WATERSHED BASED PLAN
Shaws Creek Watershed
South Carolina

May 12, 2017

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1 Introduction

- *Why is a Watershed Based Management Plan needed?*
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A watershed is the area of land where all the water that is under it or drains off it into a river, stream, or other body of water to the same point. The purpose of a Watershed Based Plan (WBP or Plan) is to document the sources of water pollution and present a course of action to protect and/or improve water quality within a watershed. The WBP provides an approach to manage and maintain or restore the waterbody to its designated use. Community stakeholders play a critical role in plan development, and the final plan reflects the community's goals for their watershed.

The Shaws Creek Watershed contains both the Upper and Middle Shaws Creek Subwatersheds (HUCs 030502040106 and 030502040107, respectively) with a total area of 54,297 acres (Figure 1). Shaws Creek begins in Edgefield County and flows into Aiken County where it drains to SCDHEC's water quality monitoring station (WQMS) E-094 and eventually flows into the South Fork Edisto River. Shaws Creek is a vital resource as a recreational area and as the primary drinking water supply source for the City of Aiken, whose water treatment plant is located just downstream of WQMS E-094. Namely, the City's Shaws Creek WTP supplies water to 15 to 25% of the City's 17,584 residential customers and 1,773 business customers, depending upon demand. Therefore, protection of and improvement in the water quality of Shaws Creek's will improve the quality of life and local economics in Aiken and Edgefield Counties.

The United States Environmental Protection Agency (EPA) defines impaired waterbodies as any waterbody that does not meet water quality criteria that support its designated use (USEPA, 2012). Impaired waterbodies are then placed on the Section 303(d) list. There have been impairments due to low pH at WQMS E-094 and RS-03344. Although WQMS E-094 is no longer impaired for pH, WQMS RS-03344 on Hillyer Branch (in the headwaters of Shaws Creek Watershed) remains on the current 303(d) list for violations of the pH water quality standard.

Although Shaws Creek has never been impaired for bacteria, it is located in the bigger South Fork Edisto River watershed, for which an approved Total Maximum Daily Load (TMDL) was written in 2011 for fecal coliform.

During the development of this Watershed Based Plan, the stakeholders and their consultant evaluated pollutants which are of concern for Shaws Creek's designated use as a freshwater stream and a source water for the City of Aiken's drinking water plant. According to SCDHEC's Water Classifications and Standards, waters classified as "Freshwaters" are freshwaters suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the requirements of SCDHEC. "Freshwaters" are suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora (SCDHEC 2012). "Freshwaters" are also suitable also for industrial and agricultural uses. The considerations in determining which pollutants are

of concern for Shaws Creek included current water quality results, concerns for the water treatment plant and likely sources of pollutants in the watershed. It was determined that the key pollutants of concern are: Nutrients (nitrogen and phosphorous), Sediment (TSS) and Bacteria (Fecal Coliform or E.Coli). Each of these pollutants is detrimental to the recreation, drinking water, fishing and aquatic live, industrial and agricultural use designations. Shaws Creek's low pH levels is not considered a concern because Shaws Creek is a blackwater system, characterized by naturally low pH conditions. Although pH excursions occurred at the furthest upstream and downstream sites in the watershed, they were typical of values seen in blackwater systems and were considered natural, not standards violations (SCDHEC 2012). Therefore, low pH was not addressed as a pollutant of concern in this Plan.

High levels of nutrients, sediment and bacteria in streams are harmful to human health and to the health of the creek; therefore, this WBP describes the sources of pollutants and identifies the recommendations needed to improve Shaws Creek's water quality. The Plan has considered the unique conditions within the watershed and developed suitable approaches to minimize future impacts to the Shaws Creek. Altogether, the importance of developing this WBP to address the pollutants in the Shaws Creek Watershed is very clear. Efforts that will be taken to reduce pollutants in Shaws Creek, and ultimately the South Fork Edisto River, will be a tremendous benefit to the water treatment plant, the local economy and the quality of life for citizens who live around and enjoy the stream and river.

1.1 How was the plan developed? And who was involved?

The plan was developed using a collaborative approach. This approach aimed to actively involve local stakeholders in selecting management strategies that may be implemented over time to solve water quality problems within the Shaws Creek Watershed. The City of Aiken managed and administered the overall project, and provided the $16,000 match for the grant to develop this WBP. Other cooperating organizations included the Aiken and Edgefield Counties; Aiken and Edgefield NRCSs; Aiken and Edgefield SWCDs; South Carolina Rural Water Association; South Carolina Forestry Commission; South Carolina Department of Health & Environmental Control (SCDHEC); Amec Foster Wheeler Environment & Infrastructure, Inc.; and watershed residents.

Over the span of a year, a kickoff meeting and a total of four (4) brainstorming sessions were held with the above-mentioned local stakeholders and two (2) Public Meetings in order to determine types and sources of pollutants within the Shaws Creek Watershed (see Section 5 for greater detail and Appendix B for Meeting Summaries). Along with information obtained during these meetings, the following helped develop and refine management strategies: the TMDL developed in 2011 for Shaws Creek, Aiken County's and the City of Aiken's monitoring results, a windshield survey, and other items mention in Section 4.

This WBP incorporates this work as well as SCDHEC's requirements for a watershed based plan to preserve and restore waterbodies. This alignment with SCDHEC guidance is intended to enable project partners to seek future SCDHEC funding to help implement the plan.

1.2 Who should read this plan?

Any group that influences or is affected by water quality, habitat management, and land use decisions in Shaws Creek Watershed should read this report. Municipalities and local groups in and around the Shaws Creek Watershed should use this plan as the foundation for local action. State and federal agencies can use this plan to enhance their understanding of local watershed conditions and as a basis for coordinating, planning, permitting and regulatory decisions.

2 Executive Summary

This project is located in Upper and Middle Shaws Creek subwatersheds (Shaws Creek Watershed). Shaws Creek drains to SCDHEC water quality monitoring station (WQMS) E-094 and eventually flows into the South Fork Edisto River. Shaws Creek is a vital resource as a recreational area and as the primary drinking water supply source for the City of Aiken, whose water treatment plant is located just downstream of WQMS E-094. Because Shaws Creek is a drinking water source for the City of Aiken, pollutant load reductions in Shaws Creek Watershed will have a direct impact on the water quality of Shaws Creek, which will be a tremendous benefit to the local economy and the quality of life for citizens who live around and enjoy the stream and river.

The Shaws Creek Watershed is located within the South Fork Edisto River TMDL for bacteria, which includes WQMS E-094. In addition to bacteria, other pollutants may threaten Shaws Creek and are a concern for the City of Aiken's water treatment plant, whose water source is Shaws Creek. A variety of non-point sources (NPS) have the potential to cause bacteria, sediment and nutrient loadings in Shaws Creek Watershed. Agricultural NPS pollutant sources of include grazing livestock depositing manure directly into Shaws Creek and its tributaries, as well as runoff (manure, fertilizer, sediments, etc.) from livestock, crop and poultry farms entering Shaws Creek and its tributaries. Septic tank usage is common for rural homes and businesses, throughout the watershed, with an estimated septic system failure rate of approximately 5 to 10% (Schueler 1999). As well, sanitary sewer overflows (SSOs) are also a potential pollutant source of bacteria in the Shaws Creek Watershed, often caused by fats, oils and grease (FOG). In addition, urban runoff, such as domestic pet waste, fertilizers, litter and sediment, contributes to pollutants in Shaws Creek Watershed. Lastly, wildlife sources, such as improper disposal of game and fish carcasses into Shaws Creek and its tributaries and the population increase of wild hogs and beavers is a source of bacteria, nutrient, and sediment loadings.

To implement the WBP, the City of Aiken will install Best Management Practices (BMPs) and preventative measures, as funding is available, to reduce pollutants entering Shaws Creek and its tributaries from non-point sources. BMPs will include septic system repairs and replacements, used cooking oil recycling program, pet waste stations, storm drain markers, urban stormwater retrofits, buffers, and agricultural BMPs such as critical area stabilization, fencing, stacking sheds, and manure composting. An outreach effort will accompany this project, educating farmers, residents and businesses of Shaws Creek Watershed about the causes and results of non-point source pollution and how they can prevent it.

3 Watershed Characteristics

- *What are the features of the surrounding landscape?*
- *What effect does hydrology and soil type have on the Watershed?*
- *What natural resources does the Watershed provide?*
- *How is land within the Watershed being used?*

3.1 Location

The Upper and Middle Shaws Creek subwatersheds (Shaws Creek Watershed) have a combined area of 84 square miles (219 km^2) and encompasses portions of Edgefield and Aiken Counties (see Figure 1). Shaws Creek flows into the Upper South Fork Edisto River. Shaws Creek is designated as Freshwater Class. There are four SCDHEC water quality monitoring stations within the two watersheds. WQMS RS-003344 is located on Hillyer Branch at the intersection of Hillyer Branch Road and is a macroinvertebrate monitoring station. WQMS RS-02480 is located on Shaws Creek at the intersection of Johnston Highway and is also a macroinvertebrate monitoring station. WQMS E-579 is located on Shaws Creek at the intersection of Shiloh Church Road. WQMS E-094 is located on Shaws Creek at the intersection of Reynolds Pond Road. The watershed is mostly rural, with more urbanization in the lower portion of the watershed near the City of Aiken.

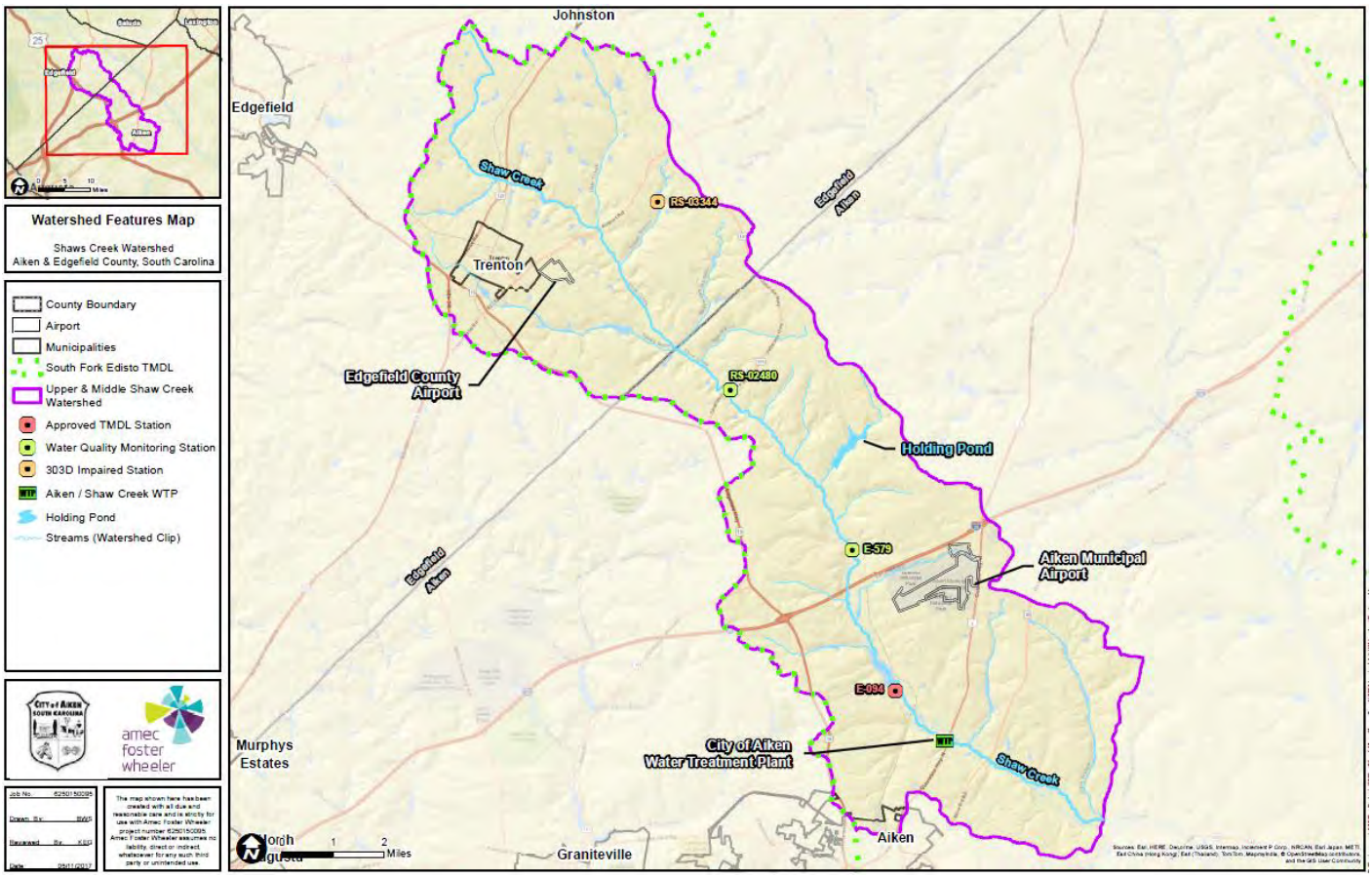


Figure 1. Shaws Creek Watershed[1]

3.2 Climate

According to South Carolina Department of Natural Resources (SCDNR), Aiken County has an average mean temperature of 64.1 °F and an annual average precipitation of 52.6 inches per year. Edgefield County has insufficient data for an average mean temperature, but has an annual average precipitation of 46.8 inches per year.

3.3 Soils

There is a diversity of soil types within this large watershed, however for the purpose of this Plan, Hydrologic Soil Groups within the watershed were examined in order to analyze areas with higher runoff potential. Hydrologic Soil Groups (HSG) are a designation developed by the National Resource Conservation Service (NRCS) which describes the infiltration capacity of soil. Soil associations are categorized in decreasing infiltration capacity from A to D and are described in greater detail below:

[1] See Appendix A for larger figure

Group A is sand, loamy sand or sandy loam types of soils. These soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sand or gravel and have a high rate of water transmission (greater than 0.30 inches/hour).

Group B is silt loam or loam. These soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15-0.30 inches/hour).

Group C soils are sandy clay loams. They have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine texture. These soils have a low rate of water transmission of (0.05-0.15 inches/hour).

Group D soils are clay loam, silty clay loam, sandy clay, silty clay or clay. This HSG has the highest runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0-0.05 inches/hour).

Figure 2 below displays the Hydrologic Soils Groups throughout the Shaws Creek Watershed. Compared to Aiken County, Edgefield County predominantly contains HSG B soils. There is a somewhat even split of HSG A and C soils between the Aiken County border and the I-20 corridor. The southernmost portion of the Shaws Creek Watershed contains mostly HSG C and D soils. As a result, understanding the watershed's runoff potential will help narrow down areas that may have a higher potential for pollutant runoff.

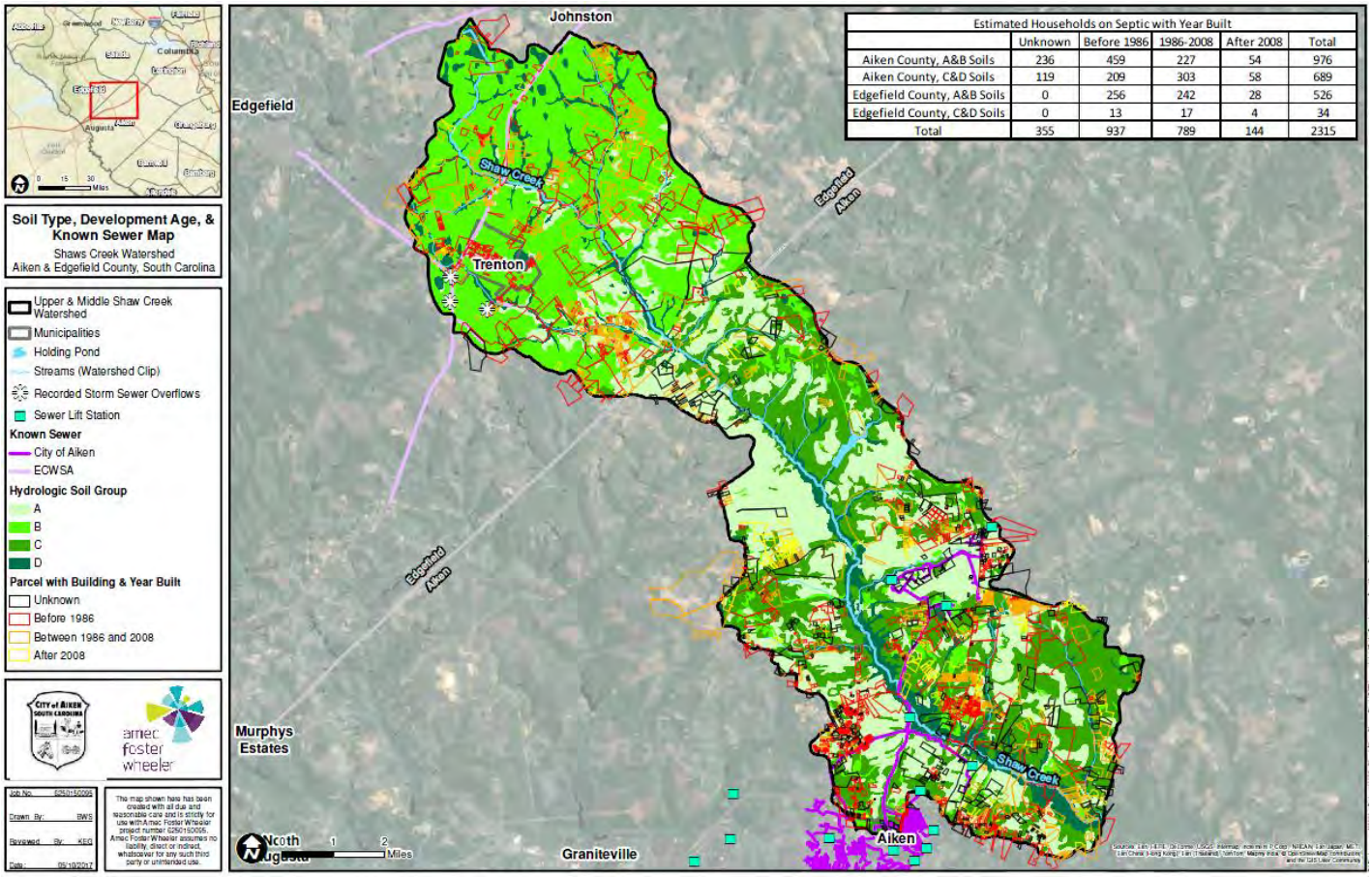


Figure 2. Hydrologic Soil Groups within the Shaws Creek Watershed[2]

Along with understanding the watershed's runoff potential areas, Hydrologic Soil Groups may shed some light on the soils' erodibility. Soil erodibility is an estimate of the ability of soils to resist erosion, based on the physical characteristics of each soil. Generally, soils with faster infiltration rates, higher levels of organic matter and improved soil structure have a greater resistance to erosion. Sand, sandy loam and loam textured soils tend to be less erodible than silt, very fine sand, and certain clay textured soils. Though HSG can only characterize infiltration rates and generalize certain soil textures, identifying the Hydrologic Soils Groups can aid the decision process of narrowing down potential sources of pollution via increased sediment loads.

3.4 Land Use

Based on 2011 USGS Multi-Resolution Land Characteristic (MRLC) land use data, 41.9 percent of the watershed is forested land. The next largest land use is for pastures, crops and grasslands, coming in at 40.7 percent. The remaining 17.4 percent is composed of wetlands (8.0%), transitional open space (4.5%), urban areas (3.2%) and a small mix of water and barren land (1.2% and 0.5%, respectively). Table

[2] See Appendix A for larger figure

1 presents the percentage of the watershed area for each aggregated land use for the years 1992 and 2011 and the percent growth or decrease for each category between the two studies.

The predominant land use in the watershed is forest; which accounted for 46.0% of the land in 1992 and decreased 9.0% by 2011, covering 61.6% of the watershed (see Table 1). Concentrated forested areas are located mostly in the center of the watershed. Agriculture areas consisted of crop lands, pastures and grasslands and grew 17.0% to now take up 40.7% of the current watershed. In Edgefield and Aiken Counties, many pasture lands are on the outliers of the watershed, and are concentrated in the upper half of the watershed (see Section 5.1 for more details on agriculture land use in the Shaws Creek Watershed).

Urban growth excelled in the watershed and has grown 19% since 1992. Commercial and industrial properties are mostly located in Aiken County's southern portion of the watershed, and urbanized areas along U.S. Highway 1 in Aiken County, such as the City of Aiken and Aiken Municipal Airport. The Town of Trenton is an urbanized area in Edgefield County, located in the northwestern portion of the watershed. Forested lands decreased 9.0% since 1992. Table 1 displays the latest (2011) USGS National Land Cover Data compared to the 1992 USGS NLCD land use data. The rest of the document will cite 2011 USGS NLCD data due to it being more recent and more accurate than the 1992 NLCD data.

Table 1. Land use distributions in the Shaws Creek Watershed

Land Use Classification	1992 USGS NLCD		2011 USGS NLCD		Increase/Decrease
	Areas [acres]	Percent of Watershed	Areas [acres]	Percent of Watershed	
Built-up	1,452	2.7%	1,727	3.2%	+19%
Barren	114	0.2%	254	0.5%	+123%
Transitional	3,479	6.4%	2,458	4.5%	-29%
Forest	24,996	46.6%	22,743	41.9%	-9%
Pasture/Crops/Grassland	18,990	35.0%	22,115	40.7%	+17%
Wetlands	3,354	6.2%	4,324	8.0%	+29%
Water	658	1.2%	676	1.2%	+3%
Total	**54,297**	**100.0**	**54,297**	**100.0**	

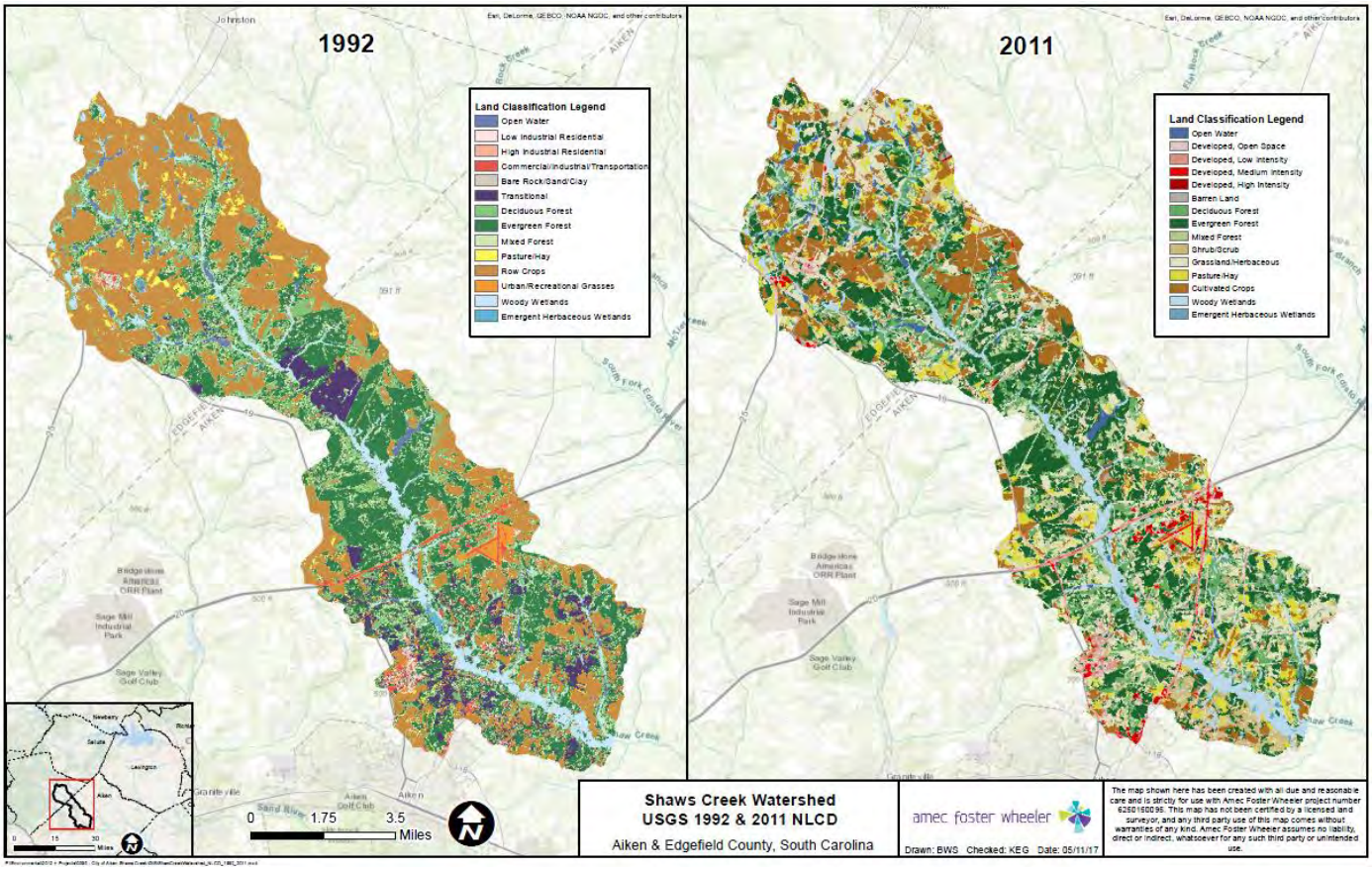


Figure 3. Shaws Creek Land Use Change from 1992-2011[3]

3.4.1 Land Use Effects on Shaws Creek

Based on the 2000 TMDL and knowledge of the watershed, contributing sources of pollutants that are effected by land use in the Shaws Creek Watershed include runoff from agricultural land (including horse and cattle farming), crop farming (peach orchards, soybeans, peanuts, cotton, corn, strawberries, and melon), septic and city sewer systems, urbanized areas, nursery nutrient management, forestry, wildlife and other point sources. These sources of pollution are addressed in greater detail in Section 5.

4 Watershed Conditions

- *What are the designated and desired uses of our surface waters?*
- *What standards are used to judge water quality?*
- *What is the current condition of the watershed?*
- *What are the impacts of pollutants on the watershed?*

[3] See Appendix A for larger figure

4.1 Stream Class & Criteria

The South Carolina Legislature (S.C. Regulation 61-68) has established water quality classification standards for all surface waters in the State of South Carolina. This system provides water quality goals and criteria and guides management efforts so that individual water bodies can be protected and restored to meet these goals. Shaws Creek, is designated as Class Freshwater. Waters of this class are described as follows: "Freshwaters suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the requirements of the Department. Suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. Suitable also for industrial and agricultural uses." (R.61-68)

4.2 Stream Assessments

SCDHEC, Aiken County and the City of Aiken have each analyzed the water quality of Shaws Creek at various points within the Watershed and at various times. The following sections summarize the data collected that are pertinent to this Plan. All sampling locations can be found in Figure 1 of Section 3.1 or in Appendix H (for Aiken Co TMDL sampling).

4.2.1 SCDHEC's Water Quality Monitoring Stations Data

SCDHEC has sampled and analyzed Shaws Creek at two WQMSs for various parameters periodically over the past 18 years. WQMS Station E-579 is located on Shaws Creek at the intersection of Shiloh Church Road. Station E-094 is located on Shaws Creek at the intersection of Reynolds Pond Road. The watershed is mostly rural, except near the urbanized City of Aiken. Figure 1 shows the approximate locations of E-579 and E-094. WQMSs E-579 and E-094 have been analyzed periodically between 1999 and 2010 for Alkalinity, Ammonia, Biological Oxygen Demand, Calcium, Chloride, Conductivity, Dissolved Oxygen (DO), Fecal Coliform, Hardness, Inorganic Nitrogen, Iron, Total Kjeldahl Nitrogen (TKN), Magnesium, Nitrogen, pH, Phosphorus, Potassium, Silicon, Sodium, Sulfate, Temperature, Total Suspended Solids (TSS), and Turbidity. WQMS E-579 was not analyzed for fecal coliform.

SCDHEC primarily collected monthly samples at WQMS E-094 from 1999-2001 and 2006. Tables 2-5 and Figures 4-7 below summarize the water quality data from WQMS E-094 for Total Nitrogen, Phosphorus, Turbidity, pH and Fecal Coliform. All "zero" values found in Figures represent readings that were below the laboratory detection limit.

Table 2. Summary of All STORET Total Nitrogen Data for E-094 (1999-2006)

Parameter	Data: 1999-2006
Number of Samples	16
Average Concentration	0.40 mg/L N
Maximum Concentration	0.78 mg/L N

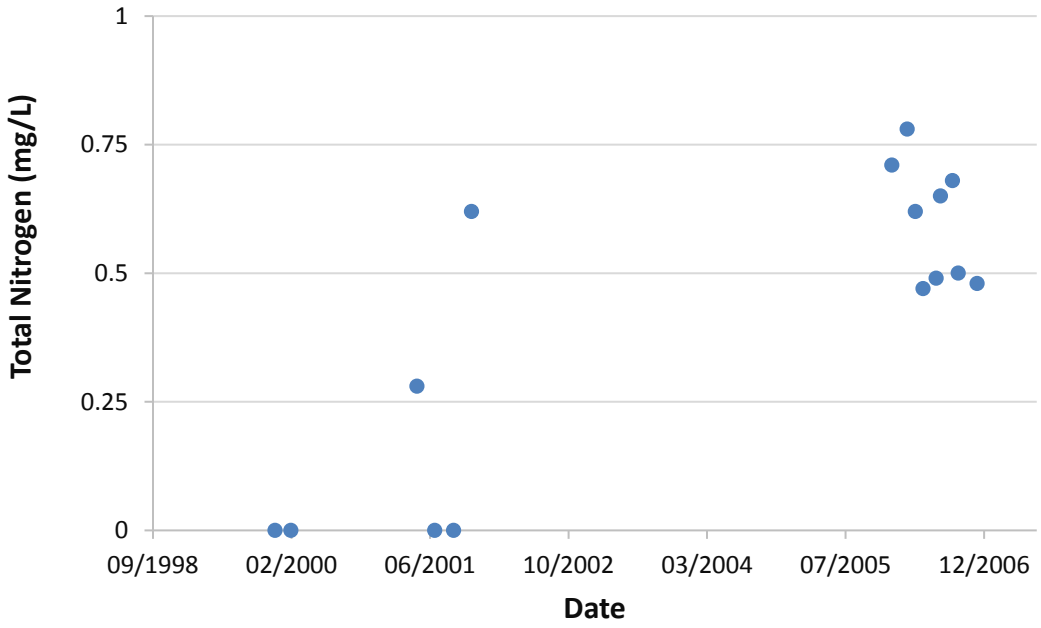


Figure 4. SCDHEC Total Nitrogen Data for Monitoring Station E-094 from 1999-2006

Table 3. Summary of All SCDHEC Phosphorus Data for E-094 (1999-2006)

Parameter	Data: 1999-2006
Number of Samples	18
Maximum Concentration	.03 mg/L P

Although SCDHEC does not have numeric water quality standards for phosphorus, levels were low - all 18 samples collected by SCHEC at E-094 were below .03 mg/L and 15 of the 18 were below laboratory detection limits.

Table 4. Summary of All SCDHEC Turbidity Data for E-094 (1999-2006)

Parameter	Data: 1999-2006
Number of Samples	47
Number of Violations	0
% Violations	0

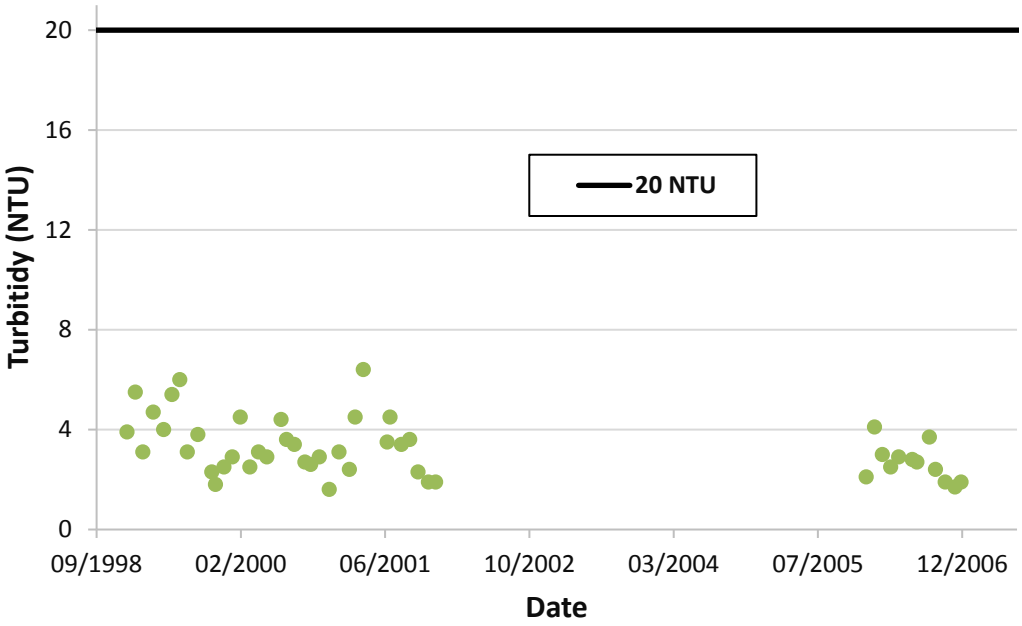


Figure 5. SCDHEC Turbidity Data for Monitoring Station E-094 from 1999-2006

Table 5. Summary of All SCDHEC Fecal Coliform Data for E-094 (1999-2006)

Parameter	Data: 1999-2006
Number of Samples	47
Number of Violations	5
% Violations	10.6

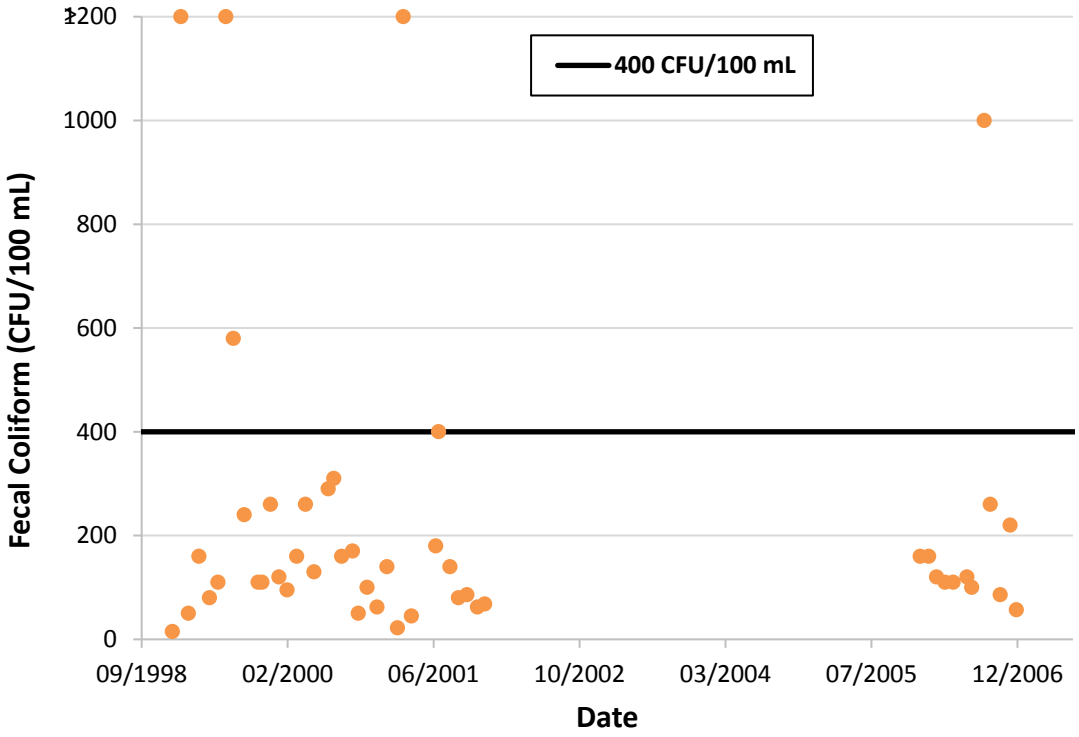


Figure 6. STORET Fecal Coliform Data for Monitoring Station E-094 from 1999-2006

Table 6. Summary of All STORET pH Data for E-094 (1999-2006)

Parameter	Data: 1999-2006
Number of Samples	46
Number of Violations	35
% Violations	76.1

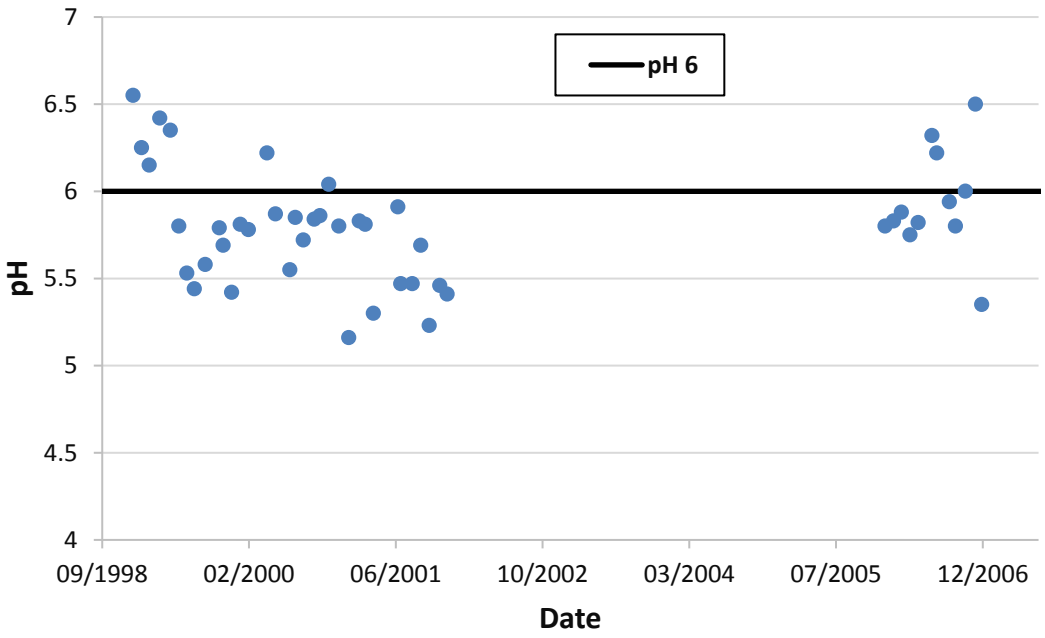


Figure 7. STORET pH Data for Monitoring Station E-094 from 1999-2006

4.2.2 SCDHEC's Macroinvertebrate Monitoring Stations Data

DHEC has monitored Shaws Creek for macroinvertebrates twice in two separate locations in two separate years, RS-02480 in 2002 and RS-03344 in 2003 (see Figure 1). Table 7 summarizes the biological assessments completed in the Shaws Creek Watershed for these two years.

Table 7. SCDHEC Macroinvertebrate Results at RS-02480 and RS-03344

Station	Date	Count	Bioclassification Score	Bioclassification
RS-02480	08/02/2002	360	3.8	Good
RS-03344	07/15/2003	287	2.0	Fair

4.2.3 Aiken County's TMDL E. coli Sampling Data

Based on TMDL requirements in the Small Municipal Separate Sewer System (SMS4) permit, Aiken County analyzed samples for *E. coli* from five points along Shaws Creek in January 2016. The samples were

collected using the grab method and were analyzed by Pace Analytical Services, Inc. All sampling results were found to be under the water quality standard of 349 MPN *E. coli*/100 mL. Table 8 below summarizes the results. The full report with a map of sampling locations can be found in Appendix H.

Table 8. Aiken County Results for *E. coli* Sampling along Shaws Creek: January 2016

Sampling Location	*E. coli* Concentration (MPN/100 mL)
SH-1020	135.0
SH-191	93.3
SH-153	90.8
MS4I-5	88.0
E-094	83.6

4.2.4 City of Aiken Water Treatment Plant Influent Water Quality Data

As mentioned previously, the City of Aiken Water Treatment Plant uses Shaws Creek as its water source. The influent water is analyzed daily for properties such as pH, alkalinity, temperature, hardness, and turbidity. In Table 9 and Figure 8 below, the averages, maximums and minimums for pH and turbidity have been summarized for the years 2013-2016.

Table 9. City of Aiken Water Treatment Plant Influent Water Quality Data Summary

Year	pH			Turbidity (NTU)		
	Average	Max	Min	Average	Max	Min
2013	6.2	6.5	5.7	8.5	56.6	1.2
2014	6.2	6.5	5.7	6.7	14.4	2.9
2015	6.1	6.3	5.8	8.4	19	4.6
2016	6.2	6.7	3.6	10.7	30.3	2.8

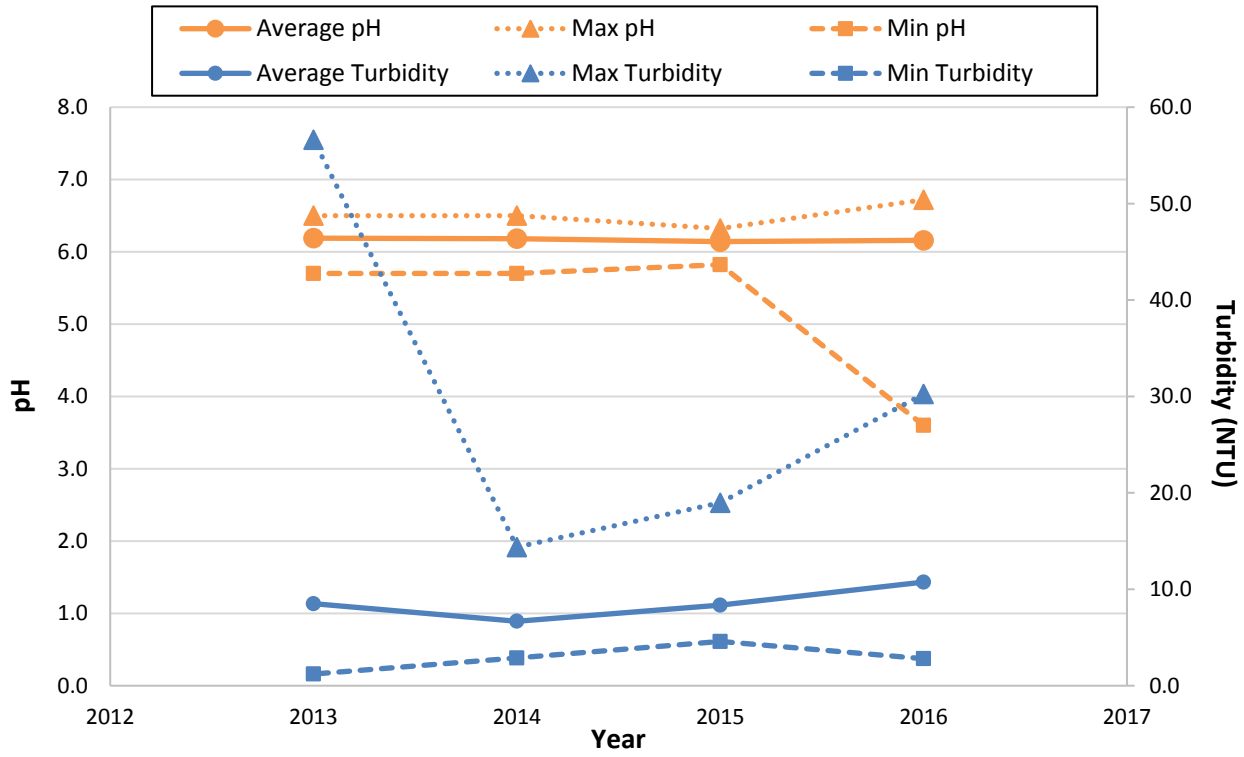


Figure 8. City of Aiken Water Treatment Plant Influent Water Quality Data Summary from 2013-2016

5 Identifying and Prioritizing Pollutants, Sources and Causes

- *What is the process for identifying and prioritizing pollutants in the Watershed?*
- *What are the impairments in the watershed?*
- *What are the sources/causes of the major pollutants in the Watershed?*
- *What are the potential solutions to improve the water quality?*

Section 5 describes the possible sources and causes of the impacts from possible pollutant loadings. These were identified by reviewing the available assessment data, as previously discussed in Section 4 and conducting supplemental field investigations as further described in Section 4. Technical advisors, stakeholders and community members also provided input on the sources and causes of potential pollutants throughout the project. By identifying the cause of pollutant sources, implementation efforts can focus on protecting Shaws Creek as a drinking water source and as a recreational water. This will ensure that implementation efforts will be completed efficiently and effectively.

Although point source pollution has not been ruled out, nonpoint source pollution has been identified as a likely cause of impairment during evaluation of Shaws Creek Watershed. The four primary sources of nonpoint source pollution in the watershed are stormwater discharges from impervious surfaces from

agricultural lands, urbanized areas, sewer sources, failing septic systems, and wildlife contributions. These sources are discussed in greater detail below.

5.1 Agricultural Sources

5.1.1 Livestock (Cattle/Horse)

Livestock such as cattle, goats, and horses grazing on pasture land can be a significant source of bacteria, nutrients and sediment loadings.

The two main conveyances of bacteria loading to the Shaws Creek Watershed from cattle/horses are stormwater runoff from pastures containing manure and cattle depositing manure directly in the stream. According to the 2011 TMDL, loading of bacteria to the South Fork Edisto River TMDL Watershed by cattle's direct discharge in the stream is possibly a significant source. As well, cattle concentrated in smaller areas (i.e. shaded area, water sources, feeding areas, etc.) often results in larger, more concentrated manure deposits and poorly stabilized soils resulting in erosion which provides additional mechanism to transport bacteria. The 2011 TMDL states that the USDA National Agricultural Statistics Service reported roughly 12,737 total cattle in Aiken County and 8,501 total cattle in Edgefield County (Shaws Creek and other watersheds). As such, through an initial aerial review, horse farms appear to be common throughout the Shaws Creek Watershed.

In addition to bacteria, both conveyances (runoff and depositing manure directly in the stream) also contribute nutrients, as manure is also a source of nitrogen and phosphorous. Fertilizer used during pasture maintenance is also a source of nitrogen and phosphorous. As well, sediment is also a pollution problem as a result from cattle, which frequently destabilize and erode pasture lands. This occurs especially in concentrated areas, and of bank slopes when using a stream as a source of drinking water, causing sedimentation problems.

Based on 2011 USGS NLCD data, pasture lands cover 6.9 percent of the Shaws Creek Watershed (about 3,726 acres) and may be a significant source of pollution. To help determine if cattle/horse farming activities contribute to pollution in Shaws Creek, a brainstorming session for Agricultural Sources was held on August 17, 2016 to utilize cooperators and stakeholders' knowledge of farms in the watershed. Attendees included City of Aiken Stormwater; Aiken County Stormwater; Edgefield County; Aiken and Edgefield NRCSs; Aiken, Edgefield and Richland SWCDs; and SCRWA.

Utilizing information from assessments mentioned in Section 4, GIS and aerial reviews, and the brainstorming sessions, the findings on agricultural livestock sources of bacteria, sediment and nutrient pollution are listed below.

Findings

The number of farms with livestock was determined for the Shaws Creek Watershed. Figure 9 displays the overall number of livestock farms (shown in yellow/gold shade) and the estimated number of animals per livestock farm. Farms tend to be in the northern half of the watershed in Edgefield County, however, some larger horse farms are located in the southern portion of Aiken County.

Based on the windshield survey, the numbers of livestock observed in the watershed are displayed in Figure 9 and are shown in Table 10 below. However, these numbers are very conservative as most animals are not visible from the road. A better estimate of livestock in the watershed was obtained from the 2012 USDA National Agricultural Statistics Service, which, for example, reported roughly 14,590 total cattle in Aiken County and 8,452 total cattle in Edgefield County in 2012. With the Edgefield potion of the watershed being roughly 6.45 percent of Edgefield County and the Aiken portion of the watershed being roughly 4.83 percent, assuming this data can be interpolated evenly across the counties, the total cattle (and other livestock) in the Shaws Creek Watershed was estimated in Table 10 as well. From this information, estimated bacteria and nutrient loadings from livestock farms were calculated and results are shown in Table 17 in Section 6. Sediment loadings and additional nutrient loadings from livestock farms were calculated from the estimated total livestock farm acreages (2,885 acres) and results are shown in Table 17 in Section 6.

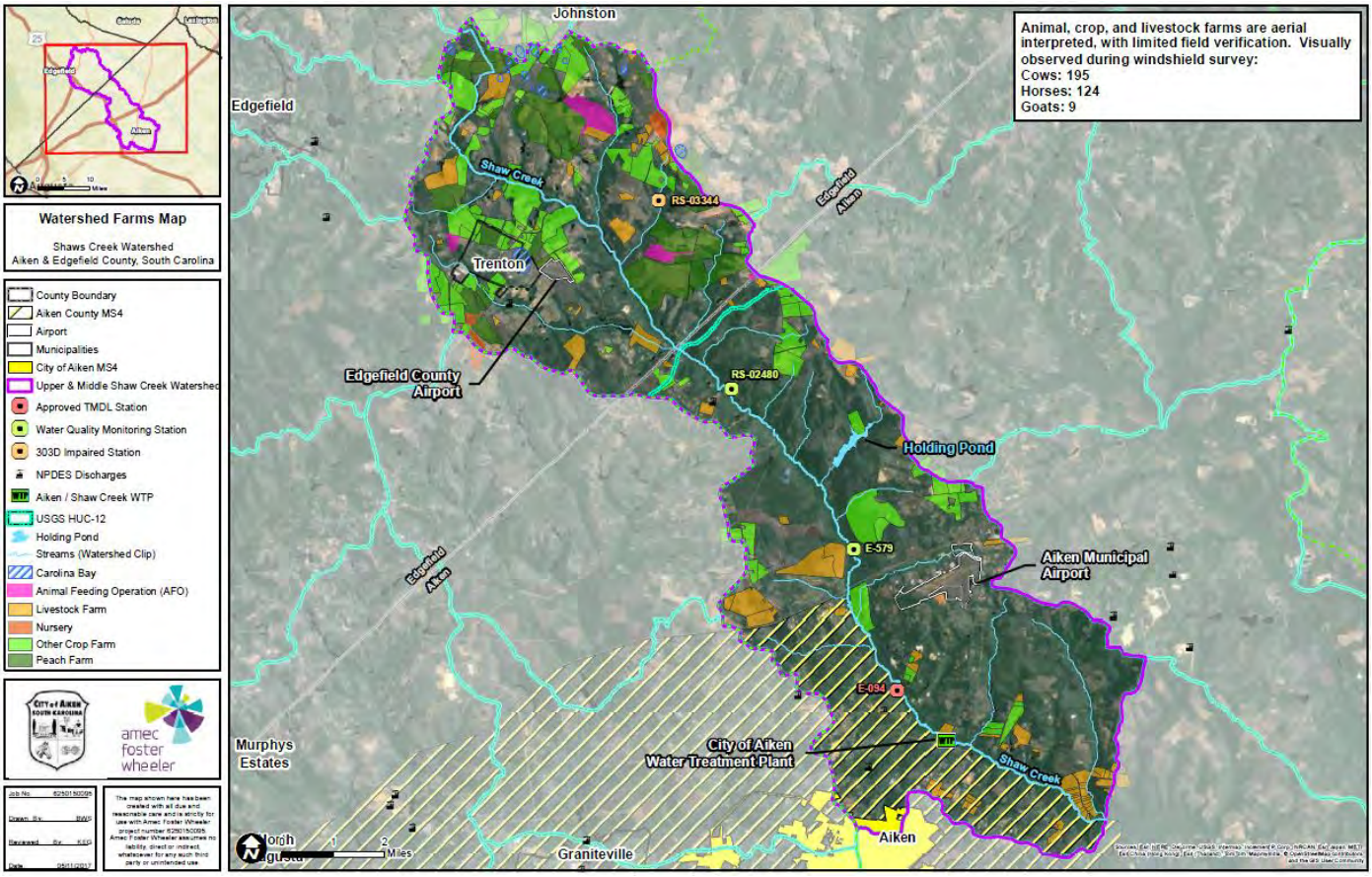


Figure 9. Livestock, Poultry, Crop Farms and Nurseries Located in the Shaws Creek Watershed[4]

Table 10. Estimated Total Number of Livestock in the Shaws Creek Watershed

Livestock	Observed During Windshield Survey	USDA National Ag. Statistics Service (2012)
Cows	195	1,250
Horses	124	299
Goats	9	146
Sheep	0	57

5.1.2 Crop Farms

Pollutant loadings from croplands are mostly attributed to runoff from fertilizer (including poultry manure) and poorly stabilized soils. Nutrient and bacteria loadings result from runoff from fertilizer containing bacteria and/or nitrogen and phosphorous. Sediment loadings occur from poorly stabilized soils entering the stream, potentially accompanied by bacteria and nutrients. Cropland within the Shaws

[4] See Appendix A for larger figure

Creek Watershed has been greatly reduced according to the NLCD 1992 landuse data used to develop the TMDL. Based on 1992 NLCD data, row crop land use accounted for approximately 35 percent of the overall watershed with a total of 18,990 acres. Based on the most recent land use data (2011 USGS NLCD data), croplands cover 14.1 percent of the Shaws Creek Watershed (about 7,676 acres). Through initial aerial review, predominant crop farms in the subwatersheds appear to be peach orchards, especially in the northern portion.

Using stakeholder's knowledge of farms in the watershed from the Agriculture Brainstorming Session (mentioned in Section 5.1.1), information from assessments mentioned in Section 4, aerial reviews and GIS, there is a strong possibility that cropland farming activities contribute to pollution Shaws Creek.

Findings

- Peach Orchards:
    - Peaches are the dominant crop in the Edgefield portion of the watershed and includes the second largest peach producer in the country. Figure 9 above displays the peach orchards in a dark green shade.
    - Conservation Plans are not required for peach fields and the farming practices of peach farmers, especially lack of vegetative cover between rows, have resulted in significant erosion issues within the subwatersheds.
    - According to Edgefield NRCS, there are three large peach companies in Edgefield County, which vary widely in farming practices:
        - One company lets natural vegetation grow between rows of peach trees and has resulted in minimal erosion.
        - One company plants row crops (that complement peach trees) between rows of peach trees and has resulted in minimal erosion.
        - One company keeps a 'clean orchard floor' with no vegetative cover between peach tree rows and has resulted in heavy erosion on 80-90 percent of that companies' fields.
    - Peach trees stop producing after about 12 years. In the past, peach farmers would plant an annual crop to help land recover after the 12 years before replanting peach trees. However, now trees are removed and burned, and within a few months replanted with new peach trees and are back in production. With this practice, it neglects replenishing the land's soil with nutrients and has resulted in an increasing need for fertilizer and increased erosion.
    - Majority of these land properties for the peach orchards are leased. Although landowners charge a higher rental rate for peach farmers because they know the land is going to be damaged by the intensive farming practices, this does not discourage these destructive practices.
    - NRCS and Clemson Extension had a research grant related to peach production and fertilizer management in Edgefield County. According to Edgefield NRCS, even though the

research shows that peach producers could reduce their fertilizer application by $250,000 based upon tissue samples, the companies are not willing to reduce their fertilizer use.

- An estimated 4,005 acres of peach orchards was determined for this watershed. Figure 9 above displays potential peach orchard project sites based on the windshield survey and aerial reviews of the watershed.

- In addition to peaches, crops in the watershed include: soybeans, peanuts, cotton, corn, strawberries, and melon.

- An estimated 6,675 acres of crop farms (excluding peach orchards) was determined for this watershed. Figure 9 above displays potential crop farm project sites in a light green shade and were determined based on the windshield survey and aerial reviews of the watershed.

- According to Aiken and Edgefield NRCSs, the majority (estimated 90 percent) of the row crop farms spread poultry litter in the watershed.

- The conservative practice of applying poultry litter via disking it in is most likely not occurring; therefore, crop farms within the watershed are potentially contributing to bacteria and nutrient polluted runoff.

- Mega farms are a growing concern in the Edisto River Basin, particularly in eastern Aiken County, where the relatively sudden change from forested land to new large farms raises questions about lost wildlife, water pollution, and depleted water supplies. Mega farms do not appear to currently be moving into Shaws Creek Watershed, converting forested land to crop farming, but, should they do so, it would cause great concern for water quality and quantity. See Appendix D for the potential development of a Land Conservation Program for Shaws Creek Watershed.

5.1.3 Poultry Farms

Based on an initial aerial review, there appear to be three AFOs within the Shaws Creek Watershed. Specifically, all are located in the Edgefield County portion of the subwatersheds. Owners/operators of most commercial animal growing operations are required by South Carolina Regulation 61-43, Standard for the Permitting of Agricultural Animal Facilities, to obtain permits for handling, storage, treatment (if necessary) and disposal of the manure, litter and dead animals generated at their facilities (SCDHEC 2002). According to the 2011 TMDL, because the requirements of R. 61-43 are designed to protect water quality, there is reasonable assurance that facilities operating in compliance with this regulation should not contribute to downstream water quality impairments. The State does permit animal feeding operations (AFOs) covered under R. 61-43. These permitted operations are not allowed to discharge directly to waterbodies and are covered under 'no discharge' (ND) permits. However, pastures and crop farms do

land apply poultry litter from these animal feed operations for fertilizer. Thus, when stormwater runs off these land applied fields it carries bacteria and nutrient loadings to downstream waterbodies.

All modern poultry facilities are required to have a Waste Management Plan by both NRCS and SCDHEC to address the cleaning of chicken litter. There are two types of litter cleaning processes in poultry houses:

- once a year the entire house is cleaned, and
- partial cleanout between cycles where 30-50% of the litter is removed while the remaining litter is wind rowed and then spread back on the floor to a depth of approximately 3 inches deep and then covered with pine shaving.

If the litter is removed from the house and moved into an open space, it is required to be covered within 72 hours. Many facilities employ stacking sheds to keep the litter covered, while others store the litter on the ground (but covered) until needed for personal field application, or until sold to manure brokers. When farmers sell excess litter to manure brokers, it is distributed to other Counties in SC as well as to surrounding states.

Using stakeholder's knowledge of farms in the watershed from the Agriculture Brainstorming Session (mentioned Section 5.1.1), along with aerials and GIS, the results include:

Findings:

- Three animal feeding operations (AFO) from aerial review and windshield survey: Three AFOs are located in the Edgefield County portion of the watershed and are displayed in Figure 9. All three facilities have No Discharge Permits (NC Permits) and the number of animals at each facility, according to the 2011 TMDL, is outlined in Table 11 below.

Table 11. Permitted Active Animal Feeding Operations within the Shaws Creek Watershed

NPDES	Facility	Operation	CAFO Size	Number of Animals
ND0083062	Adkinson Poultry Farm	Poultry (Broilers)	Medium	114,679
ND0068098	Carroll Clark Poultry Farm	Poultry (Pullets)	Small	Unknown
ND0087262	Kelly Farms	Poultry (Pullets)	Large	328,000
ND0060500	Holmes Peach Packing	Peaches	N/A	N/A

- Stakeholders believe that these poultry farms sell excess litter to manure brokers. Which may be distributed on crop farms in the watershed.

- Stakeholders stated that AFOs often will do their own composting of birds on site instead of using a large burial pits. These composting procedures require conservation plans and are designed independently with Agricultural Engineers.

- Due to Poultry Operations having ND Permits and Waste Management Plans, these operations are not considered a significant source of bacteria and nutrient loadings to Shaws Creek. However, the land application use of the poultry manure on crop farms is a concern and was addressed above in Section 5.1.2.

5.2 Urban Sources

The higher percentage of impervious surfaces, especially those built prior to stormwater regulations requiring detention, and concentrations of pets (dogs, cats and horses) that live in developed areas, especially in the lower portion of Shaws Creek watershed, increase the pollutant loading from built-up or developed land. The increase in pollutant loadings (bacteria, sediment, and nutrients) from these areas is mostly due to the increase in connected impervious surfaces. Because stormwater flows over these hard surfaces directly into a water body or storm drain, there is no opportunity for soil and plants (or a water treatment facility) to filter out pollutants. This alteration in the natural landscape increases runoff volume and creates an efficient mechanism to convey available pollutants to Shaws Creek and its tributaries. Stormwater pollutants originate from many different urban sources, ranging from fuel and oil from roads and parking lots, to litter dropped on the streets and sediment from construction sites. Common pollutants found in urban stormwater, their likely sources and the effect of the pollutant on our waterways is outline in Table 12 below (EPA Victoria 2012).

Table 12. Common Urban Pollutants, Their Likely Sources and the Effect on Waterways (EPA Victoria 2012)

Pollutant	Effect	Urban Source
Bacteria	• High numbers of bacteria and viruses can cause illnesses, including hepatitis and gastroenteritis	• Animal Waste • Sewer Overflows, Septic Tank Leaks • Organic Matter Decay
Nutrients	• An increase in nutrients stimulates growth of aquatic plants. This causes excessive growth of aquatic weeds and algae that may choke lakes and streams and lead to dramatic daily fluctuations in dissolved oxygen (DO) levels. Low DO levels can lead to fish kills.	• Organic Matter • Fertilizer • Sewer Overflows, Septic Tank Leaks • Animal Waste • Detergents (Car Washing) • Atmospheric Deposition • Spillage, Illegal Discharges
Sediment	• Reduces the amount of light in the water available for plant growth, decreasing the supply of food for other organisms • Can clog and damage sensitive tissues such as the gills of fish • Can suffocate organisms that live on or in the bed of lakes and streams by forming thick deposits when the suspended material settles out	• Land Surface Erosion • Pavement and Vehicle Wear • Building and Construction Sites • Spillage, Illegal Discharges • Organic Matter (i.e. leaf litter, grass) • Car Washing • Weathering of Buildings/Structures • Atmospheric Deposition
Oxygen Demanding Substances	• Oxygen is used up more quickly that it can diffuse into the water from the atmosphere. The resulting drop in oxygen levels may then kill fish and other aquatic organisms	• Organic Matter Decay • Atmospheric Deposition • Sewer Overflows, Septic Tank Leaks • Animal Waste

	• If all oxygen in the water is used up, can cause unpleasant odors	• Spillage, Illegal Discharges
pH (Acidity)	• Increased acidity damages plants and animals	• Atmospheric Deposition • Spillage, Illegal Discharges • Organic Matter Decay • Erosion of Roofing Material
Toxic Organics	• Poison living organisms or damage their life processes in some other way • Persist in the environment for a long time	• Atmospheric Deposition • Vehicle Wear • Sewer Overflows, Septic Tank Leaks • Weathering or Buildings/Structures • Spillage, Illegal Discharges
Litter and Debris	• Animals can eat and choke on this material • Can convey extra nutrients	• Waste Collection Systems • Leaf-fall from Trees • Lawn Clippings • Spill and Accidents
Oils, Detergents, and Shampoos (Surfactants)	• Highly toxic to fish and other aquatic life	• Asphalt Pavements • Spillage, Illegal Discharges • Leaks from Vehicles • Car Washing • Organic Matter
Increased Water Temperature	• High temperatures are lethal to fish and other aquatic organisms • Increased water temperatures stimulate the growth of nuisance plants and algae • This and other effects can lead to decreased level of dissolved oxygen, which can threaten other aquatic life	• Run-off from Impervious Surfaces • Removal of Riparian Vegetation

The City of Aiken and Aiken County are two small MS4s located in Shaws Creek subwatersheds and according to the 2011 NLCD data, developed areas account for 7.7 percent (4,185 acres) of the subwatersheds. Developed areas are mainly in the southern portion of the watershed with the City of Aiken, the Industrial Parks and development near and around Highway 1 and Interstate 20, however in the northern portion of the subwatersheds developed areas are located around the Town of Trenton.

According to 2010 SCDHEC Watershed Assessment, there is a low to moderate potential for growth in this agricultural-based watershed (SCDHEC 2012). However, there is a high potential for commercial growth surrounding the two I-20 interchanges at US 1 and at SC-19; According to the 2014 Edgefield Highway Corridor Planning Study, there are long-term plans to widen SC-19 to four lanes near I-20 and between I-20 and the City of Aiken (DRMP 2014). SC 19 runs through a small portion of Edgefield County in the subwatersheds (near Trenton) and intersects with several rail lines that could increase industrial potential. The Town of Trenton has tied into the Edgefield County Water and Sewer Authority's Regional Sewer Collection System, which could also enhance industrial growth. As well, the watershed has continued to receive growth pressures as a result of the watershed's close proximity to the population center of the

City of Aiken. Therefore, urban runoff may be a source of pollutants to Shaws Creek, and further research is needed to determine the significance of this source.

To better understand the impact that urbanization and increased impervious surfaces may have on the watershed, a brainstorming session for urban sources was held with stakeholders on October 19, 2016. Stakeholders that attended included City of Aiken Stormwater, City of Aiken Planning, Aiken County Stormwater, Aiken County Planning, Edgefield County and Amec Foster Wheeler. The goal of the meeting was to gain knowledge of the urbanized areas of the watershed to discuss any stormwater, erosion, or domestic pet issues and urban issues observed during windshield survey, as well as discuss potential preventative measures for the watershed such as revising and updating regulations and ordinances for future development. Additionally, public meetings with local residents of the watershed were held in both Aiken County and Edgefield County on January 10th and 12th, 2017 that further helped narrow down potential urban sources of pollution that needed to be addressed.

Compiling information from assessments mentioned in Section 4 and the brainstorming sessions, the following findings on potential urban sources of pollution are listed below.

<u>Findings</u>

- Verenes and Ventures Industrial Parks – The Verenes and Ventures Industrial Parks surrounding the Aiken Municipal Airport were built in the 1970's before stormwater regulations were in place. The large impervious rooftops and parking lots with little or no detention can result in highly erosive flows, which was observed throughout the Park. One example is at the Industrial Service Corp. on Windham Blvd. The SCDOT ditch along Windham Blvd between Industrial Service Corp. and Givens St. is highly eroded with significant sediment transport to a low lying wooded area off of Givens St. See Figures 10-12 below.

Figure 10. Eroded SCDOT Ditch down gradient from Industrial Service Corp. along Windham Blvd.

Figure 11. Eroded SCDOT Ditch down gradient from Industrial Service Corp. along Windham Blvd.

Figure 12. Runoff/Sediment deposition in the low lying wooded area adjacent to Givens St.

- Eroded Bank on Paces Creek Road – An unstable, eroding bank of red clay on Paces Creek Road in Edgefield County (near Trenton) was observed during the windshield survey. The eroding bank, possibly an old railroad embankment, is located adjacent to Paces Branch, about 1.9 miles upstream of Shaws Creek. During the windshield survey, Paces Branch, downstream from the eroded bank, appeared to have sediment and algae, see Figures 13 and 14.

Figure 13. Unstable embankment adjacent to Paces Branch

Figure 14. Observed sediment and algae in Paces Branch downstream of eroded embankment

- Graves Auto Salvage – During the windshield survey, a large junk yard (about 35 acres) with a high potential for pollutants was observed in Aiken County off of Highway SC-19. From the urban brainstorm session, it was revealed that Graves Auto Salvage has two detention ponds and that Aiken County visually monitors the outfalls quarterly and has not seen any indication of a sheen or other signs of pollution from this junk yard. If warranted, Aiken County can require monitoring should the outfalls indicate suspicion.

Figure 15. Graves Auto Salvage

- Construction Sites – From the windshield survey, one particular developing neighborhood off of Cooks Bridge Road, named Tod's Hill Equestrian Community, had sediment and erosion control issues observed throughout the site. During the windshield survey, the site had completed site work – land clearing, site grading, roads, stormwater infrastructure and laying out the lots. However, no lots had been sold and no houses had been built at the time of the windshield survey and thus final stabilization for the site has not been completed. Temporary stabilization on the site is not complete, and lack of needed sediment and erosion control measures have resulted in runoff and erosion issues on the site. See Figures 16 - 19 below for examples of poor stabilization, rill erosion and lack of inlet protection and lack of proper construction entrances.

Figure 16. Tod's Hill subdivision in need of sediment and erosion control measures.

Figure 17. Tod's Hill subdivision in need of stabilized construction entrance.

Figure 18. Tod's Hill subdivision in need of sediment and erosion control measures.

Figure 19. Tod's Hill Equestrian Community layout and properties.

- Mason Branch Development Plans - As stated previously, according to 2010 SCDHEC Watershed Assessment, there is a low to moderate potential for growth in this agricultural-based watershed. However, during the public meeting, it was discovered that a previously commercial timberland

property (2,493 acres) is for sale on and around Mason Branch, adjacent to the City's holding pond for the Water Treatment Plant (WTP). Mason Branch drains to Shaws Creek and is about 6.5 miles upstream from the water treatment plant. Proposed development for this currently forested area is outlined in Figures 20 and 21 below. Though some buffers and nature preserve areas are proposed in this development, the projected residential golf course, equestrian estates, offices, and retail/commercial properties would pose a threat to water quality of the WTP holding pond, Mason Branch and thus Shaws Creek.

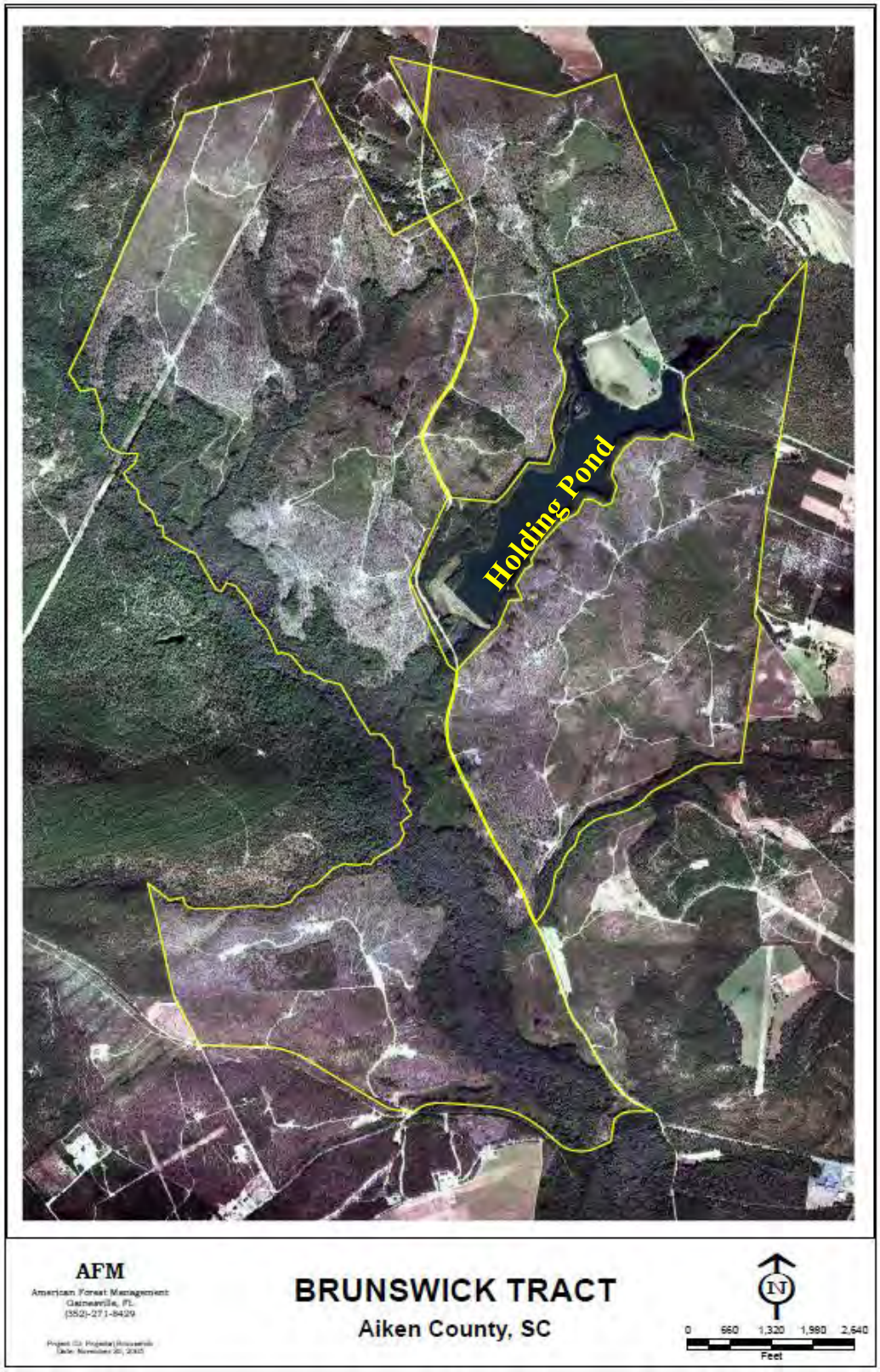


Figure 20. Mason Branch Development Tract currently for sale.

Figure 21. Proposed development plans for the tract around Mason Branch.

- Private Commercial Properties – Some good housekeeping practices and stormwater maintenance issues at private commercial properties were observed during the windshield survey. A few examples are displayed in Figures 22 - 25 below. One example included a Shell gas station with a drop inlet under the fuel canopy next to a fuel pump. It is unclear whether the drop inlet is connected to an oil/water separator and, if so, whether the oil/water separator discharges to the sewer or stormwater. Also, as shown in Figure 22, the stormwater infrastructure is poorly maintained. Another example was a McDonald's garbage dumpster being hosed off and the contaminated garbage leachate runoff drained to an adjacent tributary that runs along the property. A third observation during the windshield survey was private stormwater ponds not being maintained. The stormwater pond for the Summit Business Center off of Rutland Drive in Aiken, photographed in Figure 25, has trees and tall grasses growing in the pond and has thus the pond may have lost its needed/designed volume to properly treat stormwater runoff. Additional private stormwater ponds may also need maintenance.

Figure 22. Gas station's drop inlet under canopy

Figure 23. Gas station's stormwater infrastructure

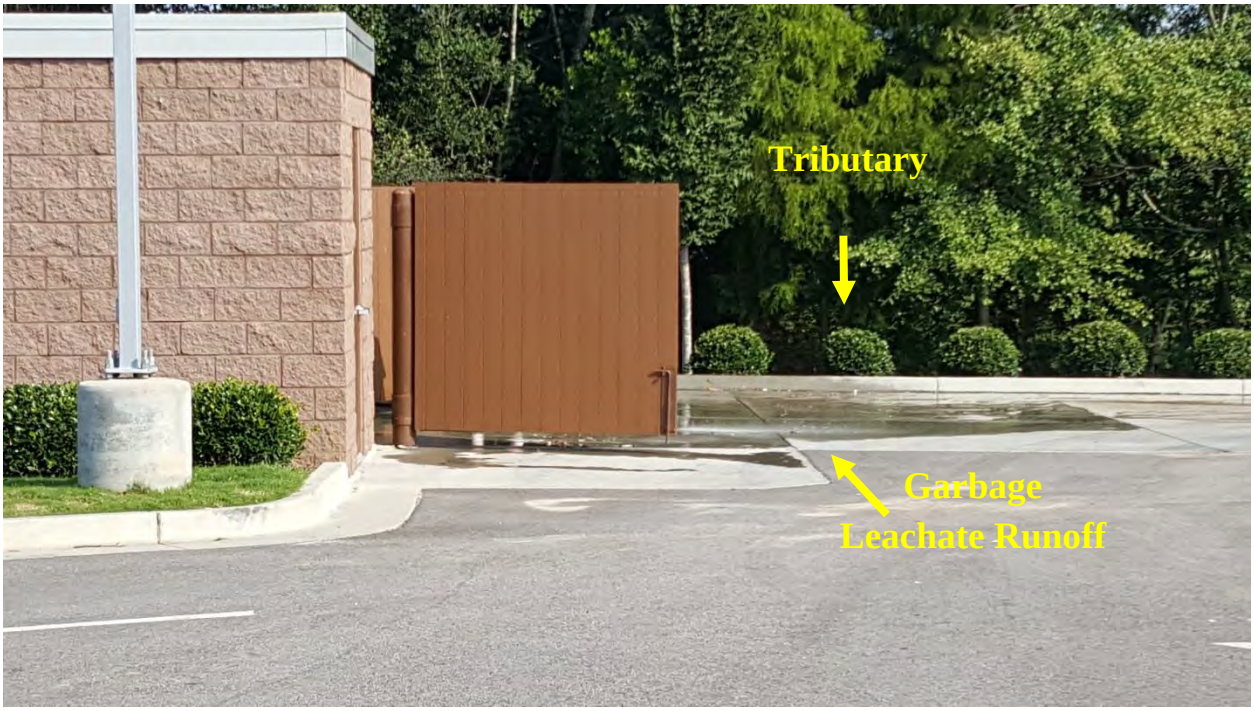


Figure 24. Garbage dumpsters being hosed off in McDonald's parking lot

Figure 25. Summit Business Center's unmaintained stormwater pond

- Pet Waste - another potential source of pollutants stemming from urban runoff, is from domestic animals (dogs, cats). Pet concentrations in the Shaws Creek watershed may increase with increased urban growth. Pet waste is often left in areas where it can be more easily transported into the stormwater system before decay can take place. Although no municipal parks exist in the watershed, there are some apartment complexes (Crosland Apartments, Glendale Terrace Apartment and Long Leaf Senior Village near Aiken and Village Yard Apartments near Trenton), which often have high concentrations of pets and the Aiken County Animal Shelter also has many dogs and cats.

- Sanitary Sewer and Septic – The City of Aiken's sewer line crosses the watershed from the City to the Airport and the City's industrial parks. See the Sewer Section 5.3 and Septic Section 5.4 for further discussion of potential sanitary sewer leaks and overflows and septic sources.

- Dirt Roads – There are a number of dirt roads, especially in the Shaws Creek Watershed. Many of the dirt roads are private roads, though a few are Edgefield and Aiken County roads. Dirt roads are a potential source of sediment as well as nutrients, particularly when dirt roads are located on farm property.

- In summary, the following urban sources exist in Shaws Creek Watershed:

- High impervious areas without stormwater controls
- Construction/post-construction erosion issues
- Lack of private stormwater pond maintenance
- Poor Good Housekeeping procedures at private facilities
- Future/planned development
- Dirt Roads
- Pet Waste

Based on the pollutants produced by these sources, urban sources primarily result in sediment pollution, and bacteria and nutrients to a lesser degree. Therefore, sediment, bacteria and nutrients have been selected as the key pollutants to address in this Watershed Based Plan.

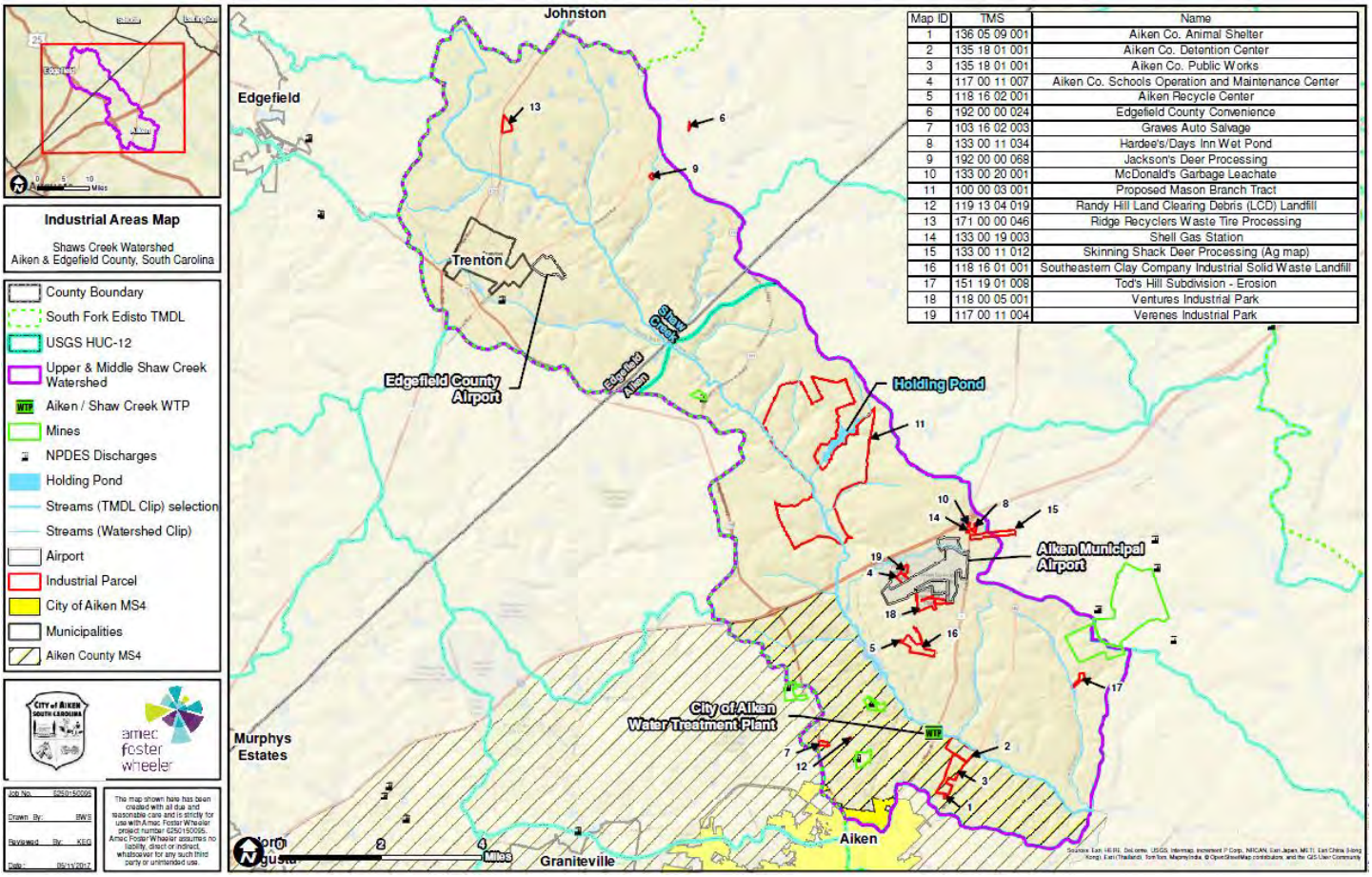


Figure 26. Map of urban and industrial areas within the Shaws Creek Watershed[5]

[5] See Appendix A for larger figure

5.3 Sewer Sources

In urbanized areas, sanitary sewer leakage and overflows can be another source of bacteria and nutrient contamination. Sanitary sewer overflows (SSOs) can be caused by anything capable of obstructing the flow of wastewater in sewer, including a build-up of solids and fats, oils, and greases (FOG). Although there are different causes for sanitary sewer overflows, FOG poured into sanitary sewer collection systems, either intentionally or unintentionally, have a significant effect on the size and frequency of sanitary sewer overflows. Fats, oils and grease in a warm liquid form may appear to be harmless since they flow easily down the drain. However, as the liquid cools, the FOG solidifies and separates from other liquids in the sewer pipes. The layer of FOG sticks to the sewer pipes and, over time, the flow of wastewater becomes restricted and can cause a backup or overflow (HCSA 2012). When the gravity flow of sanitary sewer is blocked and backs up, it will eventually overflow into roads, storm drains, ditches, creeks, and rivers. Although sanitary sewer overflows are not a constant source of bacteria and nutrients to the watershed, they can cause a significant impact to the watershed when they occur.

Sanitary sewer leaks also exist and can result in water quality issues in a stream.

Gathering information from the Brainstorming Meetings (Sewer-Septic Sources Meeting and Public Meetings) with representatives from SCDHEC, the City of Aiken, Aiken County, Edgefield County as well as communication with sewer companies within the watershed (City of Aiken and Edgefield County Water and Sewer Authority), the following findings are discussed below.

<u>Findings</u>

- Sewer Data: Amec Foster Wheeler contacted the local municipal sewer authorities to compile the watershed's Sewer Management Areas Figure (Figure 27 below). Concentrated sewer areas are

located in a small portion of Shaws Creek Watershed near the urbanized area of the City of Aiken and near the Town of Trenton.

- City of Aiken Sewer System: The City of Aiken maintains and owns sewer lines in the lower portion of the watershed – from the City of Aiken, along Hwy 1 up to I-20 and around the Aiken Municipal Airport and nearby industrial parks and commercial area. The City's sewer gravity main does cross Shaws Creek just upstream of the Water Treatment Plant. It is estimated that there are 30 parcels connected to sewer in the Aiken portion of the watershed.

- Edgefield County Water and Sewer Authority (ECWSA): The Edgefield County Water and Water Authority service territory in Shaws Creek Watershed is only in the Trenton area. It is estimated that there are 137 parcels on sewer in the Edgefield portion of the watershed.

- The number of sanitary sewer overflows (SSOs) in the Shaws Creek Watershed in the past 3 years was obtained from SCDHEC. Only 3 SSOs were identified in the watershed, as shown on Figure 27. Though the causes of these three SSOs were not FOG, other grease-related SSOs did occur in the City of Aiken and ECSWA sewer systems. The FOG campaign described in Section 8.1.5.3 will address potential SSOs as well as help prevent septic failures (see Section 5.4).

- The City of Aiken has begun a Grease Trap Inspection/ Pump Out Program: The City of Aiken has undertaken this program for their commercial customers in order to try to prevent grease from entering their sewer system. All commercial customers that prepare food (restaurants, school cafeterias, etc.) are required to have a grease trap. They have an inspector who inspects the grease trap, and places the restaurants on a pump out schedule depending on how fast it accumulates grease. The inspector is also on-site during each pump out to ensure that all the grease is taken out by the pump trucks, and not pushed into the system. During the windshield survey and follow-up by the City, spillage around the Hardee's grease collection container was discovered and clean-up was enforced by Aiken County.

- Communities Recycling Used Cooking Oil: The City of Aiken and Aiken County do collect used cooking oil from their residents, but Edgefield County does not. Edgefield will consider partnering with Midlands Biofuels to accept used cooking oil at their Convenience Centers near Shaws Creek Watershed.

- Sewage from both ECWSA and the City of Aiken is treated at the Aiken County Public Service Authority which operates the regional Horse Creek Public Service Authority. Horse Creek does accept grease from grease trap clean-outs.

- Updating Older Sewer Lines: The City of Aiken wastewater utility is conducting a Sanitary Sewer Evaluation Survey of the older part of its system in downtown Aiken to identify potential leaks and overflow areas. They are identifying and prioritizing the issues to be scheduled for upgrades and repairs.

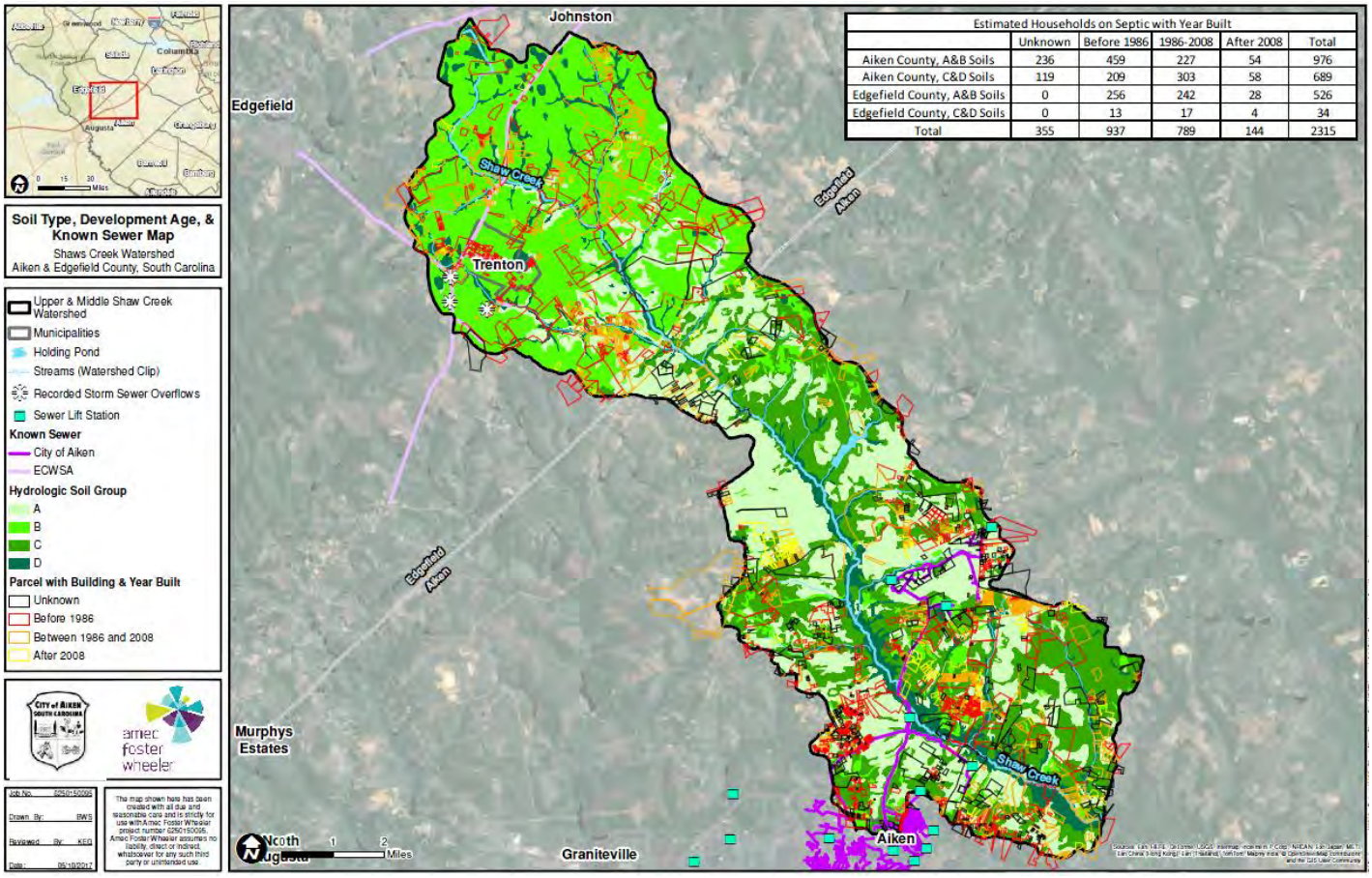


Figure 27. Concentrated sewer areas in the Shaws Creek Watershed[6]

5.4 Septic Sources

Failing septic systems represent a nonpoint source that can contribute bacteria and nutrients to receiving waterbodies through surface or subsurface malfunctions. Septic systems that do not function properly may leak septage which can reach nearby streams. Septic systems can fail due to improper design or construction, and systems may no longer function because of neglected maintenance. According to the South Fork Edisto River TMDL written in 2011 (SCDHEC 2011), it was estimated that there are 22,838 septic systems in the entire South Fork Edisto River. Interpolating the area of Shaws Creek Watershed verses the area of South Fork Edisto River Watershed, a rough estimate of the number of septic systems in Shaws Creek Watershed is 1,886 systems. There is no accurate estimate of failure rate in this watershed, but several studies have reported failure rates ranging from 5 to 39%, and a rule of thumb of 10% failure is generally used (Schueler 1999). Many residential property owners may be unaware of

[6] See Appendix A for larger figure

problems with their septic tanks or may be unable to afford repair of their septic tanks. Therefore, failing septic systems may be a significant source of bacteria in the watershed.

Example failing septic system in Hollow Creek Watershed

Compiling information from assessments mentioned in Section 4, parcel data, soils data, sewer data (Figure 27), and the brainstorming sessions (Sewer-Septic Sources Meeting and Public Meetings), SCDHEC, and municipalities the following conclusions on failing septic systems as a source of bacteria and nutrient pollution are listed below.

Findings

- The practice of recycling used cooking oil for septic systems owners prevents backups in their systems as well.

- Aiken County has located roughly 70 failing septic systems per year through their MS4's Illicit Discharge Detection and Elimination program. For these failing septic systems, a licensed contractor inspects and repairs the suspected systems and Aiken County Stormwater follows up with the house and checks that it is completed. During the brainstorm session, DHEC stated that approximately 95 percent of septic failures are in the drain lines.

- Gathered Shaws Creek Watershed Septic Parcel Data:

    - Amec Foster Wheeler obtained building parcel and assessor data from Aiken and Edgefield Counties for the Shaws Creek Watershed to determine which parcels are most likely to have older septic systems in need of maintenance or repair.

    - Amec Foster Wheeler contacted the local municipalities and sewer companies to compile the watershed's Known Sewer Figure (Figure 27 from Section 5.3 above). Concentrated sewer areas are located in the urbanized areas of City of Aiken, commercial properties

near I-20 and Highway 1, and the Town of Trenton. Thus, it was assumed that the majority of the remaining areas of the watershed use septic systems.

- The City of Aiken, Aiken County and Edgefield County do not maintain septic/sewer information for buildings in the watershed. In order to estimate the number of septic systems in the watershed, a desktop analysis was completed to estimate the number of septic systems in the watershed. It was first assumed that all parcels with buildings are either on sewer or have septic systems. Then, it was assumed that if a sewer line touched a parcel, that parcel is on sewer. A total of 167 parcels were estimated to be on sewer (refer to Section 5.3 above). The remaining parcels in the watershed were assumed to have septic systems. This desktop analysis resulted in an estimate of 2,315 septic systems in the watershed (Table 13). Using the 10% failure rule of thumb, there are an estimated 232 failing septic systems in the watershed.

- Amec Foster Wheeler overlaid the watershed's estimated septic data with the area's Hydrologic Soil Groups (Figure 28). Soils information (i.e. infiltration properties) along with age of buildings information to help narrow down areas that may be susceptible to failing septic systems. The analysis of Figure 28 to identify targeted areas is discussed in Section 8.

- Estimated bacteria and nutrient loadings from failing septic systems is detailed in Section 6.

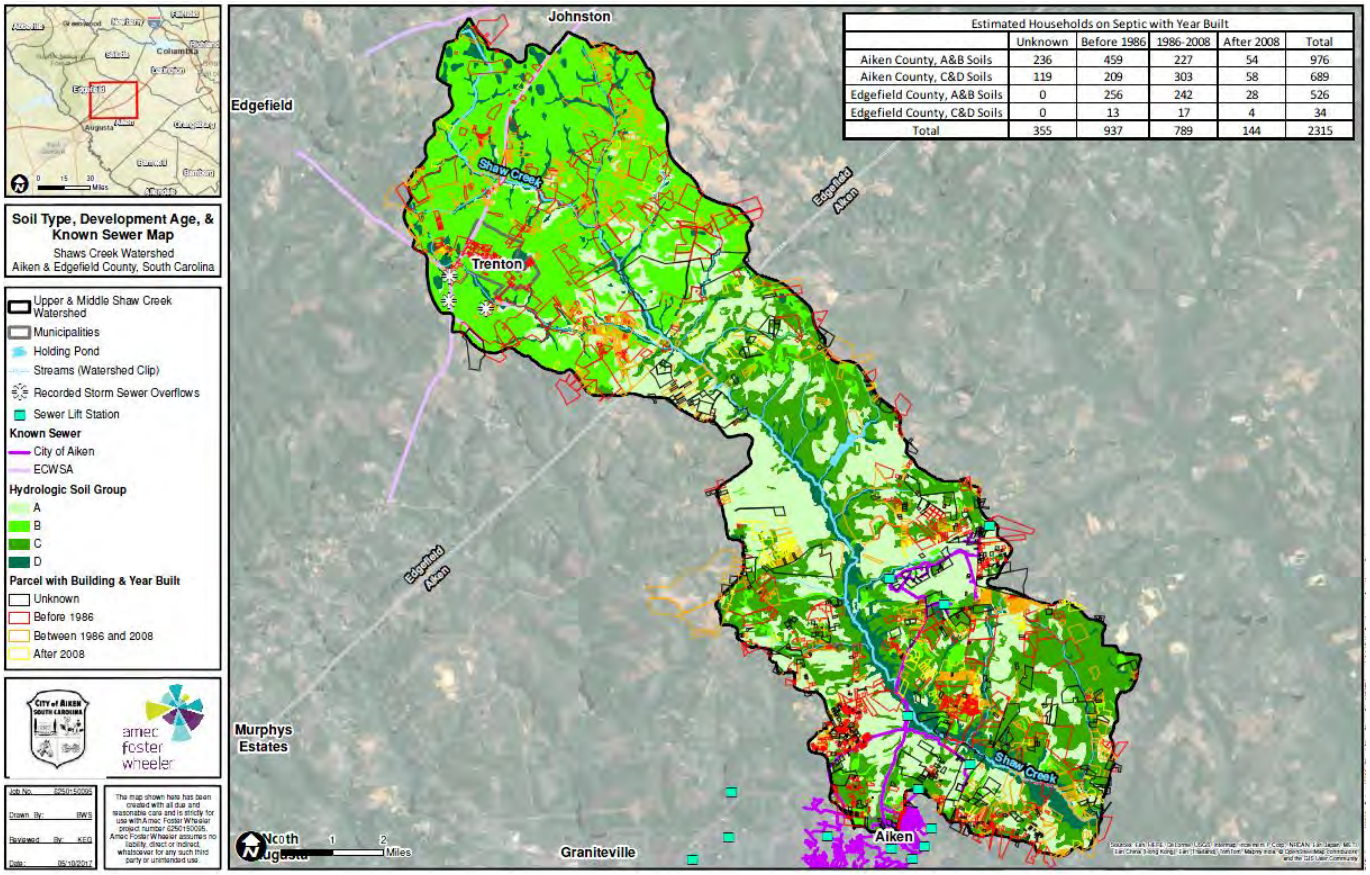


Figure 28. Shaws Creek Watershed Septic Management Areas[7]

Table 13. Total Estimated Septic Systems within the Shaws Creek Watershed

County	Approximate Number of Septic Systems
Aiken	1,755
Edgefield	560
Total	2,315

An estimated 2,315 septic systems are in the Shaws Creek Watershed. From this, parcels with septic were analyzed based on Hydrologic Soil Group and the date the building was constructed. Because septic regulations changed/improved in 1986 and in 2008, date categories include buildings with septic built before 1986, built between 1986 and 2008 and built after 2008. Therefore, septic failures are most likely occurring on C & D soils and areas where septic systems were built before 2008. Of the 222 systems parcels

[7] See Appendix A for larger figure

built before 1986 and the 320 systems built between 1986-2008; it is estimated that a total of 232 septic systems are failing in Shaws Creek Watershed.

Table 14. Estimated number of septic tanks in the Shaws Creek Watershed

County	Number of Septic Tanks	Septic Systems on C & D Soils before 1986	Septic Systems on C & D Soils between 1986-2008
Aiken County	1,755	209	303
Edgefield County	560	13	17
Total	2,315	222	320

5.5 Wildlife Sources

Wildlife (mammals and birds) are contributors of bacteria and nutrients to surface waters via wastes that are either carried into nearby streams by runoff following a rainfall or deposited directly in streams. When the South Fork Edisto River Watershed Bacteria TMDL was written in 2011, deer were designated as a significant wildlife contributor of fecal coliform bacteria (Shaws Creek Watershed is located in the larger South Fork Edisto River Watershed). In 2008, the SC Department of Natural Resources (SCDNR) estimated a density of less than 15 deer/mi^2 in Aiken County. Forest lands, whose only typical source of bacteria is wildlife, usually have relatively low loading rates for bacteria. Nonetheless, potential bacteria sources associated with wildlife listed below were found in the Shaws Creek Watershed.

One particular problem with wildlife in South Carolina is an increasing problem with wild hogs. They reproduce at an extremely rapid rate, have no natural enemies in South Carolina, and carry two bad diseases (swine brucellosis and pseudorabies) transmissible to humans or other wildlife. Their habit of "wallowing in the mud" and their preference for bottomlands (such as rivers, creeks and other drainages) can have a direct effect on surface water quality, specifically sediment, bacteria and nutrient loadings.

In order to target wildlife sources of pollution, information was gathered from the Shaws Creek Watershed Wildlife-Forestry-Nursery Sources brainstorm session that was held on December 2, 2016 and during the Agricultural brainstorm session that was held August 17, 2016. Attendees for the Wildlife-Forestry-Nursery Sources brainstorm session included City of Aiken Stormwater; Aiken County Stormwater; Edgefield County; SC Forestry Commission; and SC Rural Water Association (SCRWA). The attendees for the Agricultural brainstorm session included City of Aiken Stormwater; Aiken County Stormwater; Edgefield County; Aiken and Edgefield NRCSs; Aiken, Edgefield and Richland SWCDs; and SCRWA.

Utilizing information from assessments mentioned in Section 4, GIS and aerial reviews, and the brainstorming sessions, the findings on wildlife sources of bacteria, sediment and nutrient pollution are listed below.

Findings

- There are private properties where hunting occurs, but there are not any Department of Natural Resources (DNR) Wildlife Management Areas in the Shaws Creek Watershed. Private hunt clubs are not anticipated to be a significant source for bacteria, nutrient or sediment loadings in the watershed due to good practices being employed at the clubs with proper BMPs, such as disposal pits available for hunters to properly bury carcasses. It was also recommended that these hunters would make great "eyes in the watershed" to report issues, especially for improper disposal of carcasses.

- Improper Disposal of Carcasses:

    - Stream Dumping: From the Windshield Survey, no signs of deer carcasses being dumped in creeks were observed, though this has been observed in other rural watersheds.

    - Road-side Dumping: If carcasses are dumped on a state road, SCDOT, Aiken County or Edgefield County will remove the animal carcasses from the road and properly dispose of them at a landfill.

- Options for Proper Disposal of Carcasses:

    - Landfills - None of the following landfills nor convenience centers will accept animal carcasses from individuals, such as hunters:
        - City of Aiken's Wagener Landfill
        - Aiken County's Barden C&D Landfill
        - Aiken County's Wagener C&D Landfill
        - Three Rivers Landfill
        - Tri-County Landfill
        - Edgefield County convenience centers
        - Aiken County convenience centers

    - Incinerators – There are no incinerators located in the Shaws Creek Watershed for the City, Aiken County and Edgefield County to use for animal carcasses.

    - Meat Processors - Some meat processors may accept the whole deer (such as Jackson's Deer Processing in Johnston, SC), but some facilities require for the deer to be skinned and gutted before it can be processed. These meat processors either have rendering facilities come pick up their remains or arrange for dumpster pick-up (i.e. Jackson's Deer Processing) to transport the remains to a landfill where they are properly buried.

Because of the shortage of disposal options, hunters may dump deer carcasses in streams in the watershed. The improper disposal of carcasses is typically a result of inconvenience, cost burdens and lack of knowledge.

- Wild Hog Problem: From the Wildlife Brainstorming Session, it was stated that wild boars are in the watershed and are a problem. A student at Clemson University has been studying and trapping wild boars. There is also an SC State Wild Hog Task Force. To help mitigate this problem, SCDNR and legislation strongly encourage hunters to kill as many wild hogs as they can to control their population. The USDA Animal and Plant Health Inspection Service (APHIS) are actively trapping feral swine in Edgefield County, though not in Shaws Creek Watershed. Environmental damages from wild boars include (Hamrick, et. al. 2016):

    - Rooting, wallowing and trampling activities compact soils, which in turn disrupts water infiltration and nutrient cycling.
    - Wild pig activity in streams reduces water quality by increasing turbidity (excessive silt and particle suspension) and bacterial contamination. In time, turbidity and added contaminants affect a variety of native aquatic life, most notably fish, freshwater mussels, amphibians, and insect larvae. In some streams, feces from wild pigs have increased fecal coliform concentrations to levels exceeding human health standards.
    - Destruction of vegetation in freshwater marshes not only reduces aquatic life and water quality but also affects ecosystem services, such as water filtration, flood control, and storm surge protection

- Beaver Problem: According to stakeholders in the watershed, beavers are a problem in the watershed and can effect stream flow and sedimentation and be carriers of waterborne diseases. Beaver dams may adversely affect stream ecosystems by increasing sedimentation in streams upstream of the dam; thereby, affecting wildlife that depend on clear water, such as certain species of fish and mussels. Stagnant water impounded by beaver dams can increase the temperature of water impounded upstream of the dam, which can negatively affect aquatic organisms. Beaver dams can also act as barriers that inhibit movement of aquatic organisms and prevent the migration of fish to spawning areas. As for waterborne diseases, beavers can be carriers of the intestinal parasite *Giardia lamblia*, can contaminate human water supplies and cause outbreaks of the disease Giardiasis in people (Myers 2017). Giardiasis is an illness caused by a microscopic parasite that the Centers for Disease Control and Prevention (CDC) report as one of the most common causes of waterborne disease in people across the United States.

5.6 Other Sources

5.6.1 Nurseries

Nurseries have a high potential for runoff and erosion because of the amount of unregulated land and few regulations to govern nursery impacts on water quality. Propagating and maintaining high quality plants requires large amounts of water, fertilizer, and pesticides. These high inputs, however, increase the potential for both surface and ground water pollution (Schelle, et. al 2013). Roadways, greenhouse roofs and plastic container nursery pads are all impervious surfaces. Irrigation water or rainfall can readily flow off from these surfaces, carrying with it sediments, nutrients, pesticides, fuels and lubricants leaking from equipment, and other contaminants (Speir and Wells 2010). If not directed through grassed filter strips and channels or storage basins, runoff water can contaminate ground and surface water. Many larger nurseries are designed to have runoff water directed into storage basins. Besides providing protection against water contamination, storage basins can serve as a source of recirculating irrigation water (Speir and Wells 2010).

A brainstorming session for Wildlife-Forestry-Nursery Sources was held on December 2, 2016 to utilize cooperators' and stakeholders' knowledge of nurseries in the watershed. Attendees included City of Aiken Stormwater; Aiken County Stormwater; SC Forestry Commission (including, Hamp Holmes, the Nursery Manager at Taylor Nursery, and former employee of Costa Nursery); and SCRWA.

Utilizing information from assessments mentioned in Section 4, GIS and aerial reviews, and the brainstorming session, the findings on nurseries as a potential source of sediment and nutrient pollution are listed below.

<u>Findings</u>

Two active nurseries were located in the watershed through the windshield survey and confirmed at the brainstorming session, Costa Nursery and South Carolina Forestry Commission Taylor Tree Nursery.

- Costa Nursery - grows containerized perennials (mainly flowers). They have three ponds in series, and recycle the bottom pond for irrigation. Representatives from Costa Nursery were unable to attend, but one of the stakeholders used to work at Costa Nursery and was able to share information about Costa Nursery's procedures. He stated that Costa Nurseries has a series of storage basins and recycles water from the bottom pond for irrigation.

- SCFC Taylor Tree Nursery – grows pine trees and hardwoods (bare roots). They use liquid (spray) fertilizer every week, calibrated for Nitrogen needs based on soil analyses. Due to sandy soils, there had been some minor erosion issues in the past, but they have been addressed by a new and stabilized road in the nursery.

Because Costa Nursery has a series of storage basins and recycles water from the bottom pond for irrigation, it is not considered a significant source of pollutants in Shaws Creek. Likewise, due to Taylor Tree Nursery's regular soil analyses and adjustment of nutrients needed, Taylor Tree Nursery is not considered a significant source of pollutants in Shaws Creek.

5.6.2 Forestry

Though no active timber harvesting is currently being conducted in Shaws Creek Watershed, forestry is present throughout. When there are a lack of best management practices, the potential environmental stresses stemming from sustained forestry practices can result in severe erosion, excessive sediment loadings, lack of sufficient woody debris, and stream channelization and channel/bank instability. These attributes and conditions could, in turn, induce water quality and aquatic/riparian habitat threats.

Possible sources of nonpoint source (NPS) pollution associated with forestry activities include removal of streamside vegetation, road construction and use, timber harvesting, and mechanical preparation for the planting of trees. Road construction and road use are the primary sources of NPS pollution on forested lands, contributing up to 90 percent of the total sediment from forestry operations. In addition to other water quality impacts, an excessive quantity of sediment in a water body can reduce the ability of aquatic organisms to successfully live, forage, and spawn (USEPA 2017).

Harvesting trees in the area beside a stream can affect water quality by reducing the streambank shading that regulates water temperature and by removing vegetation that stabilizes the streambanks. These changes can harm aquatic life by limiting sources of food, shade and shelter, as well as decreasing areas suitable for species intolerant of warmer temperatures (USEPA 2017).

Based on 2011 NLCD data, forested lands account for the largest land use at 61.6 percent within Shaws Creek Watershed (33,456 acres). Through initial aerial review, properties planted for timber harvesting were noticeably present throughout the subwatersheds. To better understand the impact forestry activities may have on the subwatershed, a brainstorming session for Wildlife-Forestry-Nursery Sources was held on December 2, 2016 to utilize cooperators and stakeholders' knowledge of forestry operations in the watershed. Attendees included City of Aiken Stormwater; Aiken County Stormwater; SC Forestry Commission; and SCRWA.

Using stakeholders' knowledge of forestry activities in the watershed from the Wildlife-Forestry-Nursery Sources Brainstorming Session (mentioned in Section 5.6.1), information from assessments mentioned in Section 4, aerial reviews and GIS, the following findings on potential forestry sources are listed below.

<u>Findings</u>

- As stated by the SC Forestry Commission, Edgefield County in general is a very active for forestry activities and harvesting occurs periodically in Shaws Creek Watershed.

- South Carolina's Best Management Practices for Forestry Manual (1994): Compliance with BMPs is required for forestry activities which involve discharge of dredge or fill materials into jurisdictional wetlands to qualify for the silvicultural exemption under Section 404(f) of the Clean Water Act. Compliance with BMPs is recommended on all sites on which there is a potential for violating water quality criteria as defined by the South Carolina Pollution Control Act.

- The South Carolina Forestry Commission (SCFC) is the lead agency in South Carolina in designing, interpreting, monitoring, and updating forestry BMPs. Sustainable Forestry Initiative (SFI) mills require loggers to initially take a two-day training (half a day on BMPs) with an annual video update training. According to SCFC, not all, but most mills are SFI certified which makes the logger training essentially a requirement across the board. Mills who are SFI certified require loggers to be in compliance with SFI and will reject lumber from loggers who do not meet requirements. SCFC provides the half a day BMP training to meet the SFI requirement. As well, SCFC conducts Courtesy Exams on active sites monthly and SCDHEC enforces issues the SCFC finds. SCFC's responses to issues found during Courtesy Exams vary depending on severity, but range from requirement of the logger to go back through training, take the necessary remediation steps on the ground, or fines.

- Silviculture activities are required to have streamside management zones with 40 foot buffers. Through SCFC's regular BMP monitoring, they have shown a 98.9% compliance with streamside management zones across the state and 73.6% compliance with BMPs for stream crossings.

- A number of Carolina Bays located in the upper Shaws Creek Watershed have been converted to farmland. These would be potential mitigation sites to restore the original ecosystems.

- As mentioned in Section 5.1.2, mega farms are a growing concern in the Edisto River Basin, particularly in eastern Aiken County, where the relatively sudden change from forested land to new large farms raises questions about lost wildlife, water pollution, and depleted water supplies. Mega farms do not appear to currently be moving into Shaws Creek Watershed, converting forested land to crop farming, but, should they do so, it would cause great concern for water quality and quantity. See Appendix D for the potential development of a Land Conservation Program for Shaws Creek Watershed.

- Conservation easements were discussed as a tool to prevent current forested areas from being developed – either to urbanized area or to agriculture. See Appendix D for a plan for beginning a Land Conservation Program in Shaws Creek to provide financial incentives to encourage landowners to put portions of their property (especially buffers along streams and wetlands) into conservation easements. The City of Aiken will pursue discussions with Aiken Land Trust and other groups to partner with on this effort. The City plans to pursue 319 and/or USDA Conservation Reserve Program to help fund this program.

Because silviculture BMPs are being recommended and monitored by SCFC, issues are enforced by SCDHEC, and loggers are incentivized by SFI certified mills to conduct sustainable practices, forestry activities are not believed to be a significant contribution to pollution in these subwatersheds and are not being addressed in this plan. On the contrary, stakeholders plan to encourage landowners to put portions of their property (especially wider buffers along streams and wetlands) into conservation easements to maintain forests in these sensitive areas.

5.6.3 Point Sources

Point sources are defined as pollutant loads discharged at a specific location from pipes, outfalls, and conveyance channels from either municipal wastewater treatment plants, industrial waste treatment facilities, or regulated stormwater discharges (SCDHEC 2011). Individual NPDES permitted point sources identified within the Shaws Creek Watershed are listed below and their locations are shown on Figure 29.

Findings:

Table 15. NPDES and ND Permits in Shaws Creek Watershed

Facility	Permit #
Edgefield County Water & Sewer Authority/Trenton Wastewater Treatment Facility	SCG570030
G L Williams/Eureka Mine	SCG730485
Shree of Aiken/Inn of Aiken Lagoon, Wastewater	ND0065871
G L Wiliams/APAC Mine	SCG730490
Toby Marks Development/Shiloh Heights MN	SCG730375
Asco Valve Manufacturing LLC	SC0049026
Aiken/Shaw Creek Water Treatment Plant	SCG646003

Table 16. Permitted Mines in Shaws Creek Watershed

Facility	Permit #	Material
Eureka Mine	I-000152	Sand
APAC Mine	I-001142	Sand

In addition to these facilities' NPDES permit for their primary outfall(s), the NPDES Industrial General Permit, effective October 1, 2016, requires industrial permitted facilities with certain SIC codes to monitor their stormwater discharges and conduct analyses for certain pollutants of concern (POC), either based on the type of manufacturing or based on the impairment of the stream or both. The results of these sampling activities can be requested from industrial facilities to evaluate which, if any, of the industrial facilities may be point sources for bacteria, nutrient, sediment or other loading.

However, because these industrial facilities have individual NPDES permits and some have additional industrial stormwater permits with their own pollution prevention requirements, they are not believed to be a significant contribution to pollution in these subwatersheds and are not being addressed in this plan.

Although not a point source, a resident at one of the Shaws Creek public meetings reported that Plastic Products of the South (a factory near Trenton) has emitted particle dust all over cars, etc. which may wash off with rainwater into Shaws Creek. Stakeholders are encouraged to report air emissions of concern to DHEC so that the issue of malfunctioning control devices and/or the potential need for an air permit can be addressed by DHEC.

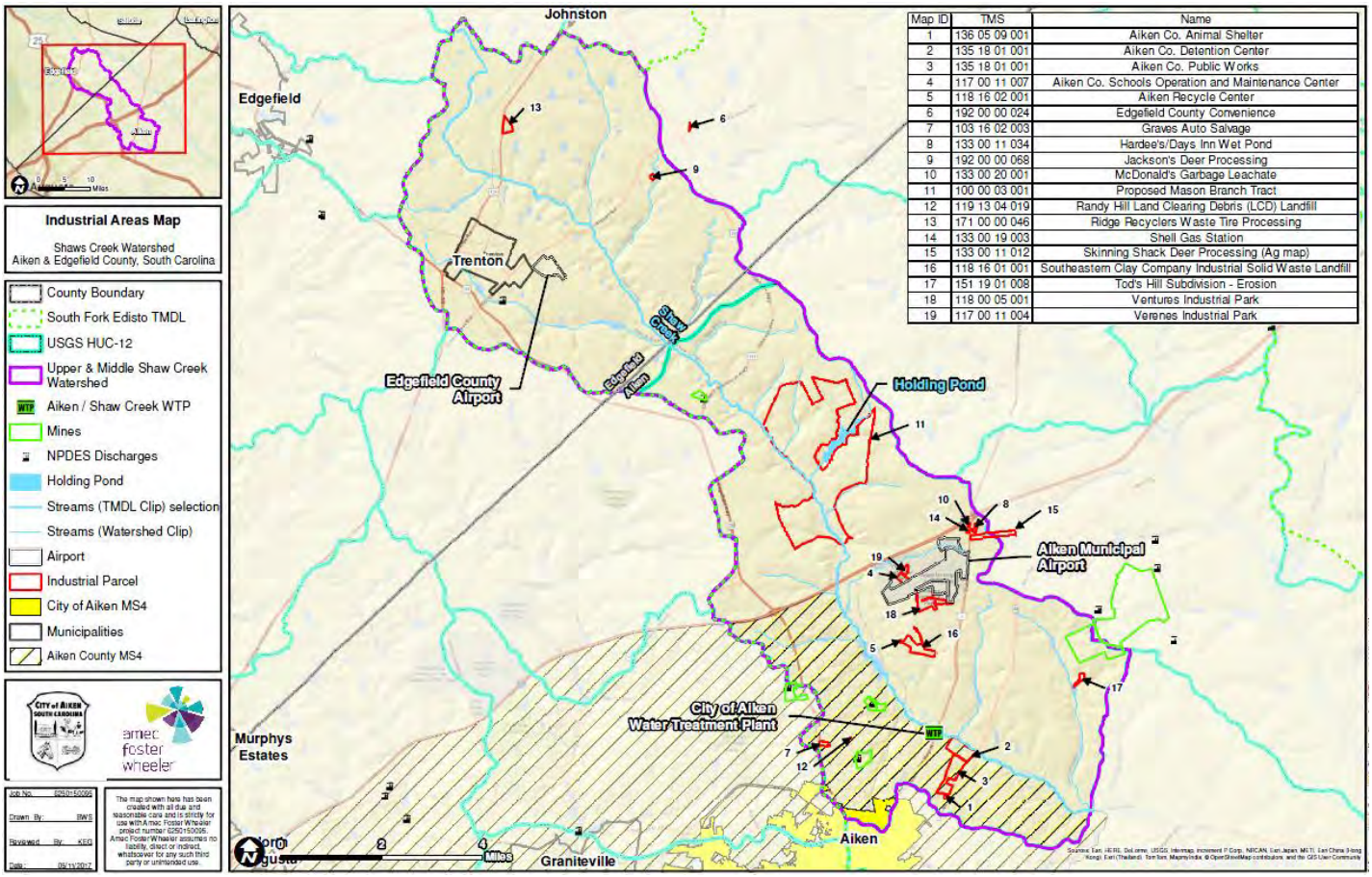


Figure 29. Map of urban and industrial areas within the Shaws Creek Watershed. [8]

6 Existing Loads

With the information gathered and summarized in Section 4 Watershed Conditions and Section 5 Identifying and Prioritizing Pollutants, Sources and Causes, it was possible to calculate an estimated load for nutrients (nitrogen (N) and phosphorous (P)), sediment (TSS), and fecal coliform bacteria (FC) in the

[8] See Appendix A for larger figure

Shaws Creek Watershed. Table 17 below summarizes the results for the existing pollutant loads estimated in Shaws Creek Watershed, followed by explanations on the estimated loads per source.

Table 17. Estimated Existing Pollutant Loads in the Shaws Creek Watershed

Source	Pollutant Load			
	N (lb/yr)	P (lb/yr)	TSS (lb/yr)	FC (CFU/yr)
Livestock	21,027	1,577	458,101	5.41E+14
Cropland	139,224	32,021	1.03E+6	8.06E+13
Urban	17,854	2,613	761,498	4.22E+14
Sewer	54.9	13.7	-	9.97E+09
Septic	7,215	2,830	-	5.61E+12
Wildlife	5,889	2,898	249,625	1.02E+13
Total Loads	**191,265**	**41,953**	**1.10E+07**	**1.05E+15**

Agricultural - Livestock

From the estimated number of livestock (USDA's 2012 statistics for beef cattle, dairy cattle, sheep and horse in Section 5.1.1 Table 10) and the total acreage of livestock farms (2,885 acres) within the Shaws Creek Watershed, it was possible to approximate the existing pollutant loads for nitrogen, phosphorous, sediment, and bacteria from livestock. The EPA's "Spreadsheet Tool for the Estimation of Pollutant Load" (STEPL) was used to calculate the estimated existing nutrient and sediment loading from livestock. EPA's STEPL incorporates many of the watershed characteristics such as soils, land use, rain data from local weather stations, number of livestock animals, and used the Universal Soil Loss Equation based on the area as well. Figure 30 on page 64 displays the input data used in STEPL and the resulting load estimations for nitrogen, phosphorus and sediment from livestock are reported in pounds per year in Table 17 above.

Because STEPL does not estimate bacteria load, literature values were used to estimate the existing bacteria load from livestock within the Shaws Creek watershed in Tables 18 - 20 below. As stated above, the estimated total of livestock for beef cattle, dairy cattle, sheep, goats and horses used to calculate bacteria loads were also based on USDA's National Agricultural Statistics Service 2012 data for Aiken and Edgefield Counties which was summarized for Shaws Creek Watershed in Section 5.1.1 Table 10. Although livestock animals were counted during the windshield survey, only those visible from public streets were able to be counted. Thus, the 2012 USDA statistics were deemed a more accurate estimate of total livestock in the watershed and therefore were used in the livestock load calculations. Based on literature, each animal's bacteria loading was converted to "pasture beef cow equivalents" (PBCE) as shown in Table 18 below (SCDHEC 2017). With the total PBCEs, fecal coliform bacteria loadings from livestock were estimated based on the literature statistic (Larsen 1995) that cattle directly deposit in stream year-round 1.97 x E11 CFU/yr/cow (Table 19).

Table 18. Estimated "Pasture Beef Cow Equivalents" for Livestock in Shaws Creek Watershed

Livestock	# of Livestock	Livestock Equivalents Factors	# PBCE
Beef Cow	625	1	625
Dairy Cow	625	2.6	1625
Horse	299	1.1	328.9
Sheep	57	0.04	2.28
Goat	146	0.04	5.84
		Total # PBCE:	**2,587.02**

Table 19. Estimated Bacteria Loading for Livestock in Shaws Creek Watershed

Livestock # (PBCE)	FC Loading (CFU/cow/yr)	FC Loading (CFU/yr)
2,587	1.97 x E11	5.10E+14

Additionally, the bacteria loading from livestock in the watershed of 5.10 x E14 CFU/yr was added to literary values for pasture land use loadings for bacteria (Shaver, et al. 2007) in order to determine the total loading from livestock farms for the Shaws Creek watershed. Figure 31 on page 64 illustrates the bacteria loading ranges for various land uses. Due to a strong presence of livestock farms in the Shaws Creek watershed, bacteria values for a Maximum Pasture was used from Figure 31 and are outlined in Table 20 below. Results from Table 19 and Table 20 totaled a bacteria loading from livestock in Shaws Creek watershed of 5.41 x E14 CFU/yr and is shown in Table 17.

Table 20. Estimated Bacteria Loading from Livestock Pastures in Shaws Creek Watershed

Landuse	FC Loading (CFU/ha-yr)	Livestock Acreage (ac)	FC Loading (CFU/yr)
Pasture, Maximum	2.70 x E10	2,885	3.15E+13

Agricultural - Cropland

With the total acreage of crop farms within the Shaws Creek Watershed (10,680 acres, including peach orchards), it was possible to approximate the existing pollutant loads for nitrogen, phosphorous, sediment, and bacteria from cropland. For nutrient and sediment loadings, STEPL was used to calculate the existing loads from crop farms. Figure 30 on page 64 displays the input data used in STEPL and the results for nitrogen, phosphorus and sediment for crop farms are reported in pounds per year in Table 17 above.

Because STEPL does not estimate bacteria load, similar to the pasture/livestock landuse above, the bacteria loading from cropland was determined from pasture loadings from the Shaver, et. al literature (Figure 31). Cropland was not specifically listed as a landuse category, however, using Minimum Pasture for peach orchards (no manure) and Maximum Pasture for crop farms (with manure), the results are outline in Table 17 and Table 21. It was estimated that the existing bacteria load from crop farms in Shaws Creek watershed is 8.06 x E13 CFU/yr.

Table 21. Estimated Bacteria Loading from Crop Farms in Shaws Creek Watershed

Landuse	Landuse Bacteria Range	Cropland Type	FC Loading (CFU/ha-yr)	Livestock Acreage (ac)	FC Loading (CFU/yr)
Pasture	Minimum	Peach Orchards	4.80 x E9	4,005	7.77E+12
Pasture	Maximum	Crop Farms	2.70 x E10	6,675	7.28E+13
				TOTAL	**8.06E+13**

Urban

Based on the NLCD 2011 total acreage of urbanized areas within the Shaws Creek Watershed (4,185 acres), it was possible to approximate the existing pollutant loads for nitrogen, phosphorous, sediment, and bacteria from urban lands. For nutrient and sediment loadings, STEPL was used to calculate the existing loads from urban areas. Figure 30 on page 64 displays the input data used in STEPL and the results for nitrogen, phosphorus and sediment for crop farms are reported in pounds per year in Table 17 above.

The bacteria loading from urban areas was determined from Commercial, Single Family Low Density Residential, and Multifamily Residential land uses from the Shaver, et. al literature (Figure 31). These land uses were related to the NLCD 2011 data and classifications for Developed-High Density, Developed-Open Space, Developed-Low Density and Developed-Medium Density and the results are outline in Table 17 and Table 22. Additionally, estimated pet waste loads for bacteria, nitrogen and phosphorus were included in the total pollutant loads based on the number of houses (2,482 total number of parcel with buildings). Pet waste existing loadings were determined based on the SCDHEC Load Estimation and Reduction Spreadsheet and is outlined in Table 23 below.

Table 22. Estimated Bacteria Loading from Urbanized Areas in Shaws Creek Watershed

Landuse	Landuse Range	NLCD Urban Classification	FC Loading (CFU/ha-yr)	Urban Acreage (ac)	FC Loading (CFU/yr)
Commercial	Median	Developed, High Intensity	1.70E+09	140	9.62E+10
Residential Low Density	Minimum	Developed, Open Space	2.80E+09	2458	1.69E+12
Residential Low Density	Median	Developed, Low Intensity	9.30E+09	1133	7.78E+11
Multifamily Residential	Median	Developed, Medium Intensity	2.10E+10	454	3.12E+11
				TOTAL	**2.87E+12**

Background Information:
2,234 households in watershed (assuming 10% of the 2,482 parcels are commercial)
37% of households that have pets
1.7 number of dogs per dog owning household
Assume 0.5lb (227 g) of dog waste per day
Bacteria: 1.49E+13 CFU/dog/day
Nitrogen: Assume 2% of mass of dog waste
Phosphorous: Assume phosphate is 10% of dog waste and Phosphorous is 43% of phosphate
Loads: Assume 20% of bacteria, nitrogen and phosphorous pollutants make it to stream

Table 23. Estimated Pollutant Loadings from Pet Waste in Shaws Creek Watershed

Number of Dogs	Mass of Dog Waste/Year (grams)	Bacteria Produced (CFU/dog/yr)	Bacteria Load (CFU/yr)	Nitrogen Load (lbs/yr)	Phosphorous Loading (lbs/yr)
1,405	1.16E+08	2.09E+15	4.19E+14	1,027	221
		TOTAL	**4.19E+14**	**1,027**	**221**

Sewer

As outlined in Section 5.3, utilizing parcels with buildings and sewer line data, the estimated parcels with sewer within the Shaws Creek watershed is 167. From a similar watershed in Lexington County, Twelve Mile Creek's TMDL (2004 Lower Saluda TMDL) referenced that sanitary sewer line leakage and overflows are a common source of contamination in the urban environment and that loadings of sewer sources were estimated at 1% of the permitted flow from the permitted discharges in the watershed. Bacteria concentrations of wastewater were approximately 20,000 cfu/100ml (Schueler 1999). As well, based on literature, an average person produces 60 gallons of wastewater per day (Benefield 2002). Assuming an average 3 people per household on sewer in the watershed, it was possible to estimate the volume of sewage leaks per year and thus approximate the existing pollutant loads for nitrogen, phosphorous and bacteria from sewer leaks.

From literature, it was found that the typical content of total nitrogen and total phosphorous in raw municipal wastewater (with minor contributions of industrial wastewater) is 60 g/m^3 and 15 g/m^3, respectively (Henze 2008). These estimated concentrations were used with the estimated volume of sewage leaks per year to calculate the estimated nitrogen and phosphorous loads from sewer sources, results displayed in Table 17 and Table 24 below. As for bacteria, the estimated sewage bacteria concentration of 20,000 CFU/100ml was also used with the estimated volume of sewage leaks per year to calculate the estimated bacteria load from sewer sources. The total estimated bacteria load results are also shown in Table 17 and Table 24.

Background Information:
60 gallons/person/day
3 people/house
167 houses on sewer
365 days per year
1.0% of flow are leaks
109,719 gallons/year of sewer are leaking

Table 24. Estimated Pollutant Loadings from Sewer Leaks in Shaws Creek Watershed

Parameter	Concentration	Units	Gallons per year leaking	Pollutant Loading	Units
N Total	60	g/m^3	109,719	59.9	lbs/yr
P Total	15	g/m^3	109,719	13.7	lbs/yr
Bacteria	20,000	CFU/100ml	109,719	9.97E+09*	CFU/yr

* Total bacteria pollutant loading added 20% since sewer areas are most likely commercial

Septic

As outlined in Section 5.4, utilizing parcels with buildings and sewer line data, the estimated number of septic systems within the Shaws Creek watershed is 2,315. For nutrient loadings, STEPL was used to estimate the existing loads from septic systems, assuming 10% are failing. Figure 30 on page 64 displays the input data used in STEPL. STEPL estimates an average 31.1 lbs/yr of nitrogen and 12.2 lbs/yr of phosphorous reaches the stream from each failing septic system. The results for nitrogen and phosphorus loadings from failing septic systems are reported in pounds per year in Table 17 above.

Bacteria loads from failing septic tanks per household amount to 2.76×10^6 CFU/hr (2.42×10^{10} CFU/yr) (SCDHEC 2017). As such, using the rule of thumb of a 10% failing rate for the estimated 2,315 septic systems within Shaws Creek Watershed, the approximated results are outline in Table 17 and Table 25. It was estimated that the existing bacteria load from failing septic systems in Shaws Creek watershed is 4.69 x E12 CFU/yr.

Table 25. Estimated Bacteria Loading from Crop Farms in Shaws Creek Watershed

Estimated Septic Systems	Estimated Failing Septic Systems	Bacteria Load per Household (CFU/hr)	Bacteria Loading (CFU/yr)
2,315	232	2.76E+06	5.61E+12

Wildlife

Based on the NLCD 2011 total acreage of forested areas within the Shaws Creek Watershed (20,961 acres, excluding shrub and grassland), it was possible to approximate the existing pollutant loads for nitrogen, phosphorous, sediment, and bacteria from forested lands. STEPL was used to calculate the existing nutrient and sediment loadings from urban areas. Figure 30 on page 64 displays the input data used in

STEPL and the results for nitrogen, phosphorus and sediment for forested areas are reported in pounds per year in Table 17 above.

The bacteria loading from wildlife (forested areas) was determined from the Forest (minimum bacteria range) landuse from the Shaver, et. al literature (Figure 31). Wildlife landuse was used for the NLCD 2011 data and classifications for Deciduous Forest, Evergreen Forest and Mixed Forest and the results are outlined in Table 17 and Table 26. It was estimated that the existing bacteria load from wildlife in Shaws Creek watershed is approximately 1.02 x E13 CFU/yr.

Table 26. Estimated Bacteria Loading from Wildlife in Shaws Creek Watershed

Landuse	Landuse Range	FC Loading (CFU/ha-yr)	Urban Acreage (ac)	FC Loading (CFU/yr)
Forest	Minimum	1.20E+09	20,961	1.02E+13

State: South Carolina | County: Aiken | Weather Station: SC COLUMBIA METRO AP

1. Input watershed land use area (ac) and precipitation (in

Watershed	Urban	Cropland	Pastureland	Forest	User Defined	Feedlots	Feedlot Percent Paved	Total	Rain correction factors: Annual Rainfall (0.920)	Rain Days (0.513)	Avg. Rain/Event
W1	4185	10680	2885	20961		0	0-24%	38711	45.8	98.8	0.849

2. Input agricultural animals

Watershed	Beef Cattle	Dairy Cattle	Swine (Hog)	Sheep	Horse	Chicken	Turkey	Duck	# of months manure applied
W1	625	625	0	57	299		0	0	6
Total	625	625	0	57	299	0	0	0	

3. Input septic system and illegal direct wastewater discharge dat

Watershed	No. of Septic Systems	Population per Septic System	Septic Failure Rate, %	Wastewater Direct Discharge, # of People	Direct Discharge Reduction, %
W1	2315	2.43	10	0	0

4. Modify the Universal Soil Loss Equation (USLE) parameter

Watershed	Cropland R	K	LS	C	P	Pastureland R	K	LS	C	P	Forest R	K	LS	C	P	User Defined R	K	LS	C	P
W1	250.000	0.130	0.539	0.255	0.950	250.000	0.130	0.539	0.040	1.000	250.000	0.130	0.539	0.003	1.000	250.000	0.130	0.539	0.255	1.000

Optional Data Input

5. Select average soil hydrologic group (SHG), SHG A = highest infiltration and SHG D = lowest infiltratic

Watershed	SHG A	SHG B	SHG C	SHG D	SHG Selected	Soil N conc.%	Soil P conc.%	Soil BOD conc.%
W1					B	0.080	0.031	0.160

6. Reference runoff curve number (may be modified

SHG	A	B	C	D
Urban	83	89	92	93
Cropland	67	78	85	89
Pastureland	49	69	79	84
Forest	39	60	73	79
User Defined	50	70	80	85

6a. Detailed urban reference runoff curve number (may be modified

Urban\SHG	A	B	C	D
Commercial	89	92	94	95
Industrial	81	88	91	93
Institutional	81	88	91	93
Transportation	98	98	98	98
Multi-Family	77	85	90	92
Single-Family	57	72	81	86
Urban-Cultiva	67	78	85	89
Vacant-Develi	77	85	90	92
Open Space	49	69	79	84

7. Nutrient concentration in runoff (mg/l

Land use	N	P	BOD
1. L-Cropland	1.9	0.3	4
1a. w/ manure	8.1	2	12.3
2. M-Croplan	2.9	0.4	6.1
2a. w/ manure	12.2	3	18.5
3. H-Croplan	4.4	0.5	9.2
3a. w/ manure	18.3	4	24.6
4. Pasturelan	4	0.3	13
5. Forest	0.2	0.1	0.5
6. User Defin	0	0	0

7a. Nutrient concentration in shallow groundwater (mg/l) (may be modifiec

Landuse	N	P	BOD
Urban	1.5	0.063	0
Cropland	1.44	0.063	0
Pastureland	1.44	0.063	0
Forest	0.11	0.009	0
Feedlot	6	0.07	0
User-Defined	0	0	0

8. Input or modify urban land use distributio

Watershed	Urban Area (ac.)	Commercial %	Industrial %	Institutional %	Transportation %	Multi-Family %	Single-Family %	Urban-Cultivated %	Vacant (developed)	Open Space %	Total % Area
W1	4185	3.3				10.9	27.1			58.7	99.9

9. Input irrigation area (ac) and irrigation amount (in

Watershed	Total Cropland (ac)	Cropland: Acres Irrigated	Water Depth (in) per Irrigation - Before BMP	Water Depth (in) per Irrigation - After BMP	Irrigation Frequency (#/Year)
W1	10680	0	0	0	0

Input Ends Here.

Figure 30. STEPL Watershed Input Sheet for Shaws Creek Watershed

Table 3-13: Pollutant Loading (kg/ha-yr) Ranges for Various Land Uses								
Land-Use Category		TSS	TP	TN	Pb	In	Cu	FC
Road	Minimum	281	0.59	1.3	0.49	0.18	0.03	7.1 E+07
	Maximum	723	1.50	3.5	1.10	0.45	0.09	2.8E+08
	Median	502	1.10	2.4	0.78	0.31	0.06	1 .8E+08
Commercial	Minimum	242	0.69	1.6	1.60	1.70	1.10	I.7E+09
	Maximum	1,369	0.91	8.8	4.70	4.90	3.20	9.5E+09
	Median	805	0.80	5.2	3.10	3.30	2.10	5.6E+09
Single family Low density Residential	Minimum	60	0.46	3.3	0.03	0.07	0.09	2.8E+09
	Maximum	340	0.64	4.7	0.09	0.20	0.27	1.6E+10
	Median	200	0.55	4.0	0.06	0.13	0.18	9.3E+09
Single family High density Residential	Minimum	97	0.54	4.0	0.05	0.11	0.15	4.5E+09
	Maximum	547	0.76	5.6	0.15	0.33.	0.45	2.6E+10
	Median	322	0.65	5.8	0.10	0.22	0.30	1.5E+10
Multifamily Residential	Minimum	133	0.59	4.7	0.35	0.17	0.17	6.3E+09
	Maximum	755	0.81	6.6	1.05	0.51	0.34	3.6E+10
	Median	444	0.70	5.6	0.70	0.34	0.51	2.1E+10
Forest	Minimum	26	0.10	1.1	0.01	0.01	0.02	1 .2E+09
	Maximum	146	0.13	2.8	0.03	0.03	0.03	6.8E+09
	Median	86	0.11	2.0	0.02	0.02	0.03	4.0E+09
Grass	Minimum	80	0.01	1.2	0.03	0.02	0.02	4.8E+09
	Maximum	588	0.25	7.1	0.10	0.17	0.04	2.7E+10
	Median	346	0.13	4.2	0.07	0.10	0.03	1.6E+ 10
Pasture	Minimum	103	0.01	1.2	0.004	0.02	0.02	4.8E+09
	Maximum	583	0.25	7.1	0.015	0.17	0.04	2.7E+ 10
	Median	343	0.13	4.2	0.010	0.10	0.03	1.6E+ 10

Figure 31. Bacteria Loadings per Land Use (Shaver, et. al 2007)

7 Goals

- *What are the restoration goals?*

The goals for Shaws Creek WBP are to protect and improve the stream quality for the long term and involve stakeholders from the watershed. The following goals and objectives were established by the project steering committee and stakeholders at the several brainstorming meetings:

Goal #1 - Improve Shaws Creek's water quality

- Ensure that Shaws Creek continues to meet or exceed water quality standards for recreational use, aquatic life and drinking water.
- Continue to monitor pollutant levels in Shaws Creek (see Section 9.1 for proposed monitoring details).
- Ensure that Shaws Creek Watershed provides good habitat for fish and other wildlife so that it can provide a connection to nature for watershed residents.

Goal #2 - Protect and maintain water quality, aquatic and wildlife habitat to ensure Shaws Creek continues to meet state water quality standards.

- Improve the management of stormwater runoff for existing development in an effort to improve water quality.
- Ensure zoning and ordinances and enforcement guide new development in a manner that protects Shaws Creek.
- Coordinate efforts with other groups in the watershed focused on land conservation and protection strategies.

Goal #3 - Build community support for the protection and enhancement of the land and water resources of the Shaws Creek Watershed.

- Develop an outreach program for citizens and businesses to promote and implement the Watershed Based Plan. Include one-on-one outreach and signage to educate residents on their role in implementing the WBPs.
- Strengthen ties with the local schools to enhance education and participation in opportunities for community action.
- Perform outreach to residents, businesses, and contractors within the watershed to encourage environmental stewardship within the Shaws Creek Watershed.
- Develop and establish a Shaws Creek Workgroup to oversee Plan implementation and work towards long term health and ensure that the Watershed Based Plan's goals are achieved.

8 Shaws Creek Action Plan

8.1 Action Plan

The overall action plan for Shaws Creek is outlined in Table 27 below and further described in Sections 8.1.1 through 8.1.8.

Table 27. Shaws Creek Watershed's Overall Action Plan

Sources	Pollutants			BMPs	Preventative Measures
	Bacteria	Sediment	Nutrients		
Agricultural					
Livestock in streams	X	X	X	Fencing/Alternative Water Source	Land Conservation Easement Program
				Vegetated Buffers	Workshops and Field Days for Farmers
				Stream Crossings	Education and Outreach
				Soil Stabilization of Stream Banks	
Runoff from Pastures	X	X	X	Loafing Shed	Workshops and Field Days for Farmers
				Cross fencing/Pasture Planting	Education and Outreach
				Heavy Use Area Stabilization	
				Waste Management/Manure Composting	
				Conservation/Manure Management Plans	
Runoff from crop farms/orchards	X	X	X	Terracing on Stream Banks	Landowner lease conditions (buffers, stabilization requirements, etc)
				Vegetated Cover Between Rows	
				Vegetated Stream Buffers	Workshops and Field Days for Farmers
				Conservation Tillage	Education and Outreach
				Conservation/Fertilizer & Pesticide Plans	
Poultry litter runoff (from AFOs)	X		X	Composting	Composting Workshop for AFO Operators
				Conservation/Manure Management Plans	Education and Outreach
Urban					
Industrial Park Erosive Flows		X		Regional Stormwater Control	
Dirt Roads and Eroded Embankments		X			
Private Commercial Properties Good Housekeeping	X	X	X		Private Commercial Properties Good Housekeeping Education and Enforcement
Pet Waste	X		X	Pet Waste Stations	Pet Waste Ordinance Revision
Fertilizers			X	Storm Drain Markers	
Development		X		Rain Barrels/Workshops	Permanent Water Quality Buffers
				Rain Gardens	Land Development Regulations
				Storm Drain Markers	Land Conservation Easement Program
				Improve construction inspection/enforcement	Improve Land Development S&EC Inspection/Enforcement Procedures
Sewer					
Leaking sewer lines	X		X		Recycle Used Cooking Oil
Sanitary Sewer Overflows (SSOs)	X		X		FOG Can Lids
					Educational Door Hangers
					Inspect/Enforce Commercial Grease Traps
Septic					
Malfunctioning septic system	X		X	Repair Septic System	Procedure for Permitting Additional Bedrooms
				Replace Septic System	Acceptable Septic System Letter Requirement
				Connect to Sewer	Recycle Used Cooking Oil
					FOG Can Lids
Wildlife					
Improper Carcass Disposal (Deer, Fish)	X		X		Bridge Signs
					Bridge Cameras
Wild Boars and Beavers	X	X	X	Wild Animal Traps	Education and Outreach/ Workshops

8.1.1 Agricultural Sources - Livestock

8.1.1.1 Target Audience/Description

Target Audience: Cattle/Horse Farms

Pollutants of Concern: Bacteria, Nutrients and Sediment

Description: Agricultural property owners and operators within the watershed area are going to be targeted for outreach efforts. Figure 9 from Section 5.1 depicts the rural improved areas. Cattle/horse farms located in the floodplains of Shaws Creek of the watershed will be the primary focus for BMP installation, although the program will be made available to any agricultural properties throughout the watershed. Many of the goals of the project (to reduce pollutants in the watershed) also meet some of the goals of the landowners (healthier animals and preserving the land for future generations). Lexington County and Richland SWCD, other 319 recipients in South Carolina, have found through various 319 projects that the biggest barriers to participation amongst farmers are a reluctance to change common practices they have performed for years, and resistance to perceived interference of their operations by government.

8.1.1.2 Strategies/BMPs Needed

Reduction of bacteria, nutrients and sediment loadings from agricultural land will be accomplished through cost share assistance on the installation of selected BMPs. The goal is to reduce livestock access to the streams, educate and assist farmers with manure management and stabilize soil. Because participation in the project is voluntary, and the landowners are traditionally somewhat skeptical of interference in their operations, effective outreach will be crucial in reaching the appropriate participants. In cooperation with NRCS and Soil Water Conservation Districts (SWCD) of Aiken and Edgefield Counties, these outreach efforts will strive to incorporate farms affected by improper livestock and/or farming practices into the project.

The City of Aiken anticipates gaining the participation of and assisting approximately 20 total farms (livestock, poultry and crop farms) in the watershed through this project during years 1-3. This is approximately 8% of the 240 farms that has been estimated for the Shaws Creek Watershed. Figure 9 and Appendix A show the potential farms for targeting outreach for the agricultural compenent of this project. An aerial review of the watershed and selected farms with visible signs of animals (cattle, horses, animal feed operations, etc) was conducted.

NRCS of Aiken and Edgefield Counties, with the assistance of the SWCDs, will work with the landowners to review their livestock operations, assess their resource concerns, develop Conservation Plans and recommend appropriate BMPs, and work with the landowners/operators to choose the appropriate BMPs and ensure they are installed and used correctly. An extensive set of BMPs can be used for different farm activities and resource conditions. City of Aiken staff will consult with NRCSs and SWCDs to determine the technical specifications and practice standards for applicable agricultural BMPs. The following BMPs

will likely be used to filter or reduce the amount of animal waste and sediment from livestock farms entering Shaws Creek and/or its tributaries, reference Table 31 for quantities proposed for the Plan:

1. Stream bank fencing will be installed to keep livestock out of floodplain and alternative water sources will be provided and installed, such as groundwater wells and water troughs.
2. Development of conservation and manure management plans for each participating farm.
3. Waste management/manure composting, particularly at horse farms.
4. Soil stabilization of streambanks.
5. Vegetated buffers or setbacks will be planted along impacted stream beds.
6. Pasture Planting/Critical Area Stabilization.
7. Loafing sheds as an alternative to direct access to streams for livestock.
8. Cross fencing will be installed to promote rotational grazing.
9. Stream crossings may be installed to allow cattle to cross streams without loitering in them.

Therefore for livestock farms, the following Table 28 summarizes the source of pollutants and the BMPs that would address and reduce bacteria, nutrients and sediment pollutant loads.

Table 28. Proposed BMPs for Agricultural Livestock Farms within the Shaws Creek Watershed

Agricultural Source	Contributing Pollutants			Best Management Practices
	Bacteria	Nutrients	Sediment	
Livestock in Streams	X	X	X	• Fencing/Alternative Water Source • Vegetated Buffers • Stream Crossings • Soil Stabilization of Stream Banks
Runoff from Pastures	X	X	X	• Loafing Sheds • Cross Fencing/Pasture Planting • Heavy Use Area Stabilization • Waste Management/Manure Composting • Conservation/Manure Management Plans

Estimated bacteria, nutrient and sediment load reductions from proposed agricultural livestock BMPs for years 1 through 15 are displayed in Table 32 and is discussed in Section 8.2.

8.1.1.3 Preventative Measures

Along with implementing best management practices such as the ones outlined above, there are a couple preventative measures that could help protect pollutant loadings entering Shaws Creek and its tributaries from livestock farms.

Through the potential Land Conservation Easement Plan discussed later in Section 8.1.4.3, preserving vegetated buffers on the farm property can prevent livestock entering the stream, capture and naturally

filter polluted runoff from the pastures, and slow down flows that cause erosion on the banks and within the streams.

Along with incentivizing the preservation of vegetated buffers, another preventative measure may include revision of local stormwater regulations to include land disturbing activities greater than one acre associated with new imperviousness on agricultural farms (for example, construction of new chicken houses or large barns).

Lastly, education and outreach for the farmer's voluntary participation in preventing pollution from livestock farms is a crucial component. Educational Workshops and Field Days such as Pasture Management, Pasture Field Day, Equine Pasture Management, Irrigation and Water Management, Soil Health Field Day, etc. can be conducted for livestock farmers in the watershed. See additional educational material mentioned in the Outreach Needed section outlined in 8.1.1.5.

8.1.1.4 Management Plan

The following plan will be used to manage the agricultural portion of the project. All three agricultural sources addressed in this proposal (livestock, cropland, and poultry), which are further detailed in the following two pollution source sections, will be addressed with this management strategy:

1. Project Management: Due to the incentive to protect Shaws Creek as a source water for the City of Aiken, the City of Aiken plans to act as the lead entity for implementing this Watershed Based Plan. The City of Aiken and its consultant(s), with the support of a project partners, will furnish project technical support, create and provide outreach and educational campaign/materials and the City of Aiken will provide overall project coordination.

2. Recruitment of Landowners: Aiken and Edgefield Counties will help the City of Aiken recruit farmers in each County. Each municipality may use one or more of the following recuitment practices: advertise on their websites and facebook pages, distribute flyers, direct mailings, and/or get out into the community (e.g. public meetings, churches, fire departments, community centers, local activities) to elicit support from farming participants. Meetings will be conducted in the watershed to inform farmers about the Project as well as providing support and insight into other educational campaign messages and outreach techniques. The municipalities plan to use success stories from Lexington County with their 319 Hollow Creek project, such as the farmers' endorsement in the Hollow Creek Farm Tour video (http://www.youtube.com/watch?v=GpsZ2_sV8Rc), as an additional recruiting tool. Other success stories to utilize will include Richland County's Soil and Water Conservation District's Twenty-five Mile Creek Agricultural 319 Implementation project, such as their successful recruitment material and strategies (https://youtu.be/BrUC0MffHlg).

3. Prioritization of Sites: All landowners in the watershed who meet the criteria of needing agricultural BMPs will be recruited, despite their location in the watershed. However, with respect to prioritization, those farms in the floodplain of Shaws Creek will be addressed first (farms based on

Figure 9), and, if necessary, those outside of the floodplain will be addressed next. Additionally, the following two types of farms will be prioritized for implementation:

- Peach orchards with little to no vegetation between rows
- Farms with many livestock (25+ animals)

4. Development of Conservation Plans and Implementation: The City of Aiken, will serve as the lead organization for the implementation of agricultural BMPs with the assistance of the Aiken and Edgefield SWCDs and NRCSs. If 319 funding is awarded, the City of Aiken will administer the cost-share fund distribution to land users who successfully complete the installation of BMPs which support the project objectives. The City of Aiken, assisted by Aiken and Edgefield NRCSs and SWCDs, will have primary responsibility for ensuring the technical integrity of all planned and installed BMPs. The City of Aiken, assisted by its consultant(s), NRCSs and the SWCDs, will have primary responsibility for developing and distributing the project message and educational campaign.

8.1.1.5 Outreach Needed

The City of Aiken will use the same outreach plan to manage all three of the agricultural portions of the project, which are further detailed in the following two pollution source sections. Because participation in the project is voluntary, effective outreach will be crucial in the success of this project. It is fortunate that the goal of the project (to reduce bacteria, nutrients and sediment in the watershed) can be achieved by the same actions that meet some of the goals of the landowners (healthier animals and preserving the land for future generations).

SWCDs and NRCSs are familiar with farmers in the area and know the best locations and means to promote the program. Using the experience of SWCDs and NRCSs, targeted outreach efforts will be employed such as one-on-one interviews with local farmers and visits to individual farms. The City will use lessons learned from the outreach efforts from multiple 319 grant projects, such as recruiting participants to reach out to their neighbors and requesting to participate in already planned local community events, (church group meetings or volunteer fire department gatherings) instead of scheduling additional public meetings. Listening sessions at regularly scheduled meetings in the community could be the main outreach method utilized. This will allow the municipalities to change their approach based on the types of farms and feedback. For example the barriers to change for poultry farmers may be different from the barriers to change for cattle farmers. Presentation of Lexington Conty's 319 Hollow Creek video during the listening sessions will educate farmers about bacteria loading of the watershed, best management practices that could reduce bacteria from agriculture related enterprises and demonstrate the benefits other Lexington County farmers saw through the program. The Farm Tour video which was also created for Lexington County's Hollow Creek 319 grant will also be used during these listening sessions and local festivals to recruit participants in this project.

After information is gained through the listening sessions, a broader outreach plan will begin. Other social media methods, such as Facebook, City and County websites (Aiken and Edgefield), and Twitter, will be used for outreach for the project. Once interest has been generated in the program, Countys' respective NRCS will conduct site visits to further encourage farmers to voluntarily participate in the project and assist them in developing conservation plans. Site visits can include farms in other nearby watersheds.

8.1.2 Agricultural Sources – Crop Farms

8.1.2.1 Target Audience/Description

Target Audience: Crop Farms

Pollutants of Concern: Bacteria, Nutrients and Sediment

Description: All farm owners and operators within the watershed area are going to be targeted for outreach efforts. Figure 9 depicts the rural improved areas. Croplands located in the floodplains of Shaws Creek will be the primary focus for BMP installation, although the program will be made available to any agricultural properties throughout the watershed. In addition, a priority will be placed on farms using manure to fertilize or use as a soil conditioner and peach orchards with little or no vegetation between rows.

8.1.2.2 Strategies/BMPs Needed

The strategies and BMPs that will be used for croplands will be very similar to those used for other agricultural sources since the main pollutant loading source addressed will also be runoff, but from fertilization, and application of pesticides, as well as harvesting practices as opposed to livestock. The goal for crop farmers is to educate and assist farmers with proper methods for vegetative cover, fertilizer and pesticide management, and conservation tilling.

Each County's respective NRCS, with the assistance of their corresponding SWCD, will work with the landowners to review their operations, assess their resource concerns, and develop Conservation Plans and recommend appropriate BMPs. The City of Aiken staff and its consultant(s) will work with SWCDs of Aiken and Edgefield Counties; NRCS of Aiken and Edgefield Counties; and the landowners/operators to choose the appropriate BMPs and ensure they are installed and used correctly.

The following BMPs will likely be used for croplands/orchards:

1. Streambank stabilization (such as terracing on streambanks),
2. Development of fertilizer and pesticide management plans for each participating farm,
3. Conservation tillage,
4. Planting vegetative cover between rows,
5. Vegetated buffers or setbacks will be planted along impacted stream beds, and

The following Table 29 summarizes the source of pollutants and the BMPs that would address and reduce bacteria, nutrients and sediment pollutant loads from crop farms and orchards.

Table 29. Proposed BMPs for Agricultural Crop Farms within the Shaws Creek Watershed

Agricultural Source	Contributing Pollutants			Best Management Practices
	Bacteria	Nutrients	Sediment	
Runoff from Crop Farms/Orchards	X	X	X	• Terracing on Stream Banks • Vegetated Cover Between Rows • Vegetated Stream Buffers • Conservation Tillage • Conservation/Fertilizer and Pesticide Management Plans

Estimated bacteria, nutrient and sediment load reductions from proposed agricultural cropland BMPs for years 1 through 15 are displayed in Table 32 and is discussed in Section 8.2.

8.1.2.3 Preventative Measures

Along with implementing best management practices such as the ones outlined above, there are some preventative measures that can help protect pollutant loadings entering Shaws Creek and its tributaries from crop farms and orchards.

According to Edgefield NRCS, the majority of peach orchard properties are leased within the subwatersheds. Therefore, one preventative implementation measure is to communicate with and assist the landowners to revise their lease contracts to peach farmers. As part of implementation efforts, language can be prepared for these leased lands to require vegetative cover between rows, buffers along the waterways, and certain stabilization requirements on the farm.

Along with communicating with landowners, education and outreach for the farmer's voluntary participation in preventing pollution from crop farms and orchards is a crucial component. Educational Workshops and Field Days such as Conservation Tillage, Cover Crops, Irrigation and Water Management, Soil Health Field Day, etc. can be conducted for cropland/orchard farmers in the watershed. See additional educational material mentioned in the Outreach Needed section outlined in 8.1.2.5.

8.1.2.4 Management Plan

The management strategies and recruiting process outlined in the livestock agricultural portion above (Section 8.1.1.4) will be expanded to crop farms as well. As mentioned prior, agricultural lands located within, or close proximity, to Shaws Creek floodplain will be the primary focus for recruitment of BMP installation. Although, the program will be made available to any agricultural properties throughout the watershed. Based on the large number of peach orchards and the associated contributions to polluted runoff, peach orchards will be targeted for prioritization efforts.

8.1.2.5 Outreach Needed

The outreach strategy outlined in the agricultural - livestock portion above in Section 8.1.1.5 will be expanded to crop farms as well with additional advertising targeted specifically to croplands. The City of Aiken and its consultant(s) will further refine the outreach message and strategy (i.e. workshops conducted at the farm, educational flyers) based on their feedback.

8.1.3 Agricultural Sources – Poultry

8.1.3.1 Target Audience/Pollutants/Description

Target Audience: Poultry Farms

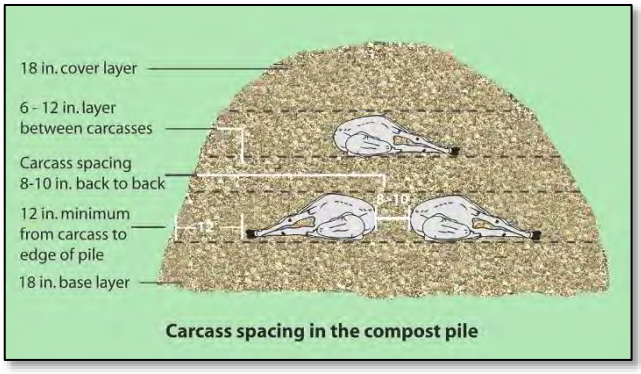
Pollutants of Concern: Bacteria, Nutrients

Description: The educational goals and proposed BMPs for this project are going to focus on the litter that is maintained at facilities for personal use (i.e. field application for feed crops). The BMPs will assist with upgrading and modernizing facilities and practices to meet both operational goals and Waste Management Plan requirements, which will also meet the program's goals of reducing bacteria and nutrient loadings from poultry operations.

Poultry owners and operators within the watershed area are going to be targeted for outreach efforts. Figure 9 depicts the rural improved areas. Poultry farms located in the subwatersheds will be the primary focus for BMP installation.

8.1.3.2 Strategies/BMPs Needed

Reduction of bacteria and nutrient loading from AFO agricultural land will be accomplished through a social marketing strategy and cost share assistance on the installation of selected BMPs. The goal of these BMPs for poultry farmers is to educate and assist farmers to use proper methods for dead animal disposal and litter management by upgrading existing control measures of the poultry operators. These control measures may include composters for dead animals and/or poultry litter.



Example of Mortality Composting Process (Photo Source: Langston University)

Example of Large Composter for Waste Management

The City of Aiken, with the assistance of Aiken and Edgefield NRCSs and SWCDs, will work with the landowners to review their operations, assess their resource concerns, review Waste Management Plans, develop Conservation Plans, as needed, and recommend appropriate BMPs. The City of Aiken staff and its consultant(s) will work with SWCDs of Aiken and Edgefield Counties; NRCS of Aiken and Edgefield Counties; and the landowners/operators to choose the appropriate BMPs and ensure they are installed and used correctly.

The following BMPs will be recommended to filter or reduce the amount of poultry waste entering Shaws Creek and/or its tributaries:

- Waste storage /coverage for litter removed from houses (such as stacking sheds or improved covering materials),
- Conservation and waste management plans for each participating AFO,
- Dead animal and waste composting. The goal of this project is to have at least one facility install a medium-sized litter composter. The composted litter will provide the same nutrient benefit for field application but will have significantly reduced bacteria and other pathogens as well as reduced soil loss from erosion as a result of improved soil structure and reduced bulk density.

Table 30. Proposed BMPs for Agricultural Crop Farms within the Shaws Creek Watershed

Agricultural Source	Contributing Pollutants			Best Management Practices
	Bacteria	Nutrients	Sediment	
Poultry Litter Runoff (from AFOs, Pastures and Crop Farms)	X	X		• Composting • Conservation/Manure Management Plans

As stated in Section 5.1.3, due to Poultry Operations having ND Permits and Waste Management Plans, these operations are not considered a significant source of bacteria and nutrient loadings to Shaws Creek. Therefore, loads and load reductions for AFOs were not estimated.

8.1.3.3 Preventative Measures

Along with communicating with AFO operators, education and outreach for the farmer's voluntary participation in preventing pollution from AFOs is a crucial component. Educational Workshops and Field Days such as Composting Workshops for AFO Operators can be conducted. See additional educational material mentioned in the Outreach Needed section outlined in 8.1.3.5.

8.1.3.4 Management Plan

The management strategies and recruiting process outlined in the livestock agricultural portion above Section 8.1.1.4 will be expanded to poultry farms as well, but the targeted audience will be adjusted.

8.1.3.5 Outreach Needed

The outreach strategy outlined in the livestock agricultural portion above (Section 8.1.1.5) will be expanded to poultry farms as well with additional advertising targeted specifically to poultry farms.

8.1.4 Urban Sources

8.1.4.1 Target Audience/Description

Target Audience: Urbanized areas with increased impervious surfaces, such as:

- MS4 areas (Aiken County MS4 and the City of Aiken MS4)
- Town of Trenton
- Vernes and Ventures Industrial Parks
- I-20 and Highway 1 Commercial Areas
- Developers

Pollutants of Concern: Bacteria, Nutrients and Sediment

Description: The Plan will target residential, commercial or industrial property owners and users to address urban runoff. For example, users of recreational facilities and public spaces as well as animal vet/supply stores, apartment complexes and residential subdivisions (and their Homeowners Associations) within the Shaws Creek Watershed will be targeted for urban runoff education and BMPs.

8.1.4.2 Strategies/BMPs Needed

The City of Aiken and Aiken County will use and supplement, as needed, programs already being implemented as part of MS4 permit compliance to address non-point source reduction from urban storm runoff in the City of Aiken and Aiken County MS4 portions of the Shaws Creek Watershed. Additional and

new strategies to address urban runoff are being proposed under this WBP and are listed below and in Section 8.1.4.3. As part of the WBP, the City of Aiken and Aiken County propose to expand the following programs already being implemented by the MS4s that have been successful at addressing urban runoff:

Bacteria and Nutrients

- Installation of approximately 10 pet waste stations. If a 319 Implementation grant is awarded, pet waste stations would be provided in green spaces in residential subdivisions and apartment complexes such as Crosland Apartments, Glendale Terrace Apartments and Long Leaf Senior Village near Aiken and Village Yard Apartments near Trenton. A pet waste station would also be beneficial in the parking area of the Aiken County Animal Services facility. Veterinary offices, will also be possible locations for pet waste stations.

- Sanitary Sewer Overflows: Further described in Section 8.1.5

- Storm drain tagging (approximately 1,000) on residential roads within the watershed with complementing educational program focused on reducing pet waste disposal in and around storm drains (outside of the MS4), if a 319 Implementation grant is awarded. See below for a photo of an example of a storm drain tag.

Example of a Storm Drain Marker

Erosive Flows

- Rain Barrel Program: If a 319 Implementation grant is awarded, provide rain barrels for willing participants, conduct rain barrel workshops on how to build one at home, possibly have a paint contest for rain barrels in school, such as Douglas Elementary School or JD Lever Elementary School, etc.

- Rain gardens: If a 319 Implementation grant is awarded, rain gardens (on average, approximately 200 sq. ft. in size) for residential homeowners could be provided on a cost-share basis between the homeowner and their jurisdiction (City or County). After the first 10, provide workshops and other educational materials to encourage property owners within the watershed to incorporate rain gardens on their lots.

- Vernes Industrial Park: Vernes Industrial Park contains the northern industrial properties surrounding the Aiken Municipal Airport. Within this industrial park, there appears to be a total of ten developed sites, nine of which do not have any stormwater control structures. The southern industrial park, Ventures Industrial Park, is much smaller with only two developed sites. Both industrial parks were built as a part of an economic development plan for the City of Aiken in the 1970's. Though these sites were developed prior to stormwater regulations, the lack of stormwater control has caused significant erosion problems throughout the Vernes Industrial Park and the area would greatly benefit from a retrofit project to incorporate regional stormwater detention to address both water quality and water quantity issues within the Shaws Creek Watershed. The developed sites in this northern industrial park account for roughly 120 acres. As a rule of thumb, typically a conservative estimate of 15 percent of a site is needed for stormwater control. Therefore, an estimated total of 18-20 acres of stormwater detention would be needed to treat stormwater runoff from this northern industrial park. Ventures Industrial Park drains to Dairy Branch that runs parallel to the park and then enters Shaws Creek. As expected, many issues would need careful consideration in order to address all 120 acres for stormwater detention, such as the City's plan for future development in this park, property owner participation, elevations, wetlands and other Waters of the U.S., engineering design, etc. Stormwater management could be accomplished by constructing one large regional stormwater pond or by constructing multiple stormwater ponds to serve each industrial facility.

Sediment

- Construction Erosion and Sediment Control: The City of Aiken and Aiken County address many urban runoff issues with the construction and post-construction minimum control measures as part of their MS4 permit compliance. In the Shaws Creek Watershed, even though most of the area is outside of their MS4 jurisdictional boundary, strengthened inspections and enforcement of construction sites will hold contractors more accountable for meeting the requirements of their Stormwater Pollution Prevention Plans/Land Disturbance Permits. Stop work orders are also very effective at getting issues resolved quickly, and they do not cost a municipality anything except time.

- Stabilization along Dirt Roads and Eroded Embankments: Paving roads is not a feasible solution for the City of Aiken, Aiken County and Edgefield County due to excessive cost. Additional BMPs, such as straw waddles in the ditches along the sloped portions of the dirt roads and improved turn-outs will reduce the sediment entering the creeks from dirt roads. Within the Shaws Creek Watershed, Aiken County has 47 miles of dirt roads and Edgefield County has 24 miles, and the City of Aiken has no dirt roads.

Miscellaneous Pollutants

Private Commercial Properties:

- Good Housekeeping: Improved good housekeeping practices at private commercial properties is essential in protecting water quality issues from these facilities. Since education will be key,

workshops and employee training for private commercial properties and educational material such as flyers can be provided to encourage property owners within the subwatersheds to prevent pollution from their site. Topics for specific sites that were observed in the subwatersheds include:

- Grease Trap Maintenance -City of Aiken will work specifically with Hardees on Highway 1 to ensure that proper maintenance is being conducted to their grease traps. A Good Housekeeping public education campaign focusing on maintenance of grease traps will be beneficial for all commercial properties in the watershed.
- Outdoor exposed waste - A Good Housekeeping public education campaign focusing on proper procedures for storing and maintaining garbage and trash at commercial properties in the watershed will also be beneficial for all commercial properties in the watershed.

- Stormwater Pond Routine Maintenance – Commercial properties are required to inspect and maintain their stormwater ponds. Several commercial ponds needing maintenance were observed during the windshield survey, which will be a target for a public education campaign focusing on proper procedures for inspecting and maintaining stormwater ponds. This campaign will also be beneficial for all commercial property in the watershed.

- Retrofit -
  - The Circle K Shell Gas Station on Highway 1 appears to have a damaged detention structure in a small swale along the backside of the property. This site is a potential property for a stormwater retrofit to reduce petroleum pollutants entering surface waters.

Municipal Properties:

It must also be noted that City of Aiken and Aiken County municipal facilities are located in the subwatersheds. Under their small MS4 permit, the City of Aiken and Aiken County are responsible for implementing good housekeeping practices at these facilities to prevent stormwater pollution. Due to this sensitive watershed, improved good housekeeping measures at municipal facilities will further help protect water quality. Examples of good housekeeping measures are: storing all chemicals under a roof, off the ground and in secondary containment; repairing all leaking containers and vehicles; having spill kits close to areas that are most likely to have spills; erosion prevention for stockpiled materials; lids closed on dumpsters; training employees about pollution prevention and good housekeeping; etc. Municipal Facilities for the City of Aiken in this watershed include the Aiken Municipal Airport, Water Treatment Plant, Lift Stations, Old Water Treatment Plant and Holding Pond. For Aiken County, the Animal Shelter, Recycle Collection Center, Detention Center, Public Works, Aiken County School Operation and Maintenance Facility and Firing Range are located in Shaws Creek Watershed (refer to Figure 26).

Estimated bacteria, nutrients and sediment load reductions from proposed urban BMPs for years 1 through 15 are displayed Table 32 and is discussed in Section 8.2.

8.1.4.3 Preventative Measures

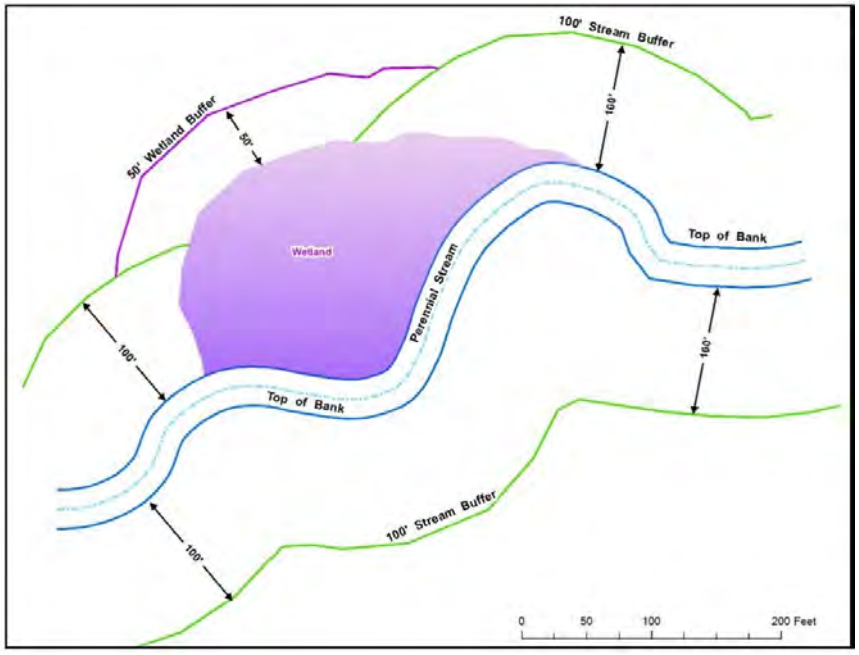
Along with implementing best management practices such as the ones outlined above, there are preventative measures that can help protect pollutant loadings entering Shaws Creek and its tributaries from urban sources, such as focusing on future development.

Regarding potential preventative measures for future development, from the urban brainstorm session and other meetings the following ideas were deemed most feasible to the municipalities within the subwatersheds:

1. Permanent Water Quality Buffers – Development of permanent water quality buffers (aquatic buffers) for the City of Aiken, Aiken County and Edgefield County to adopt in their land development regulations. Currently, the only water quality buffers required in these municipalities are the 30 foot temporary buffers required by the NPDES General Permit for Storm Water Discharges from Construction Activities SCR100000 (Construction General Permit).

   An aquatic buffer is the strip of natural vegetation along the bank of a stream, lake or other water body that separates the water from developed areas such as lawns, buildings, roads, driveways, etc. Buffers can include grass, shrubs, and trees, which hold the soil in place and act as living filters of pollution. Without buffers, homes and residential neighborhoods can contribute sediment, fertilizers, pesticides, metals, oil and other vehicle fluids, pet waste and many other pollutants to nearby waters. Buffers stabilize stream banks with their root systems and prevent erosion; and discourage algae growth and slow runoff to help prevent flooding and flood damage. Riparian buffers will provide shade to regulate light and temperature conditions and improve habitat for aquatic plants and animals.

   As an example and reference, a neighboring County (Lexington County) has implemented permanent water quality buffers around streams, shorelines and wetlands. Lexington County requires a 100 foot buffer on all perennial streams and 50 foot buffer on all intermittent streams. Stream buffers cannot be disturbed during project construction and must be left in existing conditions upon completion of the construction activities. The area associated with a stream buffer may be dedicated to the County, turned over to a Homeowners Association, or included as part of a conservation easement. For shorelines, Lexington County requires a 50 foot buffer along shorelines associated with ponds and lakes that are fed by springs or streams. Lastly, Lexington County requires a 50 foot buffer around wetlands associated with a stream and those not associated with a water body. The buffer is measured from the edge of the delineated wetland area. See Appendix C for Lexington County's buffer brochure.



Visual example of the permanent buffer requirements for Lexington County

Water quality buffer requirements (and other regulations) could be adopted municipal-wide or in the watershed only, such as a "Shaws Creek Watershed Overlay District". Buffers will be most effective if all jurisdictions in the watershed adopt the same requirements, but any stream and wetland protection in the subwatersheds will help.

It is important to note that water quality buffers restrict development and do not typically address agricultural uses. See the following "Land Conservation" section regarding voluntary opportunities to preserve land such as aquatic buffers which may apply to agricultural land.

The City of Aiken, Aiken County and Edgefield County will pursue the possible adoption of permanent water quality buffers.

2. Agricultural Regulations – Municipalities may choose to clarify that their land development regulations apply to increased impervious area on agricultural land as mentioned in the Agricultural Section 5.1.1.

3. Land Conservation – A conservation easement is a legal tool for acquiring property rights for the purpose of protecting conservation values. This tool is a legal agreement that limits uses of the land between a landowner and a non-profit land trust or public agency that is qualified to hold such interests. The land trust is responsible for monitoring the easement and enforcing its terms, usually through an annual visit. Landowners benefit from granting conservation easements to a qualified holder though monetary or tax incentives associated with the easement value. If donating to a land trust permanently protects important conservation resources, then the

donation qualifies as a tax-deductible charitable donation. Property tax savings can result from placing an easement on properties in some locations.

See Appendix D for additional explanation of the potential development of a Land Conservation Program.

4. Post-Construction Stormwater Design – As Aiken's urbanized area continues to expand, it will become increasingly important that future land development be designed to protect and improve both water quantity *and* water quality. The municipalities within the Shaws Creek Watershed have the opportunity to consider adopting alternative post-construction stormwater design methodology to not only meet stormwater quantity criteria but also promote better site design practices and the use of Low Impact Development (LID) and Green Infrastructure (GI) structural stormwater controls to protect water quality, without hindering development. See Appendix E for additional explanation of potential alternative post-construction stormwater design methods.

5. Pet Waste Ordinance – Though pet waste does not appear to be a significant issue in Shaws Creek watershed, the adoption of a Pet Waste Ordinance (see example in Appendix F) would help prevent pollutants from future pet waste as the watershed becomes more urbanized.

8.1.4.4 Management Plan

1. Project Management: City of Aiken and its consultant(s), with the support of Aiken County and Edgefield County, will furnish project technical support, create and provide outreach and educational campaign/materials and the City of Aiken will provide overall project coordination.

2. Prioritization of Sites: With respect to prioritization, property owners in the floodplain of Shaws Creek will be addressed first, and, areas in the watershed that are prone to urban runoff. As part of the screening process for potential participants, if 319 funds will be used, the urban BMPs will be evaluated to ensure it is not a permit requirement. If it is a permit requirment, it will be addressed by the MS4s' Illicit Discharge Detection and Elimination (IDDE) program.

    - Pet Stations: target areas that tend to have a large concentration of dogs in common green spaces, such as residential subdivisions, vets and animal shelters, pet supply stores and apartment complexes.

    - Pet Waste Ordinance - Could be established in "Shaws Creek Watershed Overlay District" or municipality wide

    - Rain Barrels: recruit participants in concentrated impervious areas such as MS4 areas, residential subdivisions, commercial properties, etc. to incorporate rain barrels on their property.

- Storm Drain Markers: Preferably mark roads with sidewalks so that storm drain markers can be read. Therefore, possible locations include subdivisions, parking lots, parks, etc.

- Rain Gardens: recruit participants in concentrated impervious areas such as MS4 areas, residential subdivisions, commercial properties, etc. to incorporate rain gardens on their property. Preferably sites with larger backyards/closer to Shaws Creek will be targeted first.

- Private Commercial Properties GHK Workshops: Target areas near Industrial Parks and off Highway 1.

- Permanent Water Quality Buffers: Water quality buffer requirements could be adopted municipal-wide or in the watershed only, such as a "Shaws Creek Watershed Overlay District". Buffers will be most effective if all three jurisdictions in the watershed adopt the same requirements, but any stream and wetland protection in the subwatersheds will help.

- Land Conservation Easements: All landowners with creek-front property would be prioritized for participation should a Land Conservation Program for Shaws Creek be developed.

- Better Site Design/Unified Sizing Criteria: Potentially conduct a pilot study area for a proposed development in Shaws Creek Watershed to implement the Unified Sizing Criteria post-construction stormwater design standards.

8.1.4.5 Outreach Needed

The City of Aiken and Aiken County will use and supplement, as needed, the public outreach and education programs already being implemented as part of MS4 permit compliance to address non-point source reduction from urban storm runoff within the Shaws Creek subwatersheds. Current outreach and future outreach regarding urban runoff for the City of Aiken and Aiken County MS4s are included below:

<u>Current Outreach:</u>

The City of Aiken's and Aiken County's MS4 Public Outreach Program: The City and County comply with Minimum Control Measures 1 and 2 of the MS4 permit to address public education and outreach of urban sources with the following items:

- Aiken County: Aiken County's MS4 is more rural than urban and our outreach topics are based on the pollutants of concern in the TMDL watersheds throughout the county. Thus their primary pollutant of concern is E.coli bacteria and they provide information to the public in the form of brochures to promote better decisions when it comes to human and animal waste. The four brochures currently in circulation are:
    - "Scoop the Poop" a guide for pet owners to handle their pet's waste

- "Your Septic System" gives tips and advice to help homeowners maintain their septic systems to help protect local water quality
- "A Horse Owner's Guide to Greener Pastures & Cleaner Streams" focuses on pasture management by keeping a good vegetative cover in pastures and not allowing horses directly into streams.
- "Stormwater Pollution Livestock Owners" Promotes composting and/or removal of bedding and manure of livestock.

- City of Aiken:
  - Animal Waste, Landscaping/Gardening/Pest Control, Horses and Horse Owners, Erosion and Sediment Control for Commercial/Residential Buildings, and Stormwater Brochures
  - Stormwater Information Page on the City's website. Topics include Backflow Prevention, Fats, Oils and Grease, Water Quality, etc.
  - Participate in local school activities related to stormwater, such as the Future Cities competition
  - Attach water quality information to each pre-construction or Notice of Intent letter for local developers to encourage them to include additional stormwater quality control measures in development activities
  - Developed mailer for landscaping companies discussing the City's desire to reduce pesticides, herbicides, and fertilizers in runoff and ways the companies can assist
  - Developed materials and signage to educate the public on green infrastructure around the City
  - Other actions include News Articles, Water Bill Inserts, Earth Day, Science Day, and Neighborhood Cleanups

<u>Future Outreach:</u>

Recruitment

- Volunteers to install storm drain markers: Target Boy Scout Troops, Students in the watershed, HOAs, etc. The second phase will utilize advertisements (radio stations, flyers/newsletters, newspaper ads, etc.) to recruit participants.

- Participants for rain gardens, rain barrel workshops and installation: First start with HOAs and Schools in the watershed for participation. The second phase will utilize advertisements (radio stations, flyers/newsletters, newspaper ads, etc.) to recruit participants.

- The City of Aiken will pursue working with Aiken Land Trust to develop a Shaws Creek Land Conservation Program to protect larger buffers around streams and wetlands from future development, agriculture and silviculture.

Public Education

- Have local radio stations to participate in educational 'commercials' focusing on stormwater quality and quantity, with topics such as proper pet waste disposal, urban stormwater runoff, and the importance of stream buffers.

- Rain Barrel workshops (how to make one, have a rain barrel painting contest at schools)

- Aiken Standard, Edgefield Daily and Edgefield Advertiser, who advertised for the Public Meetings.

- City of Aiken, Aiken County and Edgefield County Websites: these websites will consider creating stormwater educational layouts with supporting urban runoff educational materials (i.e. articles and links).

- Facebook and Twitter accounts will be considered for The City of Aiken and Aiken and Edgefield Counties to educate the public on urban sources of pollution.

- Workshops focusing on pet waste disposal and stream buffers for HOAs in watershed's subdivisions (such as creating a Citizen Advisory Group for the watershed).

- Establish community clean up events for Shaws Creek.

- Educating Home Builders Association if municipalities pursue adopting new Water Quality buffer and stormwater regulations.

8.1.5 Sewer Sources

8.1.5.1 Target Audience/Targeted Pollutants/Description

Target Audience: Residential and commercial generators of FOG with sanitary sewer connections

Targeted Pollutants: Bacteria and Nutrients

Description: The residents and commercial customers of the City of Aiken's stormwater utility and the ECSWA will be the target audience of a public education campaign to eliminate FOG in the sewer systems.

8.1.5.2 Strategies/BMPs Needed

The current potential load from sewer lines in Shaws Creek Watershed would be attributed to potential leaks in sewer lines. These potential leaks are addressed by the City of Aiken Utilities Department and the ECWSA and are not being addressed by this Plan. SSOs are intermittent issues that will be addressed by this Plan through preventative actions (see Section 8.1.5.3).

8.1.5.3 Preventative Measures

As with the other components of this grant project, participation is voluntary and will be accomplished through social marketing and focused BMP strategy. The BMPs selected for this component include:

- Using outreach tools within the watershed to advertise the project and recruit homeowners for participation (further described in Section 8.1.5.5 below).

- If 319 funding is obtained, use educational door hangers similar to those used by wastewater treatment utilities.

- Create an educational commercial on how to properly dispose of FOG similar to the one created for 12 Mile Creek Watershed: https://www.youtube.com/watch?v=cBenOMxsz1g&feature=youtu.be

- ECWSA does not currently have a FOG management program. Although there are very few restaurants in the ECWSA portion of Shaws Creek Watershed, a FOG management program would be a beneficial program regarding proper grease trap maintenance, and proper disposal of used cooking oil help to prevent SSOs.

- Continuing education of restaurants in the Aiken portion of the watershed, as well as in Edgefield portion of the watershed, is needed regarding proper grease trap maintenance, and proper disposal of used cooking oil (i.e. used oil from fryers) to avoid dumping into sinks or storm drains. Targeted commercial generators will first be restaurants located on Highway 1 near the industrial parks.

- As mentioned previously, the City of Aiken and Aiken County have a used cooking oil recycling program. Though Edgefield County does not have any recycle centers in Shaws Creek Watershed, a used cooking oil recycling program will be investigated for the Edgefield County recycle centers near the watershed. Midlands Biofuels will provide the used cooking oil collection containers and provide pick-up service for the used cooking oil.

- If 319 funding is obtained, distributing Promotional FOG Can Lids (see photo below) to residents to encourage the practice of not pouring fats, oils and grease down the drain. These FOG lids fit most food cans from 3 ounces to large family size cans. As well, promotional/educational FOG slogans and instructions can be printed on the lids. As there are approximately 2,500 homes and businesses in the watershed, approximately 2,500 FOG lids would be distributed.

Promotional FOG Can Lid Example

8.1.5.4 Management Plan

1. Project Management: The City of Aiken, with the support of a project partners, will furnish project technical support, create and provide outreach and educational campaign/materials and will provide overall project coordination. Each County will assist the City with the outreach and implementation portions of this project.

2. Prioritization of Sites: Prioritized citizens for distribution of FOG can lids will include apartments: Crosland Apartments, Glendale Terrace Apartments and Long Leaf Senior Village near Aiken and Village Yard Apartments near Trenton. However, all sewer and septic residents in the watershed will be targeted for distribution of FOG can lids.

8.1.5.5 Outreach Needed

Participation in the project is voluntary, and effective outreach will be crucial to the success of the project. The following outreach measures will be performed:

Future Outreach

Recruitment:

- If 319 funding is obtained, distribution of Promotional Can Lids at facilities and events within the watershed, such as the Trenton Peach Festival and school events (where parents are involved), etc.

- Conduct surveys, make announcements at community meetings, and participation in local events within the watershed to advertise the project and recruit participation.

- Mention in local newspapers, newsletters, and radio stations the time/place of when promotional FOG can lids will be distributed.

Public Education:

- Distribute educational flyers for commercial generators of FOG (restaurants) within the watershed and possibly create Daily Checklists for these restaurants.

- Conduct surveys, make announcements at community meetings, and participation in local events within the watershed (some mentioned above) to advertise the project and recruit participation.

- Include educational materials in local newspapers and HOA newsletters to prevent SSOs from FOG

- Other social media methods, such as Facebook, Twitter, and the City and County's websites will be used for outreach to generate interest in the program.
- Advertisement by Counties' Recycling Facilities and Midlands Biofuels regarding the services for recycling used cooking oil. Facilities include:

    - Aiken County Recycling Drop Off Center #3
    - Edgefield County Convenience Center – 64 Samuel E. Diggs Rd., Trenton
    - Edgefield County Convenience Center – 652 Yonce Pond Rd, Trenton

Baseline information will be gathered in order to understand the level of knowledge of homeowners in the watershed relating to disposal of FOG. The City of Aiken and its consultant(s) will determine the best method of acquiring this baseline information regarding the knowledge, attitudes, and practice of homeowners in the watershed. Once more baseline information is gathered, more focused research will be conducted.

Based on information obtained, a broader outreach effort will be conducted to all homeowners in the watershed. This will include the announcement of the distribution of the Promotional FOG Can Lids and the new services for recycling used cooking oil at various venues with good exposure to homeowners and businesses in the watershed.

8.1.6 Septic Sources

8.1.6.1 Target Audience/Description

Target Audience: Property owners with failing septic systems

Targeted Pollutants: Bacteria and Nutrients

Description: All homeowners and businesses whose septic system are in need of repair and/or replacement within the watershed area will be targeted for outreach efforts. Based on the available information, approximately 2,315 septic systems are located in the watershed, with an estimated 232 septic systems that are failing. The more rural northern portion of the watershed will be targeted as indicated on Figure 28 in Section 5.4 for the initial outreach efforts, though any known failing septic system

will be addressed. The City of Aiken will reach out to Homeowner Associations, churches, civic groups throughout the watershed and to the Aiken Chamber of Commerce to spread the message to more property owners.

8.1.6.2 Strategies/BMPs Needed

The City of Aiken will work with experienced SCDHEC personnel, local organizations, and septic tank contractors to target historic problem systems and problem areas. Based on sewer information gathered, areas to target will include septic systems on soils with poor infiltration (HGS C and D) and parcels with older building dates, Figure 28 in Section 5.4. As well, parcels believed to be on septic within the floodplains of Shaws Creek will be prioritized for recruitment. Kershaw County has developed a process as part of the Twenty-five Mile Creek 319 project, for recruiting, informing and approving participants, properly documenting costs and reimbursements, and screening and contracting with local septic tank contractors for a successful program, which will be useful for Shaws Creek implementation.

If 319 funds are obtained, cost share assistance will cover at least 60% of the cost for repair or replacement to eligible residential homeowners and commerical property owners. The City of Aiken will consider utilizinge a sliding scale based on homeowner income to lower the homeowner match. Using the low/moderate income qualification of the Community Development Block Grant program, homeowners may be eligible for an 80/20 split or 100% coverage.

The City of Aiken is a CDBG entitlement community, but has not specifically included septic or sewer repairs in their 5-year plan. However, septic repairs in the City limits may be eligible under emergency home repairs, which is included in the 5-year plan. However, neither Aiken County nor Edgefield County is an entitlement community, and therefore they participate in the state CDBG program, but the state CDBG program does not cover septic repairs. It does allow for extending sewer to low to moderate income subdivisions that have septic issues if 70% of the subdivision is willing to connect to sewer.

According to state law, if a septic system is failing and if the property is deemed accessible to sanitary sewer, the septic system may not be repaired and the property shall be connected to sewer. If 319 funds are obtained and this situation is encountered, 319 funds could help pay for the cost of connecting the building to sewer.

Estimated bacteria load reductions from proposed septic BMPs for years 1 through 15 are displayed in Table 32 and is discussed in Section 8.2.

8.1.6.3 Preventative Measures

Along with implementing best management practices such as the items outlined above, the following preventative measures could help protect pollutant loadings entering Shaws Creek and its tributaries from septic systems.

- Acceptable Septic System Letter: As a measure to help ensure that septic systems are pumped out and inspected regularly, Kershaw County requires an "Acceptable Septic System Letter" when a home with a septic system is sold in the Lake Wateree Overlay District (see language from Kershaw County's regulations in Appendix G). When asked whether this system was working in the Lake Wateree Overlay District, Kershaw County's Planning Department believes that the inspections are working when completed, but feel that they are not always completed on the sale of a home. They plan to tighten the language and enforcement to make sure that this is happening. The municipalities within the watershed will consider developing an Acceptable Septic System Letter to be applied for this watershed, similar to the Lake Wateree Overlay District, or applied municipal-wide at the time of a sale of a house (similar to a Termite letter).

- House Expansion Oversight: SCDHEC regulations require that the expansion of a septic system for all bedroom additions. In order to ensure that septic systems are sufficient when bedrooms are added to existing homes, the planning departments for the City of Aiken, Aiken County and Edgefield County should require applicants for the bedroom additions to obtain a septic permit. This procedure will be refined in the Planning Departments.

- Education: Public education on proper septic system use and maintenance is a crucial preventative measure. Additional public education as described in Section 8.1.6.5 will be undertaken.

- Septic Regulations: Tim Pearson, SCDHEC, explained the recent revisions to DHEC septic regulations, including the requirement for a planned repair area for new septic systems. This planned repair area will provide a location to extend drain fields in the future when a drain field is no longer functioning properly or regulations change in the future.

8.1.6.4 Management Plan

1. Project Management: The City of Aiken and its consultant(s) will complete all reporting requirements, conduct procurement activities, coordinate with SCDHEC and local septic providers for project technical support, create and provide outreach and educational campaign/materials and provide overall project coordination. The City of Aiken, with the support of Aiken County and Edgefield County, will act as the lead entity for all advocacy activities by working directly with the local community throughout the outreach and implementation portions of this project.

2. Prioritization of Sites: All landowners in the watershed who meet the criteria of needing septic repairs will be recruited, despite their location in the watershed. However, with respect to prioritization, properties with known septic failures and those property owners in the floodplains of Shaws Creek will be addressed first, and, if necessary, those outside of the floodplain will be addressed next. As well, areas that may be prone to septic failures due to poor soil infiltration and age of septic tank will be targeted (based on Known Sewer Figure 28). Failing septic systems in the MS4 boundaries will be

included in all outreach efforts and in 319 grant funding, if obtained, as it is not a permit requirement for the MS4 to pay for the repair of failing septic systems in the MS4.

3. Determination of Repair: A representative from the applicable jurisdiction will inspect the reported failing septic system to confirm whether a septic system is failing. Routine maintenance (i.e. pump outs) is not included as part of this project. If awarded, 319 funding will be used for repairs, replacements, or connection to sewer depending on the nature of the problem and location of the system.

8.1.6.5 Outreach Needed

Many septic problems and leaks are due to lack of or poor maintenance of the septic system. Outreach and education, including distribution of the DHEC septic maintenance folders and septic "reminder" magnets, will be used to address this problem and encourage septic owners to improve maintenance. Potential 319 funding will only be used for BMPs to repair problems with the system, not for routine maintenance. The applicable municipality will work with property owners, and septic tank contractors to determine if problems are due to maintenance issues or larger issues which require BMPs to fix. Based on Lexington County's experience with the Hollow Creek project, approximately 80% of the failing septic systems are due to maintenance issues and approximately 20% are due to septic system failures which could be addressed by BMPs. Therefore the education program is going to extend to all septic owners, approximately 2,315 in the watershed, but the BMP cost-share program is going to be targeted at the failing systems, assumed to be 10% or 232 systems. Based on participation in other watersheds and Aiken County's experience, if 319 funds are obtained, it is estimated that during a 3-year period, approximately 58 septic systems will be repaired, replaced or connected to sewer.

Many septic problems and leaks are due to lack of or poor maintenance of the septic system. Outreach and education, including distribution of the SCDHEC septic maintenance folders, septic "reminder" magnets, and other items listed below (i.e. 'Future Outreach') will be used to address this problem and encourage septic owners to improve maintenance.

Current Outreach:

Aiken County provides information to the public in the form of brochures to promote better decisions when it comes to human and animal waste. One brochure currently in circulation by the City of Aiken and Aiken County is: "Your Septic System" gives tips and advice to help homeowners maintain their septic systems to help protect local water quality

Future Outreach:

The reduction of bacteria in the watershed through repair and replacement of failing septic systems also benefits homeowners through the elimination of odor problems, health issues, and increase in property values. The following outreach measures will be performed:

Recruitment of Property Owners with Failing Septic: Marketing materials (e.g. flyers, presentations at community meetings, video from Lexington County's 319 Hollow Creek project which includes endorsements from septic owners who participated, and word-of-mouth) will be used to reach out to the local community to inform septic system owners about the Project as well as providing support and insight into educational campaign messages and outreach techniques. Other options for publicizing a septic implementation grant and recruiting septic homeowners include annual tax bills in the counties, water bill in the City, door hangers, church bulletins, Aiken Standard, Edgefield Advertiser, and Edgefield Daily. Additional options include:

- Mailing postcards to all septic homeowners in the watershed.
- Conduct surveys, make presentations at community meetings, and/or listening sessions within the watershed to advertise the project and recruit homeowners for participation.
- Identify Homeowner Associations, civic organizations and local chambers of commerce in the watershed to spread the message to more property owners.
- Evaluate septic pump-out records obtained from local licensed contractors.
- Work with experienced SCDHEC personnel, local organizations, and septic tank contractors to target historic problem systems and problem areas.
- Tailor available outreach tools (e.g. flyers & video developed for Hollow Creek Water Quality Improvement Project which included homeowner endorsements of the septic program) for Shaws Creek audience.
- Other social media methods, such as Facebook, City and County websites, and Twitter will be used for outreach to generate interest in the Project.
- Distribution of SCDHEC's "Septic System Maintenance" information and septic system management magnets (to provide homeowners guidence for when it is a good time to have their septic system cleaned out).

Baseline information will be gathered in order to understand the level of knowledge of homeowners in the watershed relating to septic tank maintenance and repairs. The City of Aiken will work with its consultant(s) to determine the best method of acquiring this baseline information regarding the knowledge, attitudes, and practice of homeowners in the watershed. Once the baseline information is gathered, City and Counties will conduct more focused research through interviews at local community centers/churches and businesses located in the watershed.

Based on information obtained, a broader outreach effort will be conducted to all homeowners in the watershed. This will include the announcement of the cost share program at various venues with good exposure to homeowners residing in the watershed. It is anticipated that local non-profit organizations and septic tank contractors will assist with outreach efforts. The respective County and their staff will encourage participation in the cost share program and promote responsible septic tank maintenance practices. All individuals receiving assistance will be educated on proper septic tank maintenance. Follow up surveys may be conducted with homeowners in the last year of the program to determine if there has been a change in their attitudes, knowledge, and future maintenance plans regarding their septic systems.

8.1.7 Wildlife Sources

8.1.7.1 Target Audience/Description

Target Audience: Landowners and hunters in and around the watershed

Pollutants of Concern: Bacteria, Nutrients and Sediment

Description: Wildlife loading is dependent on herd types, and densities can vary seasonally and can decline due to changes in land use (i.e. more built-up lands, less agriculture and open/pasture space). Therefore it is difficult to implement measures to control/monitor wildlife (such as deer and hogs) that will always tend to migrate and hangout near water. However, based on Amec Foster Wheeler's experience in other SCDHEC 319 Projects, one target audience is deer hunters who may be depositing dead carcasses directly into streams of Shaws Creek Watershed. Additionally, a target audience is landowners who may be willing to install wild hog traps on their property.

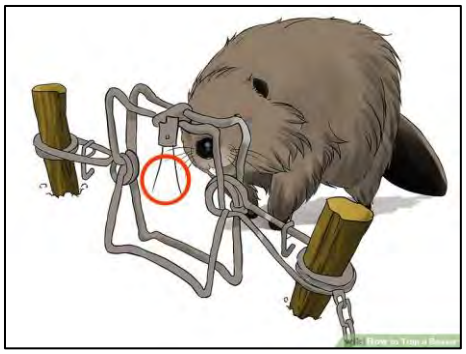
8.1.7.2 Strategies/BMPs Needed

The following BMPs would help reduce improper dumping of animal carcasses and help reduce the negative impact of wild hogs in Shaws Creek Watershed.

- Bridge Crossing Cameras: If funding is obtained, two surveillance bridge crossing cameras would be installed (and rotated to various bridge crossings) in the watershed to catch those who illegally dump carcasses, as well as other pollutants, in streams.

- As for wild hogs, landowners and farmers who are having issues will be recruited for installation of wild boar traps.


- As for beavers, landowners who are having issues will be recruited for installation of beaver traps.




Estimated bacteria, nutrient and sediment load reductions from proposed wildlife BMPs for years 1 through 15 are displayed in Table 32 and is discussed in Section 8.2.

8.1.7.3 Preventative Measures

The reduction of pollutant loading from wildlife on forested land will be accomplished primarily through educating hunters to encourage proper disposal of carcasses. Potential BMPs to install may include:

- Fine Signs: Throwing carcasses in the creek or a ditch on the backside of the property has never been legal, and it is absolutely unacceptable. If funding is obtained, signs with associated fines for illegal dumping of carcasses will be posted throughout the watershed. Such signs would be installed at bridge crossings within the watershed where potential illegal dumping may occur.

Example of Signs to be posted at stream crossings.

See Section 8.1.7.5 for educational efforts to prevent improper disposal of animal carcasses.

8.1.7.4 Management for Wildlife Sources

1. Project Management: The City of Aiken and its consultant(s), with the support of project partners, will complete all reporting requirements, conduct procurement activities, coordinate with SCDNR for project technical support, create and provide outreach and educational campaign/materials and provide overall project coordination. The City of Aiken will act as the lead entity for all advocacy activities by working directly with the local community throughout the outreach and implementation portions of this project. Aiken County and Edgefield County will provide support with educating the community regarding proper carcass disposal and enforcing illegal dumping.

2. Prioritization of Sites: All hunters in and around the watershed will be targeted for educational outreach and participation in workshops on proper disposal of game and fish carcasses. This audience will also be made aware of the fines enforced for those who illegally dispose of carcasses in any stream in the watershed. As for prioritization of sites, installation of signs and survelliance cameras will be addressed first on main roads crossing Shaws Creek. If necessary, smaller roads and other tributaries would be addressed next. All landowners and farms threatened by hog populations will be targeted for educational outreach and participation in installing traps on their properties.

8.1.7.5 Outreach Needed

Effective outreach will be crucial in the success of this project. The goal of the project (to reduce bacteria, nutrients and sediment in the watershed) can be achieved without interfering with landowners or hunters. These goals can be achieved by educating hunters on the benefits of proper disposal of game and fish carcasses and educating on the wild hog population issues.

Current Outreach

- Clemson Extension held a Coyote Control Workshop at the Aiken Fairgrounds on April 7, 2017. Several landowners from Shaws Creek Watershed who attended the conference mentioned that trapping is mainly picking up fox, coyote and beavers.

Future Outreach

Recruitment of Hunters and Landowners:

- Marketing materials (e.g. flyers, local newspapers, presentations at community meetings, social media, etc.), hunter workshops (such as the Coyote Control Workshop), and word-of-mouth will be used to reach out to the local community to inform hunters and landowners about the Watershed Based Plan, issues with wild hog populations, as well as providing support and insight into educational campaign messages and outreach techniques (such as participation in Hunter Workshops, see below).

Public Education:

- Conduct Hunter Workshops on proper disposal of game and fish carcasses and wild hog issues
- Brochures on proper disposal of game and fish carcasses and wild hog issues
- Partner with SCDNR on creating and sharing educational material
- Provide options for proper disposal of carcasses

Surveys and interviews with local hunters will be used to determine the level of knowledge of how improved hunting practices affect water quality. Interviews with the officers of local hunting clubs will be conducted in order to gauge the level of hunters' interest in water quality issues and identify barriers to changing current hunting practices. Based on the information gathered through the surveys and interviews with hunters, City of Aiken staff, with the help of its partners and its consultant(s), will be able to develop an outreach program that would be most effective in encouraging hunters to change their behaviors. Aiken and Edgefield Counties will continue with their efforts to incorporate water quality education with the SC Department of Natural Resources (SCDNR) game management and hunter education programs using the information gathered in the surveys and interviews.

8.1.8 Develop a Shaws Creek Workgroup to oversee Plan Implementation

The Stakeholders involved with the creation of this Plan have become the foundation of the Shaws Creek workgroup.

- The Leaders for this group include the City of Aiken, Aiken County and Edgefield County.
- List of additional stakeholders by source
    - Urban: SCRWA, Upper Savannah and Lower Savannah Councils of Government
    - Sewer: City of Aiken, ECWSA
    - Agricultural: Aiken's and Edgefield's NRCSs and SWCDs, Clemson Extension

- Septic: Aiken and Edgefield County Public Health (SCDHEC)
- Wildlife: SCDNR, Turkey Wildlife Federation, Edgefield's and Aiken's SWCDs, Clemson Extension

8.2 Milestones

The goal of this plan is for Shaws Creek to meet or exceed State Water Quality Standards by 2032 (15 years from 2017) by protecting the creek from non-point sources of bacteria, nutrient and sediment.

It is proposed that this goal can be accomplished by implementing various structural and nonstructural BMPs to reduce or prevent the bacteria, nutrient and sediment loadings to Shaws Creek.

Because it may take fifteen years for Shaws Creek meet this goal, interim milestones may be tracked to measure progress on Plan implementation. Interim and long term measurable milestones are outlined in Table 31 below.

Table 31. Shaws Creek WBP Measurable Milestones

Sources	BMPs		Years 1 - 3	Years 4 - 6	Years 7 - 9	Years 10 - 12	Years 13 - 15	Preventative Measures	Years 1 - 3	Years 4 - 6	Years 7 - 9	Years 10 - 12	Years 13 - 15
Agricultural													
Livestock Farms (Total 101 farms)	Examples: Fencing/Alt. Water Source, Stream Crossings, Soil Stabilization, Loafing Shed, Cross Fencing, Heavy Use Area Stabilization, etc.	Livestock Farms 1 - 15	15%										
		Livestock Farms 16 - 24		9%									
		Livestock Farms 25 - 33			9%			Workshops/Education	X	X	X	X	X
		Livestock Farms 34 - 41				8%							
		Livestock Farms 41 - 49					8%						
Crop Farms (Total 133 farms)	Examples: Manure/Fertilizer Management, Soil Stabilization, etc.	Crop Farms 1 - 5	4%					Landowner lease conditions (buffers, stabilization requirements, etc)	X				
		Crop Farms 6 - 17		9%									
		Crop Farms 18 - 28			9%			Workshops/Education	X	X	X	X	X
		Crop Farms 29 - 39				8%							
		Crop Farms 40 - 50					8%						
AFOs (Total 3)	Manure Composter	AFO Facility 1	33%										
Septic													
Malfunctioning septic system (Total 232 failing systems)	Examples: Repair septic system, replace septic system, and or connect to sewer	Septic Systems 1 - 57		25%				Procedure for Adding Bedrooms	X				
		Septic Systems 58 - 116			25%			Acceptable septic system letter		X			
		Septic Systems 117 - 174				25%		Education		X	X	X	X
		Septic Systems 175 - 232					25%	Recycle Used Cooking Oil		X			
								FOG Can Lids (2000 lids)		25%	50%	75%	100%
Sewer													
Leaking sewer lines								Recycle Used Cooking Oil		X			
Sanitary Sewer Overflows (SSOs)								FOG Can Lids (500 lids)		25%	50%	75%	100%
								Education		X	X	X	X
								Inspect/Enforce Commercial Grease Traps	X	X	X	X	X
Urban													
Industrial Park Erosive Flows	Regional Stormwater Control	Regional Pond(s)			50%	50%		Private Commercial Properties Good Housekeeping Education/Enforcement	X				
Dirt Roads and Eroded Embankments	Examples: Straw Waddles, Check Dams, Sediment Traps	Miles of Dirt Roads 1 - 17		25%				Education/Workshops	X	X	X	X	X
		Miles of Dirt Roads 18 - 36			25%			Pet Waste Ordinance Revision		X			
		Miles of Dirt Roads 37 - 54				25%		Permanent Water Quality Buffers		X			
		Miles of Dirt Roads 55 - 71					25%	Post Construction BMP Design Manual, per municipality		X	X	X	
Pet Waste	Pet waste stations	Pet Waste Stations 1 - 10		100%				Set Up Land Conservation Program	X				
Fertilizers	Storm Drain Tagging	Storm Drain Markers 1 - 1000		100%				Implement Land Conservation Program		X	X	X	X
Development	Rain Barrel Workshops	Rain Barrels 1 - 10		100%				Improve S&EC inspection/enforcement procedures	X				
	Rain Gardens	Rain Gardens 1 - 10			100%								
Wildlife													
Improper Carcass Disposal (Deer, Fish)								Bridge Signs (25 signs)		100%			
								Bridge Cameras (2 cameras)			50%	50%	
Wild Boars and Beavers	Wild Animal Traps	Traps 1 - 10		100%				Education/Workshops	X	X	X	X	X

Table 32. Estimated Load Reductions to Shaws Creek Watershed from Proposed BMPs During Years 1-15

Loading Source	BMPs	Existing N Loading (lbs/yr)	Existing P Loading (lbs/yr)	Existing TSS Loading (lbs/yr)	Existing Loading (cfu/day)	Comments	Estimated % of participants	N Load Removed by BMPs (lbs/yr)	P Load Removed by BMPs (lbs/yr)	TSS Load Removed by BMPs (lbs/yr)	Bacteria Load Removed by BMPs (CFU/yr)
Agricultural - Livestock	*Total loading	21,027	1,577	458,101	5.28E+14						
	Fencing/Alt. Water Source, Stream Crossings, Soil Stabilization, Loafing Shed, Cross Fencing, Heavy Use Area Stabilization, Manure Composting Facility, etc.					49 livestock farms participate of approximately 101 livestock farms located in watershed; ~49% participation	49%	3,060	1.93E+06	4.42E+11	7.01E+25
Agricultural - Croplands	*Total loading	139,224	32,021	9.49E+06	8.06E+13						
	Critical Area Planting, Manure/Fertilizer Management, Soil Stabilization					50 crop farms participate of approximately 133 crop farms located in watershed; ~38% participation. Assume 20% of the 50 cropland farms acreage will be treated	38%	5,234	2.51E+07	3.58E+13	2.88E+26
Urban Sources	*Total loading	17,854	2,613	761,498	4.22E+14						
	Rain Gardens					10 Rain Gardens, 50'x50' each	10 Participants	0.34	0.07	-	2.44E+08
	Pet Waste Stations					10 Pet Waste Stations, assume 10 households per station and 75% participation	75%	31.0	6.66	-	1.27E+13
	Dirt Road Stabilization					Estimated 71 miles of dirt roads in watershed, assume contribute to 40% of Urban TSS load. Assume stabilization of 71 miles of road	100%	-	-	30,460	-
	Regional Stormwater Control					Assume pollutants from Vernes Park contribute to 5% of Urban TSS load and 1% of Urban nutrient loads. Estimate a 1,093,752 cf volume of dry pond(s) are needed to treat the developed areas on Vernes Park	-	44.6	9.1	4,569	-
Sanitary Sewer Overflows and Sewer Leaks	*Total loading	55	14	-	9.97E+09						
						No load reduction because all proposed measures are preventative	0%	0	0	0	0
Septic Failures	*Total loading	7,215	2,830	-	5.61E+12						
	Septic Repairs, Replacements or Connect to Sewer					Approximately 2,315 septic systems in watershed; Estimated 10% of septic systems failing = 232 systems and 100% of failing septic systems will be treated	100%	7,215	2,830		5.61E+12
Wildlife	*Total loading	5,889	2,898	249,625	1.02E+13						
	Wild Animal Traps					Assume that wildlife trapping efforts will remove 0.1% loads from forested areas	0.1%	5.9	2.9	250	1.02E+10
						TOTAL LOAD REDUCTIONS		**15,547**	**2.71E+07**	**3.62E+13**	**3.58E+26**

Table 33. Total Estimated Project Costs During Years 1-15

Sources	BMPs		Years 1 - 3	Years 4 - 6	Years 7 - 9	Years 10 - 12	Years 13 - 15	Preventative Measures	Years 1 - 3	Years 4 - 6	Years 7 - 9	Years 10 - 12	Years 13 - 15
Agricultural													
Livestock Farms (Total 101 farms)	Examples: Fencing/Alt. Water Source, Stream Crossings, Soil Stabilization, Loafing Shed, Cross Fencing, Heavy Use Area Stabilization, etc.	Livestock Farms 1 - 15	$ 354,243					Workshops/Education/Materials	$10,000	$10,000	$10,000	$10,000	$10,000
		Livestock Farms 16 - 24		$288,440									
		Livestock Farms 25 - 33			$ 288,440								
		Livestock Farms 34 - 41				$ 288,440							
		Livestock Farms 41 - 49					$288,440						
Crop Farms (Total 133 farms)	Examples: Manure/Fertilizer Management, Soil Stabilization, etc.	Crop Farms 1 - 5	$ 208,712					Landowner lease conditions (buffers, stabilization requirements, etc)	X				
		Crop Farms 6 - 17		$288,440									
		Crop Farms 18 - 28			$ 288,440			Workshops/Education/Materials	$10,000	$10,000	$10,000	$10,000	$10,000
		Crop Farms 29 - 39				$ 288,440							
		Crop Farms 40 - 50					$288,440						
AFOs	Manure Composter	AFO Facility 1	$ 13,924										
Septic													
Malfunctioning septic system (Total 232 failing systems)	Examples: Repair septic system, replace septic system, and or connect to sewer	Septic Systems 1 - 57		$208,800				Procedure for Adding Bedrooms	X				
		Septic Systems 58 - 116			$ 208,800			Acceptable septic system letter		X			
		Septic Systems 117 - 174				$ 208,800		Education/Materials		$5,000	$5,000	$5,000	$5,000
		Septic Systems 175 - 232					$208,800	Recycle Used Cooking Oil		$1,000			
								FOG Can Lids (2000 lids)		$400	$400	$400	$400
Sewer													
Leaking sewer lines								Recycle Used Cooking Oil		$1,000			
Sanitary Sewer Overflows (SSOs)								FOG Can Lids (500 lids)		$88	$88	$88	$88
								Education/Materials		$5,000	$5,000	$5,000	$5,000
								Inspect/Enforce Commercial Grease Traps	X	X	X	X	X
Urban													
Industrial Park Erosive Flows	Regional Stormwater Control	Regional Pond(s)			$ 683,595	$ 683,595		Private Commercial Properties Good Housekeeping Education/Enforcement	X				
Dirt Roads and Eroded Embankments	Examples: Straw Waddles, Check Dams, Sediment Traps	Miles of Dirt Roads 1 - 17		$ 9,979				Education/Workshops/Materials	$10,000	$10,000	$10,000	$10,000	$10,000
		Miles of Dirt Roads 18 - 36			$ 9,979			Pet Waste Ordinance Revision		X			
		Miles of Dirt Roads 37 - 54				$ 9,979		Permanent Water Quality Buffers		X			
		Miles of Dirt Roads 55 - 71					$ 9,979	Post Construction BMP Design Manual, per municipality		$100,000	$100,000	$100,000	
Pet Waste	Pet waste stations	Pet Waste Stations 1 - 10		$ 12,850				Set Up Land Conservation Program	$ 30,000				
Fertilizers	Storm Drain Tagging	Storm Drain Markers 1 - 1000		$ 2,000				Implement Land Conservation Program		$150,000	$150,000	$150,000	$150,000
Development	Rain Barrel Workshops	Rain Barrels 1 - 10		$ 600				Improve S&EC inspection/enforcement procedures, Training Workshops	$10,000				
	Rain Gardens	Rain Gardens 1 - 10			$ 100,000								
Wildlife													
Improper Carcass Disposal (Deer, Fish)								Bridge Signs 25 signs)		$ 2,500			
								Bridge Cameras (2 cameras)			$ 3,600	$ 3,600	
Wild Boars and Beavers	Wild Animal Traps	Traps 1 - 10		$ 4,300				Education/Workshops/Materials	$10,000	$10,000	$10,000	$10,000	$10,000
TOTALS:			**$ 576,879**	**$815,408**	**$1,579,253**	**$1,479,253**	**$795,658**		**$80,000**	**$304,988**	**$304,088**	**$304,088**	**$200,488**

*This budget is an estimate for a 15-year plan, which is dependent upon funding availability. Grant funding will be an integral part of the stakeholder's ability to implement this Watershed Based Plan.
*Note that this 15-year plan does not include implementation of conservation BMPs for all farms. Implementation of BMPs on agricultural properties is voluntary and therefore may not reach 100% participation.

Table 34. Estimated Project Costs During Years 1-15 by 3-Year Periods

Budgeted Year	Cost
Years 1-3	$ 656,879
Years 4-6	$1,120,396
Years 7-9	$1,883,341
Years 10-12	$1,783,341
Years 13-15	$ 996,146
TOTAL Years 1-15	**$6,440,102**

*Referenced

Table **33** for the total project costs

9 Measures of Success

9.1 Monitoring Plan

9.1.1 SCDHEC Monitoring of E-094

According to the *2017 State of South Carolina Monitoring Strategy*, WQMS E-094 is an inactive monitoring site. Therefore, the 2006 SCDHEC monitoring results are the latest official monitoring data available for the Shaws Creek Watershed. The City of Aiken plans to request that SCDHEC reactivate WQMS E-094, particularly if 319 implementation funding is awarded. In addition, the City of Aiken plans to request that SCDHC reactivate WQMS RS-02480 as well, in order to capture the heavily agricultural upper portion of the Watershed.

9.1.2 SMS4 Bacteria Sampling

The SCDHEC SMS4 permit, effective January 1, 2014 required SMS4s to begin conducting TMDL monitoring by June 30, 2015, in order to determine the SMS4's load contribution to the TMDL's creeks and tributaries. As described in Section 4.2.3, Aiken County has initiated bacteria monitoring of Shaws Creek and the monitoring locations and results are shown in Appendix H.

9.1.3 City of Aiken Water Treatment Plant Influent Sampling

As described in Section 4.2.4, the influent water of the City of Aiken Water Treatment Plant is analyzed daily for properties such as pH, alkalinity, temperature, hardness, and turbidity.

9.2 Nutrient, Sediment, and Bacteria Loading Sources

9.2.1 Evaluation Method

In addition to evaluation of monitoring data proposed above, the success of this Plan, per source, will be evaluated based on:

<u>Agricultural Sources</u>

1. Livestock Farms
    - the number of cattle/horse farmers within the watershed who participate in outreach initiatives
    - the number of cattle/horse farms that develop conservation and manure management plans
    - the number of conservation plans, with their associated BMPs, that are implemented at cattle/horse farms
2. Crop Farms
    - The number of crop farmers within the watershed to participate in outreach initiatives

- The number of crop farm owners who develop conservation plans
- The number of BMPs that are implemented at crop farms
- The number of landowners that update their lease conditions

3. Poultry Farms
    - The number of poultry farms within the watershed that participate in outreach initiatives
    - The number of BMPs for waste management that are implemented

Follow up survey will be conducted to determine if there has been a change in attitudes, knowledge, and future conservation efforts regarding agricultural practices.

Urban Sources

- the number of pet waste stations installed
- the number of pet waste bags used
- the number of marked storm drains
- the amount of urban stormwater controls installed
- the number of dirt roads stabilized
- the number of rain barrels distributed/voluntarily installed
- the number of rain gardens incorporated in the watershed
- the number of municipalities that adopt permanent water quality buffers
- the number of landowners with land conservation easements
- the number of municipalities that participate in revising their post-construction stormwater design methodologies
- the number of municipalities that adopt a pet waste ordinance
- the number of private commercial properties that participate in outreach initiatives

Follow up surveys will be conducted to determine if there has been a change in attitudes, knowledge and disposal methods of pet waste.

Sewer Sources

- The number of participants within the watershed that receive Promotional FOG Can Lids
- The quantity of used cooking oil collected at the City and Counties recycling facilities
- The measured reduction in the number of reported SSOs
- the number of private commercial properties that participate in outreach initiatives
- the number of participants in the commercial grease trap inspection program.

Follow up surveys will be conducted in the last year of the Plan to determine if there has been a change in attitudes, knowledge and disposal methods for FOG.

Septic Sources

- The number of property owners within the watershed that participate in outreach activities
- The number of failing septic systems that are repaired, replaced, or connected to sewer
- The quantity of used cooking oil collected at the City and Counties recycling facilities
- The number of participants within the watershed that receive Promotional FOG Can Lids
- the number of municipalities that adopt an Acceptable Septic System Letter
- the number of municipalities properly enforcing septic permits for bedroom additions

Wildlife Sources

- The number of hunters that participate in outreach activities
- The number of surveillance cameras installed
- The number of bridge crossing signs installed
- The number of illegal dumpers caught/penalized
- The number of wild animal traps installed

Follow up surveys will be conducted to determine if there has been a change in attitudes, knowledge and disposal methods of game and fish carcasses.

9.2.2 Anticipated Results

Agricultural – Livestock Sources

Based on calculations using the anticipated participation in the Plan and estimated nitrogen, phosphorous, sediment and bacteria loadings from livestock (approximate participation of 49% of livestock farms), the estimated load reductions for nutrients (nitrogren and phosphorous), sediment and bacteria were estimated. Note that this 15 year Plan does not include implementation of conservation BMPs for all farms. Implementation of BMPs on agricultural properties is voluntary and therefore may not reach 100% participation. Because it is anticipated that the bulk of the livestock load reductions will come from alternative water sources with fencing BMPs, the following load reduction factors cited for alternative water sources with fencing BMPs were applied to the livestock load from the anticipated livestock farm participation rate (49% participation): for Nitrogen (30% reduction), Phosphorous (40% reduction), Sediment (50% reduction) and Bacteria (30% reduction) (Simpson and Weammert 2009). Therefore, from livestock BMPs installed, it is estimated that 3,060 lbs of nitrogen/yr, 1.93E+06 lbs of phosphorous/yr, 4.42E+11 lbs of TSS/yr and 7.01E+25 CFU/yr will be reduced in the Shaws Creek Watershed by this Plan. Table 32 above provides details of the estimated load reduction calculations to Shaws Creek Watershed from proposed BMPs during years 1 through 15.

Agricultural – Cropland Sources

Based on calculations using the anticipated participation in the Plan and estimated nitrogen, phosphorous, sediment and bacteria loadings from crop farms (approximate participation of 38% of crop farms), the estimated load reductions for nutrients (nitrogren and phosphorous), sediment and bacteria was estimated. As mentioned above, this 15 year plan does not include implementation of conservation BMPs

for all farms. Implementation of BMPs on agricultural properties is voluntary and therefore may not reach 100% participation. Because It is anticipated that the bulk of the crop farm load reductions will come from critical area plantings, the following load reduction factors cited for critical area planting BMPs were applied to the crop farm load from the anticipated crop farm participation rate (38% participation): for Nitrogen (50% reduction), Phosphorous (75% reduction), Sediment (75% reduction) and Bacteria (50% reduction). Note that it was assumed that critical area plantings would treat 20% of the participating farms. (SCDHEC 2017). From cropland BMPs installed, it is estimated that 5,234 lbs of nitrogen/yr, 2.51E+07 lbs of phosphorous/yr, 3.58E+13 lbs of TSS/yr and 2.88E+26 CFU/yr will be reduced in the Shaws Creek Watershed by this Plan. Table 32 above provides details of the estimated load reduction calculations to Shaws Creek Watershed from proposed BMPs during years 1 through 15.

Urban Sources

Reduction of sediment, nutrient and bacteria loadings from urban runoff is anticipated to be achieved from installation of pet waste stations, rain gardens, dirt road stabilization, and installation of stormwater controls.

Rain Gardens: For load reductions from rain gardens the following assumptions were made in order to estimate load reduction:

- Residential rain gardens installed will be an average of 2,500 square feet (10 rain gardens equates to 0.57 acres total in size).
- Existing loads for nitrogen, phosphorous, sediment and bacteria from 0.57 acres was from the residential medium intensity land use from Shaver, et. al. (2007)

Utilizing reduction factors from STEPL for rain gardens for nitrogen (63%), phosphorous (80%), and bacteria (62%), calculating the estimated load reductions for nutrients (nitrogren and phosphorous), sediment and bacteria was possible. It is estimated that that 0.34 lbs of nitrogen/yr, 0.07 lbs of phosphorous/yr, and 2.44E+08 CFU/yr will be reduced in the Shaws Creek Watershed by the installation of 10 rain gardens.

Pet Waste Stations: Assuming that 10 houses participate per pet waste station installed, anticipating 75% participation, and estimating that pet waste stations treat nitrogen, phosphorous and bacteria by 90%, it is estimated that 31 lbs of nitrogen/yr, 6.66 lbs of phosphorous/yr, and 1.27E+13 CFU/yr will be reduced in the Shaws Creek Watershed by the installation of 10 pet waste stations.

Dirt Road Stabilization: For this Plan, it is anticipated that participation from all of the 71 miles of dirt roads in the watershed will be accomplished with stabilization BMPs (such as straw wattles, check dams, sediment traps, etc.). Possible urban sources of sediment in this watershed can include dirt roads, construction sites (though very little development in the watershed), and properties with no vegetation (Industrial Parks and residential properties). Therefore, it is assumed that dirt roads contribute to 40% of the Urban TSS Load that was estimated in Section 6. Assuming stabilization of dirt roads will reduce the dirt roads sediment load by 10%, it was estimated that 30,460 lbs TSS//yr will be reduced in the Shaws Creek Watershed by stabilizing 71 miles of dirt roads.

Regional Stormwater Control: For this Plan the construction of one large regional stormwater pond or multiple stormwater ponds is anticipated to serve the industrial facilities at the Verenes Industrial Park. Through initial hydraulic and hydrologic calculations, a 1,093,752 cubic feet of storage volume is needed to treat the existing industrial facilities. It is assumed that Verenes Industrial Park contributes to 5% of the Urban TSS Load and 1% of the Urban Nutrient (Nitrogen and Phosphorous) Loads that was estimated in Section 6. Assuming installation of dry detention pond(s) will reduce the Industrial Park's nitrogen load by 25%, phosphorous load by 35% and the sediment load by 60%; it was estimated that 44.6 lbs of nitrogen/yr, 9.1 lbs of phosphorous/yr, and 4,569 lbs TSS/yr will be reduced in the Shaws Creek Watershed by the installation of installation of dry detention pond(s) at the Vernes Industrial Park.

Table 32 above provides details of the estimated load reduction calculations to Shaws Creek Watershed from proposed BMPs during years 1 through 15.

Sewer Sources

Since the proposed BMPs addressing sewer leaks and sanitary sewer overflows for this Plan are all preventative measures, no load reductions were calculated.

Septic Sources

For this Plan, it is anticipated that participation from all of the estimated 232 failing systems will be accomplished with septic repairs/replacments or connecting to sewer. Based on a calculation using the anticipated participation for septic repairs/replacements (100%) and estimated loading from failing septic systems, it is estimated that 7,215 lbs of nitrogen/yr, 2,830 lbs of phosphorous/yr, and 5.61E+12 CFU/yr will be reduced in the Shaws Creek Watershed by this Plan. These estimates anticipate that septic repairs/replacements will treat pollutants completely (100%). See Table 32 for more details of the estimated load reductions to Shaws Creek Watershed from proposed BMPs during years 1 through 15.

Wildlife Sources

It was assumed that wildlife trapping efforts will remove 0.1% of the loads from forested areas. Therefore, it is estimated that 5.9 lbs of nitrogen/yr, 2.9 lbs of phosphorous/yr, 250 lbs of TSS/yr and 1.02E+10 CFU/yr will be reduced in the Shaws Creek Watershed by this Plan. See Table 32 for more details of the estimated load reductions to Shaws Creek Watershed from proposed BMPs during years 1 through 15.

10 Funding Opportunities

10.1 Grant Funding

Nonpoint Source Grants Programs (319 Grants)

Description: The primary objective of NPS projects is to prevent or reduce nonpoint source pollutant loadings entering water resources so that beneficial uses of the water resources are maintained or

restored. South Carolina DHEC receives an annual grant allocation from EPA to implement NPS abatement strategies as described in the state's NPS Management Program. A portion of these funds are passed on through a competitive grant process to stakeholder groups, government entities, or other agencies interested in conducting projects that reduce or prevent NPS water pollution through the implementation of an approved TMDL. These funds are known as Section 319 grants and pay up to 60% of eligible project costs, with the applicant providing a 40% non-federal match.

US EPA/ National Fish and Wildlife Foundation: 5 Star Grants

Description: Open to any public or private entity engaging in community-based restoration. Request for Proposals are expected in October with proposals due in January. Grant amounts are $10,000 to $40,000 (typically in $20,000 to $25,000 range in South Carolina). Partnerships are required with at least 5 organizations. No matching is required, but is strongly encouraged to have at least a 1:1 match, and competitive projects often have 2:1 match (including in-kind match). Five Star grants provide modest financial assistance on a competitive basis to support community-based wetland, riparian, and coastal habitat restoration projects that build diverse partnerships and foster local natural resource stewardship through education, outreach and training activities. Since 2010, there is a new emphasis on urban projects.

NRCS Environmental Quality Incentives Program (EQIP)

EQIP is a voluntary program that provides financial and technical assistance to agricultural producers to help plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland. In addition, a purpose of EQIP is to help producers meet Federal, State, Tribal and local environmental regulations.

In South Carolina, EQIP will pay 75 percent of the costs of eligible conservation practices under the general sign-up. Historically Underserved who are Limited Resource, Socially Disadvantaged, and Beginning Farmers are eligible for 90 percent cost share. A ranking tool is used to prioritize applications based on the resource concerns that each county selected, typically farms within an approved TMDL watershed and farms that are part of a 319 implementation grant are ranked high to receive EQIP funds.

Community Development Block Grant (CDBG)

The South Carolina Community Development Block Grant (CDBG) Program is designed to provide assistance to units of general local government in improving economic opportunities and meeting community revitalization needs, particularly for persons of low and moderate income. The CDBG program has been funded through the State since 1982 by the U.S. Department of Housing and Urban Development (HUD) under the Housing and Community Development Act of 1974, as amended (Title I). The three overarching goals of the CDBG program are to provide decent housing, economic opportunities and a suitable living environment. Within the context of these goals, each project must also meet one of three outcomes identified by HUD: affordability, accessibility, or sustainability.

Aiken County and Edgefield County are not CDBG entitlement communities, and therefore participate in the state CDBG program. The state CDBG program does not cover septic repairs. It does allow for extending sewer to low to moderate income subdivisions that have septic issues if 70% of the subdivision is willing to connect to sewer. The City of Aiken is a CDBG entitlement community, but has not specifically included septic or sewer repairs in their 5-year plan. However, septic repairs in the City limits may be able to be covered under emergency home repairs.

The City's and state's CDBG priorities may change, so CDBG funding in the Watershed may be pursued if available in the future.

10.2 Self-Supporting Funding

Stormwater Utility Fee

Both the City of Aiken and Aiken County have stormwater utility fees which can help fund portions of this Watershed Based Plan. Edgefield County does not have a stormwater utility fee.

Landowner Support

If grant opportunities are made available for implementation of this Plan, landowners will be required to provide a match (up to 40%) for installation of certain BMPs (such as agricultural, septic, and rain gardens). In order to meet this match, some landowners may be able to perform in-kind labor as a way to match these funds.

11 Technical Assistance

If awarded a 319 Implementation Grant, the City of Aiken has requested that SCDHEC return to monitoring water quality parameters (such as bacteria, nitrogen, phosphorous, TSS, etc.) at E-094 and RS-02480 on a regular basis.

NRCS, one of many valuable partners in this project, will assist the City of Aiken in recruiting agricultural landowners, developing Conservation Plans and offering recommendations for agricultural BMPs. NRCS also administers the EQIP cost share program. The landowners may apply for EQIP funds, in order maximize the effect of the 319 grant funds. Technical Service Providers and SWCDs may assist NRCS with conservation plans and BMP inspections.

In addition to the assistance of the Aiken and Edgefield NRCSs, SWCDs, the City of Aiken will administer the implementation project with the help of many supporting organizations which may include: Aiken County, Edgefield County, SCRWA, SC Forestry Commission, SCDHEC Public Health, Edgefield County Water Sewer Authority, SCDNR and Upper and Lower Savannah COGs. The participation of these groups will have a large impact on the ability to conduct an effective and efficient social marketing campaign.

The City of Aiken may outline portions of the Plan to be conducted by a consultant. These tasks are anticipated to be related to project oversight, reporting, and social marketing.

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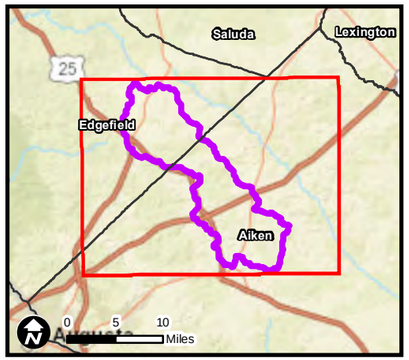
APPENDICES

Appendix A

Figures



Watershed Features Map

Shaws Creek Watershed
Aiken & Edgefield County, South Carolina

- County Boundary
- Airport
- Municipalities
- South Fork Edisto TMDL
- Upper & Middle Shaw Creek Watershed
- Approved TMDL Station
- Water Quality Monitoring Station
- 303D Impaired Station
- Aiken / Shaw Creek WTP
- Holding Pond
- Streams (Watershed Clip)

CITY of AIKEN SOUTH CAROLINA

amec foster wheeler

Job No.	6250150095
Drawn By:	BWS
Reviewed By:	KEG
Date:	05/11/2017

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Johnston
Edgefield
Shaw Creek
RS-03344
Edgefield
Aiken
Trenton
Edgefield County Airport
RS-02480
Holding Pond
E-579
Aiken Municipal Airport
Edgefield
Aiken
E-094
Murphys Estates
City of Aiken Water Treatment Plant
WTP
Shaw Creek
Aiken
Graniteville
Augusta
0
1
2
Miles

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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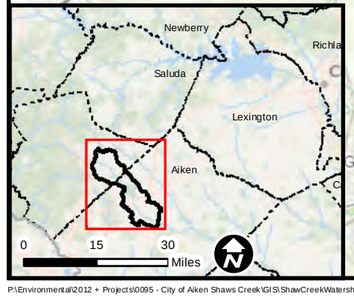
1992

Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Land Classification Legend

- Open Water
- Low Industrial Residential
- High Industrial Residential
- Commercial/Industrial/Transportation
- Bare Rock/Sand/Clay
- Transitional
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Pasture/Hay
- Row Crops
- Urban/Recreational Grasses
- Woody Wetlands
- Emergent Herbaceous Wetlands



0 1.75 3.5 Miles

2011

Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Land Classification Legend

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

Shaws Creek Watershed
USGS 1992 & 2011 NLCD

Aiken & Edgefield County, South Carolina

amec foster wheeler

Drawn: BWS Checked: KEG Date: 05/11/17

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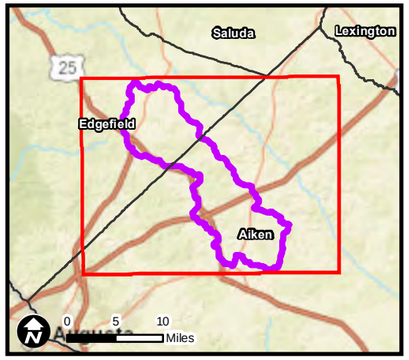

Watershed Farms Map

Shaws Creek Watershed
Aiken & Edgefield County, South Carolina

- County Boundary
- Aiken County MS4
- Airport
- Municipalities
- City of Aiken MS4
- Upper & Middle Shaw Creek Watershed
- Approved TMDL Station
- Water Quality Monitoring Station
- 303D Impaired Station
- NPDES Discharges
- Aiken / Shaw Creek WTP
- USGS HUC-12
- Holding Pond
- Streams (Watershed Clip)
- Carolina Bay
- Animal Feeding Operation (AFO)
- Livestock Farm
- Nursery
- Other Crop Farm
- Peach Farm

CITY of AIKEN SOUTH CAROLINA

amec foster wheeler

Job No.	6250150095
Drawn By:	BWS
Reviewed By:	KEG
Date:	05/11/2017

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Animal, crop, and livestock farms are aerial interpreted, with limited field verification. Visually observed during windshield survey:
Cows: 195
Horses: 124
Goats: 9

Johnston
Edgefield
Shaw Creek
RS-03344
Edgefield
Aiken
Trenton
Edgefield County Airport
RS-02480
Holding Pond
E-579
Aiken Municipal Airport
Edgefield
Aiken
E-094
WTP
City of Aiken Water Treatment Plant
Shaw Creek
Murphys Estates
Aiken
Graniteville
North Augusta
0
1
2
Miles

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, Mapmyindia, © OpenStreetMap contributors, and the GIS User Community

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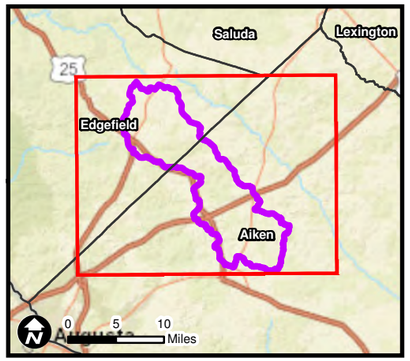

Industrial Areas Map

Shaws Creek Watershed
Aiken & Edgefield County, South Carolina

- County Boundary
- South Fork Edisto TMDL
- USGS HUC-12
- Upper & Middle Shaw Creek Watershed
- Aiken / Shaw Creek WTP
- Mines
- NPDES Discharges
- Holding Pond
- Streams (TMDL Clip) selection
- Streams (Watershed Clip)
- Airport
- Industrial Parcel
- City of Aiken MS4
- Municipalities
- Aiken County MS4

Map ID	TMS	Name
1	136 05 09 001	Aiken Co. Animal Shelter
2	135 18 01 001	Aiken Co. Detention Center
3	135 18 01 001	Aiken Co. Public Works
4	117 00 11 007	Aiken Co. Schools Operation and Maintenance Center
5	118 16 02 001	Aiken Recycle Center
6	192 00 00 024	Edgefield County Convenience
7	103 16 02 003	Graves Auto Salvage
8	133 00 11 034	Hardee's/Days Inn Wet Pond
9	192 00 00 068	Jackson's Deer Processing
10	133 00 20 001	McDonald's Garbage Leachate
11	100 00 03 001	Proposed Mason Branch Tract
12	119 13 04 019	Randy Hill Land Clearing Debris (LCD) Landfill
13	171 00 00 046	Ridge Recyclers Waste Tire Processing
14	133 00 19 003	Shell Gas Station
15	133 00 11 012	Skinning Shack Deer Processing (Ag map)
16	118 16 01 001	Southeastern Clay Company Industrial Solid Waste Landfill
17	151 19 01 008	Tod's Hill Subdivision - Erosion
18	118 00 05 001	Ventures Industrial Park
19	117 00 11 004	Verenes Industrial Park

Johnston
Edgefield
Trenton
Edgefield County Airport
Shaw Creek
Edgefield
Aiken
Holding Pond
Aiken Municipal Airport
City of Aiken Water Treatment Plant
WTP
Murphys Estates
Graniteville
Aiken
13
6
9
11
10
14
8
15
19
4
18
5
16
17
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12
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1

0 2 4 Miles

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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CITY of AIKEN SOUTH CAROLINA

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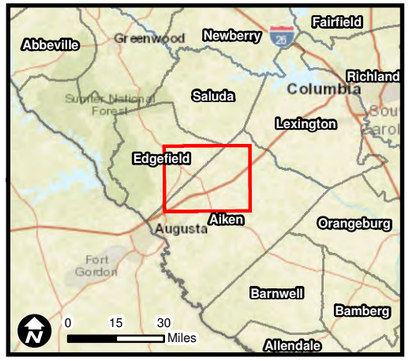

Soil Type, Development Age, & Known Sewer Map

Shaws Creek Watershed
Aiken & Edgefield County, South Carolina

- Upper & Middle Shaw Creek Watershed
- Municipalities
- Holding Pond
- Streams (Watershed Clip)
- Recorded Storm Sewer Overflows
- Sewer Lift Station

Known Sewer

- City of Aiken
- ECWSA

Hydrologic Soil Group

- A
- B
- C
- D

Parcel with Building & Year Built

- Unknown
- Before 1986
- Between 1986 and 2008
- After 2008

Job No.	6250150095
Drawn By:	BWS
Reviewed By:	KEG
Date:	05/10/2017

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Estimated Households on Septic with Year Built

	Unknown	Before 1986	1986-2008	After 2008	Total
Aiken County, A&B Soils	236	459	227	54	976
Aiken County, C&D Soils	119	209	303	58	689
Edgefield County, A&B Soils	0	256	242	28	526
Edgefield County, C&D Soils	0	13	17	4	34
Total	355	937	789	144	2315

P:\Environmental\2012 + Projects\0095 - City of Aiken Shaws Creek\GIS\Livestock Info\Soils, Development Age, Known Sewer.mxd

Appendix B

Brainstorm Meeting Summaries

Agricultural Sources Brainstorming Session – Shaw's Creek Watershed | August 17, 2016

The overall goal of the Shaw's Creek Agricultural Brainstorm Session was to determine the sources of pollutants in the watershed and attempt to quantify those sources.

In order to quantify agricultural sources of pollutants such as bacteria, nutrients and sediment, we need to quantify the following:

- Approximate # of livestock farms and the approximate # of each type of livestock at each farm
- Approximate # of horse farms and the approximate # of horses at each farm
- Approximate # of Agriculture Feed Operations (AFOs) and the approximate # of poultry at each AFO
- Approximate # of crop farms in the watershed and types of crops at each farm
- Approximate # of crop farms that spread chicken/turkey litter
- Approximate acres of eroded farm lands

Based on the desktop review and windshield survey we had conducted, we prepared a draft map of the types/locations of farms, types of animals and crops and quantities of animals that we are aware of. Our discussion resulted in the following input:

Crop Farms

Peaches are the dominant crop in the Edgefield portion of the watershed. The second largest peach producer in the country is in this watershed, and the owner is potentially the next SC Commissioner of Agriculture. The farming practices of peach farmers (especially lack of vegetative cover between rows) have resulted in significant erosion issues. Conservation Plans are not required on peach fields. Peach farmers lease most of their land. Landowners charge a higher rental rate for peach farmers because they know the land is going to be damaged by the farming practices. Peach trees stop producing after about 12 years. In the past, peach farmers would plant an annual crop to help land recover after the ~12 years before replanting peach trees, but now they remove the trees, burn them and within a few months replant new peach trees and are back in production. Myra stated that there of the 3 big peach companies in Edgefield County:

- One company lets natural vegetation grow between rows of peach trees (minimal erosion)
- One company plants row crops (that complement peach trees) between rows of peach trees (minimal erosion)
- One company keeps a "clean orchard floor" with no vegetative cover between peach tree rows, with heavy erosion in 80% to 90% of that companies' fields.

Myra recommended that efforts to encourage/require BMPs (such as vegetative cover between rows of peach trees, buffers around waterways and terracing on waterways) be communicated with the landowners, because most of the peach fields are leased. As part of implementation, we could prepare language for the landowners to include in the lease contracts.

Myra also stated that NRCS and Clemson Extension have a research grant related to peach production. Even though the research shows that the peach producers can reduce their fertilizer application by $250,000 based upon tissue samples, the companies are not willing to do it.

In considering the low pH impairment in Shaw's Creek watershed, it was determined (according to a Clemson Extension document) that peach trees do not require acidic soils to grow (ideally pH of 6.5). However, fungicides (such as sulfur-based) can acidify the soils and are applied anytime there is a threat of rain.

In addition to peaches, crops in the watershed include: soybeans, peanuts, cotton, corn, strawberries, and melon.

Josh estimated that chicken litter is spread on 90% of row crop fields in the watershed. We can also request from SCDHEC the list of No Discharge Permits for the crop farms that spread chicken litter in the watershed.

Livestock

During the windshield survey, we counted from the road approximately 225 cows, 95 horses and 9 goats at various farms in the watershed. The locations of these farms are shown in yellow/gold on the attached map. In order to better estimate the number of livestock in the watershed, Amec Foster Wheeler will send the shapefiles of the farms to Josh and Myra so that they can incorporate their data and help fill in the gaps.

Wildlife

Potential pollutant sources from wildlife, such as deer and wild boars, were discussed. Amec Foster Wheeler did not see any signs of deer carcasses being dumped in creeks, and, although there are some private hunt clubs in the watershed, it was concluded that these hunt clubs have proper BMPs, such as disposal pits, for proper carcass disposal. However, Yvonne suggested that hunters would make great "eyes in the watershed" to report issues.

Wild boars, on the other hand, are in the watershed, reproduce rapidly and their rooting, wallowing and trampling activities destroy soils, vegetation and water quality. A student at Clemson has been studying and trapping wild boars. There is also a Wild Hog Task Force.

Nurseries

There are at least 2 large plant nurseries in the watershed, though one is currently not active. The one large nursery, Costa Farms is currently having issues with stormwater quantity complaints from neighbors. Fertilizer use/runoff from nurseries is a concern. 319 Implementation would be able to target nurseries because unfortunately USDA does not consider nurseries as agricultural.

Animal Feeding Operations (AFOs)

Josh believes there is at least one more AFO within the Aiken portion of the watershed. It was discussed that AFOs often will do their own composting of birds on site instead of using large

burial pits. These composting procedures require conservation plans and are designed independently with Agricultural Engineers.

Implementation

We were fortunate to have Chanda Cooper (Richland SWCD) attend the agriculture brainstorm session and share her experience implementing the 25 Mile Creek 319 grant, which has prioritized livestock BMPs to begin addressing the bacteria TMDL in that watershed. The 25 Mile Creek 319 implementation project was set up to prepare conservation plans and BMP inspections by a part-time employee, rather than through the NRCS (like 319 grants in other counties/watersheds). She shared the conservation plan template, application for assistance, financial assistance agreement and other farmer recruitment tools.

The differences between the NRCS EQIP process and 319 funding were discussed. In particular, NRCS has limited coverage for horse farms, as they consider horses a hobby (not agriculture), and will not cover at all if horses are boarded. NRCS also will not cover board fencing. Amec Foster Wheeler has contacted DHEC and clarified that board fencing is possible with 319 funding, though the conservation plan will need to be general with regard to fencing type, as they must follow the conservation plan. Participants may use EQIP funding and/or 319 funding, depending upon the specific BMPs, though EQIP funding is better cost share (up to 90% vs. 60% for 319) and 319 funding is typically much faster. Other grant sources will be investigated and pursued, as needed.

Action Items:

1. Amec Foster Wheeler will send Josh and Myra the shapefile of the farm data collected to date in the watershed
2. Josh and Myra will use Amec Foster Wheeler's shapefile to overlay with their data and help fill in the gaps of types of farms and types and numbers of livestock in the watershed.
3. Myra will send to Amec Foster Wheeler a copy of the Clemson Extension research annual report on peaches (from Mike Henderson).
4. Myra to possibly quantify the amount of and locate the estimated erosion from the peach farms in the Edgefield portion of the watershed.
5. Amec Foster Wheeler will gather additional information about wild hog population in the watershed and determine whether 319 funds can be used for wild hog traps.
6. Amec Foster Wheeler will gather SCDHEC ND Permits within the watershed.

Urban Sources Brainstorming Session – Shaw's Creek Watershed | October 19, 2016

Thank you to those who attended the Shaw's Creek Urban Sources Brainstorm Session on Wednesday. It was very helpful to have your input into the current and future urban sources in the watershed. I have attached the agenda for your records, but below is a summary of the items that were of further interest by the attendees. As we explained, we will not write anything in the plan that commits you to an action. However, you also do not have to wait for the plan to be developed to take steps toward improvements in your regulations.

Regarding future development, the following ideas were of most interest to the municipalities:

1. Development of (or expansion of) permanent water quality buffers (aquatic buffers). Attached is a brochure describing Lexington County's water quality buffers as a reference (100 feet for perennial streams, 50 feet for intermittent streams, ponds and lakes and wetlands). Also attached is a Fact Sheet that Lexington County distributed at a public hearing when their buffers were being questioned last year. This (and other regulations) could be adopted municipal-wide or in the watershed only ("Shaw's Creek Watershed Overlay District"). Buffers will be most effective if all jurisdictions in the watershed adopt the same requirements, but any stream/wetland protection in the watershed will help. Note:

    - Water quality buffers typically address land disturbance, and often exclude agriculture. You may choose to clarify that your land development regulations (such as buffers and land disturbance requirements) apply to increased impervious area on agricultural land as well. See below for language used by Lexington County.
    - We plan to address agricultural conservation practices through a 319 grant once the Watershed Based Plan is written. However, participation in the 319 implementation project will be voluntary.

2. Land Conservation –
    a. Should an industry in the area need wetland mitigation credits, municipalities could become an involved stakeholder during the 404 permitting process and encourage preservation and restoration of sensitive areas (wetlands, Carolina Bays, etc) through mitigation.
    b. If funding is available, conservation easements could be purchased, but this is a large expense, and other efforts, such as adopting permanent water quality buffers, may be a more worthwhile pursuit.

3. Better Site Design / Stormwater Management Practices (ex. Unified Sizing Criteria) – The City of Aiken is considering requiring a new development (outside Shaw's Creek Watershed) use the Unified Sizing Criteria with an 80% TSS removal requirement as a trial/demonstration project. Note that August, GA and Richmond County have been requiring the Unified Sizing Criteria for years, as it has been a requirement in Georgia. Therefore, it should not be new to the engineering community.

4. Parking lots – Faith Riders Fellowship Church grass parking lot shows a great example of "better site design" for churches or other commercial sites with low frequency of parking needs. Regulations should not prevent grass parking lots when applicable.

Regarding current urban sources, the following topics were noted:

1. Erosion and Sediment Control – Improved inspections and enforcement of construction sites will hold contractors accountable for meeting the requirements of their SWPPP. Stop Work Orders are very effective at getting issues resolved quickly, and they do not cost a municipality anything except time.

2. Municipal Operations – Improved Good Housekeeping at municipal facilities is essential in demonstrating the municipality's efforts to protect water quality. Examples of good housekeeping are: storing all chemicals under a roof, off the ground and in secondary containment; repairing all leaking containers and vehicles; having spill kits close to area most likely to have a spill; erosion prevention for stockpiled materials; lids closed on dumpsters; training employees about pollution prevention and good housekeeping; etc. Municipal operations in the watershed include: City of Aiken: Airport, Water Treatment Plant, lift stations, Old Water Treatment Plant, Holding Pond; Aiken County: Animal Shelter, Recycle Collection Center, Animal Shelter, Detention Center, Public Works, Firing Range.

3. Verenes Industrial Park – The Verenes Industrial park surrounding the airport appears to have been built before stormwater regulations were in place. The large impervious rooftops and parking lots with little or no detention can result in highly erosive flows. One example is at the Industrial Service Corp on Windham Blvd. The DOT ditch along Windham Blvd between Industrial Corp. and Givens St. is highly eroded with significant sediment transport into a wooded area off of Givens St. The attached photo is an example of the erosion in the ditch that is also likely occurring in the streams surrounding this industrial park. Joe is planning to investigate. I will send photos in a separate e-mail to George and Joe. A regional stormwater pond to address erosive flows in this area may be able to be funded by a 319 grant.

4. Days Inn/Hardees Pond – The wet stormwater pond behind Days Inn and Hardees appeared to have a lot of algae. In the attached Google Earth aerial photo, the Shaw Industries pond also looks green, though it appeared brown when we did the windshield survey. A third pond south of Shaw Industries is somewhat green in the aerial and appears to be in a mobile home park. This could be an old lagoon. Joe is planning to investigate these.

5. Graves Junk Yard – During our windshield survey, this appeared to be a very large junkyard with a high potential for pollutants. However, Joe assured us that there are 2 detention ponds and the county monitors the outfalls quarterly and has not seen any indication of a sheen or other signs of pollution. He can require monitoring should the outfalls indicate suspicion.

6. 224 Paces Creek Road – Eroding bank of red clay (possible former railroad embankment?) right next to a stream which appears to have sediment and algae. Joe is planning to investigate. I will send photos in a separate e-mail to George and Joe.

We appreciate your attendance and input in Wednesday's discussion. We will proceed with the development of the Watershed Based Plan and will provide a draft for your review and approval prior to submittal to SCDHEC. Please keep us informed of any progress or ideas you may have moving forward with any regulation changes.

The next brainstorm session topic will be sewer/septic issues in the watershed. I will be in touch with some of you soon to obtain more information and stakeholders to invite to that session.

Thank you,
Angela and William

Sewer/Septic Sources Brainstorming Session – Shaw's Creek Watershed | December 9, 2016

The overall goal of the Shaw's Creek Sewer Septic Brainstorm Session was to determine sources of sewer and septic issues in the watershed and attempt to quantify those pollutants.

Septic Issues

Estimate of failing septic systems:

In order to estimate the loads from failing septic systems, we can take one of two approaches or a combination:

1. Map where the septic systems are and then estimate which ones may be failing based on the soil type and age of home/system or
2. Estimate the total number of septic systems in the watershed and assume (based on rule of thumb) that 10% are failing.

We have obtained the City of Aiken sewer lines in GIS and a .pdf of sewer lines from Edgefield Sewer and Water Authority. Using these data sets, we can approximate the areas of the County that are on septic. However, in order to count the number of septic systems (for either option above), we still need to know how many buildings (ie septic systems) are in the septic part of the watershed. Scottie suggested that Cherie Mortiz in GIS could answer the question of whether Aiken County tracks whether a parcel is on septic or sewer and when the building was built (ie septic system installed). Amec Foster Wheeler has since spoken with Cherie, who says that Aiken County does not track this information in GIS, but perhaps the Planning Department does. Amec Foster Wheeler has left a voicemail with Stephen Strohminger (Aiken County Planning Director) and LaKeisha Bryant (Edgefield County) to find out if this information is tracked.

Tim Pearson (DHEC) has stated that DHEC regulations require the Columbia DHEC Office be notified of all repairs to existing septic systems. Amec Foster Wheeler will contact DHEC to see if this information is tracked in a usable format. Tim stated that DHEC regulations do not require notification for the pumping out of systems.

Aiken County has located approximately 70 failing septic systems per year through their IDDE program. A licensed contractor inspects the suspected failing systems and Aiken County Stormwater checks that it is completed.

Edgefield County may have more clay soils than Aiken County and therefore may have more failures.

Aiken County and Edgefield County are not entitlement communities and therefore fall under the state CDBG plan, which does not cover septic repairs. CDBG could, however, pay to connect a current septic – low to moderate income – neighborhood to sewer if there were proven septic issues and 70% of the neighborhood is willing to connect to sewer.

Adding bedrooms

The topic of the procedure to ensure that septic systems are sufficient when bedrooms are added to existing homes was discussed. Tim has confirmed that DHEC regulations require the expansion of a septic system for all bedroom additions. He advises that municipalities instruct applicants to apply for a septic permit for the bedroom addition. Amec Foster Wheeler will contact the Planning Departments at Aiken County, City of Aiken and Edgefield County (Ginny Wall) and DHEC to confirm that this process is being implemented.

Repair permits

Tim Pearson explained that the new septic regulations require planned repair areas designed for future failures (future extension of drain field). He confirmed, however, that DHEC will not issue repair permits.

Acceptable Septic System Letter

As a measure to help ensure that septic systems are pumped out and inspected regularly, Kershaw County requires an "Acceptable Septic System Letter" when a home with a septic system is sold in the Lake Wateree Overlay District (see language from Kershaw County's regulations below). Kershaw County's Planning Department says that they believe that the inspections are working when completed, but feel that they are not always completed on the sale of a home. They plan to tighten the language and enforcement to make sure that this is happening. The City of Aiken expressed interest in investigating such a regulation in Shaw's Creek Watershed.

Tim estimates that 95% of septic failures are in the drain lines, which can't be inspected unless septage is on the surface. However, an inspection would require that the tank be pumped out, which would help with preventative maintenance.

CDBG Funding

The City of Aiken is an entitlement community, but has not specifically included septic or sewer repairs in their 5-year plan. However, septic repairs may be able to be covered under emergency home repairs, which is included. Aiken County and Edgefield County are not entitlement communities, and therefore participate in the state CDBG program. The state CDBG program does not cover septic repairs. It does allow for extending sewer to low to moderate income subdivisions that have septic issues if 70% of the subdivision is willing to connect to sewer.

Grant Procedures

A 319 grant typically pays for 60% of a septic repair. The possibility of a sliding scale (to help with the 40% match for low income families) was discussed. This would include additional match from the municipalities.

A low to moderate income family in the City of Aiken may qualify for full coverage of septic repair cost if they meet the requirements of the City's "emergency home repairs" CDBG.

Publicizing/recruiting homeowners

Various options were discussed for publicizing an implementation grant and recruiting septic homeowners: annual tax bill in the counties, water bill in the City (assessor may be able to localize in the watershed), door hangers, church bulletins, Aiken Standard, Edgefield Advertiser, Edgefield Daily.

Bid/ septic

The procedure of putting septic repairs out to bid were discussed for future implementation grant. The two options appear to be:

1. Put one RFQ out to bid and select one or two dedicated septic contractors to repair all systems in that year according to the submitted fee schedule.
2. Require multiple quotes for each septic repair and select one each time (<$5,000 does not require multiple quotes)

Sewer

Edgefield County Water and Sewer Authority

The Edgefield service territory in Shaw's Creek Watershed is only in the Trenton area. John Hare (Edgefield County Water and Sewer Authority) stated that he has not had any SSOs in Shaw's Creek watershed in the last 5 years. However, he does not have a FOG program and feels that additional FOG education would help. He has provided .pdfs of his sewer lines in the watershed.

City of Aiken Sewer

The City of Aiken has provided Amec Foster Wheeler its service lines in GIS, mostly in the bottom of the watershed and near the Airport and surrounding industrial and commercial area. The sewer line does cross Shaw's Creek.

FOG program requirements

Tim Pearson has since confirmed that Edgefield County Sewer and Water Authority is not required to have a FOG program. However, if issues are arising due to the build-up of grease, it is addressed under requirements to properly operate and maintain the sewer system.

May focus FOG education on apartments on Wire Rd and Roodey Mason Rd – Meadow Brook?). Long Leaf Senior Village has had issues with SSOs.

Aiken's restaurant FOG program may not currently be implemented in the unincorporated part of its service territory around the Industrial Park. George Grinton will investigate. Unlikely to be a big problem because most of the flow in Aiken's lines in this watershed is industrial with a lot of flow.

Action Items:

1. Scotty, Rodney and George to follow-up with corresponding Planning Departments on availability of parcel data (electronic or GIS) on septic vs. sewer and year building built.
2. Scotty, Rodney and George to follow-up with corresponding Planning Departments to confirm procedure for requiring septic permit when adding bedrooms on septic houses.
3. Amec Foster Wheeler to research success of "Acceptable Septic System Letter" in other communities.
4. Amec Foster Wheeler to check SSOs in Aiken County portion of watershed.
5. George to check on FOG program in unincorporated Aiken County sewer service addresses.

****

Kershaw County Zoning and Land Development language:

Inspections of Existing Installations *- The following regulations shall apply to all OSDS within the LWOD installed prior to the effective date of this Ordinance, as well as all OSDS within the LWOD installed subsequent to the effective date of this Ordinance.*

1. ***Inspections Prior to Sale of Real Estate Interest*** *- As of the effective date of this Ordinance, prior to the sale of any ownership interest of a lot containing an OSDS, the seller of interest shall provide the buyer with a written inspection report of the system prepared by an inspector. Sale of ownership interest does not include the conveyance by gift or inheritance from one family member to another. The inspection shall occur no earlier than sixty (60) days prior to the sale. Prior to the inspection, a pump-out of the septic tank is required to insure a proper inspection of the interior of the tank, to check for leaks from the building, and to check for saturated conditions in the drain field. A copy of the inspection report and sewage disposal manifest from the pumping contractor shall be submitted to the Building Official within ten (10) days of the inspection. The inspection report shall certify that the system is in good operating condition. Otherwise, the following actions shall be taken:*

a. ***Minor Repairs or Alterations*** *- If the inspector determines that minor repairs or alterations are needed to bring the OSDS into good operating condition (such as replacing cracked lids and missing or broken tees and baffles), such work shall be done within ninety (90) days of the inspection. Evidence of said work shall be submitted to the buyer or prospective buyer and a copy submitted to the Building Official.*

b. ***Failure Evaluation and Repairs*** *- If the inspector determines that the OSDS has failed, as herein defined, the Building Official shall notify SCDHEC of the failure within five (5) days of receiving the inspection report. The property owner shall:*

1.) Contact SCDHEC within fifteen (15) days of the inspection to request a failure evaluation and course of corrective action by a licensed contractor.

2.) Submit evidence of repairs to the buyer or prospective buyer and the Building Official within sixty (60) days of repairs.

Additional language for Approved Septic System Letters in Massachusetts:
http://www.mass.gov/eea/agencies/massdep/water/wastewater/septic-system-inspections.html#Whenasepticsystemmustbeinspected

Wildlife-Forestry-Nursery Sources Brainstorming Session – Shaw's Creek Watershed | December 9, 2016

The overall goal of the Shaw's Creek Wildlife-Forestry-Nursery Brainstorm Session was to determine sources of pollutants in the watershed from wildlife, forestry practices and nurseries and attempt to quantify those pollutants.

Nursery:

Costa Nursery - grows containerized perennials (mainly flowers). They have 3 ponds in series, and use the bottom pond for irrigation. Representatives from Costa Nursery were unable to attend. Amec Foster Wheeler will follow-up via phone or e-mail.

SCFC Taylor Tree Nursery – grows pine trees and hardwoods (bare roots). They use liquid (spray) fertilizer every week, calibrated for Nitrogen needs based on soil analyses. Due to sandy soils, there are some erosion issues.

Forestry:

Edgefield County is a very active for forestry activities. The SC Forestry Commission (SCFC) requires loggers to initially take a 2-day training (half a day on BMPs) and an annual video update training. SCFC inspects active sites monthly and DHEC enforces issues the SCFC finds. Also saw mills who are Sustainable Forestry Initiative (SFI) certified require loggers to be in compliance and will reject lumber from loggers who do not meet requirements.

A number of Carolina Bays located in the upper Shaw's Creek Watershed have been converted to farmland. These would be potential mitigation sites to restore the original ecosystems.

Conservation easements were discussed as a tool to prevent current forested areas from being developed. Amec Foster Wheeler will add current conservation easement areas to the watershed map. Amec Foster Wheeler will also contact Aiken Land Conservancy (formerly Aiken County Open Land Trust), ACE Basin, Nature Conservancy and Audobon to learn more about encouraging landowners to develop conservation easements in Shaw's Creek Watershed.

Wildlife:

There are private properties where hunting occurs, but no DNR Wildlife Management Areas in Shaw's Creek Watershed. Coyotes are prevalent in the watershed and often eat deer carcasses soon after killed. Deer processors are checked by DNR. DOT and Aiken County pick-up roadside carcasses.

Aiken County has 2 C&D Landfills (Barden and Wagener) and one municipal landfill (Three Rivers Regional MSW Landfill at Savannah River Site). Barden is open 7:30-5pm Monday through Saturday; Wagener is open Wednesdays only 7:30 -5pm; and Three Rivers is open Monday through Friday 7:30-4pm and Saturday 7:30 to 1pm. Edgefield County has a C&D Landfill on Hwy 378. Amec Foster Wheeler will contact the landfills to determine whether carcasses are allowed and the cost to dispose.

Wildlife-Forestry-Nursery Sources Brainstorming Session – Shaw's Creek Watershed | December 9, 2016

Although the National Wild Turkey Federation was unable to attend this brainstorm session, its SC headquarters is in Edgefield and their Conservation Field Manager, Lynn Lewis-Weis, is willing to provide input into the Watershed Based Plan.

Placing signs (with the watershed name and "No Dumping Allowed" and fines) at the stream crossings was discussed as a good educational BMP to reduce dumping of carcasses and other trash in the creek at stream crossings. These could by paid for by 319 funds.

Action Items:

1. Amec Foster Wheeler to contact Costa Nursery with questions about procedures and BMPs.
2. Amec Foster Wheeler will add current conservation easement areas to the watershed map and reach out to Aiken Land Conservancy (formerly Aiken County Open Land Trust), ACE Basin, Nature Conservancy and Audubon to learn more about encouraging landowners to develop conservation easements in Shaw's Creek Watershed.
3. Amec Foster Wheeler will contact the landfills to determine whether carcasses are allowed and the cost to dispose.
4. Amec Foster Wheeler will reach out to Lynn Lewis-Weis at the National Wild Turkey Federation to obtain input into wildlife issues in the watershed.
5. Amec Foster Wheeler will contact DNR to obtain input into other wildlife issues in the watershed, particularly wild boars.

Appendix C

Lexington County's Permanent Water Quality Buffers Requirements

Buffers are a natural way to protect water courses.

Stream Buffers are 100 ft along perennial streams and 50 ft along intermittent streams. Stream buffers protect stream banks from erosion and improve water quality.

Shoreline buffers are 50 ft from the shoreline of ponds and lakes. Shoreline buffers protect shores from erosion and enhance the integrity of the lake or pond.

Water Quality Buffer Quick Facts

- Floodway areas greater than and equal to 100 or 50 ft may be used as the water quality buffer area.
- Utilities are allowed in water quality buffers, but must remain 25ft from the stream or shoreline.
- The buffer area can be increased based on neighboring land use or slope.
- Single family lots not associated with a larger common development are exempt from the buffer requirement.
- Properties less than 5 acres are exempt from the water quality buffer requirements.

More information on stream and shoreline buffers can be found in Chapter 3 of the Lexington County Land Development Manual located at www.lex-co.com/departments/publicwoks/stormwater.html.

The Natural Way to Protect Waterways

Stormwater Division
440 Ball Park Road
Lexington, SC 29072

Phone: 803-785-8201
Fax: 803-785-8593

Water Quality Buffers

The Natural Way to Protect Waterways

Public Works Stormwater Division

803-785-8201

Water Quality Buffers

Water quality buffers (a.k.a. riparian buffers) are areas of natural vegetation along a water-body such as lakes, streams, rivers, and wetlands. Water quality buffers aid waterways by stabilizing stream banks, filtering pollutants, and slowing stormwater runoff entering the waterway.

There are three main types of water quality buffers:

- Grass buffers- lowest pollutant removal potential
- Shrub buffers- higher pollutant removal efficiency and limited flood control
- Forest buffers: highest pollutant removal efficiency and flood control

Lexington County requires water quality buffers in an effort to protect riparian and aquatic ecosystems, improve water quality, and provide for the environmentally sound use of the County's land resources.

Lexington County Stream Buffer Requirements

Lexington County requires a 100 ft buffer on all perennial streams and a 50 ft buffer on all intermittent streams as identified on a 7.5 USGS quad map, US Army Corp of Engineers of the Public Works Stormwater Division.

Stream buffers cannot be disturbed during project construction and must be left in the existing conditions upon completion of construction activities. The area associated with a stream buffer may be dedicated to the County, turned over to a Homeowners Association, or included as part of a conservation easement. Stream buffers shall be maintained in accordance with Lexington County's maintenance and inspection requirements for permanent stormwater management structures.

Stream buffers must be marked with permanent signage to inform the public that water quality buffers may not be disturbed.

Lexington County Shoreline Buffer Requirements

Lexington County requires a 50 ft buffer along shorelines associated with ponds and lakes that are fed by springs or streams. For ponds and lakes, the shoreline is considered the 100-yr high water elevation. For Lake Murray the shoreline is considered the 360 elevation.

Shoreline buffers are considered areas of managed vegetation. Limited clearing of understory trees and shrubs are allowed to provide access to the shoreline and view corridors.

Permanent signage is not required, but is recommended, on shoreline buffers. Management and maintenance requirements of shoreline buffers are the same as those for stream buffers.

Lexington County Wetland Buffer Requirements

Lexington County requires a 50 ft buffer around wetlands associated with a stream and those not associated with a water body. The buffer should be measured from the edge of the delineated wetland area. The management, maintenance, and signage requirements listed under stream buffers also apply to wetland buffers.

Appendix D

Development of Shaws Creek Land Conservation Program

Development of Shaws Creek Land Conservation Program

Introduction

In order to protect water quality within the Shaws Creek Watershed, the concept of a Land Conservation Program is proposed. The Shaws Creek Watershed consists of Upper and Middle Shaws Creek Subwatersheds (Hydrologic Unit Codes (HUC) 030502040106 and 030502040107). The Shaws Creek Watershed has a total area of 54,297 acres that encompasses portions of Aiken and Edgefield Counties. Shaws Creek drains into the South Fork Edisto River and is a vital resource as a recreational resource and as one of the primary drinking water supply sources for the City of Aiken. Aiken's Shaws Creek Water Treatment Plant supplies water to 15 to 25% of the City's 17,584 residential customers and 1,773 business customers, depending upon demand. A land conservation program has the potential to reduce sources of surface water pollutants in Shaws Creek, and ultimately the Edisto River. Protecting Shaws Creek will be a benefit to the local economy and the quality of life for citizens who live around and enjoy the stream and river. As important, it will protect the City of Aiken's drinking water and those who use it.

Water quality protection is a popular conservation goal in and of itself. The goal of water quality protection, however, often overlaps with other conservation goals. There are several complimentary conservation programs currently operating in the watershed including the Nature Conservancy's (TNC) Aiken Sandhills Priority Area which targets specific plant communities and ecosystems that TNC hopes to conserve (The Nature Conservancy 2017). Additionally, Aiken has been identified as a region of high Carolina Bay density by the Isolated Wetlands and Carolina Bays Task Force. This task force seeks to implement a "broad voluntary, incentive-based approach" to address the need for conservation and preservation of isolated wetlands and Carolina Bays. A land conservation program within the Shaws Creek Watershed is additionally incentivized by the protection of ecosystems that improve water quality.

Watershed Issues

The Shaws Creek Watershed is within the South Fork Edisto River Total Maximum Daily Load (TMDL) for bacteria. Other water quality issues within the watershed include a pH impairment at a water quality monitoring station at Hillyer Branch and significant increasing trends in five-day biochemical oxygen demand. Potential sources of pollution to the Shaws Creek Watershed include urban, wildlife, and agricultural sources, and are a concern for Shaws Creek as a continued source for drinking water.

Maintaining water quality in Shaws Creek is imperative since much of the developable open space in the watershed is under intense development pressure. One such development is proposed on a tract of land surrounding Mason Branch Reservoir. The land was historically used for commercial timber production and a plan has been proposed to build a residential golf community with approximately 4,300 residential units on the property. Local stakeholders have concerns about this development because the City of Aiken uses water from Mason Branch Reservoir to augment stream flows when Shaws Creek is low. A residential development of this size (2,493 acres) within the watershed has the potential to contribute to runoff pollution and have a significant impact from a basin-wide perspective. In addition, as the City of Aiken grows, urbanization will continue to expand north into the Shaws Creek Watershed. Hence, mitigating the impacts of future development, such as the one at Mason Branch Reservoir, with a conservation easement program would benefit water quality and plant communities and ecosystems in the Shaws Creek Watershed.

Watershed Conservation Project

South Carolina has significant experience using conservation easements as a tool for landscape scale protection of sensitive lands within watersheds. For example, the Congaree Land Trust (CLT) has conserved approximately 72,000 acres of priority conservation land in 13 counties of central South Carolina and in the Congaree, Wateree, and Santee River (COWASSEE) Basin (Congaree Land Trust). The

Ashepoo, Combahee, and Edisto River (ACE) Basin Project is another example of a watershed scale conservation project that was launched by a variety of stakeholders and partners to protect the natural character of the ACE Basin. Addressing water quality protection, the Shaws Creek Watershed presents an opportunity for landowners, land trusts, local government, and public agencies to work together to achieve their conservation goals.

A conservation easement is a legal tool for acquiring property rights for the purpose of protecting conservation values. This tool is a legal agreement that limits uses of the land between a landowner and a non-profit land trust or public agency that is qualified to hold such interests. The land trust is responsible for monitoring the easement and enforcing its terms, including annual monitoring visits. Landowners benefit from granting conservation easements to a qualified holder through monetary or tax incentives associated with the easement value. If donating to a land trust permanently protects important conservation resources, then the donation qualifies as a tax-deductible, charitable donation. Property tax value can result from placing an easement on properties in some locations.

The Aiken Land Conservancy (ALC) has been proposed as a potential partner for the City of Aiken in implementing a watershed conservation easement program in the Shaws Creek Watershed. The ALC already owns approximately 730 acres of land and protects approximately 1,677 acres of land through conservation easements ("Protected Lands.") in their service area. A partnership between the City of Aiken and the ALC would serve to protect hydrologic resources and further connect protected lands within the watershed. Habitat connectivity is essential for biological diversity and adaptation to environmental changes. Many conservation initiatives are focused on maintaining habitat connectivity especially when increased urbanization threatens to fragment habitats. The first step towards launching a watershed based conservation easement plan within the Shaws Creek Watershed is to approach potential partners, including ALC, South Carolina Department of Natural Resources (SCDNR), National Wild Turkey Federation, National Audubon Society, The Nature Conservancy, Duck Unlimited, and other similar land conservation groups.

A partnership between the City of Aiken and the ALC and other conservation organizations could allow public funds to be used for watershed conservation. The ALC would set conservation goals and approach land owners about obtaining conservation easements within the target watershed that are focused on riparian zones on their property. Conservation easements can be donated to the ALC or City-provided funds could be used to help facilitate purchase of conservation easements. The City of Aiken can use existing funding sources, or apply for a Section 319 grant, through the South Carolina Department of Health and Environmental Control (SCDHEC), to facilitate or even purchase conservation easements in the interest of preserving and protecting water quality and waterbodies. In addition, the US Department of Agriculture has the Conservation Reserve Program which provides financial incentives, cost-share and rental payments to agricultural producers who convert highly erodible cropland or environmentally sensitive acreage to long-term vegetative cover.

Once ALC and other conservation groups agree to partner with the City of Aiken, environmentally sensitive lands in Shaws Creek Watershed will be identified and prioritized. Prioritizing riparian buffers around wetlands, streams and their floodplains for easements will help protect surface water quality since riparian buffers are proven to help protect waterbodies from stormwater runoff pollution. The use of conservation easements on riparian buffers will complement any current or future regulatory water quality buffers for development in the watershed. A potential added benefit to voluntary conservation easements on riparian buffers is the ability to restrict agricultural use in addition to restricting land development, as is typical with regulatory buffers.

The following is a summary of next steps to initiate development of a Land Conservation Program to protect water quality in Shaws Creek Watershed.

Next Steps

- Prepare watershed conservation maps, objectives, handouts, and goals
- Approach and engage active partners to gauge interest
- Hold a workshop to invite and introduce the topic
- Establish a working group with stakeholders to further develop these recommendations
- Assess both the financial and political viability of these recommendations
- Setup up program support, funding (including grant writing), and reporting
- Implement Shaws Creek Watershed Conservation Plan

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Appendix E

Alternative Post-Construction Stormwater Design Methodologies

Alternative Post-Construction Stormwater Design Methodologies

As Aiken's urbanized area continues to expand, it will become increasingly important that future land development be designed to protect and improve both water quantity *and* water quality. The municipalities within Shaws Creek Watershed have the opportunity to consider adopting alternative post-construction stormwater design methodology to not only meet stormwater quantity criteria but also promote better site design practices and the use of Low Impact Development (LID) and Green Infrastructure (GI) structural stormwater controls to protect water quality, without hindering development. This Appendix provides an explanation of potential stormwater design methodology.

Better Site Design

During the first steps in addressing post-construction stormwater management with the site planning and design process, by implementing a combination of nonstructural approaches, collectively known as stormwater better site design practices, it is possible to reduce the amount of runoff and pollutants that are generated from a site, provide for some nonstructural on-site treatment and control of runoff, and potentially reduce the size and cost of the site's required structural stormwater controls. The better site design approach can be used to better mimic natural hydrologic conditions of the site, include management techniques that have a lower maintenance burden, and provide for more long-term and sustainable stormwater management. Better site design includes:

A. Conserving Natural Features and Resources
    - Examples: preserve undisturbed natural areas, preserve riparian buffers, avoid floodplains, avoid steep slopes, and minimize locating impervious areas on porous soils
B. Using Lower Impact Site Design Techniques
    - Examples: fit design to the terrain, locate development in less sensitive areas, reduce limits of clearing and grading, utilize open space development, and consider creative development design
C. Reducing Impervious Cover
    - Examples: reduce roadway lengths and widths, reducing building footprints, reduce the parking footprint, reduce setbacks and frontages, use fewer or alternative cul-de-sacs, and create parking lot stormwater "islands"
D. Utilizing natural feature for stormwater management
    - Examples: use buffers and undisturbed areas, use natural drainage ways instead of storm sewers, use vegetated swale instead of curb and gutter, and drain rooftop runoff to pervious areas

The use of stormwater better site design can have a number of ancillary benefits, including:

- Reduced construction costs

- Increased property values
- More open space for recreation
- More pedestrian friendly neighborhoods
- Protection of sensitive forests, wetlands and habitats
- More aesthetically pleasing and naturally attractive landscape
- Easier compliance with wetland and other resource protection regulations

Stormwater Management Practices

Within the Shaws Creek Watershed, the municipalities can adopt post-construction stormwater design standards that promote structural stormwater controls that delay, capture, store, treat or infiltrate stormwater runoff to improve water quality and meet stormwater quantity management requirements. For example, one integrated approach for meeting the stormwater runoff quality and quantity management requirements is a volume-based design methodology called the Unified Sizing Criteria.

Volume-based hydrology/volume control practices are based on reducing or treating stormwater volumes to achieve reductions in pollutant loadings and reducing runoff volumes for erosive events that can cause erosion and sedimentation and adversely impact surface water quality. Hydrologic studies show that small, frequently occurring storms account for the majority of rainfall events that generate stormwater runoff, and the runoff from these storms also accounts for a major portion of the annual pollutant loadings. This translates to a water quality volume (WQv) that has been adopted by many state and local agencies (such as Lexington County and the City of Columbia) to size structural control facilities to treat the volume of runoff from the majority of the storms that occur in an average year through infiltration, filtration, or extended detention to maximum pollutant removal. Where the pollutant of concern is generally total suspended solids (TSS), the WQv is calculated based upon impervious surfaces at the site. Hence, the water quality treatment volume is directly related to the amount of impervious cover at a site. If a site designer reduces the amount of impervious cover at a site, the required treatment volume is also reduced.

Another common volume control criteria that has been adopted (and incorporated within the Unified Sizing Criteria design standards) includes a channel protection volume (CPv) that provides extended detention for runoff generated by the 1-year, 24-hour rainfall event in order to reduce bank-full flows and protect downstream channels from degradation from urban development (i.e. further water quality impairments).

Volume-based hydrology methods, i.e. the Unified Sizing Criteria, promotes and provides incentives for the use of better site design practices (as mentioned above) and low impact development techniques. LID/GI structural stormwater controls that can be encouraged using this method include wet ponds, wetlands, bioretention cells, infiltration trenches, enhanced vegetated swales, and porous pavements.

Implementation of Alternative Post-Construction Stormwater Design Standards:

Development and implementation of new post-construction stormwater design standards can be a lengthy process and requires defined objectives, a well-planned stakeholder outreach strategy, a thorough review of existing standards, stakeholder meetings, public meetings, and multiple iterations of document review and revision. Outlined below are potential steps for the City of Aiken, Aiken County and/or Edgefield County to move forward if/when they choose to implement alternative post-construction stormwater design standards.

1. Documents Review
2. Defining Objectives
3. Kickoff Meetings
4. Establish stakeholder group and communication plan / meeting schedule
5. Development of Post-Construction Stormwater Design Standards
6. Ordinances Revisions
7. Stakeholder meetings
8. Final Drafts
9. Council approval
10. Training for staff and/or local engineering community

Appendix F

Pet Waste Ordinance Example

Model Ordinance - Pet Waste

Ordinance # [ ] - Pet Waste

SECTION I. Purpose:

An ordinance to establish requirements for the proper disposal of pet solid waste in **[insert name of municipality]**, so as to protect public health, safety and welfare, and to prescribe penalties for failure to comply.

SECTION II. Definitions:

For the purpose of this ordinance, the following terms, phrases, words and their derivations shall have the meanings stated herein unless their use in the text of this Chapter clearly demonstrates a different meaning. When not inconsistent with the context, words used in the present tense include the future, words used in the plural number include the singular number, and words used in the singular number include the plural number. The word "shall" is always mandatory and not merely directory.

a. Immediate – shall mean that the pet solid waste is removed at once, without delay.

b. Owner/Keeper – any person who shall possess, maintain, house or harbor any pet or otherwise have custody of any pet, whether or not the owner of such pet.

c. Person – any individual, corporation, company, partnership, firm, association, or political subdivision of this State subject to municipal jurisdiction.

d. Pet - a domesticated animal (other than a disability assistance animal) kept for amusement or companionship.

e. Pet solid waste – waste matter expelled from the bowels of the pet; excrement

f. Proper disposal – placement in a designated waste receptacle, or other suitable container, and discarded in a refuse container which is regularly emptied by the municipality or some other refuse collector; or disposal into a system designed to convey domestic sewage for proper treatment and disposal. [Disposal into a stormdrain or stormwater system is strictly prohibited. From Morris, NJ ordinance, full reference below]

SECTION III. Requirement for Disposal:

All pet owners and keepers are required to immediately and properly dispose of their pet's solid waste deposited on any property, public or private, not owned or possessed by that person.

SECTION IV. Exemptions:

Any owner or keeper who requires the use of a disability assistance animal shall be exempt from the provisions of this section while such animal is being used for that purpose.

SECTION V. Enforcement:

The provisions of this Article shall be enforced by the **[Police Department and the Local Board of Health]** of **[insert name of municipality]**.

SECTION VI. Violations and Penalty:

Any person(s) who is found to be in violation of the provisions of this ordinance shall be subject to a fine not to exceed **[insert amount]**.

SECTION VII. Severability:

Each section, subsection, sentence, clause and phrase of this Ordinance is declared to be an independent section, subsection, sentence, clause and phrase, and the finding or holding of any such portion of this Ordinance to be unconstitutional, void, or ineffective for any cause, or reason, shall not affect any other portion of this Ordinance.

SECTION VIII. Effective date:

This Ordinance shall be in full force and effect from and after its adoption and any publication as may be required by law.

ALL OF WHICH IS ADOPTED this _____ day of ____, 200_, by the _____.

Model ordinance based on NJ Model Pet Waste Ordinance:

http://nj.gov/dep/stormwater/tier_A/pdf/pet%20waste%20ordinance.pdf accessed February 5, 2006

Annotations:

Operation and Maintenance Program for the Prevention and Reduction of Pollution in Storm Water Runoff From Municipal Operations within the city of {Municipality Name}, St. Louis County, Missouri, February 2005, Adopted {date} Appendix 2-F6: Model – Animal Waste Ordinance

6.06.030 Possession of Removal Equipment. It is unlawful for the owner or handler of any animal to fail to have in their possession the equipment necessary to remove their animals' fecal matter when accompanied by said animal on public property or public easement, or private property of another.

6.06.040 Set Aside Areas. The above prohibitions shall not extend to areas set aside and designated by the city as areas where animals can be off-lease for exercise or training.

Ordinance #1-05, Chapter 99A Pet Waste, Township of Morris NJ – http://www.morristwp.com/ord-petwaste.asp accessed January 31, 2007

Section III. Requirements for Disposal:
"…On any property owned or possessed by that person, all pet owners and keepers are required to properly dispose of their pet's solid waste at a frequency of at least weekly or more frequently if necessary to prevent a public health nuisance."

Section VI. Violations and Penalty:
"….for each offense, together with the costs of prosecution. A separate offense shall be deemed committed on each day or part of each day during which a violation occurs or continues."

North Kingstown code of ordinances, Chapter 3 ANIMALS, http://www.municode.com/ accessed 1/21/07

Sec. 3-23. Removal of dog feces.
(a) *Required.* It shall be the duty of each person who owns, possesses or controls a dog to remove and dispose of any feces left by such person's dog on any sidewalk, street or other public area. It shall, further, be the duty of each person who owns, possesses or controls a dog to remove and dispose of any feces left by such person's dog on any private property neither owned nor occupied by the person.
(b) *Duty to possess means of removal.* No person who owns, possesses or controls a dog shall appear with such dog on any sidewalk, street, park or other public area without the means of removal of any feces left by such dog. Furthermore, no person who owns, possesses, or controls such dog shall appear on any private property neither owned nor occupied by such person without the means of removal of any feces left by the dog.

(c) *Method of removal and disposal.* For the purpose of this section, the means of removal shall be any tool, implement or other device carried for the purpose of picking up and containing such feces, unexposed to such person or the public. Disposal shall be accomplished by transporting the feces to a place suitable and regularly reserved for the disposal of human feces, to a place specifically reserved for the disposal of dog feces, or to a place so designated as appropriate by the department of public works.
(d) *Fines for violation.* Violation of this section shall be punishable by a fine not exceeding:
(1) $10.00 for the first offense;
(2) $25.00 for the second offense within a year of the first offense; and
(3) $50.00 for the third and any subsequent offenses within a year of the first offense.
Fines to be recovered by action of debt or by complaint or warrant, to use as the town council may prescribe.
(e) *Exemption.* This section shall not apply to a licensed dog accompanying any handicapped person who, because of such person's handicap, is physically unable to comply with the requirements of this section.
(Ord. No. 96-13, § 1, 7-8-1996; Ord. No. 03-06, § 3, 5-12-2003)

The Codified Ordinances of the City of Newport, Rhode Island, Chapter 6.08. ANIMAL CONTROL REGULATIONS, 6.08.050. Restraint of animals.

F. No person having control of an animal shall knowingly permit the same to defecate in or upon any sidewalk, public place, park or building, or in or upon any part of a building used by or open to the public, or upon the property of a person other than the owner of such animal. Any person having control of an animal which defecates in or upon any sidewalk, public place, park or building, or in or upon any part of a building used by or open to the public, or upon the property of a person other than the owner of such animal, shall forthwith remove the feces.

2. Any person who brings into an off-leash site shall:
a. Carry materials and implements for removing and disposing of *dog* excreta and remove all excreta deposited by the *dog* in the off-leash site, in compliance with Section 6.08.050;

Appendix G

Kershaw County's Lake Wateree Overlay District's Septic Tank Regulations

Kershaw County Planning and Zoning Department
515 Walnut Street, Room 160, Camden, SC 29020 803-425-7233

LAKE WATEREE OVERLAY DISTRICT SEPTIC TANK INSPECTION STATEMENT

Lake Wateree Overlay District On-Site Sewage Disposal System Regulations
Section 3:7.4-8, Kershaw County Zoning and Land Development Regulations

A. Definitions

Failed System - A failed system means any sewage disposal system that does not adequately treat and dispose of sewage that consequently creates a public or private nuisance or threat to public health and/or environmental quality as evidenced by, but not limited to one (1) or more of the following conditions:

1. Failure to accept sanitary sewage into the building sewer.
2. Discharge of sanitary sewage to a basement, subsurface drain, surface drain, or surface water unless expressly permitted by SCDHEC.
3. Sanitary sewage rising to the surface of the ground over or near any part of an onsite wastewater disposal system (OSDS) or seeping down-gradient from the drain field at any change in grade, bank, or road cut.
4. Any deterioration or damage to any OSDS that would preclude adequate treatment and disposal of wastewater. For example, damage from a vehicle driven over the drain field or septic tank.
5. A septic tank that is not constructed to be watertight (e.g., bottomless tank) as required to hold wastewater for primary treatment prior to discharging to a drain field.
6. The presence of a grease trap to which kitchen waste is discharged and which is not connected to the septic tank or drain field.

Good Operating Condition - Good operating condition means an OSDS that, upon inspection, is determined to function in a sanitary manner; prohibits the discharge of untreated or partially treated wastewater onto the ground surface, into surface water, or into ground water; and allows building plumbing to discharge rapidly.

Inspector - Any person licensed by SCDHEC to install, repair, service, monitor, or inspect an OSDS. At such time as regularly scheduled SCDHEC Septic System Inspector Training Workshops become available, inspectors shall successfully complete such workshops.

On-Site Sewage Disposal System (OSDS) - Any system, piping, tanks, drain fields, alternate toilets, or other facilities designed to function as a unit to convey, store, treat, and/or dispose of sanitary sewage by means other than discharge into a public sewer. For purposes of this regulation an OSDS shall mean any septic tank or other on-site sewage disposal system.

B. Applicability - These regulations shall apply to all new and existing OSDS installations within the Lake Wateree Overlay District. In no way do the provisions of these regulations abrogate the powers and duties of SCDHEC of their responsibilities for the permitting and enforcement of wastewater systems.

C. New Installations - Any new or replacement OSDS installed within the LWOD shall be required to include an access manhole built into the lid over each compartment of the tank, and over the outlet end of the septic tank. An appropriate mechanism shall be provided to make the access manholes vandal, tamper, and child resistant.

D. Inspections of Existing Installations - The following regulations shall apply to all OSDS within the LWOD installed prior to the effective date of this Ordinance, as well as all OSDS within the LWOD installed subsequent to the effective date of this Ordinance.

1. Inspections Prior to Sale of Real Estate Interest - As of the effective date of this Ordinance, prior to the sale of any ownership interest of a lot containing an OSDS, the seller of interest shall provide the buyer with a written inspection report of the system prepared by an inspector. Sale of ownership interest does

not include the conveyance by gift or inheritance from one family member to another. The inspection shall occur no earlier than sixty (60) days prior to the sale. Prior to the inspection, a pump-out of the septic tank is required to insure a proper inspection of the interior of the tank, to check for leaks from the building, and to check for saturated conditions in the drain field. A copy of the inspection report and sewage disposal manifest from the pumping contractor shall be submitted to the Building Official within ten (10) days of the inspection. The inspection report shall certify that the system is in good operating condition. Otherwise, the following actions shall be taken:

a. Minor Repairs or Alterations - If the inspector determines that minor repairs or alterations are needed to bring the OSDS into good operating condition (such as replacing cracked lids and missing or broken tees and baffles), such work shall be done within ninety (90) days of the inspection. Evidence of said work shall be submitted to the buyer or prospective buyer and a copy submitted to the Building Official.

b. Failure Evaluation and Repairs - If the inspector determines that the OSDS has failed, as herein defined, the Building Official shall notify SCDHEC of the failure within five (5) days of receiving the inspection report. The property owner shall:

   1.) Contact SCDHEC within fifteen (15) days of the inspection to request a failure evaluation and course of corrective action by a licensed contractor.

   2.) Submit evidence of repairs to the buyer or prospective buyer and the Building Official within sixty (60) days of repairs.

2. Inspections Prior to Renovations - As of the effective date of this Ordinance, prior to the issuance of a building permit for renovations, the applicant shall provide to the Building Official a written inspection report of the system prepared by an inspector. For purposes of this regulation a renovation shall mean any addition (including structural and plumbing fixtures with waste lines), replacement, demolition, and reconstruction, or modification of an existing structure on the subject property such that the renovation results in an increased flow into the system, or adds bedroom(s) and/or significant water-using fixtures to the structure (bathroom, hot tub, laundry room, etc.). Sewage flows shall be determined in conformance to SCDHEC Regulation 61-56. Prior to the inspection, a pump-out of the septic tank is required to insure a proper inspection of the interior of the tank to check for leaks from the building, and to check for saturated conditions in the drain field. A copy of the inspection report and sewage disposal manifest from the pumping contractor shall be submitted to the Building Official within ten (10) days of the inspection. The inspection report shall certify that the system is in good operating condition. Otherwise, the following actions shall be taken:

   a. Minor Repairs or Alterations - If the inspector determines that minor repairs or alterations are needed to bring the OSDS into good operating condition (such as replacing cracked lids and missing or broken tees and baffles), such work shall be done within ninety (90) days of the inspection. Evidence of said work shall be submitted to the Building Official.

   b. Failure Evaluation and Repairs - If the inspector determines that the OSDS has failed, as herein defined, the Building Official shall notify SCDHEC of the failure within five (5) days of receiving the inspection report. The property owner or his contractor shall:

      1.) Contact SCDHEC within fifteen (15) days of the inspection to request a failure evaluation and course of corrective action by a licensed contractor.

      2.) Submit evidence of repairs to the Building Official within sixty (60) days of repairs.

3. Inspections Prior to Change of Occupancy - As of the effective date of this Ordinance, prior to the issuance of a use permit and any subsequent required building permits for a change of occupancy that is likely to result in an increase in sewage flow into the system, the applicant shall provide the Building Official with a written inspection report of the system prepared by an inspector. Sewage flows shall be determined in conformance to SCDHEC Regulation 61-56. Prior to the inspection, a pump-out of the septic tank is required to insure a proper inspection of the interior of the tank, to check for leaks from the building, and to check for saturated conditions in the drain field. A copy of the inspection report and

sewage disposal manifest from the pumping contractor shall be submitted to the Building Official within ten (10) days of the inspection. The inspection report shall certify that the system is in good operating condition. Otherwise, the following actions shall be taken:

a. Minor Repairs or Alterations - If the inspector determines that minor repairs or alterations are needed to bring the OSDS into good operating condition (such as replacing cracked lids and missing or broken tees and baffles), such work shall be done within ninety (90) days of the Inspection. Evidence of said work shall be submitted to the Building Official.
b. Failure Evaluation and Repairs - If the inspector determines that the OSDS has failed, as herein defined, the Building Official shall notify SCDHEC of the failure within five (5) days of receiving the inspection report. The property owner or his contractor shall:
    1.) Contact SCDHEC within fifteen (15) days of the inspection to request a failure evaluation and course of corrective action by a licensed contractor.
    2.) Submit evidence of repairs to the Building Official within sixty (60) days of repairs.

4. Time Between Inspections - If an inspection has been conducted pursuant to a sale of real estate interest or a change of occupancy within three years of a subsequent sale of real estate interest or change of occupancy of the subject site, a new inspection shall not be required unless the sale or change of occupancy will result in increased sewage flow into the system.
5. Specialized (Engineered) Onsite Wastewater Systems - This section applies to specialized onsite wastewater systems that have been permitted and installed in accordance with SCDHEC Regulations R.61-56 system standards for specialized onsite wastewater system designs (less than 1500 GPD).

   Specialized onsite wastewater systems are exempted from the inspections prior to sale of real estate interest, prior to renovations, and prior to change of occupancy under the following condition:

   a. Upon submittal of documentation that the specialized onsite wastewater system has been inspected and maintained in accordance with the manufacturer's recommendations for operation and maintenance of the system, as well as the consulting Professional Engineer's plans for compliance of the manufacturer's recommendations. If such documentation cannot be presented, an inspection shall be required to certify that the manufacturer's recommendations for operations and maintenance of the system are current and that the system is functioning satisfactorily in accordance with the consulting Professional Engineer's plan.

By my signature, I acknowledge that I have read and understand the above regulations that require an On-Site Sewage Disposal System (Septic Tank) inspection at 1.) point of sale, 2.) renovations and additions that increase sewage flow, and 3.), change of occupancy (commercial use).

E911 Address:_____

TMS#:_____

Property Owner Signature:_____ Date:_____

STATE OF SOUTH CAROLINA, COUNTY OF KERSHAW

The foregoing instrument was acknowledged before me this _____day of_____, 20_____

By (printed name of person acknowledged):_____

_____, Notary Public of _____ My Commission Expires:_____

Kershaw County Planning and Zoning Department
515 Walnut Street, Room 160, Camden, SC 29020 803-425-7233

LAKE WATEREE OVERLAY DISTRICT
ON-SITE SEWER DISPOSAL SYSTEM INSPECTION REPORT FORM

This form or a report containing the information required by section 3:8.4-8 D.1. of the Kershaw County Unified Code of Zoning and Land Development Regulations shall be submitted to the Kershaw County Building Official within ten days of the inspection. This form or the report must be accompanied by the disposal manifest of the pumping contractor.

Property Information

Owner: _____

Address: _____

TMS#: _____

Inspector Information

Name of Inspector: _____

SCDHEC License Number: _____

Company Name: _____ Phone _____

Company Mailing Address: _____

Part A. To be completed if the On-Site Sewer Disposal System (OSDS) is in good operating condition.
"I certify that the On-Site Sewer Disposal System has been inspected and found to function in a sanitary manner; prohibits the discharge of untreated or partially treated wastewater onto the ground surface, into surface water, or into ground water; and allows building plumbing to discharge rapidly."

Note any limitations to certification at the time of inspection due to non-use of the OSDS for an extended period of time such as inability to determine leaks or assess drain field conditions _____

_____

_____

_____ _____
Signature of Inspector Date

Part B. To be completed if minor repairs or alterations are needed to bring the OSDS into good operating condition (such as replacing cracked lids and missing or broken tees and baffles).
The following minor repairs are required to bring the OSDS into good operating condition:

_____

_____

_____

_____

_____

_____ _____
Signature of Inspector Date

NOTE: All minor repairs must be completed within ninety (90) days of inspection, and evidence that the repairs have been completed shall also be presented to the Kershaw County Building Official within ninety (90) days.

Part C. To be completed if the inspection determines the system has failed.

Failed System - A failed system means any sewage disposal system that does not adequately treat and dispose of sewage that consequently creates a public or private nuisance or threat to public health and/or environmental quality as evidenced by, but not limited to one (1) or more of the following conditions: Check all that apply.

[ ] Failure to accept sanitary sewage into the building sewer.
[ ] Discharge of sanitary sewage to a basement, subsurface drain, surface drain, or surface water unless expressly permitted by SCDHEC.
[ ] Sanitary sewage rising to the surface of the ground over or near any part of an OSDS or seeping down-gradient from the drain field at any change in grade, bank, or road cut.
[ ] Any deterioration or damage to any OSDS that would preclude adequate treatment and disposal of wastewater. For example, damage from a vehicle driven over the drain field or septic tank.
[ ] A septic tank that is not constructed to be watertight (e.g., bottomless tank) as required to hold wastewater for primary treatment prior to discharging to a drain field.
[ ] The presence of a grease trap to which kitchen waste is discharged and which is not connected to the septic tank or drain field.

_____ _____

Signature of Inspector Date

NOTE: If the inspector determines that the OSDS has failed, as herein defined, the Building Official shall notify SCDHEC of the failure within five (5) days of receiving the inspection report. The property owner or his contractor shall:

1. Contact SCDHEC within fifteen (15) days of the inspection to request a failure evaluation and course of corrective action by a licensed contractor.
2. Submit evidence of repairs to the Building Official within sixty (60) days.

Appendix H

Shaws Creek Water Quality Data:

- **SCDHEC WQMS E-094**
- **Aiken County TMDL Monitoring Results**
- **City of Aiken Water Treatment Plant Influent Sampling**

SCDHEC WQMS E-094

12/7/1999 10:10	**Nitrogen**	Present Below Quantification Limit	
2/2/2000 9:30	**Nitrogen**	Present Below Quantification Limit	
5/2/2001 9:15	**Nitrogen**	Present Below Quantification Limit	
7/5/2001 12:15	**Nitrogen**	**0.28**	**mg/L**
9/11/2001 12:50	**Nitrogen**	Present Below Quantification Limit	
11/15/2001 10:28	**Nitrogen**	Present Below Quantification Limit	
1/10/2006 8:55	**Nitrogen**	**0.62**	**mg/L**
3/7/2006 8:43	**Nitrogen**	**0.71**	**mg/L**
4/5/2006 9:24	**Nitrogen**	**0.78**	**mg/L**
5/3/2006 9:13	**Nitrogen**	**0.62**	**mg/L**
6/19/2006 11:55	**Nitrogen**	**0.47**	**mg/L**
7/5/2006 11:45	**Nitrogen**	**0.49**	**mg/L**
8/17/2006 14:00	**Nitrogen**	**0.65**	**mg/L**
9/7/2006 12:50	**Nitrogen**	**0.68**	**mg/L**
11/14/2006 9:50	**Nitrogen**	**0.5**	**mg/L**
12/5/2006 12:00	**Nitrogen**	**0.48**	**mg/L**
6/25/2001 12:45	**Phosphorus**	Present Below Quantification Limit	
7/5/2001 12:15	**Phosphorus**	Present Below Quantification Limit	
8/13/2001 13:30	**Phosphorus**	Present Below Quantification Limit	
9/11/2001 12:50	**Phosphorus**	Present Below Quantification Limit	
10/10/2001 11:30	**Phosphorus**	Present Below Quantification Limit	
11/15/2001 10:28	**Phosphorus**	Present Below Quantification Limit	
12/10/2001 12:40	**Phosphorus**	**0.02**	**mg/L**
1/10/2006 8:55	**Phosphorus**	**0.021**	**mg/L**
2/8/2006 9:14	**Phosphorus**	Present Below Quantification Limit	
3/7/2006 8:43	**Phosphorus**	Present Below Quantification Limit	
4/5/2006 9:24	**Phosphorus**	Present Below Quantification Limit	
5/3/2006 9:13	**Phosphorus**	**0.03**	**mg/L**
7/5/2006 11:45	**Phosphorus**	Present Below Quantification Limit	
8/17/2006 14:00	**Phosphorus**	Present Below Quantification Limit	
9/7/2006 12:50	**Phosphorus**	Present Below Quantification Limit	
10/11/2006 9:20	**Phosphorus**	Present Below Quantification Limit	
11/14/2006 9:50	**Phosphorus**	Present Below Quantification Limit	
12/5/2006 12:00	**Phosphorus**	Present Below Quantification Limit	
1/5/1999 13:05	**Turbidity**	**3.9**	**NTU**
2/3/1999 11:20	**Turbidity**	**5.5**	**NTU**
3/1/1999 12:50	**Turbidity**	**3.1**	**NTU**
4/6/1999 13:15	**Turbidity**	**4.7**	**NTU**
5/12/1999 15:40	**Turbidity**	**4**	**NTU**
6/10/1999 12:00	**Turbidity**	**5.4**	**NTU**
7/7/1999 11:30	**Turbidity**	**6**	**NTU**
8/2/1999 9:30	**Turbidity**	**3.1**	**NTU**
9/8/1999 9:00	**Turbidity**	**3.8**	**NTU**
10/26/1999 9:30	**Turbidity**	**2.3**	**NTU**
11/8/1999 8:50	**Turbidity**	**1.8**	**NTU**
12/7/1999 10:10	**Turbidity**	**2.5**	**NTU**
1/5/2000 10:15	**Turbidity**	**2.9**	**NTU**

2/2/2000 9:30	**Turbidity**		**4.5 NTU**
3/6/2000 10:45	**Turbidity**		**2.5 NTU**
4/5/2000 11:35	**Turbidity**		**3.1 NTU**
5/4/2000 11:20	**Turbidity**		**2.9 NTU**
6/22/2000 9:51	**Turbidity**		**4.4 NTU**
7/11/2000 10:50	**Turbidity**		**3.6 NTU**
8/7/2000 10:10	**Turbidity**		**3.4 NTU**
9/13/2000 10:35	**Turbidity**		**2.7 NTU**
10/3/2000 8:40	**Turbidity**		**2.6 NTU**
11/2/2000 9:39	**Turbidity**		**2.9 NTU**
12/6/2000 10:00	**Turbidity**		**1.6 NTU**
1/9/2001 8:10	**Turbidity**		**3.1 NTU**
2/14/2001 9:50	**Turbidity**		**2.4 NTU**
3/6/2001 10:05	**Turbidity**		**4.5 NTU**
4/3/2001 9:15	**Turbidity**		**6.4 NTU**
6/25/2001 12:45	**Turbidity**		**3.5 NTU**
7/5/2001 12:15	**Turbidity**		**4.5 NTU**
8/13/2001 13:30	**Turbidity**		**3.4 NTU**
9/11/2001 12:50	**Turbidity**		**3.6 NTU**
10/10/2001 11:30	**Turbidity**		**2.3 NTU**
11/15/2001 10:28	**Turbidity**		**1.9 NTU**
12/10/2001 12:40	**Turbidity**		**1.9 NTU**
1/10/2006 8:55	**Turbidity**		**2.1 NTU**
2/8/2006 9:14	**Turbidity**		**4.1 NTU**
3/7/2006 8:43	**Turbidity**		**3 NTU**
4/5/2006 9:24	**Turbidity**		**2.5 NTU**
5/3/2006 9:13	**Turbidity**		**2.9 NTU**
6/19/2006 11:55	**Turbidity**		**2.8 NTU**
7/5/2006 11:45	**Turbidity**		**2.7 NTU**
8/17/2006 14:00	**Turbidity**		**3.7 NTU**
9/7/2006 12:50	**Turbidity**		**2.4 NTU**
10/11/2006 9:20	**Turbidity**		**1.9 NTU**
11/14/2006 9:50	**Turbidity**		**1.7 NTU**
12/5/2006 12:00	**Turbidity**		**1.9 NTU**
1/5/1999 13:05	**Fecal Coliform**		**15 /100 mL**
2/3/1999 11:20	**Fecal Coliform**	Present Above Quantification Limit	
3/1/1999 12:50	**Fecal Coliform**		**50 /100 mL**
4/6/1999 13:15	**Fecal Coliform**		**160 /100 mL**
5/12/1999 15:40	**Fecal Coliform**		**80 /100 mL**
6/10/1999 12:00	**Fecal Coliform**		**110 /100 mL**
7/7/1999 11:30	**Fecal Coliform**	Present Above Quantification Limit	
8/2/1999 9:30	**Fecal Coliform**		**580 /100 mL**
9/8/1999 9:00	**Fecal Coliform**		**240 /100 mL**
10/26/1999 9:30	**Fecal Coliform**		**110 /100 mL**
11/8/1999 8:50	**Fecal Coliform**		**110 /100 mL**
12/7/1999 10:10	**Fecal Coliform**		**260 /100 mL**
1/5/2000 10:15	**Fecal Coliform**		**120 /100 mL**

2/2/2000 9:30	**Fecal Coliform**		**95 /100 mL**
3/6/2000 10:45	**Fecal Coliform**		**160 /100 mL**
4/5/2000 11:35	**Fecal Coliform**		**260 /100 mL**
5/4/2000 11:20	**Fecal Coliform**		**130 /100 mL**
6/22/2000 9:51	**Fecal Coliform**		**290 /100 mL**
7/11/2000 10:50	**Fecal Coliform**		**310 /100 mL**
8/7/2000 10:10	**Fecal Coliform**		**160 /100 mL**
9/13/2000 10:35	**Fecal Coliform**		**170 /100 mL**
10/3/2000 8:40	**Fecal Coliform**		**50 /100 mL**
11/2/2000 9:39	**Fecal Coliform**		**100 /100 mL**
12/6/2000 10:00	**Fecal Coliform**		**62 /100 mL**
1/9/2001 8:10	**Fecal Coliform**		**140 /100 mL**
2/14/2001 9:50	**Fecal Coliform**		**22 /100 mL**
3/6/2001 10:05	**Fecal Coliform**	Present Above Quantification Limit	
4/3/2001 9:15	**Fecal Coliform**		**45 /100 mL**
6/25/2001 12:45	**Fecal Coliform**		**180 /100 mL**
7/5/2001 12:15	**Fecal Coliform**		**400 /100 mL**
8/13/2001 13:30	**Fecal Coliform**		**140 /100 mL**
9/11/2001 12:50	**Fecal Coliform**		**80 /100 mL**
10/10/2001 11:30	**Fecal Coliform**		**86 /100 mL**
11/15/2001 10:28	**Fecal Coliform**		**62 /100 mL**
12/10/2001	**Fecal Coliform**		**68 /100 mL**
1/10/2006	**Fecal Coliform**		**160 /100 mL**
2/8/2006	**Fecal Coliform**		**160 /100 mL**
3/7/2006	**Fecal Coliform**		**120 /100 mL**
4/5/2006	**Fecal Coliform**		**110 /100 mL**
5/3/2006	**Fecal Coliform**		**110 /100 mL**
6/19/2006	**Fecal Coliform**		**120 /100 mL**
7/5/2006	**Fecal Coliform**		**100 /100 mL**
8/17/2006	**Fecal Coliform**		**1000 /100 mL**
9/7/2006	**Fecal Coliform**		**260 /100 mL**
10/11/2006	**Fecal Coliform**		**86 /100 mL**
11/14/2006	**Fecal Coliform**		**220 /100 mL**
12/5/2006	**Fecal Coliform**		**57 /100 mL**
1/5/1999	**pH**	6.55	
2/3/1999	**pH**	6.25	
3/1/1999	**pH**	6.15	
4/6/1999	**pH**	6.42	
5/12/1999	**pH**	6.35	
6/10/1999	**pH**	5.8	
7/7/1999	**pH**	5.53	
8/2/1999	**pH**	5.44	
9/8/1999	**pH**	5.58	
10/26/1999	**pH**	5.79	
11/8/1999	**pH**	5.69	
12/7/1999	**pH**	5.42	
1/5/2000	**pH**	5.81	

2/2/2000	**pH**	5.78
4/5/2000	**pH**	6.22
5/4/2000	**pH**	5.87
6/22/2000	**pH**	5.55
7/11/2000	**pH**	5.85
8/7/2000	**pH**	5.72
9/13/2000	**pH**	5.84
10/3/2000	**pH**	5.86
11/2/2000	**pH**	6.04
12/6/2000	**pH**	5.8
1/9/2001	**pH**	5.16
2/14/2001	**pH**	5.83
3/6/2001	**pH**	5.81
4/3/2001	**pH**	5.3
6/25/2001	**pH**	5.91
7/5/2001	**pH**	5.47
8/13/2001	**pH**	5.47
9/11/2001	**pH**	5.69
10/10/2001	**pH**	5.23
11/15/2001	**pH**	5.46
12/10/2001	**pH**	5.41
1/10/2006	**pH**	5.8
2/8/2006	**pH**	5.83
3/7/2006	**pH**	5.88
4/5/2006	**pH**	5.75
5/3/2006	**pH**	5.82
6/19/2006	**pH**	6.32
7/5/2006	**pH**	6.22
8/17/2006	**pH**	5.94
9/7/2006	**pH**	5.8
10/11/2006	**pH**	6
11/14/2006	**pH**	6.5
12/5/2006	**pH**	5.35

Aiken County TMDL Monitoring Results

Aiken County
Engineering Department

Remembering the Past, Preparing for the Future

Joe Berry
County Engineer

MEMORANDUM

To: Joseph C. Berry, County Engineer

From: Jason L. Hall, Engineering Tech II

Date: January 19, 2016

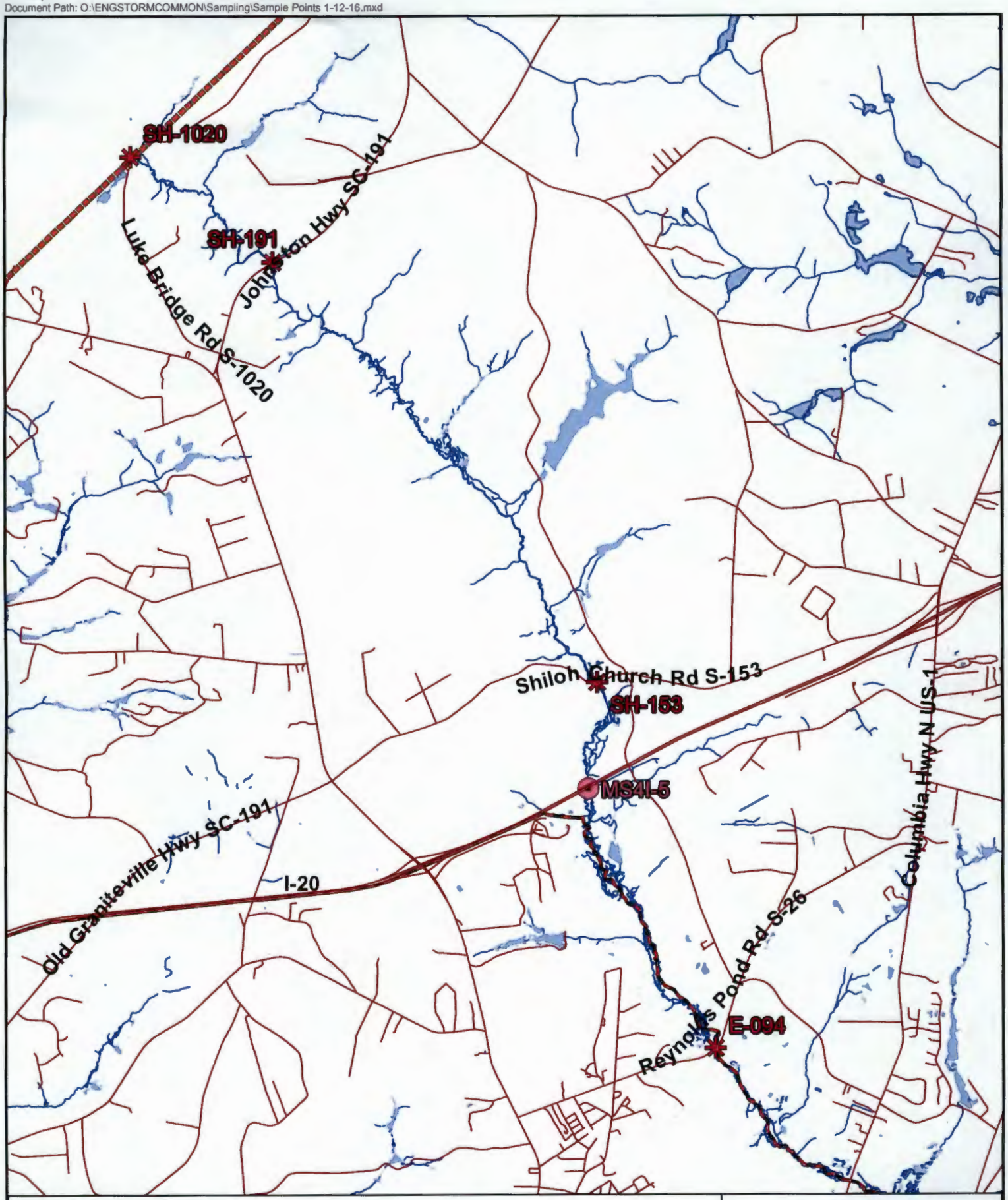
Re: Shaw Creek analytical results

Analytical results (E. Coli) of water samples taken from Shaw Creek on January 12, 2016.

E-094 – Reynolds Pond Rd.	135 MPN/100mL
MS4I-5 – I-20.	93.3 MPN/100mL
SH-153 – Shiloh Church RD.	90.8 MPN/100mL
SH-191 – Hwy 191.	88.0 MPN/100mL
SH-1020 – Luke Bridge RD.	83.6 MPN/100mL

Samples were collected using the grab method.
Samples were analyzed by Pace Analytical Services, Inc.

Document Path: O:\ENGSTORMCOMMON\Sampling\Sample Points 1-12-16.mxd



Shaw Creek Sample Points

Aiken County Engineering
1930 University Parkway
Aiken, SC 29801
803-642-1535 - Fax: 803-642-3684

1/19/2016 JH
Print Date: 1/19/2016 Time: 11:48:10 AM

SR

Scale: 1 inch = 5,000 feet

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City of Aiken Water Treatment Plant Influent Sampling

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Jan 16

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	5.90	4.0	18.0	4.0	6.83		6.40	7.00	0.192	2.50
2	6.10	4.0	18.0	3.0	9.62		6.40	7.00	0.188	2.40
3	6.20	5.0	17.0	3.0	10.11		6.30	6.00	0.188	2.40
4	6.30	6.0	18.0	6.0	9.63		6.50	8.00	0.189	2.40
5	6.20	5.0	16.0	6.0	9.83		6.40	7.00	0.189	2.20
6	6.20	5.0	15.0	5.0	9.93		6.40	7.00	0.186	2.10
7	6.10	4.0	15.0	5.0	10.03		6.40	7.00	0.173	2.50
8	6.10	4.0	16.0	6.0	9.63		6.30	6.00	0.168	2.60
9	6.20	5.0	16.0	6.0	8.45		6.40	7.00	0.164	2.40
10	6.20	5.0	16.0	5.0	8.30		6.40	7.00	0.160	2.40
11	6.20	5.0	15.0	5.0	9.25		6.40	7.00	0.160	2.60
12	6.20	5.0	15.0	4.0	8.63		6.40	8.00	0.159	2.50
13	6.10	4.0	15.0	4.0	9.25		6.40	7.00	0.160	2.30
14	6.20	5.0	16.0	4.0	9.63		6.40	7.00	0.161	2.20
15	6.20	5.0	15.0	5.0	8.75		6.50	8.00	0.163	2.20
16	6.20	6.0	15.0	6.0	7.68		6.30	6.00	0.164	2.30
17	6.20	6.0	15.0	6.0	8.85		6.30	6.00	0.159	2.30
18	6.30	6.0	15.0	8.0	9.63		6.40	6.00	0.155	2.40
19	6.20	5.0	15.0	3.0	9.98		6.40	8.00	0.153	2.60
20	6.20	5.0	15.0	5.0	9.96		6.40	7.00	0.153	2.50
21	6.30	6.0	16.0	5.0	8.34		6.40	7.00	0.151	2.50
22	6.30	6.0	15.0	4.0	7.86		6.40	7.00	0.150	2.50
23	6.30	6.0	15.0	6.0	7.93		6.40	8.00	0.146	2.50
24	6.30	6.0	15.0	4.0	8.64		6.40	7.00	0.143	2.50
25	6.40	6.0	15.0	3.0	9.63		6.40	7.00	0.141	2.40
26	6.40	6.0	15.0	6.0	9.68		6.50	8.00	0.135	2.40
27	6.40	5.0	15.0	6.0	10.02		6.50	8.00	0.131	2.30
28	6.30	5.0	15.0	5.0	8.64		6.50	9.00	0.125	2.30
29	6.30	6.0	15.0	4.0	9.23		6.50	9.00	0.117	2.40
30	6.40	6.0	15.0	4.0	7.81		6.40	7.00	0.117	2.40
31	6.40	6.0	15.0	5.0	7.66		6.40	7.00	0.110	2.40
Avg.	6.24	5.26	15.55	4.87	9.01		6.41	7.19	0.16	2.40
Max.	6.40	6.00	18.00	8.00	10.11		6.50	9.00	0.19	2.60
Min.	5.90	4.00	15.00	3.00	6.83		6.30	6.00	0.11	2.10

Prepared by: _____ Date: _____
(signature)

D H E C

PROVIDE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	January-15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	14.0	4.0	9.6		6.40	7.00	0.17	1.80
2	6.10	5.0	13.0	3.0	8.7		6.50	8.00	0.17	1.90
3	6.30	6.0	13.0	5.0	6.8		6.40	7.00	0.16	1.90
4	6.00	4.0	13.0	7.0	5.2		6.40	7.00	0.16	1.90
5	5.90	4.0	12.0	7.0	4.8		6.50	7.00	0.15	1.70
6	5.90	4.0	12.0	9.0	5.6		6.50	8.00	0.15	1.80
7	6.00	4.0	12.0	10.0	6.6		6.50	8.00	0.15	1.70
8	6.00	4.0	13.0	6.0	5.8		6.50	8.00	0.15	1.70
9	5.90	4.0	13.0	4.0	4.8		6.40	7.00	0.15	1.70
10	6.10	5.0	12.0	4.0	5.0		6.40	7.00	0.14	1.90
11	6.00	4.0	11.0	3.0	6.1		6.50	8.00	0.14	1.90
12	6.00	4.0	11.0	4.0	5.8		6.40	8.00	0.14	1.90
13	6.00	4.0	12.0	5.0	6.4		6.40	7.00	0.13	2.00
14	6.20	6.0	12.0	4.0	6.4		6.50	8.00	0.13	2.00
15	6.30	6.0	12.0	8.0	5.7		6.30	6.00	0.13	2.00
16	6.20	6.0	12.0	8.0	4.8		6.30	6.00	0.13	1.90
17	6.20	5.0	13.0	9.0	5.6		6.40	8.00	0.13	1.90
18	6.10	4.0	13.0	6.0	5.8		6.40	8.00	0.13	1.70
19	6.00	4.0	12.0	3.0	6.2		6.40	8.00	0.13	1.80
20	6.00	4.0	12.0	3.0	7.2		6.40	7.00	0.13	1.80
21	6.00	4.0	11.0	5.0	9.7		6.50	7.00	0.13	1.70
22	5.90	4.0	11.0	5.0	5.5		6.40	6.00	0.13	1.90
23	6.10	4.0	12.0	4.0	5.8		6.50	8.00	0.13	1.90
24	6.20	6.0	12.0	7.0	4.8		6.50	8.00	0.14	1.90
25	6.20	6.0	12.0	7.0	5.0		6.50	8.00	0.13	1.90
26	6.20	5.0	13.0	9.0	5.6		6.50	8.00	0.13	2.00
27	6.20	6.0	13.0	6.0	4.7		6.50	8.00	0.13	2.20
28	6.10	4.0	12.0	4.0	4.9		6.50	7.00	0.13	2.10
29	6.30	6.0	12.0	4.0	5.3		6.40	7.00	0.13	2.00
30	6.20	6.0	12.0	5.0	5.7		6.40	6.00	0.13	2.00
31	6.20	5.0	12.0	4.0	7.0		6.40	7.00	0.14	2.00
Avg.	6.09	4.74	12.23	5.55	6.04		6.44	7.35	0.14	1.89
Max.	6.30	6.00	14.00	10.00	9.68		6.50	8.00	0.17	2.20
Min.	5.90	4.00	11.00	3.00	4.73		6.30	6.00	0.13	1.70

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	February-15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	13.0	6.0	6.4		6.40	6.00	0.21	2.20
2	6.20	6.0	13.0	3.0	5.8		6.50	7.00	0.22	1.90
3	6.10	5.0	13.0	5.0	8.3		6.60	8.00	0.22	1.80
4	6.30	6.0	13.0	8.0	6.2		6.40	6.00	0.22	1.70
5	6.30	6.0	13.0	9.0	7.2		6.40	6.00	0.22	1.70
6	6.10	4.0	12.0	6.0	8.3		6.50	7.00	0.22	1.60
7	6.00	4.0	12.0	6.0	5.6		6.40	7.00	0.22	1.60
8	6.00	5.0	13.0	10.0	6.3		6.60	8.00	0.22	1.80
9	5.90	4.0	13.0	9.0	8.4		6.60	8.00	0.23	1.90
10	6.00	4.0	13.0	8.0	9.4		6.50	8.00	0.23	1.90
11	6.30	6.0	13.0	8.0	10.4		6.50	6.00	0.23	1.90
12	6.30	6.0	14.0	5.0	11.4		6.50	7.00	0.23	1.80
13	6.20	5.0	14.0	4.0	9.6		6.50	7.00	0.24	1.80
14	6.20	6.0	14.0	4.0	8.4		6.40	6.00	0.24	1.90
15	6.30	6.0	13.0	3.0	6.2		6.50	7.00	0.25	1.80
16	6.00	4.0	13.0	8.0	5.8		6.50	7.00	0.26	1.80
17	6.00	4.0	13.0	3.0	6.0		6.50	7.00	0.27	1.70
18	6.10	4.0	13.0	7.0	6.2		6.50	7.00	0.28	1.70
19	6.00	4.0	13.0	8.0	7.4		6.40	6.00	0.28	1.70
20	6.00	4.0	13.0	9.0	7.2		6.60	8.00	0.29	1.90
21	6.00	5.0	14.0	10.0	8.3		6.60	8.00	0.30	2.00
22	5.90	4.0	14.0	10.0	6.8		6.50	7.00	0.32	2.00
23	5.90	4.0	13.0	6.0	9.4		6.50	7.00	0.33	2.00
24	5.90	4.0	13.0	7.0	9.4		6.50	7.00	0.34	1.90
25	6.00	4.0	13.0	5.0	9.6		6.40	6.00	0.32	1.80
26	6.10	4.0	13.0	6.0	7.9		6.40	6.00	0.30	1.80
27	6.10	4.0	13.0	6.0	9.3		6.40	7.00	0.26	1.70
28	6.10	4.0	13.0	6.0	8.4		6.40	6.00	0.25	1.70
29										
30										
31										
Avg.	6.08	4.64	13.11	6.61	7.85		6.48	6.89	0.26	1.82
Max.	6.30	6.00	14.00	10.00	11.36		6.60	8.00	0.34	2.20
Min.	5.90	4.00	12.00	3.00	5.64		6.40	6.00	0.21	1.60

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	March-15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.10	4.0	16.0	5.0	9.6		6.50	7.00	0.21	1.90
2	6.10	4.0	16.0	8.0	8.7		6.50	8.00	0.21	1.90
3	6.20	5.0	16.0	6.0	7.6		6.40	6.00	0.21	1.90
4	6.30	5.0	16.0	4.0	5.8		6.40	6.00	0.21	1.90
5	6.30	6.0	17.0	4.0	6.2		6.30	6.00	0.21	2.00
6	6.20	5.0	17.0	8.0	5.8		6.40	7.00	0.21	2.00
7	6.30	6.0	16.0	7.0	6.0		6.40	7.00	0.22	1.80
8	6.30	6.0	15.0	7.0	6.7		6.40	8.00	0.22	1.90
9	6.30	6.0	15.0	4.0	7.2		6.50	8.00	0.22	1.90
10	6.30	6.0	15.0	8.0	6.5		6.50	8.00	0.23	1.80
11	6.20	5.0	16.0	4.0	8.4		6.40	6.00	0.22	1.80
12	6.20	6.0	16.0	3.0	7.4		6.40	8.00	0.22	1.70
13	6.30	6.0	16.0	6.0	7.0		6.50	8.00	0.22	1.90
14	6.10	4.0	15.0	6.0	7.1		6.50	8.00	0.22	1.90
15	6.00	4.0	15.0	4.0	10.2		6.50	8.00	0.22	1.90
16	6.00	4.0	16.0	10.0	10.0		6.50	8.00	0.22	1.90
17	6.00	4.0	16.0	10.0	8.7		6.60	8.00	0.22	1.90
18	6.10	4.0	17.0	8.0	7.2		6.50	8.00	0.22	1.80
19	6.20	5.0	17.0	7.0	6.7		6.50	7.00	0.22	1.80
20	6.30	5.0	16.0	7.0	6.2		6.30	6.00	0.22	1.70
21	6.30	6.0	16.0	9.0	7.2		6.40	6.00	0.22	1.90
22	6.30	6.0	15.0	8.0	7.2		6.40	7.00	0.21	1.90
23	6.00	4.0	15.0	13.0	7.2		6.40	7.00	0.21	1.90
24	5.90	4.0	16.0	10.0	7.0		6.40	7.00	0.21	2.00
25	5.90	4.0	16.0	9.0	7.2		6.40	8.00	0.20	2.00
26	6.00	4.0	16.0	9.0	7.0		6.50	8.00	0.19	2.00
27	6.00	4.0	16.0	8.0	7.0		6.40	7.00	0.19	1.90
28	6.10	5.0	16.0	8.0	7.2		6.40	7.00	0.18	1.90
29	6.00	4.0	16.0	6.0	7.2		6.40	7.00	0.18	1.90
30	6.00	4.0	16.0	6.0	8.0		6.50	7.00	0.19	1.90
31	6.00	4.0	16.0	5.0	7.1		6.40	7.00	0.21	1.90
Avg.	6.14	4.81	15.90	7.00	7.37		6.44	7.23	0.21	1.89
Max.	6.30	6.00	17.00	13.00	10.24		6.60	8.00	0.23	2.00
Min.	5.90	4.00	15.00	3.00	5.81		6.30	6.00	0.18	1.70

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	April-15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	17.0	4.0	6.7		6.40	7.00	0.30	2.20
2	6.00	4.0	17.0	5.0	7.5		6.50	8.00	0.30	2.30
3	6.20	5.0	17.0	3.0	9.7		6.50	8.00	0.29	2.30
4	6.30	6.0	18.0	6.0	10.2		6.50	8.00	0.29	2.20
5	6.30	6.0	18.0	6.0	9.7		6.30	6.00	0.28	2.20
6	6.20	6.0	18.0	4.0	8.9		6.40	8.00	0.28	2.20
7	6.10	4.0	19.0	5.0	9.2		6.40	7.00	0.28	2.40
8	6.10	4.0	19.0	8.0	8.8		6.40	7.00	0.28	2.40
9	6.10	4.0	18.0	6.0	9.6		6.40	6.00	0.27	2.30
10	6.10	4.0	18.0	6.0	7.3		6.50	7.00	0.27	2.30
11	6.20	5.0	19.0	5.0	8.2		6.50	7.00	0.27	2.30
12	6.20	5.0	19.0	4.0	7.7		6.50	7.00	0.27	2.30
13	6.10	4.0	19.0	4.0	7.9		6.50	7.00	0.27	2.20
14	6.10	4.0	19.0	5.0	6.8		6.40	7.00	0.26	2.20
15	6.10	4.0	18.0	5.0	7.2		6.40	6.00	0.26	2.20
16	6.20	5.0	18.0	6.0	7.4		6.40	6.00	0.26	2.30
17	6.20	6.0	18.0	5.0	7.2		6.50	8.00	0.27	2.30
18	6.30	6.0	19.0	5.0	7.3		6.50	8.00	0.27	2.10
19	6.30	6.0	19.0	4.0	8.3		6.50	8.00	0.26	2.10
20	6.30	6.0	19.0	7.0	8.6		6.50	8.00	0.25	2.20
21	6.00	4.0	19.0	7.0	7.2		6.50	7.00	0.24	2.30
22	6.10	4.0	19.0	8.0	7.2		6.30	6.00	0.23	2.30
23	6.00	4.0	19.0	7.0	7.1		6.40	6.00	0.20	2.40
24	6.00	4.0	19.0	6.0	6.9		6.40	7.00	0.18	2.40
25	6.20	5.0	19.0	6.0	7.7		6.50	8.00	0.17	2.20
26	6.30	6.0	18.0	5.0	7.8		6.40	6.00	0.17	2.20
27	6.30	6.0	18.0	5.0	7.8		6.40	6.00	0.17	2.20
28	6.30	6.0	18.0	3.0	7.8		6.40	6.00	0.16	2.30
29	6.30	6.0	18.0	4.0	7.9		6.40	6.00	0.16	2.30
30	6.30	6.0	18.0	4.0	9.6		6.40	6.00	0.17	2.20
31										
Avg.	6.17	4.97	18.37	5.27	8.05		6.44	6.93	0.24	2.26
Max.	6.30	6.00	19.00	8.00	10.24		6.50	8.00	0.30	2.40
Min.	6.00	4.00	17.00	3.00	6.73		6.30	6.00	0.16	2.10

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	May-15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.30	6.0	22.0	6.0	8.4		6.40	7.00	0.28	2.20
2	6.30	6.0	22.0	4.0	7.3		6.50	8.00	0.28	2.40
3	6.30	6.0	23.0	4.0	8.5		6.50	9.00	0.28	2.40
4	6.30	6.0	23.0	5.0	9.3		6.50	9.00	0.29	2.40
5	6.00	4.0	24.0	8.0	7.6		6.50	9.00	0.29	2.50
6	6.10	4.0	24.0	3.0	8.3		6.30	6.00	0.29	2.60
7	6.10	4.0	23.0	4.0	9.7		6.40	7.00	0.29	2.50
8	6.30	6.0	23.0	4.0	7.5		6.40	7.00	0.29	2.50
9	6.40	6.0	22.0	3.0	5.8		6.40	7.00	0.30	2.50
10	6.40	6.0	22.0	6.0	9.6		6.40	9.00	0.30	2.40
11	6.30	6.0	23.0	6.0	7.6		6.50	9.00	0.30	2.40
12	6.30	6.0	23.0	3.0	7.3		6.50	9.00	0.30	2.40
13	6.20	5.0	23.0	3.0	9.9		6.40	7.00	0.30	2.60
14	6.30	5.0	22.0	4.0	10.2		6.40	7.00	0.30	2.50
15	6.30	6.0	22.0	8.0	10.5		6.30	6.00	0.29	2.50
16	6.30	6.0	23.0	8.0	9.6		6.30	6.00	0.29	2.40
17	6.30	6.0	23.0	7.0	8.7		6.40	6.00	0.29	2.40
18	6.20	5.0	23.0	6.0	7.7		6.40	6.00	0.29	2.40
19	6.30	5.0	23.0	6.0	8.2		6.40	7.00	0.30	2.40
20	6.20	5.0	24.0	5.0	9.6		6.40	7.00	0.28	2.50
21	6.20	5.0	24.0	6.0	8.7		6.40	7.00	0.28	2.60
22	6.30	6.0	24.0	4.0	9.6		6.40	7.00	0.28	2.60
23	6.30	6.0	23.0	5.0	7.9		6.40	7.00	0.26	2.50
24	6.30	5.0	23.0	5.0	8.6		6.40	7.00	0.26	2.40
25	6.20	5.0	23.0	4.0	9.7		6.40	7.00	0.27	2.40
26	6.20	5.0	23.0	4.0	10.2		6.40	7.00	0.27	2.40
27	6.20	5.0	22.0	4.0	11.2		6.40	7.00	0.27	2.40
28	6.20	5.0	22.0	3.0	9.6		6.40	7.00	0.27	2.40
29	6.20	5.0	22.0	6.0	8.8		6.40	7.00	0.24	2.40
30	6.20	5.0	22.0	8.0	8.4		6.40	7.00	0.23	2.50
31	6.20	5.0	22.0	8.0	7.7		6.40	7.00	0.23	2.40
Avg.	6.25	5.35	22.81	5.16	8.77		6.41	7.26	0.28	2.45
Max.	6.40	6.00	24.00	8.00	11.23		6.50	9.00	0.30	2.60
Min.	6.00	4.00	22.00	3.00	5.84		6.30	6.00	0.23	2.20

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	June-15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	25.0	5.0	9.6		6.40	6.00	0.24	2.40
2	6.20	5.0	25.0	8.0	8.8		6.50	7.00	0.19	2.50
3	6.30	6.0	25.0	8.0	6.6		6.50	7.00	0.18	2.40
4	6.30	6.0	26.0	7.0	6.6		6.50	8.00	0.26	2.00
5	6.10	4.0	26.0	9.0	5.9		6.40	6.00	0.28	2.40
6	6.00	4.0	26.0	10.0	8.4		6.40	6.00	0.25	2.60
7	6.00	4.0	27.0	10.0	7.7		6.40	6.00	0.45	2.20
8	5.90	4.0	27.0	6.0	6.9		6.30	5.00	0.59	2.10
9	5.70	4.0	26.0	8.0	9.6		6.40	6.00	0.25	2.10
10	5.90	4.0	26.0	8.0	10.3		6.40	6.00	0.24	2.30
11	6.10	5.0	25.0	7.0	6.4		6.40	7.00	0.26	2.40
12	6.20	5.0	25.0	7.0	9.7		6.40	7.00	0.28	2.50
13	6.20	6.0	25.0	7.0	8.8		6.40	6.00	0.19	2.50
14	6.30	6.0	25.0	6.0	9.9		6.50	8.00	0.18	2.40
15	6.30	6.0	25.0	5.0	6.4		6.50	8.00	0.19	2.50
16	6.30	6.0	25.0	8.0	7.9		6.30	6.00	0.25	2.40
17	6.30	6.0	26.0	9.0	8.5		6.40	7.00	0.26	2.30
18	6.20	5.0	26.0	9.0	8.4		6.40	7.00	0.24	2.30
19	6.20	5.0	25.0	9.0	9.0		6.40	7.00	0.25	2.20
20	6.20	5.0	25.0	8.0	9.0		6.40	7.00	0.26	2.30
21	6.30	6.0	25.0	7.0	8.8		6.40	7.00	0.23	2.40
22	6.20	6.0	25.0	7.0	9.6		6.40	7.00	0.25	2.40
23	6.20	5.0	25.0	8.0	10.3		6.40	8.00	0.18	2.40
24	6.10	5.0	26.0	8.0	11.3		6.40	7.00	0.29	2.40
25	6.10	4.0	26.0	9.0	11.3		6.40	7.00	0.45	2.30
26	6.20	5.0	25.0	6.0	8.7		6.40	6.00	0.35	2.20
27	6.20	5.0	25.0	5.0	9.6		6.40	6.00	0.28	2.20
28	6.20	5.0	25.0	5.0	8.8		6.50	8.00	0.26	2.20
29	6.30	6.0	25.0	4.0	9.3		6.50	8.00	0.29	2.40
30	6.30	6.0	26.0	5.0	9.1		6.50	8.00	0.31	2.40
31										
Avg.	6.16	5.10	25.47	7.27	8.68		6.42	6.83	0.27	2.34
Max.	6.30	6.00	27.00	10.00	11.26		6.50	8.00	0.59	2.60
Min.	5.70	4.00	25.00	4.00	5.86		6.30	5.00	0.18	2.00

Prepared by: _____ Date: _____
(signature)

D H E C

PROVIDE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	July-15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.10	5.0	24.0	4.0	6.8		6.50	7.00	0.28	2.20
2	6.00	4.0	25.0	5.0	6.9		6.60	8.00	0.29	2.40
3	6.00	4.0	25.0	3.0	9.2		6.50	7.00	0.37	2.40
4	5.90	4.0	25.0	8.0	9.2		6.60	8.00	0.25	2.50
5	6.00	4.0	25.0	8.0	9.7		6.60	8.00	0.19	2.40
6	6.20	5.0	25.0	7.0	7.8		6.60	8.00	0.18	2.20
7	6.30	6.0	24.0	9.0	7.9		6.50	8.00	0.19	2.20
8	6.30	6.0	24.0	5.0	9.6		6.70	6.00	0.19	2.50
9	6.20	5.0	23.0	6.0	6.9		6.50	6.00	0.28	2.40
10	6.00	4.0	23.0	6.0	7.3		6.40	6.00	0.38	2.40
11	6.00	4.0	24.0	6.0	7.0		6.40	6.00	0.34	2.50
12	6.10	5.0	24.0	5.0	9.7		6.40	7.00	0.42	2.50
13	5.90	4.0	24.0	4.0	9.9		6.40	7.00	0.39	2.50
14	5.90	4.0	24.0	4.0	9.9		6.50	7.00	0.35	2.40
15	6.20	5.0	24.0	4.0	10.0		6.60	8.00	0.34	2.40
16	6.20	6.0	24.0	5.0	10.0		6.60	8.00	0.39	2.40
17	6.30	6.0	24.0	8.0	10.2		6.70	7.00	0.37	2.20
18	6.30	6.0	24.0	7.0	9.7		6.40	6.00	0.36	2.30
19	6.30	6.0	24.0	7.0	9.0		6.30	6.00	0.36	2.30
20	6.20	5.0	25.0	7.0	9.7		6.30	8.00	0.28	2.20
21	6.20	5.0	25.0	6.0	9.9		6.30	7.00	0.39	2.30
22	6.10	4.0	24.0	8.0	9.0		6.50	7.00	0.28	2.40
23	6.10	4.0	24.0	7.0	8.9		6.40	7.00	0.27	2.40
24	6.10	4.0	24.0	5.0	7.9		6.40	7.00	0.24	2.40
25	6.00	4.0	25.0	5.0	9.9		6.50	8.00	0.19	2.50
26	6.00	4.0	25.0	5.0	9.7		6.60	8.00	0.18	2.50
27	6.00	4.0	25.0	4.0	9.0		6.60	7.00	0.28	2.40
28	6.10	4.0	25.0	4.0	8.8		6.50	7.00	0.29	2.40
29	6.20	4.0	24.0	5.0	9.7		6.40	6.00	0.31	2.40
30	6.20	5.0	24.0	4.0	10.0		6.50	8.00	0.33	2.50
31	6.20	5.0	24.0	4.0	9.4		6.40	7.00	0.34	2.50
Avg.	6.12	4.68	24.29	5.65	8.97		6.49	7.13	0.30	2.39
Max.	6.30	6.00	25.00	9.00	10.15		6.70	8.00	0.42	2.50
Min.	5.90	4.00	23.00	3.00	6.83		6.30	6.00	0.18	2.20

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Aug 15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.10	4.0	25.0	6.0	10.9		6.40	6.00	0.21	2.20
2	6.20	5.0	25.0	5.0	10.9		6.40	7.00	0.21	2.40
3	6.30	6.0	26.0	5.0	11.0		6.50	7.00	0.21	2.40
4	6.30	6.0	26.0	4.0	10.9		6.50	7.00	0.21	2.50
5	6.30	5.0	26.0	8.0	10.8		6.30	5.00	0.21	2.40
6	6.20	5.0	25.0	7.0	10.8		6.30	5.00	0.19	2.20
7	6.10	4.0	24.0	7.0	10.6		6.40	5.00	0.19	2.20
8	6.10	4.0	24.0	9.0	10.4		6.40	6.00	0.19	2.30
9	6.00	4.0	25.0	8.0	10.4		6.40	6.00	0.19	2.30
10	6.20	5.0	26.0	6.0	10.6		6.50	7.00	0.19	2.20
11	6.30	5.0	26.0	6.0	10.7		6.50	7.00	0.19	2.20
12	6.30	6.0	26.0	7.0	10.7		6.50	7.00	0.19	2.40
13	6.30	6.0	26.0	5.0	10.7		6.50	7.00	0.19	2.40
14	6.20	5.0	24.0	5.0	10.8		6.50	8.00	0.18	2.20
15	6.20	5.0	24.0	7.0	10.8		6.40	7.00	0.18	2.50
16	6.30	6.0	24.0	7.0	10.9		6.40	6.00	0.18	2.30
17	6.30	6.0	25.0	8.0	11.0		6.40	6.00	0.18	2.30
18	6.30	6.0	25.0	8.0	10.0		6.40	6.00	0.18	2.30
19	6.10	4.0	25.0	9.0	11.0		6.50	8.00	0.18	2.40
20	6.30	6.0	25.0	8.0	10.7		6.40	7.00	0.18	2.20
21	6.30	6.0	26.0	7.0	10.8		6.40	6.00	0.18	2.20
22	6.30	6.0	26.0	7.0	11.0		6.40	6.00	0.18	2.40
23	6.30	6.0	26.0	6.0	11.1		6.40	6.00	0.18	2.50
24	6.20	5.0	26.0	5.0	11.1		6.50	7.00	0.18	2.50
25	6.20	5.0	25.0	5.0	10.9		6.50	7.00	0.18	2.30
26	6.30	5.0	25.0	5.0	11.2		6.40	6.00	0.18	2.30
27	6.20	6.0	25.0	5.0	11.7		6.60	8.00	0.18	2.20
28	6.10	4.0	25.0	4.0	12.4		6.50	8.00	0.18	2.40
29	6.10	4.0	25.0	4.0	13.2		6.50	8.00	0.18	2.40
30	6.00	4.0	25.0	5.0	14.6		6.50	7.00	0.20	2.30
31	6.00	4.0	25.0	5.0	19.0		6.50	7.00	0.23	2.30
Avg.	6.21	5.10	25.19	6.23	11.34		6.45	6.65	0.19	2.33
Max.	6.30	6.00	26.00	9.00	18.97		6.60	8.00	0.23	2.50
Min.	6.00	4.00	24.00	4.00	10.04		6.30	5.00	0.18	2.20

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Sept 15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.10	4.0	25.0	6.0			6.40	6.00		2.20
2	6.20	5.0	25.0	5.0			6.40	7.00		2.40
3	6.30	6.0	26.0	5.0			6.50	7.00		2.40
4	6.30	6.0	26.0	4.0			6.50	7.00		2.50
5	6.30	5.0	26.0	8.0			6.30	5.00		2.40
6	6.20	5.0	25.0	7.0			6.30	5.00		2.20
7	6.10	4.0	24.0	7.0			6.40	5.00		2.20
8	6.10	4.0	24.0	9.0			6.40	6.00		2.30
9	6.00	4.0	25.0	8.0			6.40	6.00		2.30
10	6.20	5.0	26.0	6.0			6.50	7.00		2.20
11	6.30	5.0	26.0	6.0			6.50	7.00		2.20
12	6.30	6.0	26.0	7.0			6.50	7.00		2.40
13	6.30	6.0	26.0	5.0			6.50	7.00		2.40
14	6.20	5.0	24.0	5.0			6.50	8.00		2.20
15	6.20	5.0	24.0	7.0			6.40	7.00		2.50
16	6.30	6.0	24.0	7.0			6.40	6.00		2.30
17	6.30	6.0	25.0	8.0			6.40	6.00		2.30
18	6.30	6.0	25.0	8.0			6.40	6.00		2.30
19	6.10	4.0	25.0	9.0			6.50	8.00		2.40
20	6.30	6.0	25.0	8.0			6.40	7.00		2.20
21	6.30	6.0	26.0	7.0			6.40	6.00		2.20
22	6.30	6.0	26.0	7.0			6.40	6.00		2.40
23	6.30	6.0	26.0	6.0			6.40	6.00		2.50
24	6.20	5.0	26.0	5.0			6.50	7.00		2.50
25	6.20	5.0	25.0	5.0			6.50	7.00		2.30
26	6.30	5.0	25.0	5.0			6.40	6.00		2.30
27	6.20	6.0	25.0	5.0			6.60	8.00		2.20
28	6.10	4.0	25.0	4.0			6.50	8.00		2.40
29	6.10	4.0	25.0	4.0			6.50	8.00		2.40
30	6.00	4.0	25.0	5.0			6.50	7.00		2.30
31	6.00	4.0	25.0	5.0			6.50	7.00		2.30
Avg.	6.21	5.10	25.19	6.23			6.45	6.65		2.33
Max.	6.30	6.00	26.00	9.00			6.60	8.00		2.50
Min.	6.00	4.00	24.00	4.00			6.30	5.00		2.20

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	October 15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	18.0	4.0	6.990		6.40	6.00	0.349	2.20
2	6.10	5.0	17.0	5.0	6.925		6.40	6.00	0.348	2.30
3	6.30	6.0	17.0	8.0	6.890		6.30	5.00	0.347	2.30
4	6.20	5.0	18.0	7.0	7.032		6.30	5.00	0.348	2.20
5	6.10	4.0	18.0	7.0	7.185		6.30	5.00	0.345	2.40
6	6.00	4.0	18.0	9.0	6.982		6.30	5.00	0.302	2.20
7	6.00	4.0	19.0	10.0	6.686		6.50	6.00	0.286	2.00
8	6.30	6.0	19.0	5.0	6.548		6.50	5.00	0.281	2.00
9	6.10	4.0	17.0	4.0	6.529		6.30	5.00	0.282	2.00
10	6.20	5.0	17.0	4.0	6.481		6.30	5.00	0.252	2.40
11	6.20	5.0	18.0	6.0	6.518		6.50	6.00	0.282	2.50
12	6.00	4.0	18.0	5.0	6.444		6.40	6.00	0.280	2.30
13	5.90	4.0	17.0	4.0	6.313		6.40	6.00	0.248	2.30
14	5.90	4.0	17.0	2.0	6.323		6.40	6.00	0.201	2.40
15	5.80	4.0	17.0	3.0	6.313		6.30	5.00	0.184	2.40
16	5.90	4.0	18.0	4.0	6.341		6.40	5.00	0.178	2.30
17	6.00	4.0	18.0	4.0	6.352		6.50	6.00	0.174	2.30
18	6.00	4.0	18.0	8.0	6.383		6.50	6.00	0.172	2.20
19	6.10	5.0	19.0	7.0	6.414		6.30	4.00	0.175	2.20
20	6.20	5.0	19.0	5.0	6.393		6.30	4.00	0.178	2.30
21	6.20	5.0	19.0	4.0	6.365		6.40	5.00	0.181	2.30
22	6.30	6.0	18.0	4.0	6.245		6.40	5.00	0.173	2.40
23	6.20	6.0	18.0	6.0	6.049		6.40	5.00	0.162	2.40
24	6.20	5.0	18.0	5.0	5.836		6.40	6.00	0.154	2.50
25	6.20	5.0	17.0	5.0	5.593		6.40	6.00	0.153	2.30
26	6.10	4.0	17.0	4.0	5.431		6.40	6.00	0.149	2.30
27	6.20	5.0	18.0	6.0	5.353		6.40	6.00	0.146	2.30
28	6.20	5.0	18.0	6.0	5.383		6.40	6.00	0.149	2.30
29	6.10	4.0	18.0	4.0	5.310		6.40	6.00	0.154	2.30
30	6.00	4.0	18.0	5.0	5.386		6.40	6.00	0.155	2.20
31	5.90	4.0	19.0	3.0	5.127		6.40	6.00	0.151	2.20
Avg.	6.09	4.61	17.90	5.26	6.262		6.39	5.48	0.224	2.28
Max.	6.30	6.00	19.00	10.00	7.185		6.50	6.00	0.349	2.50
Min.	5.80	4.00	17.00	2.00	5.127		6.30	4.00	0.146	2.00

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D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Nov 15

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	5.90	4.0	16.0	5.0	4.6		6.60	8.00	0.16	2.20
2	6.00	4.0	16.0	9.0	4.6		6.50	7.00	0.17	2.50
3	6.00	5.0	17.0	10.0	4.7		6.60	8.00	0.17	2.40
4	6.20	5.0	17.0	10.0	4.7		6.60	8.00	0.17	2.60
5	6.30	6.0	15.0	5.0	4.7		6.60	8.00	0.16	2.90
6	6.30	6.0	15.0	4.0	4.8		6.50	8.00	0.16	3.00
7	6.30	6.0	16.0	4.0	4.8		6.70	6.00	0.17	2.50
8	6.00	4.0	16.0	6.0	4.9		6.50	6.00	0.17	2.40
9	5.90	4.0	16.0	8.0	5.1		6.40	6.00	0.17	2.40
10	5.80	4.0	17.0	7.0	5.0		6.40	6.00	0.17	2.30
11	5.80	4.0	17.0	9.0	4.9		6.40	7.00	0.17	2.20
12	5.90	4.0	17.0	9.0	4.9		6.40	7.00	0.18	2.60
13	5.80	4.0	16.0	8.0	4.9		6.50	7.00	0.17	2.20
14	6.00	4.0	16.0	10.0	6.8		6.60	8.00	0.16	1.90
15	6.00	4.0	16.0	10.0	7.2		6.60	8.00	0.16	2.50
16	5.90	4.0	15.0	5.0	5.9		6.70	7.00	0.16	2.40
17	5.90	4.0	16.0	8.0	4.8		6.40	6.00	0.17	2.30
18	6.00	5.0	16.0	7.0	5.9		6.30	6.00	0.17	2.20
19	6.00	5.0	15.0	7.0	5.6		6.30	8.00	0.16	2.70
20	6.00	4.0	15.0	9.0	5.8		6.30	7.00	0.17	2.40
21	5.80	4.0	16.0	6.0	7.8		6.50	7.00	0.17	2.50
22	6.20	6.0	16.0	5.0	10.3		6.40	7.00	0.17	2.60
23	6.30	6.0	17.0	5.0	5.6		6.40	7.00	0.16	2.50
24	6.30	6.0	16.0	4.0	6.5		6.50	8.00	0.16	2.40
25	6.20	5.0	15.0	5.0	6.9		6.60	8.00	0.15	2.40
26	6.30	6.0	15.0	3.0	6.8		6.60	7.00	0.15	2.30
27	6.30	6.0	15.0	6.0	7.2		6.50	7.00	0.16	2.50
28	6.30	6.0	16.0	4.0	6.9		6.40	6.00	0.16	2.30
29	6.40	6.0	16.0	5.0	5.6		6.50	8.00	0.15	2.60
30	6.30	6.0	16.0	5.0	4.8		6.40	7.00	0.16	2.20
31										
Avg.	6.08	4.90	15.93	6.60	5.76		6.49	7.13	0.16	2.43
Max.	6.40	6.00	17.00	10.00	10.30		6.70	8.00	0.18	3.00
Min.	5.80	4.00	15.00	3.00	4.59		6.30	6.00	0.15	1.90

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Dec 2015

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.10	4.0	18.0	4.0	6.89		6.40	7.00	0.28	2.40
2	6.10	4.0	17.0	5.0	7.89		6.50	8.00	0.35	2.50
3	6.20	5.0	17.0	4.0	10.36		6.50	8.00	0.25	2.50
4	6.30	5.0	17.0	4.0	11.25		6.50	8.00	0.26	2.60
5	6.30	6.0	18.0	6.0	9.68		6.30	6.00	0.45	2.40
6	6.20	5.0	19.0	9.0	9.98		6.40	8.00	0.48	2.40
7	6.30	6.0	17.0	7.0	10.35		6.40	7.00	0.45	2.40
8	5.20	6.0	17.0	7.0	11.58		6.40	7.00	0.35	2.60
9	5.20	6.0	17.0	4.0	11.25		6.40	6.00	0.36	2.70
10	6.20	6.0	18.0	5.0	9.98		6.50	7.00	0.35	2.50
11	6.20	5.0	18.0	5.0	6.98		6.50	7.00	0.25	2.80
12	6.30	6.0	17.0	3.0	8.98		6.50	7.00	0.29	2.50
13	6.10	6.0	17.0	3.0	9.78		6.50	7.00	0.48	2.50
14	6.00	4.0	16.0	6.0	9.98		6.40	7.00	0.25	2.60
15	6.00	4.0	16.0	9.0	9.68		6.40	6.00	0.36	2.60
16	6.00	4.0	17.0	8.0	9.68		6.40	6.00	0.39	2.40
17	6.10	4.0	17.0	8.0	9.98		6.50	8.00	0.48	2.40
18	6.20	4.0	18.0	4.0	10.25		6.50	8.00	0.25	2.50
19	6.30	4.0	18.0	5.0	9.59		6.50	8.00	0.18	2.50
20	6.30	5.0	17.0	4.0	7.85		6.50	8.00	0.25	2.50
21	6.20	5.0	17.0	3.0	7.98		6.50	8.00	0.22	2.60
22	6.00	5.0	17.0	4.0	10.58		6.30	6.00	0.25	2.40
23	5.90	6.0	18.0	4.0	15.26		6.40	6.00	0.29	2.40
24	5.90	4.0	18.0	6.0	14.28		6.40	7.00	0.26	2.60
25	5.90	4.0	18.0	10.0	16.25		6.50	8.00	0.25	2.50
26	6.00	4.0	18.0	9.0	10.58		6.40	6.00	0.24	2.50
27	6.00	4.0	17.0	7.0	11.25		6.40	6.00	0.29	2.60
28	6.10	4.0	17.0	7.0	9.63		6.40	6.00	0.32	2.40
29	6.00	5.0	17.0	5.0	8.48		6.40	6.00	0.28	2.40
30	6.00	4.0	17.0	3.0	9.68		6.40	6.00	0.39	2.40
31	6.00	4.0	18.0	4.0	11.25		6.40	6.00	0.38	2.50
Avg.	6.05	4.77	17.35	5.55	10.23		6.44	6.94	0.32	2.50
Max.	6.30	6.00	19.00	10.00	16.25		6.50	8.00	0.48	2.80
Min.	5.20	4.00	16.00	3.00	6.89		6.30	6.00	0.18	2.40

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name: City of Aiken | System Number: 0210001

Certified Lab ID#: 02001 | For (Month/Yr): February-16

Day	Raw Water						Coagulated Water		Settled Water	
	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.40	6.0	15.0	6.0	9.620		6.50	7.00	0.290	2.50
2	6.40	6.0	16.0	4.0	9.680		6.50	8.00	0.295	2.40
3	6.30	5.0	16.0	5.0	10.240		6.40	6.00	0.300	2.40
4	6.30	5.0	16.0	5.0	9.680		6.40	7.00	0.305	2.20
5	6.30	4.0	15.0	7.0	17.680		6.50	7.00	0.310	2.20
6	6.30	5.0	15.0	6.0	16.240		6.50	7.00	0.316	2.60
7	6.30	4.0	15.0	5.0	10.680		6.50	8.00	0.319	2.60
8	6.20	4.0	16.0	5.0	9.630		6.50	8.00	0.323	2.80
9	6.20	6.0	16.0	4.0	8.750		6.40	7.00	0.325	2.20
10	6.10	4.0	17.0	6.0	9.630		6.30	8.00	0.321	2.20
11	6.10	4.0	17.0	6.0	9.830		6.50	8.00	0.317	2.40
12	6.00	4.0	17.0	8.0	9.640		6.50	8.00	0.318	2.40
13	6.00	4.0	16.0	4.0	10.010		6.40	8.00	0.325	2.60
14	5.90	4.0	16.0	5.0	7.830		6.40	8.00	0.333	2.50
15	6.00	4.0	15.0	5.0	8.240		6.40	8.00	0.343	2.50
16	6.20	5.0	15.0	7.0	9.260		6.40	8.00	0.354	2.50
17	6.20	5.0	15.0	6.0	8.740		6.50	8.00	0.368	2.60
18	6.10	4.0	15.0	5.0	9.630		6.40	6.00	0.385	2.60
19	6.00	4.0	16.0	4.0	12.460		6.40	6.00	0.257	2.60
20	6.00	4.0	16.0	8.0	11.680		6.50	8.00	0.132	2.40
21	6.00	4.0	16.0	6.0	10.370		6.40	6.00	0.133	2.40
22	6.10	4.0	16.0	6.0	16.840		6.50	8.00	0.132	2.50
23	6.20	5.0	15.0	4.0	20.610		6.50	8.00	0.132	2.40
24	6.10	5.0	15.0	4.0	18.250		6.50	8.00	0.138	2.50
25	6.00	4.0	17.0	5.0	17.630		6.50	7.00	0.144	2.50
26	6.00	4.0	16.0	5.0	10.840		6.40	7.00	0.151	2.50
27	6.00	4.0	16.0	4.0	11.680		6.50	8.00	0.156	2.30
28	6.00	4.0	16.0	6.0	9.640		6.40	7.00	0.162	2.40
29	6.00	4.0	16.0	6.0	8.720		6.50	6.00	0.169	2.40
30										
31										
Avg.	6.13	4.45	15.79	5.41	11.51		6.45	7.38	0.26	2.45
Max.	6.40	6.00	17.00	8.00	20.61		6.50	8.00	0.39	2.80
Min.	5.90	4.00	15.00	4.00	7.83		6.30	6.00	0.13	2.20

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	March 16

Day	Raw Water						Coagulated Water		Settled Water	
	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	18.0	6.0	9.64		6.40	6.00	0.229	2.20
2	6.20	5.0	18.0	4.0	9.96		6.50	8.00	0.232	2.40
3	6.30	6.0	18.0	7.0	10.38		6.50	7.00	0.235	2.40
4	6.00	4.0	18.0	5.0	12.45		6.40	6.00	0.237	2.50
5	6.30	6.0	18.0	5.0	13.25		6.40	8.00	0.240	2.50
6	6.30	6.0	17.0	3.0	9.68		6.30	6.00	0.242	2.40
7	6.20	6.0	17.0	4.0	10.08		6.30	7.00	0.244	2.40
8	6.20	5.0	17.0	4.0	11.23		6.30	7.00	0.248	2.60
9	6.20	5.0	18.0	6.0	11.46		6.40	8.00	0.252	2.40
10	6.20	5.0	19.0	8.0	12.25		6.40	8.00	0.254	2.20
11	6.30	6.0	19.0	6.0	13.25		6.40	8.00	0.254	2.30
12	6.30	6.0	18.0	5.0	11.68		6.40	7.00	0.256	2.30
13	6.30	6.0	19.0	5.0	10.68		6.40	8.00	0.259	2.40
14	6.30	6.0	19.0	5.0	11.34		6.40	8.00	0.262	2.40
15	6.00	4.0	18.0	4.0	9.64		6.40	7.00	0.263	2.40
16	5.90	4.0	19.0	6.0	9.75		6.50	7.00	0.262	2.50
17	5.90	4.0	18.0	6.0	10.11		6.50	8.00	0.260	2.50
18	6.00	4.0	18.0	7.0	10.24		6.50	8.00	0.260	2.50
19	6.10	4.0	18.0	4.0	9.63		6.50	8.00	0.259	2.40
20	6.30	6.0	17.0	3.0	9.78		6.40	7.00	0.260	2.60
21	6.40	6.0	18.0	3.0	9.93		6.40	7.00	0.266	2.60
22	6.40	6.0	18.0	5.0	7.68		6.40	7.00	0.272	2.40
23	6.30	4.0	18.0	6.0	12.46		6.50	8.00	0.278	2.40
24	6.00	4.0	18.0	5.0	11.37		6.40	8.00	0.280	2.50
25	6.00	4.0	19.0	5.0	12.28		6.40	7.00	0.275	2.50
26	5.90	4.0	19.0	8.0	13.36		6.40	7.00	0.272	2.50
27	5.90	5.0	18.0	7.0	14.24		6.40	7.00	0.278	2.40
28	6.10	5.0	18.0	6.0	15.63		6.50	7.00	0.278	2.40
29	6.20	5.0	18.0	6.0	10.26		6.50	8.00	0.272	2.40
30	6.20	5.0	19.0	5.0	9.68		6.50	8.00	0.276	2.40
31	6.20	5.0	19.0	5.0	10.24		6.50	8.00	0.288	2.50
Avg.	6.16	5.00	18.16	5.29	11.08		6.43	7.39	0.26	2.43
Max.	6.40	6.00	19.00	8.00	15.63		6.50	8.00	0.29	2.60
Min.	5.90	4.00	17.00	3.00	7.68		6.30	6.00	0.23	2.20

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name: City of Aiken | System Number: 0210001
Certified Lab ID#: 02001 | For (Month/Yr): Apr 16

Day	Raw Water						Coagulated Water		Settled Water	
	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	18.0	6.0	9.96		6.40	7.00	0.267	2.32
2	6.30	6.0	19.0	4.0	9.98		6.40	7.00	0.264	2.40
3	6.50	5.0	19.0	4.0	10.03		6.50	8.00	0.260	2.40
4	5.90	4.0	19.0	5.0	17.65		6.30	7.00	0.248	2.40
5	5.90	4.0	20.0	6.0	20.21		6.40	7.00	0.241	2.50
6	6.00	4.0	20.0	3.0	19.93		69.40	9.00	0.236	2.30
7	6.00	4.0	19.0	3.0	14.68		6.40	7.00	0.232	2.30
8	6.30	6.0	18.0	5.0	10.24		6.50	7.00	0.225	2.20
9	6.30	6.0	18.0	4.0	9.98		6.40	8.00	0.222	2.20
10	6.30	5.0	18.0	4.0	10.23		6.50	8.00	0.222	2.30
11	5.80	4.0	19.0	6.0	11.64		6.50	8.00	0.224	2.30
12	5.70	4.0	19.0	7.0	14.63		6.50	8.00	0.223	2.30
13	5.90	4.0	17.0	8.0	9.68		6.50	8.00	0.224	2.40
14	5.90	4.0	18.0	8.0	9.93		6.50	8.00	0.226	2.40
15	6.30	6.0	18.0	4.0	10.24		6.50	8.00	0.229	2.50
16	6.20	5.0	19.0	4.0	11.31		6.40	7.00	0.234	2.50
17	5.90	4.0	19.0	5.0	11.26		6.50	7.00	0.237	2.40
18	6.00	4.0	20.0	4.0	12.13		6.50	8.00	0.237	2.40
19	5.90	4.0	20.0	7.0	14.63		6.40	7.00	0.230	2.20
20	5.90	4.0	21.0	8.0	13.48		6.50	8.00	0.230	2.40
21	6.10	4.0	21.0	4.0	12.65		6.50	8.00	0.231	2.40
22	6.30	6.0	21.0	5.0	14.75		6.50	8.00	0.234	2.50
23	6.30	6.0	20.0	5.0	15.21		6.50	7.00	0.240	2.50
24	6.30	6.0	20.0	4.0	14.23		6.40	7.00	0.249	2.40
25	6.30	6.0	19.0	6.0	13.64		6.40	7.00	0.260	2.40
26	6.20	5.0	19.0	6.0	12.48		6.50	8.00	0.264	2.60
27	6.20	5.0	19.0	5.0	13.24		6.40	8.00	0.252	2.50
28	6.30	5.0	18.0	5.0	14.26		6.40	8.00	0.222	2.40
29	6.30	6.0	18.0	6.0	10.65		6.50	7.00	0.224	2.20
30	3.60	6.0	18.0	5.0	11.83		6.50	8.00	0.214	2.20
31										
Avg.	6.03	4.87	19.03	5.20	12.83		8.55	7.60	0.24	2.37
Max.	6.50	6.00	21.00	8.00	20.21		69.40	9.00	0.27	2.60
Min.	3.60	4.00	17.00	3.00	9.68		6.30	7.00	0.21	2.20

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	May-16

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	5.90	4.0	20.0	6.0	12.63		6.40	7.00	0.205	2.20
2	6.20	5.0	21.0	4.0	18.78		6.50	8.00	0.204	2.40
3	6.30	6.0	21.0	4.0	10.24		6.50	8.00	0.206	2.30
4	6.30	6.0	21.0	5.0	11.36		6.50	8.00	0.207	2.30
5	6.20	5.0	19.0	6.0	9.78		6.50	7.00	0.209	2.30
6	6.20	5.0	18.0	3.0	10.81		6.40	7.00	0.210	2.10
7	6.20	5.0	18.0	3.0	12.28		6.50	8.00	0.212	2.00
8	6.40	6.0	18.0	5.0	13.63		6.50	8.00	0.213	2.00
9	6.40	6.0	19.0	4.0	12.47		6.50	8.00	0.212	2.00
10	6.50	6.0	19.0	4.0	11.68		6.50	8.00	0.210	2.30
11	6.50	6.0	20.0	6.0	12.25		6.50	7.00	0.210	2.50
12	6.40	6.0	20.0	7.0	13.68		6.40	7.00	0.208	2.40
13	6.50	6.0	20.0	8.0	14.25		6.40	8.00	0.207	2.30
14	6.40	6.0	20.0	8.0	10.68		6.50	8.00	0.207	2.00
15	6.40	6.0	21.0	4.0	11.23		6.50	8.00	0.207	2.20
16	6.40	6.0	21.0	4.0	11.68		6.40	7.00	0.206	2.20
17	6.00	4.0	20.0	5.0	9.41		6.40	8.00	0.204	2.20
18	6.20	5.0	20.0	4.0	9.48		6.40	8.00	0.207	2.50
19	6.20	5.0	21.0	6.0	9.34		6.50	8.00	0.205	2.50
20	6.10	4.0	21.0	5.0	9.43		6.40	6.00	0.189	2.40
21	6.00	4.0	21.0	5.0	9.55		6.40	6.00	0.185	2.40
22	6.00	4.0	20.0	6.0	10.19		6.50	8.00	0.188	2.60
23	6.00	4.0	20.0	4.0	10.62		6.40	6.00	0.190	2.40
24	6.10	4.0	20.0	4.0	10.79		6.50	8.00	0.196	2.50
25	6.20	5.0	21.0	4.0	10.65		6.50	8.00	0.199	2.40
26	6.10	5.0	21.0	5.0	10.20		6.50	8.00	0.193	2.40
27	6.00	4.0	22.0	4.0	9.79		6.50	7.00	0.191	2.20
28	6.00	4.0	20.0	6.0	9.30		6.40	7.00	0.177	2.20
29	6.00	4.0	20.0	6.0	9.02		6.50	8.00	0.182	2.30
30	6.00	4.0	20.0	4.0	10.61		6.40	7.00	0.185	2.20
31	6.00	4.0	20.0	4.0	10.85		6.50	6.00	0.190	2.20
Avg.	6.20	4.97	20.10	4.94	11.18		6.46	7.45	0.20	2.29
Max.	6.50	6.00	22.00	8.00	18.78		6.50	8.00	0.21	2.60
Min.	5.90	4.00	18.00	3.00	9.02		6.40	6.00	0.18	2.00

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	June 16

Day	Raw Water						Coagulated Water		Settled Water	
	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	25.0	6.0	9.780		6.30	7.00	0.270	2.200
2	6.20	5.0	26.0	4.0	10.360		6.30	7.00	0.270	2.400
3	6.30	6.0	26.0	4.0	11.640		6.40	8.00	0.260	2.400
4	6.30	6.0	25.0	5.0	13.250		6.40	8.00	0.180	2.500
5	6.20	5.0	25.0	6.0	10.640		6.40	8.00	0.090	2.200
6	6.30	6.0	27.0	3.0	9.930		6.30	7.00	0.100	2.100
7	6.30	6.0	27.0	3.0	10.680		6.40	7.00	0.110	2.400
8	6.40	6.0	28.0	5.0	14.250		6.40	8.00	0.110	2.400
9	6.20	5.0	28.0	4.0	16.310		6.40	8.00	0.120	2.600
10	6.10	4.0	28.0	4.0	14.250		6.30	8.00	0.160	2.800
11	6.00	4.0	27.0	6.0	10.360		6.30	7.00	0.120	2.700
12	6.00	4.0	27.0	7.0	9.750		6.40	8.00	0.130	2.700
13	6.00	4.0	26.0	8.0	8.740		6.40	8.00	0.130	2.500
14	6.20	5.0	26.0	8.0	9.630		6.40	8.00	0.140	2.500
15	6.30	5.0	26.0	4.0	9.980		6.40	7.00	0.140	2.100
16	6.20	4.0	25.0	4.0	10.250		6.50	8.00	0.150	2.000
17	6.40	6.0	25.0	5.0	11.260		6.40	8.00	0.160	2.000
18	6.40	6.0	25.0	4.0	10.080		6.40	8.00	0.170	2.300
19	6.30	6.0	26.0	4.0	9.960		6.40	8.00	0.180	2.200
20	6.30	6.0	26.0	3.0	10.250		6.40	8.00	0.190	2.200
21	6.30	6.0	27.0	6.0	9.960		6.40	7.00	0.210	2.500
22	6.30	5.0	27.0	6.0	8.740		6.40	7.00	0.210	2.500
23	6.20	4.0	26.0	5.0	9.630		6.40	8.00	0.210	2.300
24	6.20	4.0	25.0	6.0	10.250		6.40	8.00	0.210	2.200
25	6.20	5.0	25.0	6.0	9.730		6.30	7.00	0.200	2.200
26	6.30	5.0	25.0	5.0	8.640		6.30	7.00	0.190	2.400
27	6.30	6.0	25.0	4.0	9.680		6.40	7.00	0.190	2.400
28	6.20	4.0	26.0	4.0	11.350		6.40	8.00	0.190	2.300
29	6.20	5.0	26.0	4.0	10.460		6.40	8.00	0.180	2.300
30	6.30	6.0	26.0	5.0	9.720		6.40	8.00	0.160	2.200
31										
Avg.	6.23	5.10	26.07	4.93	10.65		6.38	7.63	0.17	2.35
Max.	6.40	6.00	28.00	8.00	16.31		6.50	8.00	0.27	2.80
Min.	6.00	4.00	25.00	3.00	8.64		6.30	7.00	0.09	2.00

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(signature)

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PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	July 16

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	24.0	4.0	9.680		6.30	7.00	0.143	2.20
2	6.20	5.0	25.0	6.0	8.240		6.40	8.00	0.141	2.30
3	6.30	6.0	25.0	4.0	11.260		6.40	8.00	0.129	2.30
4	6.00	4.0	25.0	4.0	13.240		6.40	8.00	0.125	2.50
5	6.10	4.0	26.0	3.0	14.060		6.50	9.00	0.123	2.40
6	6.10	4.0	26.0	8.0	13.210		6.50	8.00	0.119	2.40
7	6.10	4.0	25.0	4.0	9.640		6.30	7.00	0.118	2.40
8	6.30	6.0	25.0	4.0	8.780		6.30	7.00	0.117	2.30
9	6.20	5.0	25.0	5.0	7.840		6.50	8.00	0.107	2.30
10	6.30	5.0	24.0	7.0	8.630		6.40	8.00	0.103	2.20
11	6.30	6.0	24.0	6.0	9.640		6.40	8.00	0.965	2.20
12	6.30	6.0	24.0	6.0	10.240		6.40	8.00	0.891	2.40
13	6.20	5.0	23.0	4.0	9.740		6.40	8.00	0.819	2.30
14	6.10	4.0	23.0	5.0	7.630		6.40	8.00	0.741	2.30
15	6.20	5.0	23.0	5.0	13.240		6.40	8.00	0.654	2.30
16	6.20	5.0	24.0	7.0	16.680		6.30	7.00	0.615	2.40
17	6.10	4.0	24.0	8.0	14.240		6.40	8.00	0.550	2.40
18	6.30	6.0	23.0	8.0	12.830		6.40	8.00	0.376	2.50
19	6.30	6.0	23.0	6.0	10.360		6.40	8.00	0.279	2.40
20	6.20	5.0	24.0	5.0	11.250		6.50	9.00	0.214	2.40
21	6.30	6.0	24.0	5.0	12.280		6.50	9.00	0.216	2.30
22	6.30	6.0	24.0	4.0	9.680		6.40	8.00	0.217	2.30
23	6.30	6.0	25.0	6.0	7.650		6.34	8.00	0.216	2.30
24	6.40	6.0	25.0	5.0	8.250		6.40	8.00	0.213	2.30
25	6.30	6.0	25.0	5.0	7.980		6.40	8.00	0.209	2.20
26	6.30	6.0	26.0	4.0	8.360		0.40	8.00	0.205	2.30
27	6.30	6.0	26.0	6.0	9.240		6.50	9.00	0.180	2.30
28	6.30	6.0	25.0	6.0	8.730		6.40	9.00	0.173	2.30
29	6.20	5.0	25.0	8.0	7.680		6.40	8.00	0.157	2.30
30	6.30	5.0	25.0	6.0	8.240		6.50	9.00	0.152	2.40
31	6.30	6.0	25.0	6.0	9.260		6.50	9.00	0.152	2.40
Avg.	6.23	5.26	24.52	5.48	10.25		6.22	8.10	0.30	2.33
Max.	6.40	6.00	26.00	8.00	16.68		6.50	9.00	0.97	2.50
Min.	6.00	4.00	23.00	3.00	7.63		0.40	7.00	0.10	2.20

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Aug 16

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	24.0	6.0	8.360		6.60	8.00	0.354	2.40
2	5.90	4.0	25.0	5.0	9.360		6.50	7.00	0.360	2.30
3	6.00	4.0	25.0	4.0	16.840		6.60	8.00	0.368	2.30
4	6.00	5.0	25.0	6.0	20.250		6.60	8.00	0.376	2.50
5	6.20	5.0	24.0	7.0	17.650		6.60	8.00	0.376	2.60
6	6.30	6.0	24.0	4.0	16.360		6.50	8.00	0.371	2.60
7	6.30	6.0	24.0	5.0	12.420		6.70	6.00	0.371	2.50
8	6.30	6.0	24.0	6.0	13.250		6.50	6.00	0.377	2.50
9	6.00	4.0	25.0	5.0	10.610		6.40	6.00	0.385	2.40
10	5.90	4.0	25.0	5.0	11.750		6.40	6.00	0.397	2.20
11	5.80	4.0	26.0	7.0	10.360		6.40	7.00	0.408	2.40
12	5.80	4.0	25.0	4.0	11.750		6.40	7.00	0.418	2.40
13	5.90	4.0	25.0	4.0	10.630		6.50	7.00	0.425	2.30
14	5.80	4.0	26.0	6.0	9.720		6.60	8.00	0.433	2.30
15	6.00	4.0	25.0	8.0	10.780		6.60	8.00	0.443	2.30
16	6.00	4.0	25.0	7.0	11.650		6.70	7.00	0.456	2.40
17	5.90	4.0	25.0	7.0	12.240		6.40	6.00	0.469	2.40
18	5.90	4.0	26.0	10.0	16.360		6.30	6.00	0.486	2.50
19	6.00	5.0	26.0	11.0	14.240		6.30	8.00	0.505	2.50
20	6.00	5.0	26.0	7.0	10.360		6.30	7.00	0.526	2.50
21	6.00	4.0	25.0	6.0	11.240		6.50	7.00	0.555	2.40
22	5.80	4.0	25.0	6.0	9.630		6.40	7.00	0.588	2.40
23	6.20	6.0	24.0	5.0	8.740		6.40	7.00	0.626	2.30
24	6.30	6.0	24.0	8.0	9.260		6.50	8.00	0.673	2.30
25	6.30	6.0	24.0	7.0	7.680		6.60	8.00	0.534	2.20
26	6.20	5.0	24.0	7.0	7.840		6.60	7.00	0.456	2.70
27	6.30	6.0	24.0	6.0	8.760		6.50	7.00	0.445	2.60
28	6.30	6.0	25.0	5.0	9.230		6.40	6.00	0.456	2.50
29	6.30	6.0	25.0	6.0	12.240		6.50	8.00	0.335	2.50
30	6.40	6.0	25.0	7.0	13.260		6.40	7.00	0.336	2.40
31	6.30	6.0	25.0	6.0	12.210		6.40	7.00	0.338	2.40
Avg.	6.08	4.87	24.84	6.23	11.78		6.49	7.13	0.44	2.42
Max.	6.40	6.00	26.00	11.00	20.25		6.70	8.00	0.67	2.70
Min.	5.80	4.00	24.00	4.00	7.68		6.30	6.00	0.34	2.20

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Sept 16

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.30	6.0	23.0	6.0	14.630		6.40	8.00	0.150	2.40
2	6.00	4.0	24.0	5.0	25.640		6.50	8.00	0.151	2.40
3	6.00	4.0	24.0	4.0	30.250		6.50	8.00	0.148	2.50
4	6.20	5.0	24.0	4.0	19.260		6.30	7.00	0.148	2.50
5	6.20	5.0	23.0	7.0	11.280		6.40	7.00	0.137	2.20
6	6.20	5.0	23.0	5.0	8.750		6.40	7.00	0.138	2.20
7	6.20	5.0	24.0	4.0	9.630		6.30	7.00	0.140	2.30
8	6.10	4.0	24.0	8.0	11.750		6.40	8.00	0.143	2.30
9	6.10	4.0	24.0	6.0	14.640		6.40	8.00	0.145	2.30
10	6.10	4.0	23.0	6.0	17.630		6.40	8.00	0.146	2.20
11	6.20	5.0	23.0	5.0	18.250		6.40	8.00	0.149	2.20
12	6.20	5.0	22.0	4.0	16.230		6.50	8.00	0.152	2.40
13	6.30	6.0	22.0	4.0	12.440		6.50	8.00	0.155	2.40
14	6.20	4.0	24.0	5.0	13.260		6.40	7.00	0.159	2.40
15	6.30	6.0	24.0	6.0	9.730		6.40	7.00	0.164	2.50
16	6.30	6.0	23.0	6.0	8.740		6.40	8.00	0.168	2.40
17	6.30	6.0	23.0	9.0	9.780		6.30	7.00	0.173	2.60
18	6.20	6.0	23.0	7.0	10.280		6.40	8.00	0.180	2.40
19	6.30	5.0	23.0	47.0	10.450		6.40	8.00	0.186	2.40
20	6.30	6.0	24.0	5.0	10.360		6.50	8.00	0.194	2.40
21	6.30	6.0	24.0	5.0	14.250		6.40	8.00	0.202	2.50
22	6.30	5.0	23.0	4.0	9.630		6.40	8.00	0.211	2.50
23	6.20	4.0	24.0	3.0	9.870		6.40	7.00	0.210	2.40
24	6.10	4.0	24.0	8.0	10.010		6.40	8.00	0.207	2.40
25	6.10	5.0	24.0	4.0	10.060		6.30	7.00	0.202	2.40
26	6.20	5.0	23.0	6.0	9.730		6.40	8.00	0.197	2.40
27	6.20	5.0	22.0	6.0	9.980		6.40	8.00	0.184	2.50
28	6.20	5.0	22.0	4.0	9.250		6.40	8.00	0.175	2.40
29	6.20	5.0	22.0	5.0	9.680		6.40	8.00	0.171	2.40
30	6.30	5.0	22.0	6.0	10.250		6.40	8.00	0.170	2.20
31										
Avg.	6.20	5.00	23.23	6.80	12.86		6.40	7.70	0.17	2.38
Max.	6.30	6.00	24.00	47.00	30.25		6.50	8.00	0.21	2.60
Min.	6.00	4.00	22.00	3.00	8.74		6.30	7.00	0.14	2.20

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Oct16

Day	Raw Water						Coagulated Water		Settled Water	
	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.10	4.0	22.0	6.0	9.630		6.40	8.00	0.193	2.50
2	6.20	5.0	21.0	5.0	9.840		6.40	8.00	0.194	2.50
3	6.30	6.0	21.0	5.0	9.260		6.40	8.00	0.195	2.50
4	6.20	5.0	20.0	5.0	9.470		6.40	7.00	0.194	2.50
5	6.30	6.0	20.0	6.0	9.320		6.50	8.00	0.193	2.50
6	6.30	6.0	20.0	5.0	9.250		6.50	8.00	0.193	2.50
7	6.10	4.0	20.0	6.0	9.930		6.40	7.00	0.193	2.50
8	5.80	3.0	21.0	6.0	15.810		6.50	7.00	0.194	2.50
9	5.80	1.0	21.0	5.0	24.100		6.50	8.00	0.195	2.50
10	5.90	3.0	22.0	5.0	14.630		6.40	8.00	0.195	2.50
11	5.90	5.0	21.0	5.0	11.170		6.40	8.00	0.196	2.60
12	6.10	5.0	21.0	6.0	8.290		6.50	8.00	0.199	2.60
13	6.30	6.0	21.0	5.0	8.730		6.50	7.00	0.203	2.60
14	6.20	5.0	20.0	5.0	10.450		6.50	7.00	0.203	2.70
15	6.20	4.0	20.0	5.0	12.190		6.40	8.00	0.201	2.60
16	6.30	4.0	20.0	6.0	18.130		6.40	8.00	0.203	2.70
17	6.20	4.0	20.0	5.0	17.630		6.40	8.00	0.205	2.60
18	6.20	4.0	21.0	5.0	14.250		6.40	8.00	0.204	2.50
19	6.20	4.0	21.0	5.0	3.180		6.40	8.00	0.200	2.60
20	6.20	4.0	20.0	5.0	8.730		6.40	8.00	0.194	2.30
21	6.20	5.0	20.0	5.0	12.690		6.40	8.00	0.190	2.50
22	6.20	4.0	20.0	5.0	11.170		6.40	8.00	0.185	2.70
23	6.20	5.0	21.0	6.0	9.610		6.40	8.00	0.185	2.90
24	6.10	6.0	21.0	5.0	9.680		6.40	7.00	0.182	2.70
25	6.10	6.0	20.0	6.0	5.640		6.40	8.00	0.177	2.50
26	6.20	5.0	20.0	6.0	7.530		6.40	8.00	0.179	2.40
27	6.20	5.0	20.0	6.0	7.610		6.40	8.00	0.184	2.40
28	6.20	6.0	20.0	4.0	7.360		6.40	8.00	0.185	2.40
29	6.10	6.0	20.0	6.0	8.430		6.40	7.00	0.173	2.40
30	6.20	5.0	20.0	6.0	9.260		6.50	8.00	0.167	2.40
31	6.20	5.0	20.0	6.0	9.630		6.50	8.00	0.161	2.40
Avg.	6.15	4.71	20.48	5.39	10.73		6.43	7.77	0.19	2.53
Max.	6.30	6.00	22.00	6.00	24.10		6.50	8.00	0.21	2.90
Min.	5.80	1.00	20.00	4.00	3.18		6.40	7.00	0.16	2.30

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Nov. 2016

Day	Raw Water						Coagulated Water		Settled Water	
	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.10	4.0	21.0	5.0	9.630		6.40	8.00	0.200	2.40
2	6.00	4.0	21.3	8.0	11.640		6.50	8.50	0.201	2.46
3	6.20	3.0	21.0	7.0	5.830		6.50	8.00	0.203	2.43
4	6.20	4.0	21.0	6.0	6.070		6.50	8.50	0.205	2.50
5	6.10	4.0	21.0	6.0	6.650		6.40	8.20	0.206	2.50
6	6.20	3.0	21.1	6.0	5.360		6.40	8.00	0.208	2.50
7	6.00	4.0	20.5	7.0	5.960		6.40	8.00	0.211	2.50
8	6.10	4.0	20.0	7.0	5.110		6.40	7.00	0.212	2.65
9	6.20	5.0	20.0	6.0	6.100		6.40	7.00	0.213	2.57
10	6.20	5.0	19.0	7.0	6.270		6.50	8.50	0.212	2.50
11	6.10	5.0	19.4	7.0	6.210		6.40	7.00	0.213	2.53
12	6.20	4.0	19.5	5.0	10.010		6.50	8.00	0.210	2.55
13										
14	6.20	4.0	18.5	5.0	10.030		6.50	8.50	0.208	2.40
15	6.20	4.0	18.7	4.0	9.620		6.50	8.50	0.209	2.43
16	6.20	5.0	19.0	6.0	5.730		6.20	8.00	0.210	2.40
17	6.20	5.0	19.0	4.0	6.780		6.40	8.00	0.212	2.40
18	6.20	5.0	19.1	4.0	6.430		6.40	7.00	0.213	2.40
19	6.10	4.0	19.0	7.0	5.420		6.30	7.00	0.212	2.40
20	6.10	4.0	18.0	6.0	5.330		6.30	7.00	0.211	2.40
21	6.10	5.0	18.0	6.0	6.130		6.40	7.00	0.214	2.40
22	6.10	5.0	18.0	5.0	7.240		6.40	8.00	0.216	2.50
23	6.10	5.0	18.5	4.0	6.380		6.40	8.00	0.218	2.50
24	6.10	5.0	18.5	4.0	6.420		6.40	8.00	0.219	2.50
25	6.10	4.0	18.5	4.0	5.560		6.40	8.00	0.211	2.65
26	6.10	4.0	18.0	4.0	7.700		6.40	8.50	0.204	2.60
27	6.20	4.0	18.2	5.0	6.100		6.30	7.00	0.204	2.50
28	6.20	4.0	18.4	5.0	10.080		6.30	7.00	0.213	2.50
29	6.20	4.0	18.7	5.0	9.650		6.30	7.00	0.218	2.50
30	6.30	4.5	21.0	6.0	8.240		6.50	7.50	0.212	2.58
31										
Avg.	6.15	4.29	19.38	5.55	7.16		6.40	7.75	0.21	2.49
Max.	6.30	5.00	21.30	8.00	11.64		6.50	8.50	0.22	2.65
Min.	6.00	3.00	18.00	4.00	5.11		6.20	7.00	0.20	2.40

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Dec.16

Day	Raw Water						Coagulated Water		Settled Water	
	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	21.0	5.0	10.080		6.20	7.00	0.351	2.50
2	6.00	4.0	21.1	8.0	9.630		6.30	7.00	0.355	2.50
3	6.10	4.0	22.0	7.0	9.170		6.30	7.00	0.361	2.50
4	6.10	3.0	20.9	6.0	4.500		6.30	7.00	0.368	2.50
5	5.90	4.0	20.5	6.0	5.000		6.30	7.00	0.375	2.25
6	5.90	3.0	21.0	6.0	15.680		6.40	8.00	0.380	2.54
7	5.90	4.0	19.9	7.0	14.670		6.33	5.70	0.382	2.50
8	5.95	4.5	19.5	6.0	2.800		6.32	5.50	0.382	2.50
9	6.00	3.0	19.2	6.0	2.930		6.20	7.00	0.357	2.50
10	6.00	4.0	17.0	7.0	9.430		6.20	7.00	0.352	2.40
11	6.10	4.0	17.5	7.0	10.380		6.20	7.50	0.353	2.50
12	6.10	3.0	14.0	5.0	7.312		6.10	7.00	0.356	2.60
13	6.10	4.0	14.0	8.0	18.400		6.30	7.20	0.361	2.60
14	6.10	4.0	13.8	5.0	16.210		6.40	8.00	0.366	2.60
15	6.30	4.0	13.9	4.0	12.740		6.40	8.00	0.373	2.60
16	6.10	4.5	14.0	6.0	4.840		6.40	7.00	0.365	2.50
17	6.10	4.0	14.1	4.0	12.360		5.88	7.00	0.362	2.40
18	6.10	4.0	14.0	4.0	11.880		6.80	7.00	0.351	2.50
19	5.50	4.0	18.0	24.0	10.750		6.70	5.50	0.337	2.25
20	5.80	5.5	17.0	33.0	11.330		6.32	7.00	0.312	2.40
21	6.49	4.5	16.0	38.0	8.430		6.20	7.50	0.242	2.30
22	6.72	4.5	17.0	29.0	7.280		6.50	7.00	0.201	2.40
23	6.20	4.5	16.0	27.0	9.380		6.58	7.00	0.192	2.10
24	6.20	5.0	18.5	8.0	9.640		6.49	7.00	0.192	2.37
25	6.20	5.0	17.0	9.0	9.340		6.40	7.20	0.196	2.50
26	6.20	5.0	18.0	8.0	8.670		6.40	7.20	0.199	2.30
27	6.00	4.0	18.0	37.0	7.230		6.30	5.70	0.194	2.30
28	6.10	4.0	18.0	37.0	11.320		6.40	5.80	0.192	2.38
29	5.80	3.0	18.0	33.0	16.380		6.40	7.50	0.196	2.40
30	6.10	4.0	18.0	37.0	11.450		6.40	7.50	0.207	2.30
31	5.40	4.5	16.6	38.0	8.050		5.88	7.00	0.227	2.30
Avg.	6.05	4.08	17.53	15.00	9.91		6.33	6.96	0.30	2.43
Max.	6.72	5.50	22.00	38.00	18.40		6.80	8.00	0.38	2.60
Min.	5.40	3.00	13.80	4.00	2.80		5.88	5.50	0.19	2.10

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	January-14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.20	5.0	13.0	4.0	4.7		6.50	7.00	0.13	1.90
2	6.40	6.0	12.0	3.0	5.3		6.40	6.00	0.11	2.00
3	6.20	5.0	12.0	6.0	4.8		6.50	6.00	0.15	2.00
4	6.10	4.0	11.0	7.0	5.0		6.60	7.00	0.12	2.00
5	6.10	4.0	11.0	6.0	5.1		6.60	7.00	0.11	2.10
6	6.40	6.0	12.0	6.0	6.2		6.40	6.00	0.18	2.20
7	6.50	6.0	12.0	4.0	5.5		6.50	8.00	0.15	2.20
8	6.40	6.0	13.0	5.0	4.9		6.50	8.00	0.36	2.20
9	6.40	6.0	13.0	5.0	4.9		6.50	7.00	0.33	2.20
10	6.40	6.0	12.0	4.0	6.9		6.40	6.00	0.26	2.10
11	6.30	5.0	12.0	3.0	7.3		6.60	7.00	0.28	1.90
12	6.10	4.0	11.0	3.0	6.5		6.50	7.00	0.33	1.80
13	6.00	4.0	11.0	7.0	7.3		6.50	7.00	0.31	1.80
14	6.00	4.0	11.0	2.0	5.7		6.50	6.00	0.28	1.90
15	5.90	4.0	12.0	3.0	4.3		6.40	6.00	0.17	2.00
16	6.10	5.0	12.0	4.0	3.9		6.50	6.00	0.59	2.00
17	6.30	5.0	13.0	4.0	5.7		6.40	6.00	0.16	2.20
18	6.40	6.0	13.0	6.0	4.8		6.40	7.00	0.19	2.00
19	6.40	6.0	12.0	5.0	6.8		6.40	6.00	0.19	2.00
20	6.40	6.0	12.0	5.0	7.3		6.30	6.00	0.25	2.00
21	6.40	6.0	11.0	5.0	8.2		6.40	6.00	0.23	2.00
22	6.30	6.0	11.0	6.0	7.8		6.40	6.00	0.20	1.90
23	6.20	4.0	11.0	5.0	8.6		6.30	6.00	0.19	1.80
24	6.20	4.0	11.0	4.0	6.5		6.40	7.00	0.15	1.80
25	6.40	6.0	12.0	4.0	7.4		6.40	7.00	0.17	1.90
26	6.30	5.0	12.0	3.0	8.9		6.30	6.00	0.18	1.90
27	6.30	5.0	13.0	3.0	10.1		6.30	6.00	0.29	1.80
28	6.30	5.0	11.0	3.0	9.7		6.30	6.00	0.20	2.00
29	6.30	5.0	11.0	4.0	8.7		6.30	7.00	0.17	2.20
30	6.20	4.0	11.0	6.0	9.7		6.40	7.00	0.17	2.20
31	6.20	4.0	11.0	5.0	7.5		6.40	7.00	0.19	2.10
Avg.	6.26	5.06	11.77	4.52	6.64		6.43	6.55	0.22	2.00
Max.	6.50	6.00	13.00	7.00	10.11		6.60	8.00	0.59	2.20
Min.	5.90	4.00	11.00	2.00	3.87		6.30	6.00	0.11	1.80

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	February-14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.20	4.0	11.0	4.0	7.3		6.30	6.00	0.17	2.00
2	6.30	5.0	10.0	6.0	4.9		6.40	7.00	0.19	1.80
3	6.40	6.0	10.0	4.0	7.2		6.50	8.00	0.26	1.80
4	6.10	4.0	8.0	3.0	7.8		6.40	7.00	0.23	2.20
5	6.20	5.0	8.0	4.0	7.8		6.50	8.00	0.23	2.20
6	6.20	5.0	8.0	4.0	9.6		6.50	8.00	0.17	2.10
7	6.10	4.0	9.0	8.0	7.6		6.60	8.00	0.17	2.00
8	6.00	4.0	9.0	10.0	6.8		6.60	8.00	0.15	2.00
9	6.00	4.0	10.0	10.0	7.3		6.30	6.00	0.20	2.00
10	6.20	5.0	10.0	6.0	9.5		6.40	6.00	0.20	2.00
11	6.10	4.0	10.0	4.0	10.2		6.40	7.00	0.17	1.80
12	6.30	6.0	11.0	3.0	9.7		6.40	7.00	0.20	1.80
13	6.30	6.0	12.0	3.0	8.2		6.50	8.00	0.40	1.80
14	6.20	5.0	12.0	4.0	6.5		6.40	6.00	0.40	1.60
15	6.10	4.0	11.0	6.0	4.8		6.30	6.00	0.30	1.80
16	6.10	4.0	10.0	5.0	5.3		6.40	8.00	0.26	2.00
17	6.10	4.0	10.0	4.0	7.2		6.40	7.00	0.18	2.00
18	6.30	6.0	9.0	4.0	6.2		6.40	7.00	0.32	2.20
19	6.20	5.0	9.0	6.0	5.8		6.40	7.00	0.43	2.20
20	6.20	5.0	8.0	5.0	4.8		6.30	6.00	0.32	2.20
21	6.20	5.0	8.0	5.0	5.1		6.40	7.00	0.30	2.10
22	6.20	5.0	8.0	3.0	6.2		6.40	7.00	0.20	2.10
23	6.30	6.0	9.0	4.0	7.2		6.50	8.00	0.19	2.20
24	6.30	6.0	10.0	8.0	5.7		6.50	8.00	0.20	2.00
25	6.30	6.0	11.0	8.0	4.7		6.50	8.00	0.17	2.00
26	6.20	6.0	11.0	3.0	5.6		6.30	6.00	0.14	2.00
27	6.20	6.0	12.0	4.0	6.3		6.40	7.00	0.12	2.00
28	6.30	6.0	11.0	3.0	5.8		6.40	7.00	0.12	2.00
29										
30										
31										
Avg.	6.20	5.04	9.82	5.04	6.83		6.42	7.11	0.23	2.00
Max.	6.40	6.00	12.00	10.00	10.24		6.60	8.00	0.43	2.20
Min.	6.00	4.00	8.00	3.00	4.73		6.30	6.00	0.12	1.60

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	March-14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	16.0	4.0	5.6		6.40	6.00	0.12	1.80
2	6.00	4.0	16.0	4.0	4.8		6.50	7.00	0.15	1.80
3	6.10	4.0	15.0	4.0	5.6		6.60	8.00	0.21	2.00
4	6.20	5.0	16.0	3.0	6.8		6.50	7.00	0.14	2.10
5	6.30	6.0	17.0	6.0	7.2		6.60	8.00	0.14	1.90
6	6.30	6.0	17.0	6.0	7.0		6.60	8.00	0.14	1.90
7	6.40	6.0	15.0	8.0	7.5		6.60	8.00	0.15	1.80
8	6.30	5.0	15.0	9.0	5.4		6.50	8.00	0.15	1.90
9	6.30	5.0	16.0	7.0	4.8		6.70	6.00	0.18	2.10
10	6.20	6.0	16.0	7.0	7.4		6.50	6.00	0.24	2.10
11	6.00	4.0	17.0	6.0	9.7		6.40	6.00	0.20	2.20
12	6.00	4.0	15.0	5.0	10.6		6.40	6.00	0.25	1.90
13	6.30	5.0	15.0	9.0	7.4		6.40	7.00	0.20	1.80
14	6.20	6.0	16.0	9.0	6.8		6.40	7.00	0.17	1.90
15	6.20	5.0	16.0	7.0	6.0		6.50	7.00	0.18	2.10
16	6.40	6.0	16.0	4.0	6.0		6.60	8.00	0.20	2.20
17	6.40	6.0	15.0	3.0	7.1		6.60	8.00	0.23	1.90
18	6.10	4.0	17.0	3.0	6.7		6.70	7.00	0.20	1.80
19	6.00	4.0	17.0	4.0	7.2		6.40	6.00	0.21	2.10
20	6.30	6.0	16.0	3.0	9.4		6.30	6.00	0.24	1.80
21	6.30	6.0	16.0	4.0	7.4		6.30	8.00	0.22	2.00
22	6.20	5.0	15.0	4.0	6.6		6.30	7.00	0.22	1.90
23	6.30	6.0	16.0	4.0	5.9		6.50	7.00	0.21	1.80
24	6.30	6.0	15.0	3.0	5.7		6.40	7.00	0.28	2.00
25	6.20	5.0	15.0	2.0	6.3		6.40	7.00	0.62	2.20
26	6.20	4.0	15.0	4.0	7.2		6.50	8.00	0.40	1.90
27	6.10	4.0	17.0	4.0	5.2		6.60	8.00	0.26	1.90
28	6.00	4.0	16.0	6.0	4.7		6.60	7.00	0.17	1.80
29	6.00	4.0	17.0	6.0	5.2		6.50	7.00	0.21	1.80
30	6.00	4.0	15.0	7.0	4.0		6.40	6.00	0.18	2.00
31	6.10	4.0	16.0	5.0	4.8		6.50	8.00	0.21	2.00
Avg.	6.18	4.94	15.87	5.16	6.53		6.49	7.10	0.22	1.95
Max.	6.40	6.00	17.00	9.00	10.61		6.70	8.00	0.62	2.20
Min.	6.00	4.00	15.00	2.00	4.03		6.30	6.00	0.12	1.80

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	April-14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.20	5.0	18.0	5.0	3.5		6.50	6.00	0.21	2.00
2	6.20	5.0	18.0	4.0	4.0		6.50	7.00	0.18	2.10
3	6.10	4.0	18.0	4.0	4.8		6.60	8.00	0.18	2.40
4	6.20	5.0	17.0	6.0	5.3		6.40	6.00	0.20	2.40
5	6.30	6.0	19.0	7.0	4.3		6.40	6.00	0.16	1.80
6	6.40	6.0	19.0	9.0	4.2		6.40	7.00	0.11	1.90
7	6.40	6.0	19.0	4.0	7.0		6.60	8.00	0.11	1.90
8	6.30	5.0	19.0	5.0	6.9		6.50	8.00	0.17	1.80
9	6.30	5.0	18.0	5.0	5.6		6.70	8.00	0.21	2.00
10	6.20	6.0	18.0	5.0	4.5		6.50	6.00	0.20	2.00
11	6.00	4.0	17.0	4.0	4.3		6.50	5.00	0.21	2.20
12	6.00	4.0	17.0	6.0	5.0		6.50	6.00	0.19	2.40
13	6.30	5.0	19.0	6.0	4.9		6.40	4.00	0.18	2.40
14	6.20	6.0	19.0	7.0	6.2		6.40	4.00	0.18	2.00
15	6.30	5.0	18.0	9.0	7.5		6.50	7.00	0.18	2.30
16	6.30	5.0	18.0	8.0	5.3		6.60	8.00	0.34	2.40
17	6.20	4.0	18.0	8.0	5.0		6.60	8.00	0.39	2.20
18	6.20	4.0	18.0	8.0	4.3		6.70	7.00	0.22	2.20
19	6.00	4.0	18.0	7.0	5.3		6.40	5.00	0.18	2.20
20	6.30	6.0	19.0	7.0	8.3		6.30	6.00	0.19	2.20
21	6.30	6.0	19.0	5.0	4.9		6.40	5.00	0.25	2.20
22	6.20	5.0	18.0	4.0	4.7		6.40	5.00	0.26	2.40
23	6.30	6.0	18.0	6.0	4.8		6.40	6.00	0.27	2.10
24	6.30	6.0	18.0	6.0	4.9		6.40	7.00	0.24	2.30
25	6.30	6.0	18.0	6.0	5.9		6.40	7.00	0.23	2.20
26	6.30	6.0	18.0	6.0	4.5		6.50	7.00	0.21	2.30
27	6.10	4.0	18.0	4.0	5.4		6.50	8.00	0.19	2.30
28	6.00	4.0	18.0	4.0	6.2		6.50	7.00	0.21	2.20
29	6.00	4.0	19.0	4.0	7.1		6.50	6.00	0.15	2.20
30	6.00	4.0	19.0	5.0	8.6		6.40	6.00	0.18	2.20
31										
Avg.	6.21	5.03	18.23	5.80	5.44		6.48	6.47	0.21	2.17
Max.	6.40	6.00	19.00	9.00	8.63		6.70	8.00	0.39	2.40
Min.	6.00	4.00	17.00	4.00	3.54		6.30	4.00	0.11	1.80

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	May-14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.10	4.0	24.0	5.0	6.0		6.50	7.00	0.25	2.20
2	5.90	4.0	23.0	4.0	7.6		6.40	6.00	0.34	2.40
3	5.90	4.0	23.0	4.0	6.5		6.50	6.00	0.16	2.40
4	6.30	6.0	23.0	6.0	6.8		6.60	7.00	0.17	2.20
5	6.20	5.0	24.0	7.0	7.2		6.60	7.00	0.20	2.20
6	6.20	5.0	24.0	5.0	8.9		6.40	6.00	0.24	2.40
7	6.20	6.0	24.0	5.0	7.7		6.50	8.00	0.26	2.40
8	6.40	6.0	23.0	10.0	7.3		6.50	8.00	0.24	2.20
9	6.40	6.0	23.0	9.0	7.0		6.50	7.00	0.22	2.30
10	6.30	6.0	22.0	9.0	6.7		6.40	6.00	0.21	2.30
11	6.20	5.0	22.0	7.0	7.3		6.60	7.00	0.21	2.30
12	6.20	5.0	23.0	5.0	7.2		6.50	7.00	0.21	2.40
13	6.20	5.0	23.0	6.0	7.4		6.50	7.00	0.29	2.40
14	6.40	6.0	24.0	6.0	7.6		6.50	6.00	0.21	2.40
15	6.30	6.0	24.0	7.0	12.2		6.40	6.00	0.14	2.30
16	5.80	6.0	24.0	5.0	7.8		6.50	6.00	0.25	2.20
17	5.70	4.0	24.0	6.0	7.0		6.40	6.00	0.36	2.20
18	5.90	4.0	24.0	6.0	7.4		6.40	7.00	0.25	2.20
19	6.20	4.0	23.0	6.0	8.2		6.40	6.00	0.23	2.40
20	6.00	5.0	23.0	5.0	7.9		6.30	6.00	0.22	2.40
21	5.90	4.0	22.0	6.0	8.6		6.40	6.00	0.27	2.40
22	5.90	4.0	23.0	4.0	8.2		6.40	6.00	0.23	2.30
23	6.00	4.0	23.0	3.0	8.2		6.30	6.00	0.41	2.20
24	6.00	4.0	24.0	3.0	8.5		6.40	7.00	0.36	2.40
25	6.10	4.0	24.0	5.0	8.0		6.40	7.00	0.16	2.40
26	6.00	4.0	24.0	2.0	8.2		6.30	6.00	0.20	2.30
27	6.00	5.0	23.0	2.0	9.2		6.30	6.00	0.22	2.30
28	5.80	4.0	23.0	2.0	9.0		6.30	6.00	0.20	2.20
29	5.90	4.0	24.0	5.0	9.3		6.30	7.00	0.20	2.20
30	5.90	4.0	24.0	6.0	14.0		6.40	7.00	0.28	2.40
31	5.90	4.0	24.0	5.0	14.4		6.40	7.00	0.42	2.40
Avg.	6.07	4.74	23.39	5.35	8.29		6.43	6.55	0.25	2.31
Max.	6.40	6.00	24.00	10.00	14.38		6.60	8.00	0.42	2.40
Min.	5.70	4.00	22.00	2.00	6.03		6.30	6.00	0.14	2.20

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	June-14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	23.0	5.0	5.4		6.40	7.00	0.29	2.20
2	6.10	4.0	22.0	3.0	6.8		6.50	8.00	0.21	2.30
3	6.10	5.0	22.0	6.0	7.4		6.50	8.00	0.16	2.30
4	6.30	6.0	24.0	6.0	8.5		6.30	7.00	0.12	2.40
5	6.20	5.0	24.0	9.0	10.2		6.50	8.00	0.24	2.40
6	6.20	6.0	24.0	7.0	11.3		6.50	8.00	0.23	2.40
7	6.30	6.0	24.0	5.0	10.4		6.50	8.00	0.19	2.50
8	6.30	6.0	24.0	5.0	9.7		6.60	8.00	0.30	2.60
9	6.30	6.0	23.0	4.0	7.6		6.40	7.00	0.47	2.60
10	6.00	4.0	23.0	5.0	5.8		6.40	7.00	0.29	2.40
11	6.10	4.0	23.0	3.0	5.0		6.40	8.00	0.24	2.50
12	5.90	4.0	24.0	3.0	6.9		6.40	7.00	0.67	2.50
13	5.80	4.0	24.0	4.0	10.0		6.50	8.00	0.89	2.60
14	6.00	4.0	24.0	6.0	10.5		6.30	7.00	0.33	2.60
15	6.00	4.0	24.0	6.0	10.2		6.40	7.00	0.19	2.60
16	6.30	6.0	24.0	5.0	10.2		6.40	7.00	0.21	2.40
17	6.30	6.0	24.0	4.0	10.0		6.40	8.00	0.17	2.30
18	6.20	5.0	23.0	8.0	7.7		6.50	8.00	0.33	2.30
19	6.40	6.0	23.0	5.0	6.8		6.50	8.00	0.24	2.20
20	6.40	6.0	23.0	6.0	7.2		6.40	8.00	0.27	2.40
21	6.10	4.0	24.0	6.0	5.8		6.40	7.00	0.31	2.40
22	6.00	4.0	24.0	4.0	9.6		6.40	7.00	0.24	2.20
23	6.00	4.0	24.0	8.0	7.6		6.40	7.00	0.20	2.30
24	6.00	4.0	24.0	10.0	6.8		6.40	8.00	0.21	2.30
25	6.30	6.0	24.0	6.0	7.3		6.50	8.00	0.17	2.20
26	6.30	6.0	24.0	6.0	7.2		6.50	7.00	0.32	2.40
27	6.40	6.0	24.0	3.0	6.9		6.40	7.00	0.29	2.40
28	6.30	6.0	24.0	5.0	6.8		6.40	7.00	0.27	2.40
29	6.30	5.0	24.0	5.0	7.2		6.40	7.00	0.17	2.40
30	6.30	6.0	24.0	4.0	7.0		6.40	7.00	0.29	2.60
31										
Avg.	6.17	5.07	23.63	5.40	7.99		6.43	7.47	0.28	2.40
Max.	6.40	6.00	24.00	10.00	11.28		6.60	8.00	0.89	2.60
Min.	5.80	4.00	22.00	3.00	4.96		6.30	7.00	0.12	2.20

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	July-14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.20	5.0	23.0	4.0	7.5		6.30	5.00	0.27	1.80
2	6.30	6.0	23.0	6.0	8.4		6.40	5.00	0.36	1.90
3	6.30	6.0	22.0	4.0	7.5		6.40	6.00	0.26	1.70
4	6.30	5.0	24.0	7.0	7.9		6.40	6.00	0.30	1.70
5	6.20	5.0	24.0	8.0	7.9		6.50	7.00	0.28	1.80
6	6.20	5.0	23.0	8.0	8.3		6.40	6.00	0.42	1.80
7	6.10	4.0	23.0	9.0	10.0		6.50	7.00	0.37	1.90
8	6.00	4.0	23.0	7.0	8.7		6.50	6.00	0.34	1.90
9	6.00	4.0	24.0	6.0	8.0		6.30	6.00	0.31	2.20
10	6.30	6.0	23.0	6.0	7.8		6.30	4.00	0.28	2.20
11	6.20	5.0	23.0	5.0	7.8		6.30	4.00	0.38	2.10
12	6.20	5.0	23.0	5.0	8.4		6.50	6.00	0.28	2.20
13	6.20	5.0	23.0	5.0	8.1		6.50	6.00	0.30	2.20
14	6.20	5.0	23.0	5.0	6.8		6.50	7.00	0.36	2.10
15	6.30	6.0	23.0	4.0	6.1		6.50	7.00	0.20	2.00
16	6.10	4.0	23.0	6.0	7.7		6.40	6.00	0.25	2.00
17	6.10	4.0	23.0	10.0	7.9		6.40	6.00	0.24	2.00
18	6.20	5.0	24.0	9.0	7.3		6.40	6.00	0.26	2.00
19	6.30	5.0	24.0	9.0	5.9		6.40	6.00	0.15	1.90
20	6.20	5.0	24.0	7.0	6.0		6.50	6.00	0.10	1.80
21	6.20	5.0	23.0	5.0	9.8		6.50	7.00	0.19	1.80
22	6.20	5.0	23.0	5.0	7.4		6.50	7.00	0.11	1.80
23	6.20	5.0	22.0	4.0	6.8		6.50	7.00	0.12	1.70
24	6.30	6.0	22.0	5.0	12.0		6.40	7.00	0.17	1.90
25	6.30	6.0	22.0	5.0	11.9		6.40	6.00	0.17	1.90
26	6.30	6.0	22.0	6.0	9.1		6.40	6.00	0.16	1.90
27	6.30	6.0	24.0	5.0	6.0		6.40	6.00	0.23	1.90
28	6.30	6.0	23.0	4.0	6.7		6.40	6.00	0.24	1.90
29	6.30	6.0	23.0	4.0	5.9		6.50	6.00	0.41	1.80
30	6.30	6.0	23.0	5.0	6.0		6.50	7.00	0.21	1.70
31	6.30	6.0	23.0	5.0	6.1		6.50	7.00	0.20	1.90
Avg.	6.22	5.23	23.06	5.90	7.79		6.43	6.13	0.26	1.92
Max.	6.30	6.00	24.00	10.00	12.02		6.50	7.00	0.42	2.20
Min.	6.00	4.00	22.00	4.00	5.93		6.30	4.00	0.10	1.70

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	August-14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.20	4.0	24.0	5.0	6.2		6.40	6.00	0.13	1.80
2	6.00	4.0	23.0	8.0	5.3		6.40	6.00	0.22	1.90
3	6.10	5.0	23.0	8.0	6.1		6.30	5.00	0.13	1.90
4	6.20	6.0	23.0	7.0	8.0		6.30	5.00	0.19	1.80
5	6.30	6.0	24.0	9.0	8.2		6.30	5.00	0.20	1.70
6	6.20	5.0	24.0	5.0	6.9		6.30	5.00	0.20	1.80
7	6.20	4.0	24.0	5.0	6.2		6.50	6.00	0.20	1.80
8	6.30	6.0	25.0	4.0	6.6		6.50	5.00	0.21	1.70
9	6.00	4.0	25.0	4.0	12.4		6.40	5.00	0.17	1.60
10	6.00	4.0	25.0	6.0	11.7		6.40	5.00	0.23	1.60
11	6.00	4.0	25.0	5.0	7.6		6.40	6.00	0.14	1.80
12	6.00	4.0	24.0	5.0	6.4		6.40	6.00	0.14	1.80
13	6.20	5.0	24.0	6.0	9.0		6.40	6.00	0.18	1.80
14	6.30	5.0	25.0	3.0	6.5		6.40	6.00	0.19	1.80
15	6.20	6.0	25.0	5.0	6.8		6.30	5.00	0.19	1.90
16	6.20	5.0	25.0	5.0	6.5		6.30	5.00	0.18	1.80
17	6.30	6.0	24.0	5.0	6.1		6.50	6.00	0.20	1.90
18	6.30	6.0	24.0	7.0	6.4		6.50	6.00	0.22	1.90
19	6.20	6.0	24.0	8.0	5.6		6.30	4.00	0.16	1.80
20	6.20	5.0	25.0	6.0	6.1		6.30	4.00	0.21	1.80
21	6.20	5.0	25.0	4.0	5.8		6.30	5.00	0.21	1.70
22	6.30	6.0	25.0	4.0	5.3		6.30	5.00	0.26	1.90
23	6.30	6.0	24.0	4.0	5.8		6.40	5.00	0.26	1.90
24	6.30	6.0	24.0	6.0	5.5		6.40	6.00	0.24	1.80
25	6.20	5.0	24.0	6.0	5.6		6.40	6.00	0.34	1.80
26	6.00	4.0	24.0	6.0	5.2		6.40	6.00	0.36	1.80
27	6.00	4.0	24.0	5.0	4.9		6.40	6.00	0.29	1.90
28	6.00	4.0	24.0	4.0	5.0		6.40	6.00	0.24	1.70
29	6.00	4.0	24.0	4.0	5.4		6.40	6.00	0.25	1.70
30	6.00	4.0	25.0	4.0	5.5		6.40	6.00	0.31	1.80
31	6.00	4.0	25.0	5.0	5.8		6.40	6.00	0.25	1.80
Avg.	6.15	4.90	24.29	5.42	6.59		6.38	5.48	0.22	1.80
Max.	6.30	6.00	25.00	9.00	12.38		6.50	6.00	0.36	1.90
Min.	6.00	4.00	23.00	3.00	4.86		6.30	4.00	0.13	1.60

Prepared by: _____ Date: _____
(signature)

D H E C

PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	September-14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.10	4.0	18.0	4.0	5.2		6.40	6.00	0.20	2.20
2	6.20	5.0	17.0	6.0	5.8		6.40	6.00	0.34	2.40
3	6.30	6.0	17.0	6.0	4.6		6.50	7.00	0.19	2.40
4	6.20	5.0	17.0	8.0	7.7		6.60	7.00	0.23	2.30
5	5.90	4.0	16.0	7.0	8.1		6.60	7.00	0.19	2.30
6	5.90	4.0	17.0	4.0	6.9		6.50	8.00	0.15	2.50
7	6.00	4.0	17.0	4.0	6.4		6.50	8.00	0.14	2.30
8	6.20	6.0	18.0	4.0	6.5		6.40	6.00	0.16	2.20
9	6.30	6.0	18.0	4.0	6.5		6.40	6.00	0.16	2.20
10	6.30	6.0	17.0	8.0	6.9		6.40	6.00	0.31	2.40
11	6.20	5.0	17.0	9.0	6.7		6.40	6.00	0.31	2.40
12	6.10	4.0	17.0	9.0	5.8		6.60	8.00	0.32	2.60
13	6.00	4.0	18.0	5.0	6.0		6.50	7.00	0.22	2.50
14	5.90	4.0	18.0	2.0	7.4		6.50	7.00	0.14	2.30
15	5.90	4.0	17.0	3.0	9.2		6.40	6.00	0.23	2.30
16	5.90	4.0	17.0	3.0	7.7		6.40	6.00	0.29	2.30
17	6.20	5.0	16.0	3.0	9.7		6.40	6.00	0.30	2.20
18	6.10	4.0	16.0	4.0	7.3		6.40	6.00	0.33	2.20
19	5.90	4.0	18.0	5.0	6.1		6.50	7.00	0.21	2.20
20	5.90	4.0	17.0	4.0	5.8		6.50	8.00	0.19	2.30
21	6.20	5.0	17.0	4.0	5.5		6.60	8.00	0.17	2.20
22	6.10	4.0	17.0	6.0	6.9		6.60	8.00	0.15	2.20
23	6.10	4.0	17.0	7.0	4.6		6.60	7.00	0.21	2.20
24	6.00	4.0	17.0	7.0	4.3		6.40	7.00	0.13	2.20
25	6.00	4.0	18.0	8.0	4.1		6.50	7.00	0.11	2.40
26	6.10	4.0	18.0	10.0	4.4		6.50	7.00	0.13	2.40
27	6.20	5.0	17.0	5.0	4.3		6.40	7.00	0.12	2.30
28	6.10	4.0	17.0	5.0	4.5		6.50	6.00	0.12	2.30
29	6.10	4.0	17.0	6.0	4.5		6.50	6.00	0.13	2.30
30	6.00	4.0	17.0	4.0	4.1		6.50	6.00	0.11	2.20
31										
Avg.	6.08	4.47	17.00	5.47	6.12		6.48	6.77	0.20	2.31
Max.	6.30	6.00	18.00	10.00	9.65		6.60	8.00	0.34	2.60
Min.	5.90	4.00	16.00	2.00	4.10		6.40	6.00	0.11	2.20

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Oct 14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.20	5.0	14.0	5.0	7.9		6.50	7.00	0.25	2.10
2	6.30	6.0	13.0	4.0	7.9		6.40	6.00	0.19	2.00
3	6.30	6.0	13.0	4.0	8.2		6.40	6.00	0.18	2.00
4	6.30	5.0	13.0	6.0	5.8		6.50	7.00	0.26	2.00
5	6.20	5.0	12.0	8.0	5.7		6.60	7.00	0.15	2.40
6	6.20	5.0	12.0	7.0	5.0		6.60	7.00	0.17	2.40
7	6.10	4.0	14.0	7.0	6.0		6.50	8.00	0.22	2.40
8	6.00	4.0	14.0	7.0	6.9		6.50	8.00	0.19	2.20
9	6.00	4.0	14.0	9.0	6.8		6.40	6.00	0.18	2.20
10	6.30	6.0	13.0	8.0	6.8		6.40	6.00	0.19	2.50
11	6.20	5.0	13.0	5.0	7.9		6.40	6.00	0.23	2.20
12	6.20	5.0	12.0	5.0	7.3		6.40	6.00	0.22	2.20
13	6.20	5.0	12.0	5.0	7.4		6.60	8.00	0.24	2.20
14	6.20	5.0	12.0	4.0	7.3		6.50	7.00	0.27	2.20
15	6.30	6.0	14.0	6.0	7.7		6.50	7.00	0.18	2.40
16	6.10	4.0	14.0	6.0	7.0		6.40	6.00	0.19	2.40
17	6.10	4.0	14.0	6.0	6.9		6.40	6.00	0.26	2.40
18	6.20	5.0	14.0	8.0	7.9		6.40	6.00	0.18	2.20
19	6.30	5.0	13.0	7.0	10.9		6.40	6.00	0.28	2.20
20	6.20	5.0	12.0	7.0	10.3		6.50	7.00	0.24	2.20
21	6.20	5.0	13.0	9.0	9.7		6.50	8.00	0.21	2.00
22	6.20	5.0	13.0	8.0	8.3		6.60	8.00	0.23	2.00
23	6.20	5.0	13.0	8.0	6.6		6.60	8.00	0.21	2.00
24	6.30	6.0	13.0	8.0	5.9		6.60	7.00	0.26	2.10
25	6.30	6.0	14.0	4.0	6.3		6.40	7.00	0.18	1.90
26	6.30	6.0	14.0	4.0	6.9		6.50	7.00	0.19	2.20
27	6.30	6.0	14.0	5.0	6.5		6.50	7.00	0.26	2.10
28	6.30	6.0	14.0	5.0	6.9		6.40	7.00	0.24	2.10
29	6.30	6.0	13.0	5.0	6.3		6.50	6.00	0.22	2.00
30	6.30	6.0	12.0	5.0	5.9		6.50	6.00	0.21	2.00
31	6.30	6.0	13.0	5.0	5.8		6.50	6.00	0.26	2.00
Avg.	6.22	5.23	13.16	6.13	7.17		6.48	6.77	0.22	2.17
Max.	6.30	6.00	14.00	9.00	10.89		6.60	8.00	0.28	2.50
Min.	6.00	4.00	12.00	4.00	4.95		6.40	6.00	0.15	1.90

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Nov 14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.30	6.0	12.0	8.0	4.5		6.40	6.00	0.14	2.30
2	6.30	6.0	11.0	8.0	4.5		6.30	5.00	0.14	2.20
3	6.10	4.0	11.0	7.0	4.6		6.30	5.00	0.14	2.20
4	6.00	4.0	12.0	9.0	4.6		6.30	5.00	0.14	2.00
5	6.00	4.0	12.0	5.0	4.6		6.30	5.00	0.14	2.00
6	6.00	4.0	12.0	5.0	4.6		6.50	6.00	0.14	2.00
7	6.20	4.0	13.0	4.0	4.6		6.50	5.00	0.14	2.10
8	6.20	5.0	13.0	4.0	4.6		6.40	5.00	0.14	2.20
9	6.30	5.0	12.0	6.0	4.6		6.40	5.00	0.15	2.20
10	6.30	6.0	11.0	5.0	4.6		6.40	6.00	0.15	2.20
11	6.30	6.0	11.0	5.0	4.5		6.40	6.00	0.15	2.40
12	6.40	6.0	11.0	6.0	4.3		6.40	6.00	0.15	2.30
13	6.20	5.0	12.0	3.0	4.4		6.40	6.00	0.16	2.30
14	6.20	5.0	13.0	5.0	4.6		6.30	5.00	0.16	2.20
15	6.20	6.0	13.0	5.0	4.7		6.30	5.00	0.16	2.20
16	6.30	5.0	12.0	5.0	5.1		6.50	6.00	0.17	2.10
17	6.30	6.0	12.0	7.0	5.9		6.50	6.00	0.17	2.10
18	6.40	6.0	12.0	8.0	4.1		6.30	4.00	0.18	2.30
19	6.40	6.0	12.0	6.0	4.3		6.30	4.00	0.18	2.40
20	6.20	4.0	11.0	4.0	3.9		6.30	5.00	0.18	2.20
21	6.20	4.0	11.0	4.0	3.5		6.30	5.00	0.18	2.20
22	6.10	4.0	11.0	4.0	3.7		6.40	5.00	0.19	2.20
23	6.10	4.0	12.0	6.0	3.8		6.40	6.00	0.19	2.20
24	6.30	6.0	12.0	6.0	3.7		6.40	6.00	0.20	2.20
25	6.30	6.0	12.0	6.0	3.5		6.40	6.00	0.20	2.10
26	6.20	5.0	11.0	5.0	3.4		6.40	6.00	0.21	2.30
27	6.20	5.0	11.0	4.0	3.1		6.40	6.00	0.17	2.30
28	6.20	5.0	11.0	4.0	3.0		6.40	6.00	0.17	2.30
29	6.30	6.0	11.0	4.0	2.9		6.40	6.00	0.16	2.20
30	6.20	6.0	12.0	5.0	2.9		6.40	6.00	0.16	2.20
31										
Avg.	6.22	5.13	11.73	5.43	4.16		6.38	5.47	0.16	2.20
Max.	6.40	6.00	13.00	9.00	5.92		6.50	6.00	0.21	2.40
Min.	6.00	4.00	11.00	3.00	2.88		6.30	4.00	0.14	2.00

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Dec 14

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.20	5.0	13.0	5.0	9.6		6.40	7.00	0.23	2.10
2	6.10	4.0	13.0	4.0	6.5		6.50	8.00	0.25	1.90
3	6.30	6.0	12.0	4.0	8.4		6.50	8.00	0.18	1.90
4	6.30	6.0	12.0	8.0	8.5		6.50	8.00	0.19	2.20
5	6.20	6.0	12.0	7.0	6.3		6.40	8.00	0.17	2.40
6	6.20	5.0	11.0	7.0	4.3		6.40	7.00	0.25	2.20
7	6.30	6.0	12.0	8.0	6.3		6.40	7.00	0.26	2.20
8	6.30	6.0	12.0	8.0	5.7		6.60	9.00	0.31	2.30
9	6.10	4.0	13.0	7.0	5.3		6.50	9.00	0.25	2.20
10	6.00	4.0	13.0	9.0	5.4		6.50	8.00	0.25	2.40
11	6.00	4.0	13.0	9.0	5.3		6.40	7.00	0.24	2.90
12	6.20	6.0	14.0	4.0	5.3		6.40	7.00	0.22	2.80
13	6.30	6.0	12.0	5.0	5.2		6.40	7.00	0.26	2.50
14	6.20	5.0	12.0	5.0	5.6		6.40	7.00	0.28	2.50
15	6.20	5.0	12.0	5.0	8.5		6.50	7.00	0.19	2.50
16	6.30	5.0	11.0	4.0	8.6		6.50	8.00	0.28	2.12
17	6.30	6.0	11.0	5.0	9.6		6.50	8.00	0.26	2.20
18	6.00	4.0	11.0	4.0	10.3		6.50	8.00	0.25	2.20
19	6.00	4.0	12.0	4.0	10.0		6.50	9.00	0.28	2.40
20	6.00	4.0	12.0	4.0	9.0		6.40	7.00	0.23	2.20
21	6.20	5.0	12.0	3.0	9.7		6.40	7.00	0.24	2.30
22	6.20	5.0	13.0	5.0	8.5		6.40	7.00	0.24	2.30
23	6.20	5.0	13.0	6.0	6.3		6.40	7.00	0.26	2.20
24	6.20	6.0	12.0	6.0	4.3		6.50	8.00	0.25	2.20
25	6.30	6.0	12.0	5.0	5.6		6.50	7.00	0.31	2.20
26	6.30	5.0	12.0	5.0	4.8		6.50	8.00	0.28	2.30
27	6.30	5.0	12.0	5.0	5.3		6.50	8.00	0.29	2.40
28	6.20	5.0	12.0	5.0	4.9		6.60	8.00	0.25	2.40
29	6.20	5.0	12.0	5.0	5.2		6.60	9.00	0.26	2.40
30	6.20	4.0	12.0	5.0	4.7		6.50	9.00	0.25	2.20
31	6.30	5.0	12.0	5.0	4.8		6.50	9.00	0.24	2.50
Avg.	6.20	5.06	12.16	5.52	6.69		6.47	7.77	0.25	2.31
Max.	6.30	6.00	14.00	9.00	10.25		6.60	9.00	0.31	2.90
Min.	6.00	4.00	11.00	3.00	4.25		6.40	7.00	0.17	1.90

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	January-13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	14.0	6.0	9.5		6.70	11.00	0.14	1.40
2	6.20	5.0	15.0	3.0	5.8		6.80	12.00	0.15	1.60
3	6.20	5.0	15.0	4.0	9.8		6.90	12.50	0.12	1.60
4	6.30	6.0	15.0	4.0	12.6		6.90	12.50	0.13	1.70
5	6.10	4.0	15.0	6.0	9.6		6.90	12.50	0.15	1.50
6	6.10	4.0	14.0	8.0	6.2		6.80	12.00	0.22	1.60
7	6.40	6.0	14.0	8.0	5.8		6.80	12.00	0.16	1.60
8	6.40	6.0	14.0	6.0	4.7		6.80	12.00	0.15	1.60
9	6.30	5.0	14.0	3.0	3.8		6.80	12.50	0.21	1.60
10	6.20	5.0	15.0	3.0	7.6		6.90	12.50	0.17	1.50
11	6.00	4.0	15.0	7.0	5.8		6.80	11.00	0.20	1.60
12	6.00	4.0	15.0	6.0	6.2		6.70	11.00	0.16	1.70
13	6.10	4.0	15.0	5.0	5.8		6.70	11.00	0.13	1.70
14	6.20	5.0	16.0	6.0	4.7		6.90	12.50	0.18	1.60
15	6.20	5.0	16.0	5.0	4.0		6.70	11.00	0.16	1.60
16	6.30	6.0	15.0	4.0	5.8		6.90	12.50	0.16	1.50
17	6.30	6.0	15.0	4.0	6.2		6.90	12.50	0.15	1.60
18	6.40	6.0	15.0	6.0	7.9		7.00	12.50	0.12	1.60
19	6.30	6.0	15.0	8.0	8.5		7.00	12.50	0.14	1.60
20	6.30	6.0	14.0	8.0	9.2		6.90	12.50	0.14	1.40
21	6.20	5.0	14.0	3.0	7.2		6.80	12.00	0.14	1.40
22	6.00	4.0	14.0	3.0	6.4		6.70	11.00	0.15	1.60
23	6.00	4.0	14.0	4.0	7.6		6.70	12.00	0.13	1.60
24	6.10	4.0	15.0	5.0	6.4		6.80	11.00	0.12	1.60
25	5.90	4.0	15.0	5.0	5.8		6.80	12.00	0.11	1.60
26	6.20	5.0	16.0	5.0	7.2		6.80	12.50	0.15	1.50
27	6.30	5.0	15.0	4.0	6.9		6.90	12.50	0.29	1.60
28	6.30	6.0	15.0	6.0	7.2		6.90	12.50	0.14	1.60
29	6.20	5.0	15.0	3.0	5.7		6.90	12.50	0.14	1.60
30	6.30	6.0	15.0	4.0	4.7		6.80	12.00	0.19	1.60
31	6.30	6.0	15.0	4.0	5.8		6.90	12.50	0.22	1.60
Avg.	6.20	5.03	14.81	5.03	6.80		6.83	12.03	0.16	1.58
Max.	6.40	6.00	16.00	8.00	12.61		7.00	12.50	0.29	1.70
Min.	5.90	4.00	14.00	3.00	3.82		6.70	11.00	0.11	1.40

Prepared by: _____ Date: _____
(signature)

D H E C

PROVIDE. PROTECT. PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	February-13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.30	6.0	14.0	6.0	7.6		6.70	11.00	0.19	1.50
2	6.30	6.0	15.0	4.0	6.8		6.80	12.00	0.18	1.60
3	6.20	5.0	15.0	4.0	7.5		6.80	12.50	0.17	1.60
4	6.30	5.0	15.0	6.0	7.2		6.90	12.50	0.49	1.40
5	6.10	4.0	15.0	6.0	8.6		6.70	11.00	0.25	1.40
6	6.20	4.0	14.0	8.0	13.5		6.70	11.00	0.15	1.50
7	6.20	5.0	14.0	8.0	11.6		6.80	12.00	0.16	1.60
8	6.10	4.0	14.0	9.0	10.6		6.90	12.00	0.16	1.60
9	6.00	4.0	14.0	4.0	9.8		6.90	12.50	0.18	1.60
10	6.00	4.0	15.0	5.0	6.8		6.90	12.50	0.20	1.50
11	6.20	5.0	15.0	5.0	7.2		7.00	12.50	0.31	1.50
12	6.30	6.0	15.0	6.0	8.2		6.90	12.50	0.32	1.50
13	6.30	6.0	15.0	6.0	9.3		6.70	11.00	0.37	1.60
14	6.20	5.0	16.0	8.0	7.6		6.80	12.00	0.36	1.60
15	6.00	4.0	16.0	9.0	5.8		6.80	12.50	0.27	1.50
16	6.00	4.0	16.0	8.0	6.3		7.00	12.50	0.22	1.50
17	6.10	4.0	15.0	10.0	7.2		6.90	12.50	0.23	1.40
18	6.20	4.0	15.0	7.0	9.2		6.90	12.00	0.30	1.40
19	6.20	5.0	15.0	7.0	7.8		6.70	11.00	0.19	1.60
20	6.20	5.0	15.0	5.0	10.6		6.80	12.00	0.18	1.60
21	6.30	6.0	15.0	4.0	11.8		6.90	12.50	0.20	1.60
22	6.30	6.0	14.0	4.0	13.9		6.90	12.50	0.16	1.50
23	6.20	6.0	14.0	6.0	9.6		6.80	12.50	0.16	1.50
24	6.30	6.0	14.0	6.0	7.7		6.80	12.00	0.27	1.50
25	6.30	6.0	14.0	7.0	9.3		6.70	11.00	0.50	1.50
26	6.30	5.0	14.0	8.0	16.8		6.90	12.50	0.30	1.50
27	6.40	6.0	14.0	7.0	18.2		6.90	12.50	0.37	1.50
28	6.20	5.0	15.0	6.0	12.3		6.90	12.50	0.34	1.60
29										
30										
31										
Avg.	6.20	5.04	14.71	6.39	9.61		6.84	12.05	0.26	1.53
Max.	6.40	6.00	16.00	10.00	18.21		7.00	12.50	0.50	1.60
Min.	6.00	4.00	14.00	4.00	5.84		6.70	11.00	0.15	1.40

Prepared by: _____ Date: _____
(signature)

D H E C

PROVIDE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	March-13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.10	5.0	14.0	5.0	16.4		6.70	11.00	0.22	1.60
2	6.30	6.0	15.0	4.0	9.7		6.80	12.00	0.21	1.80
3	6.30	6.0	15.0	4.0	6.8		6.90	12.00	0.18	1.70
4	6.20	4.0	15.0	5.0	7.6		6.90	12.50	0.19	1.70
5	6.20	5.0	16.0	6.0	8.4		6.80	12.00	0.22	1.70
6	6.30	6.0	16.0	8.0	9.8		6.90	12.50	0.20	1.50
7	6.30	6.0	15.0	8.0	10.8		6.90	12.50	0.23	1.60
8	6.30	6.0	15.0	6.0	9.6		6.80	12.50	0.22	1.60
9	6.30	6.0	15.0	4.0	6.8		6.80	12.00	0.15	1.60
10	6.20	5.0	15.0	5.0	6.9		6.80	12.00	0.17	1.80
11	6.20	5.0	14.0	6.0	7.7		6.70	11.00	0.17	1.80
12	6.30	6.0	14.0	2.0	9.5		6.90	12.50	0.18	1.70
13	6.30	6.0	14.0	4.0	10.2		6.90	12.50	0.20	1.70
14	6.30	6.0	15.0	8.0	7.7		6.90	12.00	0.18	1.70
15	5.90	4.0	15.0	8.0	6.8		6.80	12.00	0.14	1.70
16	5.80	4.0	16.0	7.0	7.2		6.90	12.50	0.19	1.70
17	6.10	4.0	16.0	5.0	6.9		6.90	12.50	0.14	1.70
18	6.20	4.0	16.0	3.0	6.2		7.00	12.50	0.24	1.60
19	6.20	5.0	16.0	4.0	7.2		6.90	12.00	0.24	1.50
20	6.30	6.0	16.0	5.0	6.8		6.70	11.00	0.17	1.60
21	6.20	5.0	16.0	6.0	8.2		6.90	12.50	0.24	1.60
22	6.00	4.0	15.0	6.0	16.8		6.90	12.50	0.15	1.60
23	5.90	4.0	16.0	8.0	16.3		7.00	13.00	0.15	1.60
24	5.90	4.0	16.0	6.0	12.4		6.80	12.00	0.15	1.60
25	5.80	4.0	16.0	6.0	9.8		6.80	12.00	0.64	1.60
26	5.90	4.0	16.0	7.0	10.6		6.80	12.00	0.42	1.60
27	6.10	5.0	15.0	4.0	11.2		6.90	12.50	0.35	1.50
28	6.20	5.0	15.0	3.0	6.8		6.90	12.50	0.30	1.60
29	6.20	6.0	15.0	6.0	5.9		6.90	12.50	0.20	1.60
30	6.30	6.0	16.0	8.0	7.6		7.00	12.50	0.18	1.60
31	6.20	5.0	16.0	6.0	8.3		6.90	12.50	0.17	1.60
Avg.	6.15	5.06	15.32	5.58	9.13		6.86	12.19	0.22	1.64
Max.	6.30	6.00	16.00	8.00	16.84		7.00	13.00	0.64	1.80
Min.	5.80	4.00	14.00	2.00	5.86		6.70	11.00	0.14	1.50

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	April-13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.20	5.0	15.0	6.0	9.6		6.70	11.00	0.20	1.70
2	6.20	6.0	16.0	4.0	7.5		6.80	12.00	0.23	1.60
3	6.00	4.0	16.0	6.0	6.8		6.90	12.50	0.21	1.60
4	5.90	4.0	16.0	5.0	9.9		7.00	13.00	0.18	1.80
5	5.90	4.0	17.0	3.0	13.5		6.80	12.00	0.15	1.80
6	6.20	5.0	17.0	8.0	15.3		6.80	12.00	0.20	1.70
7	6.30	6.0	16.0	10.0	10.6		7.00	13.00	0.19	1.70
8	6.30	5.0	16.0	7.0	9.8		6.90	12.50	0.19	1.70
9	6.30	6.0	15.0	7.0	7.6		6.90	12.50	0.21	1.60
10	6.00	4.0	15.0	4.0	8.3		6.90	12.50	0.18	1.60
11	6.10	4.0	17.0	3.0	9.8		6.90	12.00	0.17	1.60
12	6.00	4.0	17.0	3.0	11.3		6.80	12.00	0.18	1.60
13	6.00	4.0	17.0	5.0	10.2		6.80	12.00	0.16	1.70
14	6.20	5.0	16.0	6.0	6.8		6.90	12.50	0.12	1.70
15	6.20	5.0	16.0	6.0	7.8		6.70	11.00	0.17	1.70
16	5.90	4.0	16.0	4.0	9.6		6.80	12.00	0.17	1.80
17	5.80	4.0	17.0	4.0	10.3		6.80	12.00	0.17	1.80
18	5.90	4.0	17.0	3.0	9.7		6.90	13.00	0.16	1.80
19	6.20	5.0	17.0	6.0	7.6		6.90	13.00	0.22	1.80
20	6.20	6.0	17.0	7.0	5.9		7.00	13.00	0.14	1.60
21	6.30	6.0	17.0	7.0	6.8		7.00	13.00	0.14	1.60
22	6.30	6.0	17.0	4.0	7.9		6.80	12.00	0.18	1.60
23	6.10	4.0	16.0	3.0	14.6		6.70	11.00	0.19	1.60
24	6.00	4.0	16.0	3.0	15.7		6.70	11.00	0.13	1.50
25	6.00	4.0	16.0	4.0	9.9		6.80	12.00	0.19	1.50
26	6.00	4.0	17.0	5.0	7.7		6.90	12.50	0.18	1.50
27	6.30	6.0	17.0	5.0	9.6		6.90	12.50	0.10	1.60
28	6.20	6.0	17.0	4.0	16.8		7.00	13.00	0.11	1.60
29	5.90	4.0	17.0	6.0	18.3		6.90	12.50	0.16	1.60
30	5.90	4.0	17.0	7.0	13.4		6.90	12.50	0.25	1.60
31										
Avg.	6.09	4.73	16.43	5.17	10.29		6.86	12.25	0.17	1.65
Max.	6.30	6.00	17.00	10.00	18.26		7.00	13.00	0.25	1.80
Min.	5.80	4.00	15.00	3.00	5.86		6.70	11.00	0.10	1.50

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	May-13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	18.0	4.0	10.0		6.70	11.00	0.55	1.80
2	6.20	5.0	18.0	3.0	8.0		6.80	12.00	0.41	1.90
3	6.30	6.0	19.0	6.0	7.8		6.90	12.50	0.29	1.90
4	6.30	6.0	19.0	4.0	5.6		6.90	12.50	0.25	1.90
5	6.10	4.0	19.0	4.0	6.7		6.70	11.00	0.22	1.70
6	6.00	4.0	18.0	8.0	14.3		6.70	11.00	0.43	1.70
7	6.00	4.0	17.0	6.0	9.3		6.90	13.00	0.44	1.90
8	5.90	4.0	18.0	6.0	8.0		7.00	13.00	0.58	1.80
9	5.70	4.0	18.0	8.0	8.5		7.00	13.00	0.43	1.80
10	5.90	4.0	18.0	7.0	7.9		7.00	13.00	0.30	1.80
11	6.10	5.0	19.0	8.0	7.5		6.70	11.00	0.19	1.90
12	6.20	5.0	19.0	9.0	7.6		6.80	12.00	0.18	2.00
13	6.20	6.0	19.0	4.0	8.4		6.80	12.00	0.21	2.00
14	6.30	6.0	19.0	4.0	7.6		6.80	12.00	0.15	2.00
15	6.30	6.0	19.0	3.0	8.5		6.90	12.50	0.20	1.90
16	6.30	6.0	19.0	5.0	8.3		6.90	12.00	0.16	1.80
17	6.30	6.0	18.0	5.0	8.5		6.90	12.50	0.15	1.80
18	6.20	5.0	18.0	4.0	8.3		6.80	12.50	0.13	1.80
19	6.20	5.0	19.0	6.0	8.5		6.80	12.00	0.15	1.90
20	6.20	5.0	20.0	3.0	8.9		6.80	12.00	0.19	1.90
21	6.30	6.0	20.0	3.0	7.7		6.80	12.00	0.10	1.90
22	6.20	6.0	20.0	4.0	11.4		7.00	12.50	0.16	1.80
23	6.20	5.0	19.0	5.0	8.3		7.00	13.00	0.19	1.80
24	6.10	5.0	19.0	5.0	8.3		6.90	13.00	0.15	1.90
25	6.10	4.0	19.0	6.0	8.5		6.90	12.50	0.13	2.00
26	6.20	5.0	19.0	6.0	7.9		6.90	12.50	0.16	2.10
27	6.20	5.0	19.0	5.0	7.8		6.80	12.00	0.18	2.00
28	6.20	5.0	19.0	5.0	7.5		6.80	12.00	0.15	2.00
29	6.30	6.0	19.0	4.0	8.2		6.80	12.00	0.16	1.90
30	6.30	6.0	18.0	4.0	8.7		6.80	12.00	0.15	1.90
31	6.30	6.0	19.0	5.0	8.3		6.90	12.50	0.16	1.90
Avg.	6.16	5.13	18.74	5.13	8.40		6.85	12.21	0.24	1.88
Max.	6.30	6.00	20.00	9.00	14.25		7.00	13.00	0.58	2.10
Min.	5.70	4.00	17.00	3.00	5.57		6.70	11.00	0.10	1.70

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	June-13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	20.0	4.0	16.5		6.70	11.00	0.16	1.80
2	5.90	4.0	20.0	6.0	22.5		6.80	12.00	0.16	1.70
3	5.90	4.0	21.0	6.0	19.6		6.90	12.50	0.50	1.70
4	6.20	5.0	21.0	8.0	16.2		7.00	13.00	0.60	1.70
5	5.80	4.0	21.0	3.0	27.4		6.80	12.00	0.73	1.80
6	5.90	4.0	20.0	4.0	20.5		6.80	12.00	0.33	1.60
7	6.00	4.0	20.0	5.0	17.6		6.80	12.00	0.79	1.60
8	6.10	4.0	22.0	3.0	10.5		6.90	12.50	0.69	1.70
9	6.00	4.0	22.0	3.0	9.7		6.90	12.50	0.22	1.70
10	5.80	4.0	23.0	8.0	14.6		7.00	12.50	0.58	1.80
11	5.70	4.0	22.0	9.0	18.3		7.00	12.50	0.52	1.80
12	5.70	4.0	22.0	6.0	19.2		7.00	12.50	0.41	1.80
13	5.90	4.0	21.0	6.0	12.5		6.70	11.00	0.67	1.80
14	6.00	4.0	21.0	4.0	10.4		6.70	11.00	0.25	1.60
15	6.00	4.0	21.0	4.0	9.6		6.80	11.00	0.23	1.60
16	6.10	4.0	20.0	3.0	7.8		6.80	12.50	0.26	1.70
17	6.30	6.0	20.0	3.0	12.9		6.90	12.50	0.22	1.70
18	6.30	6.0	20.0	2.0	14.9		6.90	12.50	0.14	1.80
19	6.20	5.0	21.0	4.0	15.4		6.90	12.50	0.13	1.80
20	6.10	4.0	21.0	5.0	16.2		7.00	13.00	0.20	1.80
21	6.00	4.0	22.0	5.0	12.2		6.90	13.00	0.23	1.80
22	6.00	4.0	20.0	4.0	16.6		6.70	11.00	0.12	1.60
23	5.90	4.0	20.0	5.0	12.5		6.70	11.00	0.12	1.70
24	6.20	5.0	21.0	6.0	15.4		6.80	11.00	0.23	1.70
25	6.20	5.0	21.0	4.0	14.6		6.90	12.50	0.43	1.70
26	6.30	6.0	21.0	3.0	23.7		6.90	12.50	0.45	1.80
27	6.30	6.0	21.0	3.0	30.5		7.00	13.00	0.67	1.80
28	6.00	4.0	20.0	5.0	19.7		7.00	13.00	0.25	1.80
29	6.10	4.0	20.0	5.0	13.3		7.00	13.00	0.17	1.60
30	6.10	4.0	20.0	4.0	12.2		6.90	12.50	0.13	1.60
31										
Avg.	6.03	4.40	20.83	4.67	16.10		6.87	12.18	0.35	1.72
Max.	6.30	6.00	23.00	9.00	30.46		7.00	13.00	0.79	1.80
Min.	5.70	4.00	20.00	2.00	7.84		6.70	11.00	0.12	1.60

Prepared by: _____ Date: _____
(signature)

D H E C

PROVIDE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	July-13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.00	4.0	23.0	6.0	16.7		7.00	12.50	0.17	1.80
2	5.90	4.0	22.0	5.0	18.4		6.70	11.00	0.14	2.20
3	6.00	4.0	22.0	4.0	19.6		6.80	12.00	0.24	2.20
4	6.00	5.0	22.0	4.0	22.4		6.80	12.00	0.21	1.80
5	6.20	5.0	23.0	6.0	26.4		6.90	12.00	0.34	1.80
6	6.30	6.0	23.0	7.0	22.4		6.90	12.00	0.39	1.80
7	6.30	6.0	23.0	3.0	28.4		6.90	12.50	0.41	1.60
8	6.30	6.0	22.0	3.0	19.3		6.90	12.50	0.71	1.60
9	6.00	4.0	22.0	2.0	17.7		6.70	11.00	0.62	1.80
10	5.90	4.0	24.0	4.0	12.5		6.70	11.00	0.34	1.80
11	5.80	4.0	24.0	4.0	14.7		6.90	12.50	0.39	1.60
12	5.80	4.0	24.0	4.0	20.9		6.80	12.00	0.57	1.60
13	5.90	4.0	24.0	6.0	21.7		6.80	12.00	0.57	1.80
14	5.80	4.0	22.0	4.0	26.3		6.80	12.00	0.56	1.80
15	6.00	4.0	22.0	5.0	22.5		6.90	12.00	0.50	1.60
16	6.00	4.0	23.0	5.0	19.6		7.00	13.00	0.65	1.60
17	5.90	4.0	23.0	5.0	14.7		7.00	13.00	0.77	1.80
18	5.90	4.0	23.0	3.0	10.6		7.00	13.00	0.70	1.80
19	6.00	5.0	23.0	3.0	9.7		6.80	12.00	0.52	1.80
20	6.00	5.0	23.0	4.0	11.4		6.80	12.00	0.31	1.80
21	6.00	4.0	22.0	3.0	9.6		6.90	12.00	0.36	1.60
22	5.80	4.0	22.0	2.0	7.6		6.80	11.00	0.32	1.60
23	6.20	6.0	22.0	3.0	8.2		6.90	11.00	0.20	2.00
24	6.30	6.0	22.0	3.0	8.0		6.90	12.00	0.22	2.00
25	6.30	6.0	21.0	6.0	8.1		6.90	12.00	0.33	2.00
26	6.20	5.0	22.0	4.0	9.3		6.90	12.00	0.25	1.80
27	6.30	6.0	22.0	3.0	7.8		6.90	12.00	0.15	1.80
28	6.30	6.0	22.0	3.0	9.6		6.90	12.50	0.11	1.80
29	6.30	6.0	22.0	5.0	7.8		6.90	12.50	0.10	1.80
30	6.40	6.0	22.0	4.0	8.2		6.80	12.50	0.39	1.80
31	6.30	6.0	22.0	4.0	7.2		6.90	12.50	0.28	1.80
Avg.	6.08	4.87	22.52	4.10	15.07		6.86	12.06	0.38	1.79
Max.	6.40	6.00	24.00	7.00	28.36		7.00	13.00	0.77	2.20
Min.	5.80	4.00	21.00	2.00	7.16		6.70	11.00	0.10	1.60

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	August-13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.30	6.0	23.0	6.0	7.6		6.90	12.50	0.20	2.90
2	6.30	6.0	23.0	4.0	6.9		6.90	12.50	0.25	3.00
3	6.20	5.0	22.0	3.0	7.2		6.80	12.00	0.29	3.00
4	6.30	5.0	24.0	3.0	6.9		6.80	12.00	0.18	3.00
5	6.30	6.0	23.0	6.0	5.9		6.80	11.00	0.19	3.00
6	6.40	6.0	23.0	4.0	6.5		7.00	12.50	0.19	3.00
7	6.30	6.0	23.0	3.0	5.2		6.20	6.00	0.14	3.00
8	6.30	6.0	24.0	5.0	5.0		6.30	6.00	0.20	3.00
9	6.40	6.0	24.0	6.0	4.8		6.30	6.50	0.19	3.00
10	6.40	5.0	24.0	6.0	5.6		6.40	7.00	0.21	3.00
11	6.30	5.0	23.0	4.0	5.1		6.40	7.00	0.22	3.00
12	6.30	6.0	23.0	3.0	5.0		6.30	6.00	0.22	3.00
13	6.30	6.0	24.0	3.0	5.2		6.30	6.00	0.31	2.90
14	6.00	5.0	23.0	4.0	56.6		6.20	5.00	0.39	2.80
15	5.90	4.0	22.0	3.0	6.2		6.40	6.00	0.29	2.80
16	5.90	4.0	22.0	3.0	6.0		6.40	6.00	0.14	2.80
17	6.10	5.0	22.0	6.0	6.1		6.50	7.00	0.15	2.90
18	6.20	6.0	23.0	5.0	6.8		6.50	7.00	0.20	2.60
19	6.30	6.0	23.0	5.0	7.2		6.50	6.00	0.27	2.60
20	6.30	5.0	23.0	6.0	7.4		6.40	5.00	0.34	2.80
21	6.30	6.0	22.0	4.0	7.0		6.30	6.00	0.76	2.90
22	6.40	6.0	22.0	4.0	6.5		6.30	6.00	0.38	2.90
23	6.40	6.0	23.0	7.0	6.2		6.20	5.00	0.47	2.80
24	6.30	6.0	23.0	8.0	5.9		6.30	6.00	0.24	2.60
25	6.30	6.0	22.0	6.0	6.0		6.30	6.00	0.23	2.60
26	6.30	6.0	22.0	6.0	7.1		6.40	7.00	0.24	2.50
27	6.40	6.0	23.0	5.0	6.5		6.40	7.00	0.31	2.60
28	6.30	6.0	23.0	5.0	6.3		6.40	7.00	0.28	2.60
29	6.40	6.0	23.0	5.0	6.7		6.40	7.00	0.28	2.80
30	6.40	6.0	22.0	4.0	6.8		6.40	7.00	0.30	2.80
31	6.40	6.0	22.0	3.0	5.8		6.40	7.00	0.23	2.60
Avg.	6.28	5.65	22.84	4.68	7.87		6.45	7.42	0.27	2.83
Max.	6.40	6.00	24.00	8.00	56.63		7.00	12.50	0.76	3.00
Min.	5.90	4.00	22.00	3.00	4.75		6.20	5.00	0.14	2.50

Prepared by: _____ Date: _____
(signature)

D H E C
PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	September-13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.30	6.0	23.0	3.0	6.2		6.40	6.00	0.23	2.40
2	6.40	6.0	22.0	6.0	5.9		6.50	7.00	0.22	2.50
3	6.40	6.0	22.0	4.0	5.4		6.50	7.00	0.24	2.50
4	6.20	5.0	22.0	3.0	6.4		6.40	6.00	0.26	2.40
5	5.90	4.0	21.0	6.0	7.1		6.50	7.00	0.19	2.20
6	6.00	4.0	21.0	6.0	5.3		6.50	7.00	0.17	2.20
7	6.10	4.0	20.0	9.0	5.5		6.50	7.00	0.19	2.40
8	6.10	4.0	20.0	10.0	4.9		6.50	8.00	0.19	2.40
9	6.00	4.0	21.0	10.0	5.0		6.50	8.00	0.22	2.60
10	6.20	5.0	21.0	7.0	5.1		6.40	6.00	0.23	2.50
11	6.20	6.0	22.0	4.0	8.4		6.40	6.00	0.20	2.50
12	6.30	6.0	22.0	3.0	5.5		6.40	6.00	0.19	2.50
13	6.40	6.0	22.0	3.0	5.3		6.50	6.00	0.26	2.40
14	6.30	6.0	21.0	4.0	5.0		6.40	6.00	0.16	2.40
15	6.30	5.0	21.0	6.0	5.0		6.50	7.00	0.20	2.20
16	6.40	6.0	20.0	5.0	5.0		6.50	7.00	0.34	2.20
17	6.20	5.0	20.0	5.0	5.2		6.50	7.00	0.23	2.20
18	6.40	6.0	20.0	6.0	5.5		6.50	7.00	0.23	2.50
19	6.40	6.0	20.0	4.0	5.2		6.50	8.00	0.14	2.40
20	6.40	6.0	20.0	8.0	5.0		6.50	8.00	0.21	2.20
21	6.40	6.0	20.0	6.0	5.0		6.50	7.00	0.18	2.20
22	6.40	6.0	20.0	6.0	5.0		6.50	7.00	0.16	2.20
23	6.40	6.0	21.0	4.0	5.0		6.50	7.00	0.22	2.20
24	6.30	5.0	21.0	3.0	4.9		6.40	7.00	0.22	2.60
25	6.40	6.0	22.0	5.0	5.0		6.50	8.00	0.22	2.40
26	6.40	6.0	21.0	8.0	5.0		6.50	8.00	0.19	2.40
27	6.50	6.0	21.0	8.0	4.8		6.50	8.00	0.29	2.20
28	6.40	6.0	20.0	3.0	4.9		6.50	7.00	0.17	2.20
29	6.30	5.0	20.0	4.0	4.9		6.50	8.00	0.16	2.20
30	6.30	5.0	20.0	4.0	5.0		6.50	8.00	0.17	2.20
31										
Avg.	6.29	5.43	20.90	5.43	5.37		6.48	7.07	0.21	2.35
Max.	6.50	6.00	23.00	10.00	8.36		6.50	8.00	0.34	2.60
Min.	5.90	4.00	20.00	3.00	4.76		6.40	6.00	0.14	2.20

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	October-13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.20	4.0	21.0	3.0	5.2		6.40	6.00	0.20	2.20
2	6.30	5.0	21.0	5.0	5.0		6.50	7.00	0.22	2.30
3	6.30	6.0	22.0	5.0	5.2		6.50	7.00	0.19	2.40
4	6.30	6.0	22.0	4.0	5.0		6.50	7.00	0.23	2.40
5	6.20	4.0	21.0	6.0	5.0		6.40	7.00	0.21	2.40
6	6.20	5.0	21.0	6.0	4.9		6.40	6.00	0.23	2.30
7	6.40	6.0	20.0	4.0	4.3		6.40	6.00	0.16	2.30
8	6.40	6.0	20.0	4.0	8.5		6.50	6.00	0.10	2.20
9	6.30	5.0	20.0	4.0	9.7		6.40	7.00	0.11	2.20
10	6.30	6.0	21.0	5.0	5.3		6.30	7.00	0.07	2.20
11	6.30	6.0	21.0	6.0	5.3		6.30	7.00	0.06	2.20
12	6.30	6.0	21.0	4.0	4.9		6.40	7.00	0.04	2.20
13	6.30	6.0	22.0	6.0	4.2		6.40	8.00	0.04	2.40
14	6.40	5.0	21.0	7.0	5.1		6.50	8.00	0.05	2.50
15	6.40	6.0	21.0	8.0	5.0		6.50	8.00	0.20	2.50
16	6.20	4.0	21.0	4.0	4.5		6.30	6.00	0.20	2.40
17	6.30	5.0	21.0	5.0	4.4		6.40	6.00	0.27	2.40
18	6.30	5.0	22.0	6.0	4.2		6.50	7.00	0.20	2.30
19	6.30	5.0	20.0	4.0	3.6		6.50	7.00	0.19	2.30
20	6.30	6.0	20.0	4.0	3.6		6.50	7.00	0.11	2.40
21	6.40	6.0	21.0	3.0	5.0		6.50	7.00	0.14	2.40
22	6.40	6.0	22.0	3.0	4.3		6.50	8.00	0.13	2.40
23	6.30	6.0	21.0	4.0	3.4		6.50	8.00	0.16	2.30
24	6.30	6.0	21.0	5.0	2.9		6.40	6.00	0.12	2.30
25	6.30	6.0	21.0	4.0	2.9		6.40	7.00	0.14	2.40
26	6.40	6.0	21.0	4.0	2.6		6.50	7.00	0.11	2.40
27	6.40	6.0	20.0	4.0	2.3		6.50	7.00	0.15	2.40
28	6.30	6.0	20.0	6.0	3.3		6.40	6.00	0.40	2.30
29	6.30	6.0	21.0	5.0	2.7		6.40	6.00	0.20	2.30
30	6.40	6.0	21.0	5.0	3.0		6.40	7.00	0.12	2.40
31	6.40	6.0	21.0	4.0	2.6		6.40	7.00	0.26	2.40
Avg.	6.32	5.58	20.94	4.74	4.44		6.44	6.87	0.16	2.34
Max.	6.40	6.00	22.00	8.00	9.71		6.50	8.00	0.40	2.50
Min.	6.20	4.00	20.00	3.00	2.26		6.30	6.00	0.04	2.20

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Nov 13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.40	6.0	18.0	4.0	5.0		6.50	7.00	0.26	2.20
2	6.30	6.0	18.0	3.0	4.8		6.40	6.00	0.23	2.40
3	6.40	6.0	17.0	3.0	3.7		6.40	6.00	0.19	2.40
4	6.40	6.0	17.0	4.0	3.9		6.50	7.00	0.15	2.50
5	6.20	5.0	18.0	6.0	4.8		6.60	7.00	0.16	2.20
6	6.10	4.0	18.0	5.0	5.2		6.60	7.00	0.34	2.20
7	6.00	4.0	17.0	5.0	4.7		6.50	8.00	0.21	2.20
8	6.00	4.0	16.0	6.0	5.2		6.50	8.00	0.15	2.00
9	6.40	6.0	16.0	3.0	4.7		6.40	6.00	0.16	2.00
10	6.30	6.0	15.0	4.0	5.0		6.40	6.00	0.16	2.00
11	6.30	6.0	15.0	4.0	4.2		6.40	6.00	0.21	2.50
12	6.20	5.0	15.0	7.0	3.9		6.40	6.00	0.20	2.40
13	6.40	6.0	16.0	8.0	3.7		6.60	8.00	0.20	2.40
14	6.40	6.0	16.0	6.0	3.5		6.50	7.00	0.29	2.40
15	6.40	6.0	16.0	3.0	3.8		6.50	7.00	0.44	2.40
16	6.50	6.0	15.0	3.0	4.3		6.40	6.00	0.44	2.40
17	6.30	5.0	15.0	4.0	4.0		6.40	6.00	0.42	2.40
18	6.30	6.0	15.0	3.0	4.2		6.40	6.00	0.44	2.30
19	6.40	6.0	15.0	3.0	3.9		6.40	6.00	0.10	2.20
20	6.40	6.0	16.0	4.0	3.7		6.50	7.00	0.11	2.20
21	6.30	5.0	16.0	3.0	4.7		6.50	8.00	0.12	2.30
22	6.20	5.0	16.0	2.0	5.8		6.60	8.00	0.19	2.30
23	6.20	5.0	15.0	2.0	6.2		6.60	8.00	0.17	2.30
24	6.10	4.0	15.0	4.0	5.6		6.60	7.00	0.11	2.40
25	6.00	4.0	15.0	3.0	5.0		6.40	7.00	0.15	2.20
26	6.00	4.0	15.0	6.0	5.9		6.50	7.00	0.18	2.20
27	6.00	4.0	16.0	6.0	10.2		6.50	7.00	0.21	2.40
28	6.40	6.0	16.0	4.0	9.6		6.40	7.00	0.16	2.50
29	6.30	6.0	15.0	3.0	8.8		6.50	6.00	0.14	2.50
30	6.30	5.0	15.0	3.0	8.4		6.50	6.00	0.11	2.50
31										
Avg.	6.26	5.30	15.93	4.13	5.21		6.48	6.80	0.21	2.31
Max.	6.50	6.00	18.00	8.00	10.24		6.60	8.00	0.44	2.50
Min.	6.00	4.00	15.00	2.00	3.52		6.40	6.00	0.10	2.00

Prepared by: _____ Date: _____
(signature)

D H E C

PROMOTE PROTECT PROSPER

Surface Water System Monthly Operation Report
Chemical & Physical Analyses of
Raw, Coagulated, & Settled Water
Bureau of Water

System Name:	City of Aiken	System Number:	0210001
Certified Lab ID#:	02001	For (Month/Yr):	Dec 13

	Raw Water						Coagulated Water		Settled Water	
Day	pH	Alkalinity (mg/L)	Temp (°C)	Hardness (mg/L)	Turbidity (NTU)	Color (CU)	pH	Alkalinity (mg/L)	Turbidity (NTU)	Disinfectant Residual (mg/L)
1	6.20	4.0	16.0	3.0	3.2		6.40	7.00	0.17	2.00
2	6.30	5.0	15.0	7.0	3.0		6.50	8.00	0.21	1.80
3	6.30	5.0	14.0	8.0	2.3		6.50	8.00	0.16	1.80
4	6.30	4.0	14.0	4.0	5.5		6.40	8.00	0.30	1.90
5	6.20	4.0	14.0	5.0	3.7		6.30	7.00	0.29	1.90
6	6.20	4.0	13.0	5.0	2.6		6.30	6.00	0.31	2.20
7	6.10	4.0	14.0	5.0	2.7		6.30	6.00	0.23	2.10
8	6.00	4.0	15.0	9.0	5.1		6.40	7.00	0.19	2.00
9	6.00	4.0	15.0	10.0	3.8		6.40	7.00	0.17	2.00
10	6.00	4.0	15.0	10.0	4.1		6.50	8.00	0.22	2.00
11	6.20	4.0	14.0	4.0	3.1		6.50	8.00	0.13	2.40
12	6.30	5.0	14.0	4.0	3.0		6.50	8.00	0.12	2.30
13	6.30	6.0	14.0	3.0	2.3		6.50	8.00	0.12	2.30
14	6.40	6.0	13.0	2.0	2.7		6.50	8.00	0.12	2.20
15	6.20	4.0	13.0	3.0	1.2		6.40	8.00	0.18	2.00
16	6.20	4.0	13.0	3.0	5.5		6.30	6.00	0.17	2.00
17	6.20	5.0	14.0	4.0	4.4		6.30	6.00	0.15	2.00
18	6.20	4.0	14.0	4.0	3.7		6.40	7.00	0.16	2.00
19	6.10	4.0	15.0	4.0	4.8		6.40	6.00	0.21	2.10
20	6.10	4.0	14.0	5.0	3.1		6.50	8.00	0.21	2.40
21	6.00	4.0	14.0	3.0	2.9		6.40	7.00	0.23	2.30
22	6.00	4.0	13.0	4.0	2.5		6.40	7.00	0.23	2.30
23	6.10	4.0	13.0	4.0	5.1		6.40	7.00	0.23	2.30
24	6.10	4.0	13.0	4.0	7.5		6.50	6.00	0.20	2.30
25	6.10	4.0	15.0	3.0	5.5		6.60	8.00	0.57	2.20
26	6.20	4.0	14.0	2.0	2.9		6.50	8.00	0.12	2.20
27	6.20	5.0	14.0	2.0	2.8		6.50	8.00	0.11	2.20
28	6.20	5.0	14.0	4.0	2.4		6.40	7.00	0.10	2.20
29	6.20	4.0	13.0	4.0	5.2		6.40	6.00	0.11	2.20
30	6.30	4.0	13.0	3.0	5.9		6.40	6.00	0.16	2.10
31	6.20	5.0	14.0	3.0	4.1		6.40	7.00	0.14	2.00
Avg.	6.17	4.35	13.97	4.45	3.75		6.43	7.16	0.19	2.12
Max.	6.40	6.00	16.00	10.00	7.50		6.60	8.00	0.57	2.40
Min.	6.00	4.00	13.00	2.00	1.21		6.30	6.00	0.10	1.80

Prepared by: _____ Date: _____
(signature)