identifying and securing the resources needed to fund and install the management practices and activities that would best achieve the pollutant load reductions needed to meet the TMDL and restore water quality; 3) verifying major sources of impairment; 4) developing a Watershed Improvement Plan that would address USEPA's 9-Key Elements of Watershed Planning; and 5) providing the information needed to support applications for funding (such as EQIP, Section 319(h), GEFA, or others), or identifying existing funding sources, such as utility fees, SPLOST, or others.

2.0 SEGMENT AND WATERSHED DESCRIPTION

One of the first steps in understanding a watershed is through the discovery of its general and natural history. This section presents an overview and characterization of the Turkey Creek Watershed.

Located in the northeast section of Laurens County, the Turkey Creek Watershed is and is part of the Oconee River Basin and is divided into two segments, for the purposes of TMDL Monitoring. The first section of the watershed runs from Horse Branch to Rocky Creek for a

total of 10 miles. The second section of the watershed runs from Rocky Creek to the Oconee River for a total of 11 miles; this portion of Turkey Creek is located in the 10 – digit hydrologic unit code (HUC 10) 0307010211. Political jurisdictions of this segment of Turkey Creek are Laurens County, and the cities of Dudley, Dublin and Rentz. The watershed runs through rural portions of the county, with farmland, forests, housing and some industry being located along Turkey Creek.

The City of Dudley operates a Wastewater Treatment Facility that utilizes the Turkey Creek water system. The facility is located along Turkey Creek at Georgia Highway 338.

The Oconee River Basin, located entirely inside the State of Georgia, occupies an area of approximately 5,330 square miles. The basin lies within the Piedmont and Coastal Plain physiographic provinces, which extend throughout the southeastern United States.

The Turkey Creek Watershed is located in an "average" groundwater pollution susceptibility area. Aquifer recharge areas are vulnerable to both urban and agricultural development. Pollutants from stormwater runoff in urban areas and excess pesticides and fertilizers in agricultural areas can access a groundwater aquifer more easily through these recharge areas. Once in the aquifer, pollutants can spread uncontrollably to other parts of the aquifer thereby decreasing or endangering water quality for an entire region. Therefore, development of any kind in these areas, including installation of septic tanks, should be limited.

If hazardous waste or toxic substances pollute the water that seeps into the ground in a recharge area, these pollutants are likely to be carried into the aquifer and contaminate the groundwater, making it unsafe to drink. Once polluted, it is almost impossible for a groundwater source to be cleaned up[1]. Since the City of Dublin and greater Laurens County receive a majority of their drinking water from groundwater out of the Southeastern Coastal Plain and Floridan aquifer systems, it is important that additional measures be taken to protect these highly sensitive areas. The City of Dublin also draws water for consumption from the Oconee River, increasing the importance for pollutant controls. To assist with the protection of most significant groundwater recharge areas, examples of opportunities include:

- Wellhead protection program;
- Limit impermeable surfaces (e.g. maximum building footprints);
- Require sewer services instead of septic systems; and
- Zoning overlay district (e.g. types of development allowed, increased minimum lot size, incentives for recharge – sensitive cluster development).

The physical landscape is fairly homogenous with no outstanding physical features with the streams flowing generally southeast. Turkey Creek Watershed encompasses 86,097 acres currently composed primarily of agricultural land (19.6%), forestry (72.4%) with a mix of residential (4.6%), and commercial use (1%), as shown on Figure 2, *Turkey Creek River Watershed Current Landuse.* The remaining land use includes 1% public/institutional. Figure 3,

Turkey Creek Watershed Future Landuse, illustrates the estimated future landuse changes in the watershed. Future landuse scenarios were created based on an analysis of trends between 2014 landuse and future landuse zoning projected to the year 2024.

The bedrock of Laurens County is composed of Pliocene-Miocene-Oligocene sedimentary rocks which were formed mostly during the Cenozoic Era (up to 70 million years ago). Below this, the rocks are Eocene and Paleocene sedimentary rocks. The sediments which formed these rocks originated in the "ancient" Appalachian Mountains which have been eroded to form the present day Piedmont and remnant mountains.

Laurens County's climate is classified as humid subtropical (Cfa) according to the Köppen climate classification system. Winters are cool and short with periodic cold spells moderating in 1-2 days. Summers are hot and humid. Annual precipitation typically ranges from 45 to 50 inches and is spread evenly throughout the year (2-5 inches each month). Measurable snowfalls are very rare with a less than 5% probability each year. When they occur, snowfall amounts are most always less than one inch and melt quickly. In winter, the average minimum daily temperature is 39 degrees. In summer, the average maximum daily temperature is 90 degrees. Laurens County's growing season ranges from 8-9 months with an average of 250 days that have daily minimum temperatures greater than 32 degrees. The first winter freeze typically occurs in early November and the last freeze typically occurs in mid-March.

Soils are considered to be a region's most basic and fragile natural resource, combined with such variable resources as air and water. In 1986, the United States Department of Agriculture Soil Conservation Service published the *Soil Survey of Laurens and Johnson Counties Georgia* in cooperation with the University of Georgia, College of Agriculture – Agricultural Experiment Stations, Laurens and Johnson Counties.

Rivers, lakes, and groundwater aquifers are crucial to public health, economic development, and recreational opportunities. However, our water sources are constantly threatened with degradation by such activities as imprudent development, improperly managed agricultural and industrial activities, and unsound waste disposal practices. The soil exerts an important influence on water quality. How we manage the soil determines, in part, the level of treatment required to make our water supplies safe and enjoyable. An understanding of soil properties and their management is essential for reducing the input of water pollutants from the soil. Reducing soil erosion is the key to reducing the damaging effects of sedimentation. Fortunately, with current technology and information, erosion can be reduced to acceptable levels. Table 1 depicts the *Turkey Creek Watershed Generalized Soils* and provides a general description of the 37 soil associations found in the Turkey Creek Watershed.

TABLE 1 – Turkey Creek Watershed Soil Associations

Soil Association	Soil Description
HM – Herod and Muckalee (14.5%)	0% – 2% slope; Poorly drained; very slow runoff; moderate permeability.

DoB – Dothan Loamy Sand (13.7%)	2 to 5 % slopes; This well drained, very gently sloping soil is on ridgetops and hillsides in the uplands.
FuB – Fuquay Loamy Sand (10.0%)	Well drained, nearly level and very gently sloping soil, Located on the broad tops of ridges in the uplands. Slopes are smooth and convex; Moderately suited to field crops, hay, and pasture due to low available water capacity.
TfB – Tifton Loamy Sand (6.6%)	2 to 5% slope; Deep, well drained, very gently sloping soils found on ridgetops and side slopes.
NaB – Nankin Loamy Sand (6.3%)	Well drained, very gently sloping soil is on the narrow tops of ridges in the uplands. Slopes are irregular, undulating, and convex.
OrB – Orangeburg Loamy Sand (5.3%)	2 to 5% slopes; Well drained, very gently sloping soil is on ridgetops and hillsides in the uplands. Well suited to field crops, hay, pasture, most urban uses and recreational development.
TrB – Troup Sand (4.6%)	0 to 6% slope; Well drained, nearly level to gently sloping soil is mainly on the broad tops of ridges in the uplands. Soil is well suited to most urban uses, but seepage is a limitation on sites for most sanitary facilities.
CoB – Cowarts Loamy Sand (3.5%)	Well drained, very gently sloping soil is on ridgetops and hillsides in the uplands. Slopes are irregular, undulating, and convex. Low in natural fertility and in content of organic matter.
FaB – Faceville Sandy Loam (3.1%)	Well drained, very gently sloping; Located on the broad tops of ridges in the uplands. Well suited to field crops, hay, and pasture.
CnA – Clarendon Loamy Sand (3.1%)	0 to 2% slopes; Moderately well drained, located in smooth areas on uplands; is well suited to field crops, hay, and pasture, but the wetness is a limitation.
NkC2 – Nankin Sandy Loam (2.8%)	5 to 8 % slopes, eroded; Well drained, gently sloping soil, located on hillsides in the uplands. The surface layer is a mixture of the original surface soil and the upper part of the subsoil.
MaB – Marlboro Sandy Loam (2.1%)	2 to 5 % slopes; well drained, very gently sloping soil is on the broad tops of ridges in the uplands.
Ra – Rains Sandy Loam (2.0%)	Poorly drained, nearly level soil is in slight depressions and on smooth uplands. In most areas the Rains soil is wooded.

FaC2 – Faceville Sandy Loam (2.0%)	5% – 10% slopes, eroded; Well drained, gently sloping and strongly sloping soil is on hillsides in the uplands. Erosion is a severe hazard unless cultivated areas are protected.
DoA – Dothan Loamy Sand (1.8%)	Well drained, nearly level soil is on the tops of ridges in the uplands.
OsC2 – Orangeburg Sandy Loam (1.8%)	5 to 8% slopes, eroded; Well drained, gently sloping soil is on hillsides in the uplands. Well suited to field crops, hay, and pasture. Erosion is a severe hazard unless cultivated areas are protected.
OsD2 – Orangeburg Sandy Loam (1.8%)	8 to 12% slopes, eroded; Well drained, strongly sloping, located on hillsides in the uplands. Erosion is a severe hazard unless cultivated areas are protected.
CtC2 – Cowarts Sandy Loam (1.7%)	5 – 8% slopes, eroded; Well drained, gently sloping soil is on narrow ridgetops and short hillsides in the uplands. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Has galled spots and an occasional gully.
TC – Tawcaw-Chastain-Congaree Association (1.4%)	Frequently flooded. Nearly level soils formed in clayey or loamy sediments on flood plains.
AeC – Ailey Loamy Sand (1.1%)	5 to 8 percent slopes. This well drained, gently sloping soil is on ridgetops and hillsides in the uplands. Slopes commonly are smooth and convex. Areas are 10 to 90 acres in size.
Gr – Grady Loam (1.0%)	Poorly drained, nearly level soil is in saucer-shaped depressions on uplands. It is ponded from winter to early summer. Slopes are 0 to 2%
LuB – Lucy Loamy Sand (0.8%)	0 to 5% slopes; This well drained, nearly level and very gently sloping soil is on the broad tops of ridges in the uplands.
CaB2 – Carnegie Sandy Loam (0.8%)	2% to 5% slopes; eroded. Well drained, very gently sloping soil is on ridgetops and hillsides in the uplands. The landscape is undulating and has galled spots and gullies.
SuB – Susquehanna Sandy Loam (0.8%)	Somewhat poorly drained, very gently. Sloping soil located on ridgetops and hillsides in the uplands. Does not have a fluctuating high water table; It is wet only during periods of heavy rainfall.
AeB – Ailey Loamy	2 to 5 percent slopes. This somewhat excessively drained, very gently sloping soil is on the broad tops of ridges in the uplands. Slopes are

Sand (0.8%)	smooth and convex. Areas are 5 to 75 acres in size.
Od – Ocilla Loamy Sand (0.7%)	0 to 2% slopes; This somewhat poorly drained, nearly level soil is mainly on broad, smooth, slightly depressional uplands.
SuC – Susquehanna Sandy Loam (0.6%)	5 to 12% slopes; Somewhat poorly drained, very gently sloping soil is on ridgetops and hillsides in the uplands. Available water capacity is moderate. Runoff is rapid.
TfA – Tifton Loamy Sand (0.6%)	0 to 2% slope; Deep, well drained, very gently sloping soils found on ridgetops and side slopes.
OrE – Orangeburg Loamy Sand (0.5%)	12 to 17% slopes; Well drained, moderately steep soil located on hillsides in the uplands. In most places slopes are irregular and have a few galled spots and an occasional gully unsuited to field crops due to slope.
TnC2 – Tifton Sandy Loam (0.5%)	5 to 8% slope, eroded; Well drained, gently sloping soil is on short hillsides in the uplands. A conservation tillage system, a water management system, or a combination of both helps to control runoff and erosion.
FuC – Fuquay Loamy Sand (0.4%)	5 to 8 percent slopes; This well drained, gently sloping soil is on ridgetops and hillsides in the uplands. Slopes commonly are smooth and convex. Areas are 5 to 20 acres in size.
DtC2 – Dothan Sandy Loam (0.3%)	5 – 8% slopes, eroded; well drained, gently sloping soil is on ridgetops and hillsides in the uplands. In most places slopes are irregular and have galled spots and an occasional gully.
Oc – Ochlockonee Sandy Loam (0.3%)	Well drained, nearly level soil is on narrow flood plains. It is occasionally flooded for very brief periods from late fall to mid spring.
CaC2 – Carnegie Sandy Loam (0.3%)	5% to 8% slopes; eroded. Well drained, very gently sloping soil is on ridgetops and hillsides in the uplands. The landscape is undulating and has galled spots and gullies.
OrA – Orangeburg Loamy Sand (0.3%)	0 to 2% slopes; This well drained, nearly level soil is on the broad tops of ridges in the uplands. Well suited to urban uses and to recreational development.
AmB – Americus loamy sand (0.3%)	2% to 5% slopes; somewhat excessively drained, very gently sloping, located on the broad tops of ridges in the uplands.

ReB – Red Bay Loamy Sand (0.2%)	2 to 5% slopes; Well drained, very gently sloping soil is on the broad tops of ridges in the uplands. Slopes are smooth and convex. Well suited to urban uses and to recreational development.

Source: http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

3.0 WATER QUALITY IMPAIRMENTS AND TOTAL MAXIMUM DAILY LOADS (TMDLS)

Turkey Creek was identified in the 2007 and 2012 305(b)/303(d) draft list of impaired wasters. The Georgia 2012 305(b)/303(d) draft list of waters was prepared as a part of the Georgia 2010-2011 assessment of water quality prepared in accordance with Sections 305(b) and 303(d) of the Federal Clean Water Act and guidance from the U.S. Environmental Protection Agency. Assessed water bodies are classified according to a comparison of water quality monitoring results to water quality standards and other pertinent information. Table 2 depicts values contained in the *Total Maximum Daily Load Evaluation for Seventy-Two Stream Segments in the Oconee River Basin for Fecal Coliform* of 2007.

TABLE - 2 Turkey Creek Watershed 2007 305(b)/303(d) List

Waterbody Name	Location	County(s)	Impairment	Miles Impacted	Percent Load Reduction
Turkey Creek	Horse Branch to Rocky Creek	Laurens	FC	10	13%
Turkey Creek	Rocky Creek to Oconee River	Laurens	FC	11	4%

Source: Georgia Department of Natural Resources, Environmental Protection Division, 2007

Two segments of Turkey Creek were placed on the Section 303(d) list by the GA EPD for violating the state standards for fecal coliform (FC); an upstream segment from Horse Branch to Rocky Creek (10 miles), and downstream segment from Rocky Creek to the Oconee River (11 miles). Georgia's standard specifies that fecal coliform concentration in the stream water shall not exceed the 30 – day geometric mean of 200 cfu/100 ml for the months of May and October, and 1,000 cfu/100 ml with no single sample greater than 4,000 for the months of November through April.

This TMDL has an implicit margin of safety embodied in the endpoint identification. Units of percent can be used to quantify the standard TMDL equation: Load Allocation (LA) + Waste Load Allocation (LA) = TMDL. This equation describes both the allocation of allowable loading and the allocation of responsibility for reducing loading to the extent necessary to achieve the endpoint. Using the data set resulting in the violation and associated modeling, suggests that a load reduction of approximately 13 percent would result in attainment of the standard for Turkey Creek, and 4% for Turkey Creek at Rocky Creek to the Oconee River.

As a result of the water quality impairment, both segments of Turkey Creek were assessed as "not supporting" the Clean Water Act's fishing use support goal. In order to remedy the water

quality impairment pertaining to fecal coliform, a TMDL has been developed, taking into account all sources of fecal coliform. Upon implementation, the Watershed Improvement Plan for Turkey Creek shall ensure that the water quality standard relating to fecal coliform will be in compliance with the geometric mean standard.

4.0 VISUAL SURVEYS AND TARGETED MONITORING

The purpose of a visual survey is to determine if there are observable problems on the river and to characterize the environment the river flows through. The visual survey helped pinpoint areas that may be the source of water quality impairments and helped to determine the overall condition of the river.

Where watershed – wide monitoring had not been conducted, a targeted monitoring plan was developed (Appendix D) to geographically isolate the major sources of impairment(s). In order to offer a "better" picture of water quality conditions, target monitoring was conducted for *E. coli* every week from May 2013 – July 2013. The sampling schedule was one (1) sample, every week, per stream over a 3 month period. Funding and other resources can be better used in areas of the watershed that show the greatest need for attention. This can help open the door for projects that target areas of the watershed to receive funding to implement best management practices (BMPs) that are recommended to address water quality violations.

TABLE 3 - Turkey Creek River Water Quality Results (E. Coli)

5/14/2013	Time	Ecoli (cfu/100ml)
Control	11:50 AM	0
Old Montrose Road @ Tky Crk	10:05 AM	153
US Hwy 80 @ Tky Crk	10:37 AM	513
GA Hwy 257@ Tky Crk	11:02 AM	60
GA Hwy 19 @ Tky Crk	11:34 AM	17
5/21/2013	**Time**	**Ecoli (cfu/100ml)**
Control	1:00 PM	0
Old Montrose Road @ Tky Crk	10:11 AM	140
US Hwy 80 @ Tky Crk	10:40 AM	260
GA Hwy 257@ Tky Crk	11:08 AM	252
GA Hwy 19 @ Tky Crk	12:33 PM	147
5/28/2013	**Time**	**Ecoli (cfu/100ml)**
Control	11:40 AM	0
Old Montrose Road @ Tky Crk	10:06 AM	44
US Hwy 80 @ Tky Crk	10:32 AM	33
GA Hwy 257@ Tky Crk	10:57 AM	16

GA Hwy 19 @ Tky Crk	11:23 AM	102

6/4/2013	Time	Ecoli (cfu/100ml)
Control	1:00 PM	0
Old Montrose Road @ Tky Crk	12:11 PM	110
US Hwy 80 @ Tky Crk	11:19 AM	77
GA Hwy 257@ Tky Crk	10:46 AM	30
GA Hwy 19 @ Tky Crk	10:25 AM	23

6/11/2013	Time	Ecoli (cfu/100ml)
Control	11:50 AM	0
Old Montrose Road @ Tky Crk	10:26 AM	140
US Hwy 80 @ Tky Crk	10:48 AM	103
GA Hwy 257@ Tky Crk	11:08 AM	70
GA Hwy 19 @ Tky Crk	11:34 AM	207

6/18/2013	Time	Ecoli (cfu/100ml)
Control	11:05 AM	0
Old Montrose Road @ Tky Crk	9:59 AM	70
US Hwy 80 @ Tky Crk	10:20 AM	47
GA Hwy 257@ Tky Crk	10:39 AM	17
GA Hwy 19 @ Tky Crk	10:58 AM	30

6/25/2013	Time	Ecoli (cfu/100ml)
Control	12:00 PM	0
Old Montrose Road @ Tky Crk	10:59 AM	20
US Hwy 80 @ Tky Crk	11:20 AM	43
GA Hwy 257@ Tky Crk	11:38 AM	63
GA Hwy 19 @ Tky Crk	11:57 AM	67

7/2/2013	Time	Ecoli (cfu/100ml)
Did not Sample during this week		

7/9/2013	Time	Ecoli (cfu/100ml)
Control	11:00 AM	0
Old Montrose Road @ Tky Crk	9:55 AM	70
US Hwy 80 @ Tky Crk	10:16 AM	33
GA Hwy 257@ Tky Crk	10:38 AM	133
GA Hwy 19 @ Tky Crk	10:55 AM	7

7/16/2013	Time	Ecoli (cfu/100ml)
Control	10:50 AM	0
Old Montrose Road @ Tky Crk	9:34 AM	412
US Hwy 80@ Tky Crk	9:56 AM	193
GA Hwy 257@ Tky Crk	10:20 AM	73
GA Hwy 19 @ Tky Crk	10:40 AM	3

7/23/2013	Time	Ecoli (cfu/100ml)
Control	11:20 AM	0
Old Montrose Road @ Tky Crk	10:18 AM	37
US Hwy 80 @ Tky Crk	10:45 AM	37
GA Hwy 257@ Tky Crk	11:01 AM	7
GA Hwy 19 @ Tky Crk	11:17 AM	3

7/30/2013	Time	Ecoli (cfu/100ml)
Control	1:20 PM	0
Old Montrose Road @ Tky Crk	9:30 AM	70
US Hwy 80 @ Tky Crk	9:52 AM	40
GA Hwy 257@ Tky Crk	10:45 AM	287
GA Hwy 19 @ Tky Crk	10:12 AM	327

5.0 IDENTIFICATION AND RANKING OF SIGNIFICANT SOURCES OF IMPLEMENTATION

The nonpoint sources of fecal coliform are mainly agricultural, such as, land-applied animal waste and manure deposited on pastures by cattle. A significant fecal coliform load comes from cattle directly depositing in streams. Wildlife contributed to fecal coliform loadings on pasture, forest, and stream. Other nonpoint sources of fecal coliform loadings include failing septic systems and pet waste.

TABLE 4 - Sources of Implementation

Source	Extent (Miles, acres, etc.)	Permitted (Y/N)	Estimated Contribution (Rank 1 – 5)	Stakeholder Opinion (1 – 5)	Comments
Agricultural Runoff	16,957	N	5	5	Agricultural animals can be an important source of fecal coliform loading to streams, through both runoff from pastureland and cattle in streams.

Stormwater Runoff	3,980	N	4	4	Stormwater runoff primary sources of fecal coliform bacteria include pet waste, wildlife, septic systems, illicit discharges.
Failing Septic Systems	NA	Y	3	3	Failing septic systems are not always easy to identify, especially if the failure involves untreated sewage entering a stream via groundwater. Water quality sampling should be collected in the Turkey Creek Watershed. Education outreach should be implemented with the local Health Departments.
Wildlife	79,314	N	2	2	Wildlife deposit fecal coliform bacteria with their feces onto land surfaces where it can be transported during storm events to nearby streams. The bacteria load from wildlife could be a contribution due to the rural acreage in this watershed.
Publically Owned Treatment Works	200	Y	4	4	This includes both possible leaks from treatment facilities as well as pipes used for collection.

6.0 IDENTIFICATION OF APPLICABLE EXISTING MANAGEMENT MEASURES

Management measures are "economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint and stormwater sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint and stormwater source pollution control practices, technologies, processes, citing criteria, operating methods, or other alternatives" (USEPA, 1993).

A description of existing management measures for the Turkey Creek Watershed are summarized below in Table 5. These measures are effective, practical, structural or nonstructural methods which prevent or reduce the movement of sediment, nutrients, pesticides and other pollutants from the land to surface or groundwater, or which otherwise protect water quality from potential adverse effects. These practices are developed to achieve water quality protection within natural and economic limitations.

TABLE 5 - Existing Management Measures

Regulation/Ordinance or Management Measure	Responsible Government, Organization or Entity	Description
Local Wetlands Policy Ordinance	Laurens County City of Dudley City of Rentz	Water Resource District Ordinance applies to the Georgia Planning Act Part V: Environmental Criteria.
Protected River Corridor Plan Ordinance	Laurens County City of Dudley City of Rentz	Water Resource District Ordinance applies to the Georgia Planning Act Part V: Environmental Criteria.
Farm Service Agency	USDA - FSA	Requires producers to comply with conservation plans for the farm, wetland provisions, planting flexibility provisions, as well as to keep the land in agricultural use.
Conservation Reserve Program (CRP)	USDA - FSA	Ongoing financial and technical assistance to encourage farmers to convert erodible cropland to vegetative cover.
Environmental Quality Incentives Program (EQIP)	USDA - FSA	Ongoing financial and technical assistance to install/implement structural and management practices on eligible agricultural land and/or for commodity operations.
Soil Testing	Landowner with assistance from UGA - Cooperative Extension and/or licensed contractor	Applies to soil sampling taken on a regular basis to minimize impacts of fertilizers, pesticides, and herbicides in waterways.
Erosion & Sedimentation Ordinance	Laurens County	Adopted and enforced.
Cover Crop, Critical Area Planting, Fence, Heavy Use Area Protection, Irrigation System - Sprinkler, Pasture and Hay Planting,	USDA - NRCS and landowner in Laurens County	Ongoing financial and technical assistance to install/implement structural and management practices on eligible agricultural land and/or for commodity operations.
Groundwater Recharge Development Ordinance	Laurens County City of Dudley City of Rentz	Water Resource District Ordinance applies to the Georgia Planning Act Part V: Environmental Criteria.
Stormwater detention/retention standards	City of Dublin	Adopted and enforced.

Regulation/Ordinance or Management Measure	Responsible Government, Organization or Entity	Description
Manure Management Plan	Landowner with assistance from NRCS, UGA - Cooperative Extension, and/or licensed contractor	Applies to keeping records of manure applications and continuous soil sampling.
The Joint Laurens County Solid Waste Management Plan 2019	Laurens County City of Dublin City of Dudley City of Rentz	In 2010, the Joint Laurens County Solid Waste Management Plan (SWMP) was completed and is scheduled to be updated in 2019.
Section 319(h) Grant – Well and Septic Tank and Online Referencing Mapping (WelSTROM) System	Laurens County Health Department	Approved by GA EPD and began work in 2007. This provides a tool for local governments and regional agencies to guide future decisions, such as development, infrastructure expansions, TMDL development and implementation, and education outreach on all new septic systems.

7.0 RECOMMENDATIONS FOR ADDITIONAL MANAGEMENT MEASURES

Development of effective management measures depends on accurate source assessment. Coliform bacteria are contributed to the environment from a number of categories of sources including human, domestic or captive animals, agricultural practices, and wildlife. Coliform bacteria from these sources can reach waterbodies directly, through overland runoff, or through sewage or stormwater conveyance facilities. Each potential source will respond to one or more management strategies designed to eliminate or reduce that source of coliform bacteria. Each management strategy has one or more entities that can take lead responsibility to effect the strategy.

Because the Turkey Creek Watershed contains a combination of rural, suburban, and urban land uses, implementation actions consist of a variety of management practices to address human impacts arising from these various land uses. Proposed actions include agricultural BMPs, stream channel BMPs, stormwater management BMPs, sanitary sewer system improvements, and urban/residential education components.

Education is the key to a successful watershed management program. The overall goal of the Information and Education Strategy component of the watershed improvement plan is to provide educational information to local officials, shoreline residents, contractors and developers, school children and the general public, enabling them to make decisions that will enhance the protection of the Turkey Creek Watershed. Informed citizens can greatly affect the outcome of a watershed protection program.

Table 6 lists the information and education strategies that will be directed towards a specific target audience.

TABLE 6 - Implementation/Education Strategy

Information/Education Strategy			
Source	**Target Audience**	**Message**	**Delivery Mechanism**
Streambank erosion, land clearing/construction practices	Riparian landowners, builders, contractors	Encourage landowners to leave a conservation buffer, provide attractive landscaping for natural vegetation.	Information material disseminated and implement BMPs.
Cattle/livestock access	Agriculture managers, landowners	Control livestock access, establish fencing, create proper stream crossings, provide alternate funding sources.	With NRCS and Conservation Districts, and other partners provide information at fairs, field days, and events, implement BMPs.
Failing septic systems	Homeowners	Properly maintain your septic system to prevent water quality degradation.	Information material disseminated to local Health Departments and landowners, repair failing systems.
Agriculture practices	Agriculture managers, landowners	By reducing livestock access to surface water you are protecting a resource that is very valuable to everyone.	Implement BMPs and hold field days/workshops.
Cropland	Agriculture managers, landowners	By reducing runoff from disturbed cropland and pesticide/herbicide applications you reduce the amount of sediment and chemical pollutants entering the watershed.	Implement BMPs and hold field days/workshops.
Stormwater runoff	Local officials, residents	Protect the waterways by reducing the amount of pollutants entering the river, make public aware of where stormwater goes.	Drain markers, informative seminars for local officials, brochures for the public, tours of model stormwater site, implement appropriate BMPs.

TABLE 7 - ADDITIONAL MANAGEMENT MEASURES

BMP	Cost (Per unit)	Est. Total Cost	Impair-ment Addressed	Load Reduction (%)	Stake-holder Support (1 – 5)	Benefits
Ag Riparian Buffer	NA	NA	FC	50 – 75%	5	Act to intercept sediment, nutrients, pesticides, and other materials in surface runoff and reduce nutrients and other pollutants in shallow subsurface water flow. They also serve to provide habitat and wildlife corridors and can help reduce erosion by providing stream bank stabilization.
Livestock Exclusion Fencing	$1.80 LF or $2.50 LF	$450,000	FC	75%	5	Reduce sediment and possibly nutrient yield from streams draining pastures.
Limited Access Crossing	NA	NA	FC	NA	5	Less erosion and sedimentation in the water.
Streambank Restoration	NA	$300,000 - $600,000	FC	NA	4	Helps to improve habitat for the aquatic and semi-aquatic life supported by the stream, serve as a pollutant buffer, and act as a physical buffer against cattle and other animals that may trample or erode the streambank.
Street Sweeping	$160,000	$160,000	FC	NA	3	Removing both the large and microscopic pollutants, such as metal particles from vehicles.
Bio-retention Areas	$12 SF	$240,000	FC	71 – 90%	2	Removes pollutants through a variety of physical, biological, and chemical treatment processes.

Stormwater Wetlands	$10 CY	$250,000	FC	70%	3	Improves water quality, flood control. Enhances wildlife, and removes pollutants through sedimentation and filtration.
Increase E&S Efficiency	NA	NA	FC	75%	4	Helps mitigate increased sediment loads to streams.
Education Outreach	NA	NA	FC	NA	5	Helps to increase awareness on the importance of water quality.
Vegetative Buffers	NA	NA	FC	50 – 80%	5	Highly effective for controlling sedimentation, erosion, and pollution from runoff.
Cover Crops	$20 AC to $65 AC	$300,000	FC	40 – 60%	5	Prevents erosion.
Heavy Use Area Paddocks	$1.66 SF to $8 SF	$120,000	FC	80%	4	Reduces erosion while improving water quality.
Septic System Repairs	$500 to $5,000	$75,000	FC	50 – 75%	4	Reduces fecal coliform from nearby streams.
Pet Receptacles	$350	$5,000	FC	NA	2	Helps remove bacteria, pathogens, and nutrients via stormwater runoff.
Filter Strip	$450 AC	$50,000	FC	50 – 80%	4	Protects water quality by trapping soil particles, nutrients, and pesticides, they can also improve water infiltration and enhance wildlife habitat.
DRI Implements	NA	NA	FC	50 – 75%	3	Reduces erosion and runoff.
Promote a naturalized landscape	NA	NA	FC	NA	1	Improves water quality, and reduces erosion.

Grass Waterway	$5 LF	NA	FC	60 – 80%	2	Provides pretreatment, partial infiltration of runoff in suitable soil conditions, generally less expensive than extruded curb, good for small drainage areas, and relatively low maintenance requirements.
Rain Barrels	$200	$10,000	FC	NA	2	Reduces stormwater runoff and acts as an alternative water source.

In order to determine the overall effectiveness of the implemented management strategies an evaluation process is essential.

These various methods should be considered for evaluation:

- Physical water quality monitoring;
- Chemical water quality monitoring;
- Biological life measurements;
- Photographic or visual evidence, before and after photos;
- Documentation of site BMPs installed;
- Pollutant loading measurements;
- Stakeholder surveys, evaluate knowledge or change in behavior; and
- Focus groups, to determine effectiveness of project activities.

8.0 PARTNER ORGANIZATIONS AND ADVISORY GROUPS

An Advisory Group recruitment from a number of working group partners were utilized to provide input for this watershed plan. Representatives include agriculture, industrial or municipal point source discharge permittees, forest products firms, members of local government, and landowners. The final advisory group of major stakeholders and community participants includes:

TABLE 8 - PARTNERS/ADVISORY GROUP

Name	Address	City	St	ZIP	Email
Gabe Morris	5405 Oak Street	Eastman	GA	31023	morris@hogarc.org
James Pope	331 West Parker Street	Baxley	GA	31513	pope@hogarc.org
Jason Locke	P.O. Box 315	Dudley	GA	31022	cityofdudley@progressivetel.com
Bobby Allen	P.O. Box 315	Dudley	GA	31022	cityofdudley@progressivetel.com
Buddy Adams	P.O. Box 2011	Dublin	GA	31040	adamsb@dlcga.com
Bryan Rogers	P.O. Box 2011	Dublin	GA	31040	rogersb@dlcga.com
Jimmy Sawyer	P.O. Box 690	Dublin	GA	31040	sawyerj@dlcga.com
M. L. Knight	P.O. Box 127	Rentz	GA	31075	rentzcty@progessivetel.com
Britt Parker		Dublin	GA	31040	
Jen Hilburn	P.O. Box 4122	Macon	GA	31208	coastkeeper@altamahariverkeeper.org
Rahn Milligan	NA	NA	GA	NA	rmilligan@pinecountryrcd.org
Andy Dyar	3014 Heritage Road, Suite 1	Milledgeville	GA	31061	adyar@gaswcc.org

The Watershed Improvement Plan (WIP) Advisory Group is a collection of individuals who bring unique knowledge and skills which complement the knowledge and skills of the public in order to more effectively accomplish this revision. The purpose of the WIP Advisory Group is to provide a forum for the public, partners, etc. to discuss potential concerns and solutions that will impact Turkey Creek, and to make recommendations relative to TMDLs.

The Advisory Group's key responsibilities were to:

- **Advise** on matters of concern to the community;
- **Contribute to the education** of the residents of the watershed on water quality issues;
- **Help identify** contributing pollution sources;
- **Assist** in arriving at equitable pollution reduction allocations among contributors;
- **Recommend specific actions** needed to effectively control sources of pollution; and
- **Help develop** and set in motion a watershed improvement plan.

The initial round of correspondence of the Advisory Group was held between May and September, 2013 to review the goals of this project. Group members were invited to conduct a streamwalk along Turkey Creek during the first sampling event. A second review opportunity

was given to provide comments for the initial draft between May and June of 2014. Due to a staffing turnover at the Heart of Georgia Altamaha Regional Commission, the plan was delayed from final submission until July of 2015 until the time a new planner was assigned. The Advisory Group and Stakeholders were given a final review opportunity of the plan July 30, 2015 to finalize edits on the draft Watershed Improvement Plan.

9.0 PUBLIC INVOLVEMENT

Stakeholders are individuals who live or have land management responsibilities in the watershed, including government agencies, businesses, private individuals and special interest groups. Stakeholder participation and support is essential for achieving the goals of this TMDL effort.

Building partnerships was a key component in order to declare input from the Stakeholder perspective in evaluating the plan and to provide an opportunity for Stakeholders to understand how the peer review process contributes to the development of WIP plans and results. As a result of their participation, Stakeholders became knowledgeable advocates for the role to help manage or decrease nonpoint source pollution impacts.

Stakeholders' key responsibilities were to:

- **Provide** technical support and assistance;
- **Distribute** and share information;
- **Identify** opportunities and common concerns; and
- **Develop** public support.

HOGARC staff encouraged public participation in the development of this WIP Plan by inviting Stakeholders to participate in meetings throughout the development stages. The objective of these meetings was to obtain feedback from Stakeholders about the concerns and composition of watershed activities. Stakeholders were given the opportunity to comment through email, fax or phone to suggest planning practices for the improvement of Turkey Creek from a period of May 2013 until September 2013, while sampling was conducted. Communication from stakeholders was included in the plan and reviewed in draft format prior to submission.

Examples of Stakeholder recommendations include:

- Additional monitoring to verify effectiveness of measures implemented;
- Review of all existing development codes, ordinances, and policies to identify where revisions could be made to reduce non-point source water pollution;
- Design and implement a citizen education program to make citizens aware of the non-point source water pollution problem and their role in improving the water quality;
- Encourage the continuing formation of volunteer groups to conduct community based stream protection efforts such as restoring vegetative cover within riparian areas, stream clean-up, and reporting of problems;
- Conduct screening level analyses of structural and non-structural BMPs;
- Investigate grant and funding opportunities to fund these efforts;
- Propose best management practices (BMPs) or other ways to correct problems at each location; and
- Evaluate technical assistance needed and how to administer assistance.

10.0 INTERIM MILESTONES

The ultimate goal of this implementation plan is to bring Turkey Creek into compliance with water quality standards, and the ultimate accomplishment of being listed as supporting on the 303(d) list of impaired waters. This goal will be measured by the concentration of fecal coliform and E. coli in samples, but milestones along the way will include both water quality measurements, the implementation of BMPs and load reductions for each BMP. The construction of BMPs in the urban area will be to some extent dependent on opportunities presented, while milestones may be tailored to the resources available.

In order to achieve the TMDL it is recommended that there be a 13% load reduction of FC from Horse Branch to Rocky Creek, and 4% reduction from Rocky Creek to Oconee River. Although the type of source is known, there is very limited data available on the effectiveness of existing and/or potential management measures available to address the sources. Furthermore, there are also limited financial resources available to stakeholders and local governments to address nonpoint sources. A list of management measures and other general actions to be implemented during the first 3 years of the plan around the Turkey Creek Watershed is shown in Section 12.0 Plan Implementation, Table 10.

In order to bring Turkey Creek to compliance, sub – goals and objectives are listed below. These address the watershed issues outlined in the previous sections of this report:

GOAL #1: Implement cost – shared best management practices (BMPs) to achieve targeted agricultural reductions.

Objective: Educate targeted landowners in funding available and procedures for implementing BMPs on their properties.

Objective: Install appropriate BMPs such as, but not limited to, exclusion fencing, riparian buffers, cover crops, and stream crossings on pastures.

GOAL #2: Reduce inputs in urban, university, and residential areas through education.

Objective: Encourage installation of urban streamside forest buffers, where possible.

Objective: Encourage installation of homeowner Low Impact Development (LID) measures.

Objective: Educate homeowners in funding available for forested buffers.

Objective: Use media to increase awareness of water quality issues and good stewardship practices.

Objective: Include education about water quality and stewardship in local school curricula.

Objective: Offer educational programs and literature through homeowners' associations and other neighborhood or civic organizations.

Objective: Expand the state Adopt-a-Stream program in the watershed.

GOAL #3: Implement stormwater management practices to reduce inputs from public works.

Objective: Install and monitor demonstration Low Impact Development (LID) sites.
Objective: Improve enforcement of Erosion and Sediment Control regulations.
Objective: Improve efficiency of street sweeping practices.
Objective: Seek opportunities for remediation and increased stormwater infiltration with redevelopment and new construction.
Objective: Reduce sanitary sewer overflows.
Objective: Prevent infiltration/exfiltration from sanitary sewers.

GOAL #4: Through planning activities, identify and prioritize opportunities for stream protection and restoration, and ensure that codes and design standards are "water quality friendly."

Objective: Revise as necessary master plans and action lists for watershed.
Objective: Review and adopt codes and design standards as needed.
Objective: Encourage future development using smart development guidelines.
Objective: Encourage stream restoration other suitable infiltration practices in areas of redevelopment.

GOAL #5: Reduce urban and residential inputs by performing inspection, monitoring and maintenance activities to eliminate illicit discharges, ensure proper stormwater system performance and prevent pollution.

Objective: Inspect all stormwater outfalls.
Objective: Detect and address non – storm water/illicit discharges.
Objective: Maintain and repair stormwater structures.
Objective: Provide guidelines to downtown businesses regarding acceptable wastewater disposal procedures.

11.0 RECOMMENDATIONS FOR MONITORING AND CRITERIA FOR MEASURING SUCCESS

While a good amount of monitoring data is available on the Turkey Creek Watershed, effectiveness of BMP installation is still only estimated. The City of Dudley and Laurens County should conduct sampling each year as BMPs are being implemented. This information will help verify which BMP projects are most beneficial. This information will be used not only in determining how to proceed or revise the management plan, but also in other nearby watersheds.

According to EPA standards, monitoring is recommended at rotation sites throughout the watershed as well as biological and habitat assessments every two years. The monitoring program to assess implementation progress may also be based on a volunteer monitoring program such as Adopt – A – Stream. GAEPD will provide assistance, upon request, with setting up, designing, and implementing monitoring programs.

12.0 PLAN IMPLEMENTATION

The objective of a Watershed Improvement Plan is to restore impaired water quality to meet water quality standards. From a broader perspective, Georgia's water quality management strategy addresses three things:

1. Protection: Prevent the degradation of healthy waters.
2. Restoration: Develop and execute plans to eliminate impairments.
3. Maintaining Restored Waters: Institutionalize technical and administrative procedures to prevent or offset new pollutants.

A list of management measures and other general actions to be implemented during the first 3 years is shown in Table 10.

TABLE 10 - IMPLEMENTATION SCHEDULE

2015	
Measurable Milestone	**Party Responsible**
Complete final Watershed Improvement Plan.	HOGARC
Contact Stakeholder and Advisory Groups to present and discuss funding options and future goals.	HOGARC
2016	
Apply for a Section 319(h) Grant by November.	HOGARC, EPD
2017	
Measurable Milestone	**Party Responsible**
Execute contract with EPD.	HOGARC, EPD
Employ a part - time watershed coordinator.	HOGARC
Coordination and Liaison with Watershed Citizens, Stakeholders, and Advisory Groups.	HOGARC
Present a community educational workshop.	HOGARC
Implement BMPs.	HOGARC
Create website.	HOGARC
2018	
Measurable Milestone	**Party Responsible**
Employ a part - time watershed coordinator.	HOGARC
Coordination and Liason with Watershed Citizens, Stakeholders, and Adivsory Groups.	HOGARC
Implement BMPs.	HOGARC, Landowners
Create brochure.	HOGARC
Update website.	HOGARC
Present a rural/urban educational workshop/field day.	HOGARC
Hold Adopt - A - Stream workshop.	HOGARC, EPD
Locate and map all stormwater outlets.	HOGARC
Submit semi - annual reports for GRTS update. Submit load reductions	HOGARC

each August 31st.	
2019	
Measurable Milestone	**Party Responsible**
Employ a part - time watershed coordinator.	HOGARC
Coordination and Liason with Watershed Citizens, Stakeholders, and Adivsory Groups.	HOGARC
Implement BMPs.	HOGARC, Landowners
Update website.	HOGARC
Hold Adopt - A - Stream workshop.	HOGARC, EPD
Present a rural/urban educational workshop/field day.	HOGARC
Submit semi - annual reports for GRTS update. Submit load reductions each August 31st.	HOGARC
2020	
Measurable Milestone	**Party Responsible**
Employ a part - time watershed coordinator.	HOGARC
Coordination and Liaison with Watershed Citizens, Stakeholders, and Advisory Groups.	HOGARC
Implement BMPs.	HOGARC, Landowners
Update website.	HOGARC
Create brochure.	HOGARC
Present a rural/urban educational workshop/field day.	HOGARC
Submit final project close - out report to EPD for review and approval.	HOGARC
Annually	
Measurable Milestone	**Party Responsible**
Education Outreach (website, media, workshops/field days, etc).	HOGARC
Encourage and install appropriate BMPs.	HOGARC, Laurens County
Expand the Adopt - A - Stream Program.	HOGARC, EPD
Improve enforcement of Erosion and Sediment Control regulations.	HOGARC, Dudley/Laurens County
Review and revise Master Plan.	HOGARC, Dudley/Dublin/Laurens County
Submit semi - annual reports for GRTS update. Submit load reductions each August 31st.	HOGARC

During each semi – annual evaluation of implementation on Turkey Creek, a reassessment of implementation priorities will be made by the Advisory Group to readjust and fine – tune the targeting approach in concert with the staged implementation approach. If reasonable progress toward implementing the management practices is not demonstrated, the Advisory Group will consider additional implementation actions.

If it is demonstrated that reasonable and feasible management measures have been implemented for a sufficient period of time and TMDL targets are still not being met, additional measuring may be needed. If after three years the Advisory Group determines that load reductions are being achieved as management measures are implemented, then the recommended appropriate

course of action would be to continue management measure implementation and compliance oversight. If it is determined that all proposed control measures have been implemented, yet the TMDL is not achieved, further investigations will be made to determine whether: 1) the control measures are not effective; 2) fecal coliform loads are due to sources not previously addressed; or 3) the TMDL is unattainable.

As with all programs, funding is an integral component in making a program not only happen, but a success. There are numerous funding opportunities for local governments, non-profits, and individuals from federal, state, and local sources. Opportunities may include, but not limited to: U.S. Environmental Protection Agency, GA Environmental Protection Division, U.S. Department of Agriculture – Natural Resource Conservation Service, U.S. Fish and Wildlife Programs, and GA Environmental Facilities Authority. These are only a few of the many funding sources available. It is important to note that funding sources and opportunities change on a yearly basis, so always check for the most up-to-date information.

13.0 REFERENCES

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14.0 Plan Appendices

- **A. Nine (9) – Key Element Summary**
- **B. Watershed Maps (HUC) #0307010211**
- **C. Land Use Maps: Current and Future**
- **D. Monitoring Plan and Pictures**
- **E. Meeting Minutes**

APPENDIX A: NINE (9) – KEY ELEMENT SUMMARY

Beginning with FY03 grants, the United States Environmental Protection Agency (EPA) requires all implementation, demonstration, and outreach – education projects funded under Section 319 of the federal Clean Water Act to be supported by a Watershed Plan which includes the following nine listed elements. To be eligible for Section 319 funding watershed plans must address all nine elements. The nine EPA required elements, and the location of the plan component addressing these elements are listed below.

A. An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in this watershed based plan (and to achieve any other watershed goals identified in the watershed based plan), as discussed in item (b) immediately below. Sources that need to be controlled should be identified at the significant subcategory level with estimates of the extent to which they are present in the watershed (e.g., X numbers of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded streambank needing remediation).

- Causes of pollution in the watershed that will need to be controlled are found in Section 3.0 Water Quality Impairments and Total Maximum Daily Loads (TMDLs) and 5.0 Identification and Ranking of Significant Sources of Implementation of the completed watershed improvement plan.

B. An estimate of the load reductions expected for the management measures described under paragraph (c) below (recognizing the natural variability and the difficulty in precisely predicting the performance of management measures over time). Estimates should be provided at the same level as in item (a) above (e.g., the total load reduction expected for dairy cattle feedlots; row crops; or eroded streambanks).

- Estimates of the load reductions expected for the management measures recommended for implementation are found in Section 7.0 Recommendations for Additional Management Measures of the completed watershed improvement plan.

C. A description of the NPS management measures that will need to be implemented to achieve the load reductions estimated under paragraph (b) above (as well as to achieve other watershed goals identified in this watershed-based plan), and an identification (using a map or a description) of the critical areas in which those measures will be needed to implement this plan.

- A description of the measurements that are recommended for implementation to achieve the estimated load reductions can also be found in Section 7.0 Recommendations for Additional Management Measures of the completed watershed improvement plan.

D. An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan. As

sources of funding, States should consider the use of their Section 319 programs, State Revolving Funds, USDA's Environmental Quality Incentives Program and Conservation Reserve Program, and other relevant Federal, State, local and private funds that may be available to assist in implementing this plan.

- Estimates of the amounts of technical and financial assistance needed and associated costs for the implementation of this plan can be found in Section 12.0 Plan Implementation.

E. An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented.

- The Information and Education component of the watershed management plan can be found in Section 7.0 Recommendations for Additional Management Measures.

F. A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious.

- A schedule for implementing the NPS management measures identified in this plan can be found in Section 12.0 Plan Implementation.

G. A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.

- A description of interim, measurable milestones for the implementation phase of the watershed plan can be found in Section 6.0 Identification of Applicable Existing Management Measures and 10.0 Interim Milestones.

H. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether this watershed based plan needs to be revised or, if a NPS TMDL has been established, whether the NPS TMDL needs to be revised.

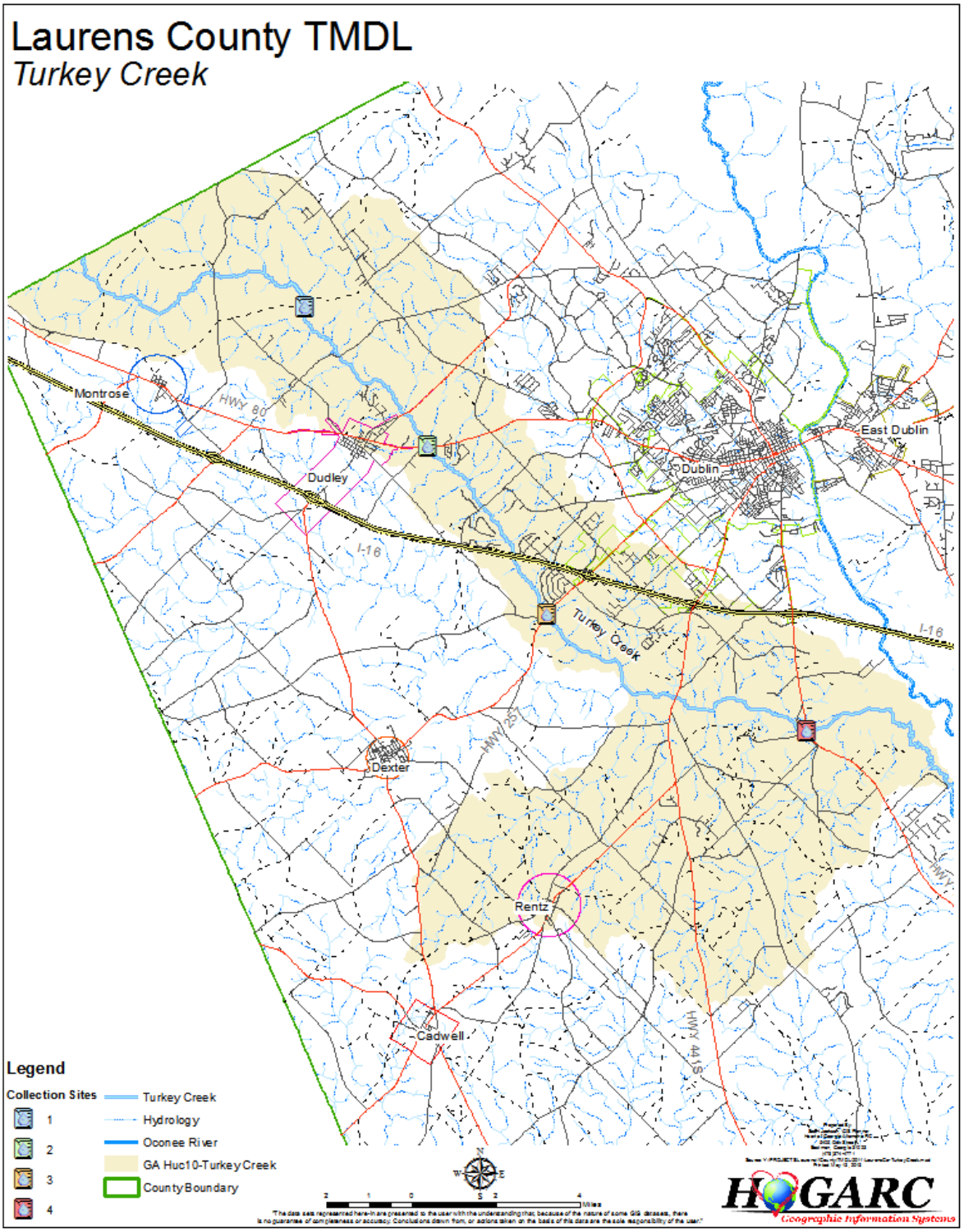
- Section 12.0 Plan Implementation contains the required set of criteria.

I. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) immediately above.

The required monitoring component for the watershed plan can be found in Table 3 Turkey Creek Water Quality Results (E. Coli).

APPENDIX B: WATERSHED MAPS (HUC) # 0307010211

FIGURE 1
TURKEY CREEK WATERSHED



APPENDIX C: MAPS

FIGURE 2
2012 EXISTING LAND USE

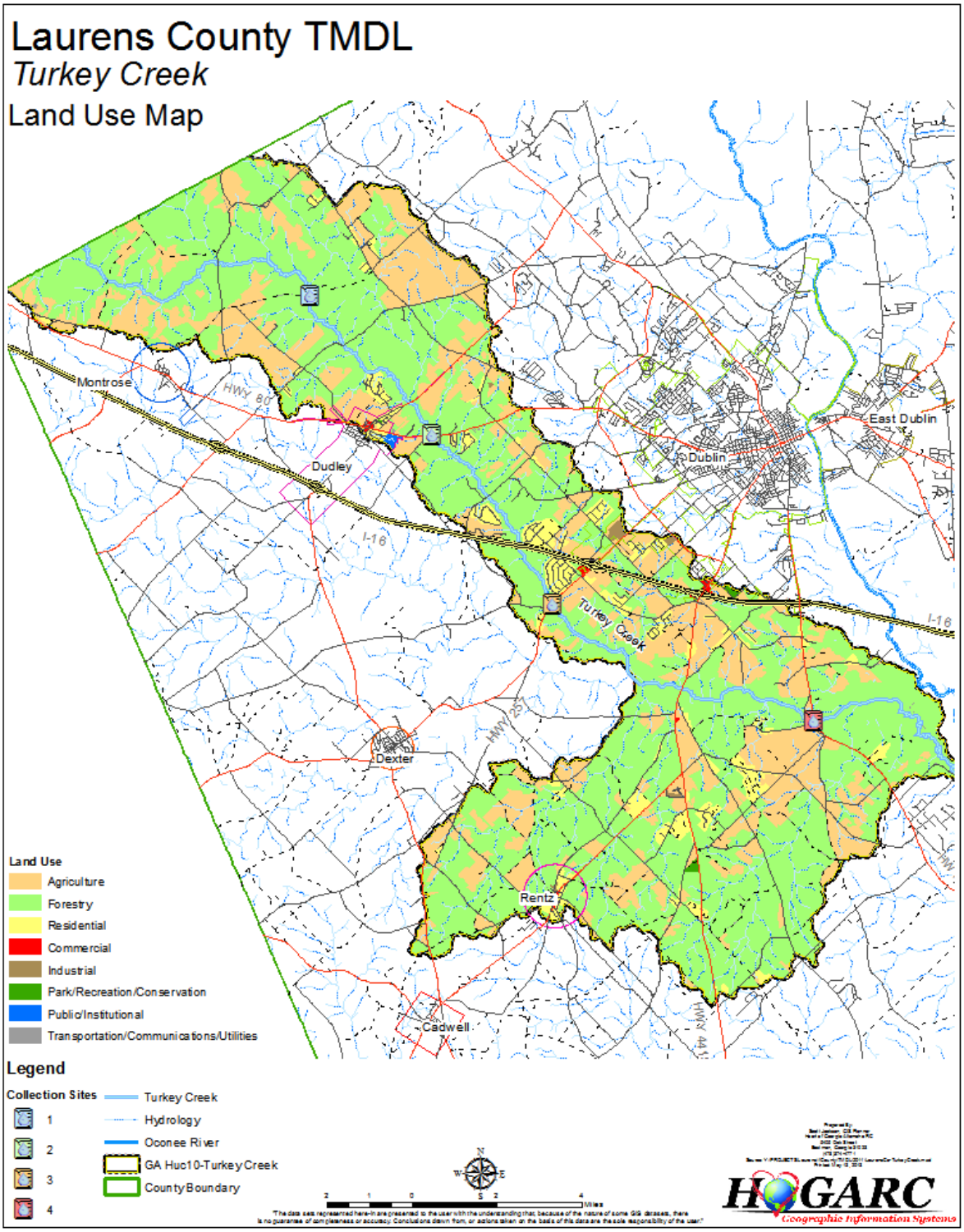
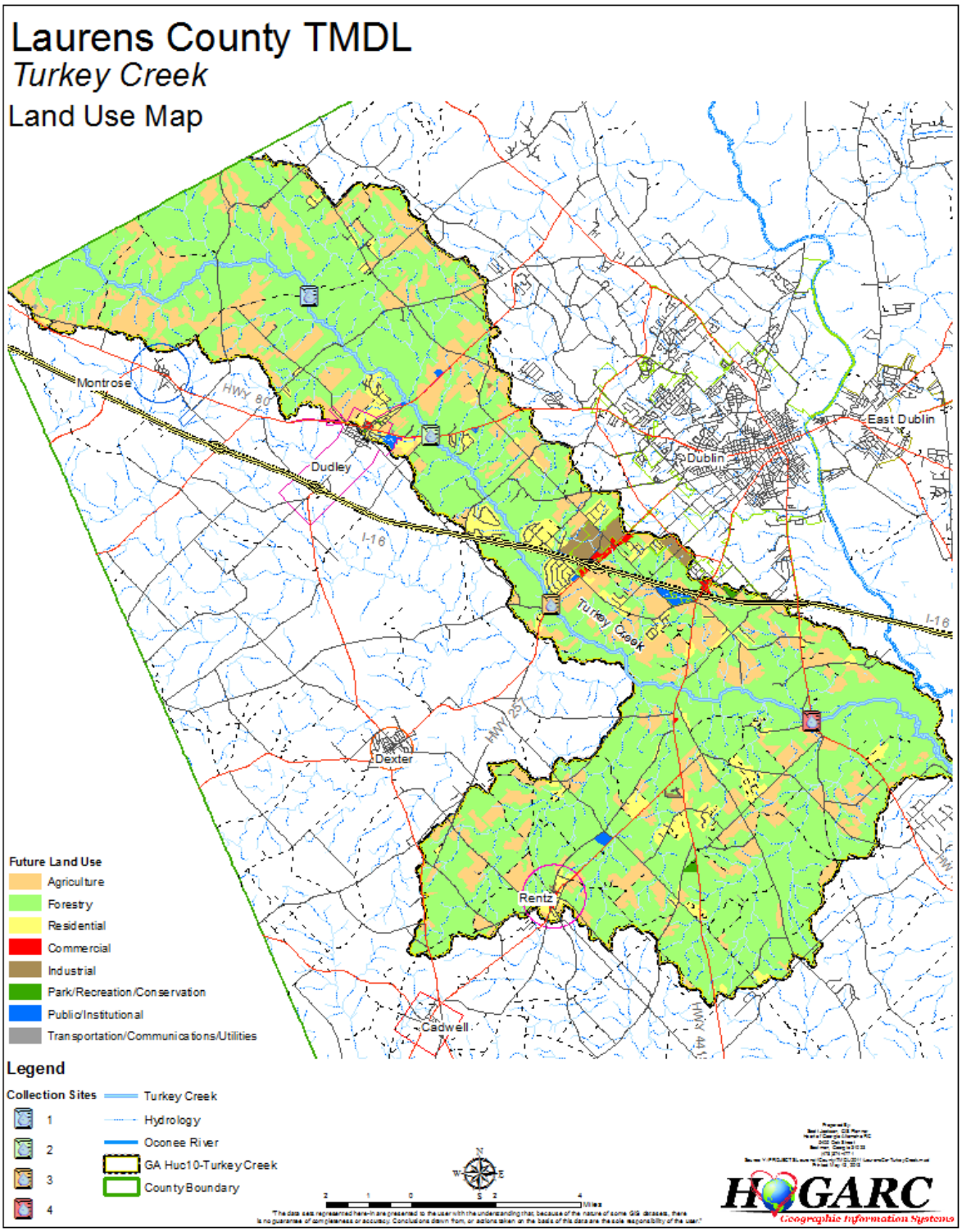


FIGURE 3
FUTURE LAND USE 2014-2034



APPENDIX D: MONITORING PLAN/PICTURES

Location: Turkey Creek (Laurens County)

Field Personnel:
Gabe Morris, *Community Development Planner*, HOGARC – QA/QC Trained

Sample Site GPS Coordinates*:*

1. Old Montrose@ Turkey Creek – 32° 35' 15.67"N, 83°05'43.09"W
2. Highway 80 @ Turkey Creek – 32°32'26.42"N, 83°02'40.07"W
3. Highway 257 @ Turkey Creek – 32°29'0.96"N, 82°59'41.97"W
4. Highway 19 @ Turkey Creek – 32°26'55.56"N, 82°53'22.65"W

Monitoring Schedule:
Sampling will be taken weekly on Tuesdays from May 14, 2013 until July 30, 2013 as weather permits.

Sampling Procedure:
Samples will be collected by an employee from the Heart of Georgia Altamaha Regional Commission trained in proper QA/QC collection through the Adopt-A-Stream program. All sample analysis will be conducted by Jeffery Roberson (License WWL007331; Expiration Date 06/30/2013) or Matthew McDaniel (WWL 014566 (Expiration Date; 06/30/2013), at the City of Eastman wastewater lab. Mr. Roberson and Mr. McDaniel both have an active Wastewater Laboratory Analyst license that authorizes them to perform laboratory tests in compliance with NPDES permitting requirements. They performs tests for fecal coliform using the 18th edition of Standard Methods, Membrane Filter procedure 9222D.

In order to conduct field sampling, employees from the Heart of Georgia Altamaha Regional Commission trained in proper Georgia Adopt-a-Stream Bacterial QA/QC sample collection procedures will gather the required samples. The process that these employees will follow adheres to those established in the Georgia Adopt-a-Stream, Department of Natural Resources - Environmental Protection Division guidance on Bacterial Monitoring (Spring 2009). The process will include the following steps:

1. Correctly label 2 Whirl-pak bags with indelible marker (one for the sample, one for the blank).
2. Put on latex gloves and remove the perforated seal from edge of Whirl-pak bag.
3. Use the two small white tabs to open the bag.
4. While holding the yellow twist ties, place the bag in the water at mid-stream, mid-depth, and allow the water to flow into the bag. Fill the bag with water up to 2/3 full. (collect the water sample upstream)
5. Grab the ends of the twist ties and "whirl" or spin the bag shut.
6. Make sure the bag is closed securely by testing the seal.
7. Immediately place the Whirl-pak bag in a cooler with ice
8. Holding time for samples on ice or refrigeration is for no more than 24 hours.
9. Dispose of gloves.

If sampling is done with sanitary bottles, provided by Eastman Wastewater Lab, the process will be as follows:

1. Put on latex gloves and open sanitary bottle.
2. While holding the outside of the sanitary bottle, place the bottle in the water at mid-stream, mid-depth, and allow the water to flow into the bottle. Fill the bottle to fill line. (collect the water sample upstream)
3. Close the lid of the sanitary bottle.
4. Make sure the bottle is closed securely by testing the seal.
5. Immediately place the bottle in a cooler with ice.
6. Holding time for samples on ice or refrigeration is for no more than 24 hours.
7. Dispose of gloves.

Once the samples have been collected they will be given to employees at the Eastman Wastewater Laboratory for testing. Water testing will take place within 24 hours of sample collection to ensure that the collected sample is properly analyzed.

Sampling equipment includes the following:

1. Waders
2. Sanitary gloves
3. Whirl-pak bags
4. Sanitary bottles
4. Cooler
5. Labels for sample bags/bottles
6. Permanent marker for labeling

Field survey equipment will include the following:

1. 100 foot tape measure
2. String for water depths marked at 1 foot intervals
3. Survey forms
4. Pen
5. Camera
6. Sealed sanitary bottle (for float testing)

SAMPLING SITES 1-4

1.

2.

3.

4.

APPENDIX E: MEETING MINUTES

Meeting 1 Notes– May - September, 2013

In Attendance:

Correspondence was conducted through email

Comments were submitted within May – September timeframe.

It was decided that Domestic Animals would fit into the Stormwater Runoff Category, so that has been eliminated on the chart. There are no landfills within the watershed to our knowledge.

Due to amount of Agricultural Area within the watershed, Ag = Priority 1.

Ag = 1
Stormwater = 2
Failing Septic = 3 or 4
Wildlife = 3 or 4
Landfills = NA
Publicly Owned Treatment Plant = 2. [These numbers were corrected to show 5 as being highest in the plan]

Meeting 2 Notes– May-June, 2014

In Attendance: Conducted via email correspondence

However, all Advisory Members responded through email with comments to be added or changed in the WIP. All request were changed by July, 2014.

Meeting 3 Notes – July27-August 7, 2015

In Attendance: Conducted via email correspondence

Additional Stakeholders added to contact list.

Email responses were added or changed in the WIP by August 11, 2015.