September 2010

City of Villa Rica, Georgia
Watershed Protection Plan

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1 INTRODUCTION

1.1 Purpose

The purpose of this Watershed Protection Plan (WPP) is to establish a strategy to protect resources and maintain and/or improve water quality in local streams and rivers within the City of Villa Rica. The development and implementation of a WPP is a requirement of the City's NPDES wastewater discharge permit for the West Water Pollution Control Plant (WPCP), NPDES Permit Number GA0027162. The City is expanding the capacity of the West WPCP to meet the long-term needs of the community for wastewater treatment.

The WPP outlines a long-term water quality monitoring program and strategies for pollution identification, prevention, and public outreach that will be implemented in coordination with the Villa Rica Stormwater Management Program and requirements of Metropolitan North Georgia Water Planning District (District). By coordinating the efforts related to all of these water quality initiatives, the City will ensure that strategies, monitoring, and funding mechanisms are integrated to provide the most efficient and cost effective solutions for solving water quality concerns within the service area.

1.2 Background

1.2.1 Villa Rica Background

Villa Rica is located along Interstate-20 approximately 35 miles west of Atlanta, Georgia. Figure 1 on the page 3 shows a location map of the City. The 2010 U. S. Census population of the City is 13,956. Historical population and population projections for the City of Villa Rica are shown in Table 1.1 below.

Table 1.1 Villa Rica Historical and Projected Population

Year	Population
2000 [1]	4,134
2010 [1]	13,956
2015 [2]	22,524
2020 [2]	28,654
2025 [2]	34,784

Source: (1) U.S. Bureau of Census Population
(2) City of Villa Rica Comprehensive Plan

The City provides water service to approximately 5,900 customers and sewer service to approximately 4,050 customers serving residents and businesses located within the City and in some adjacent areas. The sewer service area for the City is limited to the shown on Figure 2, Water and Sewer Service Area Map.

The City is made up of mix of residential, commercial, industrial and low-density development. Figure 3 shows the current land use map for the City of Villa Rica. The Future Land Use map based on the City's Comprehensive Plan is shown on Figure 4. Based on a review of the Future Land Use Map it appears that commercial and industrial development is planned to occur primarily along major highway routes and residential development will occur in outlying undeveloped areas including infill development, of residential and commercial types. In general, future land used will have an impact on the watersheds within the City as a result of increasing non-point source impacts on streams within the City especially in areas that are presently undeveloped. In particular, areas in the Little Tallapoosa basin will be most impacted if future land use occurs as indicated by the City's Future Land Use Plan.

1.2.2 Watershed Assessment and Long-Term Monitoring Program – Villa Rica

The City of Villa Rica as well as Carroll County, Heard County and various other cities within the counties, was included in a regional Watershed Assessment for Carroll County and Heard County Georgia. The Watershed Assessment (West Georgia Watershed Assessment or WGWSA) was prepared by the Center

for Water Resources, State University of West Georgia and Hayes, James & Associates, Inc. and completed in 2003. The West Georgia Watershed Assessment was reviewed and accepted by Georgia Environmental Protection Division (EPD) and used by the City of Villa Rica to meet its NPDES permit requirements for preparation of a Watershed Assessment associated with the City's West Side wastewater treatment facility permit.

Based on WGWSA, the study encompassed the following tasks:

- **Data Collection** - gathering base watershed data that illustrate the existing conditions of the study area.
- **Water Quality and Biological Monitoring** - to adequately assess the condition of water bodies, fish, and aquatic macroinvertebrates in the watershed.
- **Modeling** - using Soil and Water Assessment Tool (SWAT) developed by the USDA Agricultural Research Service (ARS), predict the impact of land management practices on water, sediment and agricultural chemical yields in watersheds with varying soils, land use, and management conditions over long periods of time.
- **Watershed Management Plan** - to meet the goals of the study: protect state waters, protect aquatic life, and help develop a sustainable resource in Carroll County.

Since completion of the WGWSA, Villa Rica has participated in the long-term water quality monitoring outlined in the Watershed Management Plan of the WGWSA, conducted by the Center for Water Resources, State University of West Georgia. The Watershed Management Plan includes a comprehensive long-term monitoring program including inspections, sampling and analysis of water quality and biological monitoring throughout the counties, including four sampling stations located within the City of Villa Rica. The long-term monitoring plan includes a total of 9 watershed sampling stations to represent areas affected by the City of Villa Rica including the original sampling stations from the Watershed Assessment and excluding station CTL-63.

Annual reports have been submitted to Georgia Department of Natural Resources (DNR) Environmental Protection Division (EPD), which document the results of long-term watershed monitoring for Villa Rica as well as Carroll and Heard Counties and participating cities.

The City of Villa Rica intends to continue to be involved with long-term watershed monitoring in conjunction with the West Georgia Watershed Assessment Watershed Management Plan.

This Watershed Protection Plan builds findings of the WGWSA and the Watershed Monitoring Plan by identifying best management practices (BMPs) specific to Villa Rica to address identified or anticipated water quality concerns and by defining the City's plan to track the successful implementation of these BMPs.

Figure 1 – Villa Rica Location Map

Figure 2 – Water and Sewer Service Area Map

Figure 3 Villa Rica Land Use Map.

Figure 4 - Villa Rica Future Land Use Map

2 POLITICAL JURISDICTIONS AND LEGAL AUTHORITY

2.1 Political Jurisdictions

2.1.1 Local Government Authority

Contact information for the responsible party for the City of Villa Rica is provided below:

Villa Rica City Management Contact Information	
Name	David Milliron
Title	City Manager
Address	571 W. Bankhead Hwy. Villa Rica, GA 30180
Phone	(678) 840-1211
Fax	(770) 459-7003
Email	dmilliron@villarica.org

Villa Rica Watershed Management Contact Information	
Name	Jameson Green
Title	Watershed Protection Supervisor
Address	571 W. Bankhead Hwy. Villa Rica, GA 30180
Phone	(678) 840-1214
Fax	(770) 459-7003
Email	jgreen@villarica.org

2.1.2 Local Zoning and Development Authorities

Contact information for the local zoning and development agency for the City of Villa Rica is provided below:

Villa Rica Community Development Contact Information	
Name	Janet Hyde
Title	Community Development Director
Address	571 W. Bankhead Hwy. Villa Rica, GA 30180
Phone	(678) 840-1213
Fax	(770) 459-7003
Email	jhyde@villarica.org

2.2 Legal Authority

2.2.1 Available Resources for Implementation

The City of Villa Rica has the legal foundation for implementing watershed management and the WPP through its Charter and Municipal Code of Ordinances, which provides a legal foundation for enforcement of violations as well as for implementation of watershed monitoring activities.

The City has adopted a variety of ordinances targeted at protection of watersheds including model ordinances required by Metropolitan North Georgia Water Planning District including the following:

- Ordinance for Post-Development Stormwater Management for New Development and Redevelopment
- Floodplain Management / Flood Damage Prevention Ordinance
- Stream Buffer Protection Ordinance
- Illicit Discharge and Illegal Connection Ordinance
- Litter Control Ordinance

These ordinances along with other City Codes (i.e., Code of Villa Rica and Unified Development Code), provide a legal framework that allows the City to control and limit impacts to watersheds and it provides enforcement tools to ensure that the City will be able to correct violations of codes via enforcement provisions outlined in the ordinances.

2.3 Code and Regulation Evaluation

The Municipal Code of Ordinances for Villa Rica, Georgia can be found online at the City of Villa Rica's Website located at http://www.VillaRica.org. A review of applicable codes and ordinances was conducted to evaluate the effectiveness in which the City could regulate and enforce water quality problem issues and/or violations.

In addition to the City Code and the adopted Metro District Stormwater Model Ordinances, Villa Rica has a Unified Development Code, which includes the Zoning Ordinance, Subdivision Regulations and Development Standards including design criteria for land development, tree protection, buffer requirements, protection of surface waters through implementation of stormwater management facilities.

A brief discussion of ordinances specific to protection of water resources is presented below.

2.3.1 Soil Erosion and Sedimentation Control

Soil Erosion and Sedimentation Control is included in Villa Rica Code Chapter 17, Article II. This chapter lays the foundation for the discharge of stormwater run-off from construction sites, ensuring that best management practices (BMPs) for land disturbing activities must conform, at a minimum to the standards established in O.C.G.A § 12-5-30, the Georgia Water Quality Control Act and are designed in accordance with the hydraulic specifications contained in the "Manual for Erosion and Sediment Control in Georgia" specified in O.C.G.A. § 12-7-6(b). Villa Rica serves as a local issuing authority, must review all erosion and sedimentation control plans prior to the initiation of a land disturbing activity and continually inspect and enforce code on permitted sites.

2.3.2 Stormwater Detention

Stormwater Detention is included in Villa Rica Code Chapter 17, Article III. This chapter requires stormwater management facilities to be constructed for new developments and provides standards for stormwater detention facility design. This ordinance conflicts with a new Ordinance adopted by Villa Rica entitled *Ordinance for Post-Development Stormwater Management for New Development and Redevelopment.* It is recommended that the City repeal Chapter 17, Article III Stormwater Detention due to the conflict with the *Ordinance for Post-Development Stormwater Management for New Development and Redevelopment.*

2.3.3 Ordinance for Post-Development Stormwater Management for New Development and Redevelopment

This ordinance provides post-development stormwater management requirements for new development and redevelopment in the City. The ordinance defines requirements for development to address stormwater runoff quality and quantity impacts following construction resulting from the permanent alteration of the land surface as well as the nonpoint source pollution from land use activities.

2.3.4 Floodplain Management / Flood Damage Prevention Ordinance

Floodplain management involves the designation of flood-prone areas and the managing of their uses. It is also aimed at minimizing modifications to streams, reducing flood hazards, and protecting the beneficial uses of the floodplain such as water quality protection. Floodplain regulations and development restrictions can greatly reduce future flooding impacts, preserve greenspace and habitat, and protect their function in safely conveying floodwaters and protecting water quality. This ordinance aims to help avoid potential flood damages by regulating future-conditions floodplains and providing building standards in flood-prone areas.

2.3.5 Stream Buffer Protection Ordinance

The loss of vegetation, increases in impervious surface and increases in stormwater runoff associated with urbanization can have severe impacts on streams, including scouring, bank collapse, increased erosion and sediment, loss of habitat and reduction in water quality. Stream buffers, along with other protection measures, can help protect streams and preserve water quality by filtering of pollutants, reducing erosion and sedimentation, protecting and stabilizing stream banks, preserving vegetation and providing both aquatic and land habitat. This ordinance provides a framework to develop buffer zones for streams as well as the requirements that minimize land development within those buffers. It is the purpose of these buffer zone requirements to protect and stabilize stream banks, protect water quality and preserve aquatic and riparian habitat.

2.3.6 Illicit Discharge and Illegal Connection Ordinance

An illicit discharge is defined as any discharge to a storm drainage system or surface water that is not composed entirely of stormwater runoff (except for discharges allowed under an NPDES permit or waters used for firefighting operations). This ordinance provides Villa Rica with the authority to deal with illicit discharges and establishes enforcement actions for those properties found to be in noncompliance or that refuse to allow access to their facilities.

2.3.7 Litter Control Ordinance

Litter found often finds its way into streams, rivers and lakes and detracts from the quality of life. This litter control ordinance provides a prohibition against littering and it provides an enforcement mechanism with penalties for dealing with those found littering. This ordinance is modeled on the “Georgia Litter Control Law” (O.C.G.A. § 16-7-40 et. seq.) and contains a few additions to ensure that Villa Rica can address the impacts trash and debris have on water resources.

2.3.8 Solid Waste Management - Litter Control

Solid Waste Management – Litter Control is included in Villa Rica Code Chapter 16, Article II. This City Code conflicts with a new Ordinance adopted by Villa Rica entitled *Litter Control Ordinance.* It is recommended that the City repeal the conflicting portion of City Code, Chapter 16 Solid Waste Management , Article II Litter Control due to the conflict with the new *Litter Control Ordinance.*

2.3.9 Water and Sewerage

Villa Rica provides public water and sewer facilities for use by the public within its service area. These systems operate as a public utility system under the direction of the city manager.

City Code Chapter 21 – Water and Sewerage, Article III – Sewer Use, Division 2 requires disconnection from private on-site wastewater systems and connection to public sewer when it becomes available to the

property. Division 4 of the Code prohibits the discharge of sanitary wastewaters into the separate storm sewer system.

When public sewerage is not available, septic tanks are allowed if they conform to the requirements of the Code and are approved by the County Health Official. As future expansion of the public system reaches throughout the service area, residences and businesses will be required to abandon their current septic systems and connect with public sewerage. This may help alleviate fecal coliform and other pollutants from leaching into ground and surface waters.

2.3.10 Unified Development Code

The Unified Development Code (UDC) includes requirements of Zoning requirements, Landscaping, Buffers and Tree Protection.

Article 3, Section 30.4 L of the UDC includes Planned Development Zoning category promotes Open Spaces and buffers with an allowance to increase density in developed areas. The permitted development density can be increased when open space areas are increased.

Article 6, Section 6 of the UDC includes regulations for Landscaping, Buffers, and Tree Protection. This code was developed to create an opportunity for and to promote the protection of the City's natural resources. This requirement can lead to an improvement in water quality through the protection of trees and landscaping requirements for development and their associated parking lots.

2.3.11 Criteria for Wetlands Protection

Villa Rica, acknowledges the importance of wetlands for the public good in the land-use planning process as mandated by O.C.G.A. § 12-2-8. The Department of Natural Resources has established a freshwater wetlands database and minimum criteria for local governments of wetlands protection in the land use planning process. These criteria have been recognized by Villa Rica and are designed to assist in the identification and protection of wetlands, and do not constitute a state or local permit program. Villa Rica requires wetlands to be identified on plans for proposed land developments and if impacted permitting through US Army Corps of Engineers is required.

2.3.12 Groundwater Recharge Areas

The Georgia Department of Natural Resources (DNR) and the Georgia Department of Community Affairs require that local governments in Georgia with significant groundwater recharge areas must adopt an Aquifer Recharge Area Protection Ordinance. These requirements are established in House Bill 215 and Georgia's 1989 Growth Strategies Legislation. The City of Villa Rica does not contain significant recharge areas and to date has not been advised by DNR to adopt protection ordinances.

2.4 Survey of Potential Sources of Water Pollution

2.4.1 State Permitted Facilities

Tables 2.1 and 2.2 below include lists of potential sources of water pollution with permitted facilities located within Villa Rica.

Table 2.1 NPDES Permitted Facilities

NPDES Permit #	Facility Name	Location
GA0027162	West WPCP	Villa Rica, GA
GA0027171	North WPCP	Villa Rica, GA
CS0450006	Water Treatment Plant	Villa Rica, GA

Table 2.2 Stormwater General Permit GAR000000

NOI #	Facility Name	Location
01631	WAYNE DAVIS CONCRETE COMPANY	1706 BANKHEAD HIGHWAY
02102	PRINTPACK, INC.	297 ANDREWS WAY
02433	MCNEILUS TRUCK & MANUFACTURING, INC.	148 PUNKINTOWN ROAD
2501	FLOWERS BAKING COMPANY OF VILA RICA, INC.	134 DOYLE MCCAIN DRIVE
02645	INTEX, A BOLLAG INTL CO	100 LEGGETT DRIVE
03853	MCNEILUS TRUCK & MANUFACTURING DIVISION	110H. DORIS WILLIAMS DRIVE
03915	C. W. MATHEWS CONTRACTING	25 OLD ROCK QUARRY ROAD
10056	READY MIX USA	70 INDUSTRIAL COURT
10070	MARY ANN IND	82 CONNERS ROAD
10071	MARY ANN IND	40 CONNERS ROAD
10072	MARY ANN IND	40 INDUSTRIAL CT
10542	VILLA RICA BINS	157 FLEET DRIVE

Based on database research and review of City maintained records for permitted facilities, the following types of potential sources of pollution were not found to be located in the City Limits of Villa Rica:

- Landfills
- RCRA sites
- Hazardous waste sites or facilities
- Land application systems

2.4.2 Locally Regulated Facilities and Activities

The City of Villa Rica Community Development Program regulates construction activities within the City. This program is responsible for permitting associated with land disturbing activities associated with construction activities. The City maintains current records and conducts routine inspections for all permitted land disturbing activities in the City.

As part of the City's on-going watershed protection program, the Watershed Department has conducted an inventory and inspection of all known stormwater management facilities located in the jurisdictional limits of the City. The Watershed Department is actively working with owners of stormwater management facilities to ensure that the facilities are being properly maintained and repaired as necessary to ensure proper operation of these facilities. Appendix D provides a current inventory of Stormwater Management Facilities located in Villa Rica, Georgia.

2.4.3 Septic Systems

Septic systems are permitted and monitored by Carroll County or Douglas County Health Departments. The City estimates that there are approximately 1,655 septic systems located in the City. The City does not have a complete inventory of septic systems located within its jurisdictional boundary. Septic systems are dispersed throughout the City of Villa Rica; however, the majority of the septic systems are located in older residential neighborhoods, which were constructed prior to availability of public sewers. It is possible that there are on-site waste treatment systems greater than 10,000 gallons per day located in Villa Rica, which are under the control of the Department of Human Resources.

3 WATERSHED ASSESSMENT SUMMARY

3.1 Service Area

Villa Rica is Carroll County is a progressively growing City located in Carroll County and Douglas County, located on the western margin of the Atlanta Metropolitan Statistical Area (MSA). Villa Rica is located approximately 35 miles west of Atlanta and it is situated along Interstate 20, Georgia Hwy 78 and Georgia Hwy 61. The City of Villa Rica has an area of approximately 12.6 square miles.

The City of Villa Rica's primary Watersheds flow into the Little Tallapoosa River Basin. The northeastern portion of the City also flows into Town Branch Watershed, and to the southeast, a portion of the City's service area flows into the Crawfish Creek located in the Dog River Basin.

The City of Villa Rica is located within USGS Hydrological Unit-Code-12 (HUC-12) boundaries as follows:

- Crawfish HUC-12 (31300020308)
- Little Tallapoosa Upstream HUC-12 (31501080801)
- Town Branch HUC-12 (031300020201)

During the last two decades the City of Villa Rica has experienced rapid residential and commercial growth, which has more than tripled the City's population during this period of time. During the same period, Carroll and Douglas Counties also have faced increased suburbanization as populations in the metropolitan Atlanta area move west and south from the inner suburbs. As a result of this growth, the capacity of the water and wastewater infrastructure has strained to keep pace with the growth. In addition, the recent major drought that ended in 2009 has stresses water systems serving the communities and heightened awareness of the importance of protection water quality. Because of its growth and the resulting stress on its water and wastewater delivery systems, Villa Rica faces complex decisions regarding how to balance economic growth and stability while protecting the environment.

The West Georgia Watershed Assessment identified four monitoring stations for the City of Villa Rica to assess condition of the watersheds within the Villa Rica service area. The West Georgia Long-Term Monitoring Plan includes a total of nine monitoring sites in Villa Rica and the Plan eliminated Station Number CTL-63 from long-term watershed monitoring. **Note: Meeting on November 2, 2015, GA-EPD approved to reduce the number of monitoring sites down to six. The new Watershed Monitoring stations are listed below in Table 3.1 with locations identified on the map located in Appendix A.**

Table 3.1 Villa Rica Sample Stations Locations and Rational for Selection (revised Nov. 2015)

Station Number	Location	Selection Rationale	Monitoring Performed	
			Water Quality	Biological
CMH-53	Mud Creek at Hwy 101	A tiny watershed that heads in a cow pasture inside the city of Villa Rica. Sample station located where creek exits cow pasture.	X	
CMN-54	Mud Creek at railroad track off North Van Wert Road	A tiny watershed that flows through large industrial park and some residential land uses. Sample station is downstream of Villa Rica Waste Treatment Plant. Supporting.	X	X
CTL-63 (1)	Little Tallapoosa River at Lake Paradise Road	Upper most access point for Little Tallapoosa River. Sample station located downstream of Lake Paradise. Part of drinking water supply for City of Villa Rica.	X	
DTB-124	Town Branch	Town Creek at Brewer Road represents a developing watershed with a mix of commercial, residential, urban, suburban, and agricultural land uses.	X	X
CTP-127	Town Branch	Town Branch at Punkintown Road represents a developing watershed with a mix of commercial, residential, urban, suburban, and agricultural land uses.	X	

Station Number	Location	Selection Rationale	Monitoring Performed	
			Water Quality	Biological
CBW-126	Bay Springs Creek at Whitworth Road	Downstream segment that flows through rural wooden tracts of land. Some residential neighborhoods and a lot of forested land.	X	X
CKW-1	Keaton Creek at W. Tyson Road	Undisturbed watershed; potential for growth. Mostly forested land with some residential.	X	X

1 - West Georgia Watershed Assessment only

Sources: Long-Term Monitoring Plan, Carroll County Watershed Group

Figure 5 on the following page is a map depicting the above referenced monitoring sites along with HUC 12 boundaries and watercourses located within the City's jurisdiction.

3.2 Baseline Water Quality Conditions

As part of the West Georgia Watershed Assessment, chemical and bacterial water quality data were collected at four sites in the area of Villa Rica during a series of sampling events that began in 2001. Water sampling has been ongoing as part of the WGWSA Watershed Management Plan and West Georgia Long-Term Monitoring Plan, Carroll County Watershed Group (WGLTMP) on a continuous basis since completion of the Watershed Assessment. Water quality and biological data that have been collected are compared to water quality benchmarks to determine if water quality at these sites was impaired, or if there is potential for future concern. When the WGWSA was completed, streams located in Villa Rica were determined to be supporting their intended use.

Water samples were analyzed for the basic water quality parameters listed in Table 3.2. The date, time and ambient conditions were recorded for all samples taken and test procedures and detection limits were in accordance with accepted standards established by the State of Georgia.

Table 3.2 Villa Rica Water Quality Test Parameters

Air Temperature (°C)	Ni
Water Temperature (°C)	Cu
Dissolved Oxygen (ppm)	LDL (TSS)
pH	TSS1
Conductivity (µs/cm)	Fecal Coliform Bacteria
Turbidity	Non-Ideal Colony Ct
Calcium	BOD
Magnesium	Ammonia
Hardness	Nitrite-Nitrate-N
Se	TKN
Zn	Phosphorous
Pb	COD
Cd	

Figure 5 – Waters, Watershed Monitoring Sites and HUC 12 Boundaries

3.2.1 Chemical Water Quality Conclusions

West Georgia Watershed Assessment identified the following conditions at sites in Villa Rica:

- Low DO at CTH-64 potentially caused by beaver dams that pool the water. However it was also noted that low DO could have been at least partially caused by discharge of treated wastewater effluent from the Villa Rica West WPCP facility. Long-term monitoring is being conducted to further assess conditions at this sample location.
- TKN sample was sampled to be 5.9 mg/L at station CMN-54 located downstream of the Villa Rica WPCP discharge into Mud Creek.
- Fecal Coliform Bacteria was found to be 3,700 col./100 ml at station CMH-53 the upstream site on Mud Branch) upstream of the Villa Rica WPCP discharge. This site is exposed to urban runoff as well as a large cattle operation, which are believed to be the cause of the elevated Fecal Coliform levels at this sample site.
- Hardness of 83.4 mg/L was found at sample station CMN-54 located downstream of Villa Rica WPCP. This elevated level of hardness is the result of limestone addition to discharged treated wastewater. Limestone is used in the wastewater treatment process to buffer pH.

Based on the findings of WGWSA, the streams located in Villa Rica were determined to be supporting their intended use.

However, it is noted that exceedances for fecal coliform instream water quality standards have occurred at monitoring sites CHM-53 (Mud Creek upstream), CMN-54 (Mud Creek downstream), CHT-64 (Little Tallapoosa River), CUW-119 (tributary to Mud Creek), and at CTP-127 (Town Branch). In addition conductivities have been found to high at monitoring sites CMN-54 (Mud Creek downstream), which suggests a pollutant loading to Mud Creek above this monitoring station. Further, elevated total phosphorus levels were occasionally observed at monitoring sites CMNH-53 (Mud Creek upstream), CMN-54 (Mud Creek downstream, and CUW-119 (tributary to Mud Creek).

If these water quality issues persist as determined through long-term monitoring, the sources should be determined and addressed through implementation of relevant best management practices (BMPs).

3.2.2 Bacterial Water Quality Conclusions

Bacterial sampling was conducted at all sample sites in Villa Rica. The West Georgia Watershed Assessment identified the following bacterial condition at a sample site in Villa Rica:

- Fecal Coliform Bacteria was found to be 3,700 col./100 ml at station CMH-53 the upstream site on Mud Branch) upstream of the Villa Rica WPCP discharge. This site is exposed to urban runoff as well as a large cattle operation, which are believed to be the cause of the elevated Fecal Coliform levels at this sample site.

This elevated level of Fecal Coliform is below the maximum allowable level of 4,000 col./ml established by Georgia; however the elevated level of Fecal Coliform is of concern. Villa Rica participates in ongoing sampling for Fecal Coliform as part of WGWSA Watershed Management Plan to monitor this parameter.

3.2.3 Biological Water Quality Conclusions

Biological assessment and sampling was conducted at two sites in Villa Rica (i.e. CMH-53 and CMN-54). The assessment and sampling was conducted in accordance with Georgia Bioassessment Protocols (GBP). Villa Rica participates in ongoing biological assessments as part of WGWSA Watershed Management Plan. The West Georgia Watershed Assessment identified the following biological condition at sites in Villa Rica:

Based on the findings of biological assessment conducted as part of the WGWSA and WG Long-Term Monitoring Plan, the streams located in Villa Rica were determined to be supporting their intended use.

3.3 Impairments & Contaminant Sources

Based upon the results of water quality monitoring and the land uses within the studied drainage basins, the sanitary sewer service area is impacted by urban non-point source pollutants.

It remains important to note that some water quality concerns that exist with the Villa Rica service area may be associated with a variety of federally and State-regulated point sources. These include 2 municipal NPDES discharges.

3.3.1 Chemical Water Quality Pollutant Sources

Where chemical water quality pollution was identified, the primary source of pollutant loading identified within the Watershed Assessment is likely from urban non-point source pollution and from treated wastewater discharges in the case of hardness and TKN. Typically, pollutant transfer from the drainage basins and associated land uses occurs during and immediately following rain events. As Villa Rica is located along a ridge (i.e. the highest point in the drainage basin), pollutant loading from areas outside of the jurisdictional limits of the City does not significantly contribute to water quality standard violations.

3.3.2 Bacterial Water Quality Pollutant Sources

At CMH-53 elevated levels of fecal coliform appears to be a result of point and non-point source runoff from a large cattle operation and urban runoff. Rain events could cause transport of fecal coliform from the cattle farm and urban areas into the stream. Since the City of Villa Rica has a wastewater collection system with a limited number of septic tanks, levels of fecal coliform found are not suspected to be from failing septic tanks.

Table 3.3 Pollutant Loading Summaries by Drainage Basin

Sample Station	Pollutant Source			
	Non-Point Source Urban Runoff	Industrial and Sources	Urban Runoff	NPDES Permitted Discharges
CMH-53	X		X	
CMN-54	X		X	X
CTL-63	X		X	
DTB-124	X		X	X
CTP-127	X		X	
CBW-126	X		X	
CKW-1	X		X	

Sources: West Georgia Watershed Assessment
Long-Term Monitoring Plan, Carroll County Watershed Group

3.4 Load Reductions

Based upon the results of watershed monitoring, water quality violations within each assessed drainage basin were due to urban non-point source pollution and wastewater point sources. The implementation of stormwater management programs established by Villa Rica as required by Metropolitan North Georgia Water Planning District along with public outreach education, and adoption and enforcement of ordinances will provide strategies to identify control and treat non point source pollution from stormwater runoff within the jurisdictional limits of the City. These activities will help address the water quality issues identified within the WGWSA and WGLTMP while changing behavioral patterns of businesses and residents.

4 BEST MANAGEMENT PRACTICES (BMPS)

4.1 Stormwater Management Plan (SWMP)

The City of Villa Rica is permitted to discharge stormwater as a Municipal Separate Storm Sewer System (MS4) under rules promulgated under the Clean Water Act (CWA) at 40 CFR § 122.26, Storm Water Discharges. The City currently is not required to be permitted as Stormwater NPDES Permittee under the state and federal program. However, the City is located within the Metropolitan North Georgia Water Planning District and it is required to implement a stormwater management program. Below is a description of the City's stormwater management program.

4.1.1 Structural and Source Control Programs

These programs are intended to reduce pollutants from runoff originating from commercial and residential areas. Measures include, but are not limited to:

- Stormwater system inventory and mapping
- Inspection and maintenance of stormwater system structural controls
- Procedures for receiving and responding to citizen complaints
- Post construction run-off control ordinance
- Site plan review

4.1.2 Illicit Discharge Detection and Elimination

These programs have been established to address non-stormwater discharges (illicit discharges). Illicit discharges are regulated through the City's Illicit Discharge Ordinance which prohibits tampering or altering any part of the stormwater drainage systems and requires that accidental discharges into the stormwater system be reported to the City. Measures include, but are not limited to:

- Illicit discharge inspections, enforcement, and penalties
- Dry weather screening
- Procedures to investigate suspected illicit discharges including source tracing and removal
- Procedures to prevent, contain, and respond to hazardous material spills
- Public education on stormwater pollution
- Programs to promote proper management and disposal of used oil and hazardous substances
- Controls limiting infiltration of sanitary sewage

4.1.3 Waste Handling and Industrial Facilities Pollution Control

These programs include monitoring and controlling pollutants originating from landfills, facilities used for hazardous waste treatment, disposal, and recovery, and other commercial facilities. Programs include, but are not limited to:

- Inventory of industries and commercial businesses
- Industrial stormwater inspections
- Industrial NPDES Permit Stormwater Pollution Prevention Plan (SWP3) for municipal sites

4.1.4 Construction Site Structural and Non-Structural Control

Establishes controls for the proper management of runoff from construction sites from pre-construction through post-construction phases. Programs include:

- Plan review
- Requirements for structural and non-structural controls
- Erosion and sedimentation control inspections
- Construction site operator training and certification

4.1.5 Pollution Prevention/ Good Housekeeping for Municipal Operations

The City will develop Stormwater Pollution Prevention Plans at all municipal facilities in accordance with 40 CFR Part 122.34(b)(6). Preparation of SWP3's along with staff training will achieve the goal of preventing or reducing pollutant runoff from municipal operations.

4.1.6 Storm Sewer Map

The City is developing an inventory and map of its MS4. The map/GIS data of the storm sewer system shows the location of all outfalls and the names and location of all waters of the State that receive discharges from those outfalls Storm sewer system inventory data will be used to assess conditions and provide a means to prioritize needed capital improvements for the storm drainage system.

4.2 Other Structural BMPs

4.2.1 Villa Rica Water & Sewer Enterprise Fund (Stormwater Management)

The City of Villa Rica funds stormwater management through its Water and Sewer Enterprise Fund. Funding stormwater management activities using this source of revenue stresses operating funds, which are required for water and sewer operations and may cause inflated water & sewer utility system rates as a result.

4.2.2 Development and Design Standards

All new development within the service area must abide by the approved Development Standards and must meet the minimum requirements outlined in the Sediment and Erosion Control Ordinances to reduce negative impacts from development on the watershed. The City has adopted Georgia Blue Book requirements for stormwater management facility design to protect water quality and prevent or mitigate to the extent possible downstream watershed impacts. These standards are available from the City's website.

4.3 Other Non-Structural BMPs

4.3.1 Public Awareness

Villa Rica has provides education and outreach services to residents and businesses within the service area in compliance with Metropolitan North Georgia Water Planning District requirements. Several outreach programs exist under this agreement to educate the public about stormwater pollution prevention and the proper disposal of potential pollutants. Examples of the Public Education and Public Awareness Program activities in Villa Rica include the following:

The City's website www.villarica.org has a Watershed Protection link available to the public to view brochures, flyers, etc.

Printed materials and fact sheets are available at City Hall and other governmental facilities.

Watershed Protection tips are placed on water bills that are mailed to water customers.

Stormwater educational materials are included in *Villa Rica Purple Book,* a magazine that is mailed out to every address in the 30180 Zip Code.

Several press releases in the local newspaper *Villa Rican*, informing the citizens about stormwater issues.

The City participated in Villa Rica Beautiful Annual Programs: Clean-up days including the following:

- April 2, 2011 Stream/Body of Water clean-up
- May 2, 2011 Senior/ Low income property clean-up
- June 4, 2011 Thomas Dorsey Drive right-of-way litter clean-up
- Annual Bring one for the Chipper

City of Villa Rica uses the Clean Water Campaign Resources to assist with public education and public awareness.

The City of Villa Rica will continue to provide information to the public as described above as well as participate with Villa Rica Beautiful clean-up activities.

5 303(D) LISTED STREAMS & TMDL IMPLEMENTATION PLANS

Under Georgia 2008 303(d) List of Waters no 303(d) listed stream segments are located within or adjacent to the Villa Rica service area.

6 LONG TERM AMBIENT TREND MONITORING

6.1 Purpose and Objectives

Long-term water quality monitoring will be performed within the Villa Rica service area to:

- Document water quality trends;
- Identify water quality impairments requiring further action; and
- Provide information on the effectiveness of BMPs, and identifying any needed modifications.

6.2 Monitoring Locations

Four monitoring stations were originally selected by WGWSA for the Villa Rica area to assess the present conditions of the watersheds within the Villa Rica service area. Stations were chosen to best represent the various subbasins within the watersheds. The chemical and biological monitoring sites are listed below in Table 6.1 and are shown on the map in the Appendix.

Table 6.1 Chemical and Biological Monitoring Locations

Sample Station	Location	Biological	Chemical
CMH-53	Mud Creek at Hwy 101		X
CMN-54	Mud Creek at railroad track off North Van Wert Road	X	X
DTB-124	Town Creek at Brewer Road	X	X
CTP-127	Town Branch at Punkintown Road		X
CBW-126	Bay Springs Creek at Whitworth Road	X	X
CKW-1	Keaton Creek at W. Tyson Road	X	X

Sources: Long-Term Monitoring Plan, Carroll County Watershed Group

6.3 Water Quality Monitoring

Chemical water quality will be determined by analyzing water samples for the water quality parameters listed in Table 6.2. Parameters included in the long-term monitoring are those that EPD has already established or plans to establish standards for waters of the State of Georgia.

Table 6.2 Physical & Chemical Parameters

Parameter	Rationale	Standard (1)	Baseline Limit
Water Temperature	Elevated temperatures will reduce water's ability to hold oxygen. Can be affected by soil erosion and urban runoff.	32.2°C	< 32.2°C
Dissolved Oxygen (DO)	Decreased oxygen will reduce water's ability to support biology. Stressors include increased temperatures, increased salinity, low volumes, wastewater, and fertilizers in runoff.	4.0 mg/L (Min)	> 3.0 mg/L
pH	Affects toxicity of metals	6.0 – 8.5	> 6.0 < 8.5

Parameter	Rationale	Standard (1)	Baseline Limit
Turbidity (2)	Excessive turbidity can increase water temperature, decrease oxygen, and impact biology. Often results from soil erosion and urban runoff.	(2)	< 50 NTU
Total Suspended Solids (TSS) (3)	Same as Turbidity	20.0 mg/L	< 20.0 mg/L
Fecal Coliform Bacteria (4)	Used as indicator of presence of other forms of bacteria, which may be harmful to humans. Results from sewage effluent, animal waste, urban runoff and failing septic systems.	May-Oct: 200col./100ml 30-day geometric mean Nov-Apr: 1,000col./100 ml 30-day geometric mean Nov-Apr: 4,000col./100 ml maximum	May-Oct: 200col./100ml 30-day geometric mean Nov-Apr: 1,000col./100 ml 30-day geometric mean Nov-Apr: 4,000col./100 ml maximum
Escherichia coli (E coli) Bacteria (4)(5)	Bacteria common to fecal material from warm-blooded animals including humans.	126 CFU/ 100ml	126 CFU/ 100ml
Chemical Oxygen Demand (COD) (2)	Measure of the total amount of oxygen required in chemical reactions to oxidize all organic and inorganic matter in water.	70 mg/L	< 62 mg/L
Nitrite Nitrogen (5)	Common form of nitrogen in aquatic ecosystems.	10 mg/L	< 10 mg/L
Nitrate Nitrogen (5)	Common form of nitrogen in aquatic ecosystems.	0.1 mg/L	< 0.1 mg/L
Ammonia Nitrogen (5)	Produced by the decomposition of plants and animals.	1.0 mg/L	< 2.0 mg/L
Total Kjeldahl Nitrogen (TKN) (5)	Measure of organic and ammonia nitrogen due to organic wastes.	2.0	< 2.0 mg/L
Total Phosphorus as P (5)	Essential nutrient for plant growth. Limits plant growth because occurs naturally in small concentrations. Excessive levels commonly result from human wastes, animal wastes and fertilizers.	0.10 mg/L	< 0.10 mg/L

Parameter	Rationale	Standard (1)	Baseline Limit
Orthophosphate as P	Essential nutrient for plant growth. Limits plant growth because occurs naturally in small concentrations. Excessive levels commonly result from human wastes, animal wastes and fertilizers.	n/a	n/a
Hardness (6)	Measure of the concentration of alkaline earth ions in water (primarily Mg and Ca). High hardness reduces toxicity of metals.	n/a	< 2,200 mg/L
Cadmium (6)	Excessive concentrations of metals can accumulate in surface water and have a toxic effect on aquatic animals. Common constituent in industrial wastewater discharges.	0.042 mg/L	< 0.042 mg/L
Copper (6)	Metal- sources include roadway runoff, metal plating, electrical equipment, pesticides, paint additives, and wood preservatives.	0.0048 mg/L	< 0.0048 mg/L
Lead (6)	Metal- sources include batteries, gasoline, paints, caulking, rubber, and plastics.	0.210 mg/L	< 0.210 mg/L
Zinc (6)	Metal- sources include plastic production, photo processing/finishing, metal plating/ fabrication/ finishing, machine shops, industrial wastes, electronics and chemical/petroleum processing.	0.09 mg/L	< 0.09 mg/L
Air Temperature	Ambient air temperature at time of test	n/a	n/a
Specific Conductance	The measure of the ability of a solution to conduct electricity	n/a	300 µmhos/cm
Biochemical Oxygen Demand 5-day (BOD5)	Measure of the amount of oxygen required by microbes to oxidize organic matter in water.	70 mg/L	< 62 mg/L
Measured or estimated flow	Provides information about stream flow conditions.	n/a/	n/a
Dissolved Cadmium	Excessive concentrations of metals can accumulate in surface water and have a toxic effect on aquatic animals. Common constituent in industrial wastewater discharges.	.042 mg/L	<0.042 mg/L
Dissolved Copper	Excessive concentrations of metals can accumulate in surface water and have a toxic effect on aquatic animals. Common constituent in industrial wastewater discharges.	0.0048 mg/L	<0.0048 mg/L
Dissolved Lead	Excessive concentrations of metals can accumulate in surface water and have a toxic effect on aquatic animals. Common constituent in industrial wastewater discharges.	0.210 mg/L	<0.210 mg/L

Parameter	Rationale	Standard (1)	Baseline Limit
Dissolved Zinc	Excessive concentrations of metals can accumulate in surface water and have a toxic effect on aquatic animals. Common constituent in industrial wastewater discharges.	0.09 mg/L	<0.09 mg/L

(1)EPD Standard unless otherwise noted
(2)EPD has not established a standard for this parameter
(3)EPA recommended standard
(4)Geometric mean
(5)Common water quality standard
(6)EPD acute criteria (dissolved)

6.4 Aquatic Habitat and Biological Assessment

Villa Rica is located in subecoregion 45a, Southern Inner Piedmont. Reference data and metrics for this subecoregion can be found in Appendix C.

As part of the Long-Term Monitoring Plan, Carroll County Watershed Group, on-going Aquatic Habitat and Biological Assessments are being conducted at Villa Rica sampling stations. From the Long-Term Monitoring Plan the following information describes Aquatic Habitat and Biological Assessments that are being conducted in Villa Rica as part of the WGLTMP.

It is noted that Bioassessments for the long-term monitoring should be conducted using the most recent SOPs which are periodically updated. The current GAEPD macroinvertebrate SOP and appropriate metric data can be obtained at the following website:

http://www.gaepd.org/Documents/WPB_Macroinvertebrate_SOP.html

The Wildlife Resources Division (WRD) Fish SOP can be obtained at the following website:

http://www.georgiawildlife.org/documentdetail.aspx?docid=436&pageid=1&category=fishing

Reference locations are not required for the current macroinvertebrate and fish assessment protocols.

6.4.1 Approach and Methodology-

Habitat assessments will be conducted at all monitoring stations following the draft standard operating procedures (SOPs) of the Georgia Department of Natural Resources (DNR, 1997 & 2000). These procedures include an evaluation of the immediate watershed, substrates, stream width, and general water quality conditions. Since the local in-stream environmental conditions can influence, either positively or negatively, the production and diversity of aquatic organisms, an attempt was made to minimize the variability in the biotic community structure due to habitat differences by selecting stream sites that have similar physical structure and morphology (shape characteristics).

According to EPD (personal communication, 2001), streams in Carroll County and in the surrounding area of Georgia are historically characterized is riffle/run streams, based on the topography, physiography, and geology of the area. The DNR developed habitat assessment protocols in the SOP for riffle/run systems (DNR, 1997 & 2000). This process involves rating each of ten metrics that measure different riparian and in-stream parameters on the habitat assessment SOP field data sheets. The reference stream at station CWH46 on Whooping Creek is treated as the reference for riffle/run systems based on physical characteristics and physiography.

Habitat assessment parameters include the following list:

- Instream Cover
- Epifaunal
- Embeddedness In Run Areas
- Channel Alteration

- Sediment Deposition
- Frequency of Riffles
- Riffle Frequency =Distance between riffles/ MSW
- Channel Flow Status
- Bank Vegetative Protection
- Bank Stability
- Ripatian Vegetation Zone

Habitat quality will be evaluated over a study reach of approximately 100 to 500 meters. The area used for the habitat assessment includes the reach that is sampled for macro-invertebrates and fish. For QA/QC purposes, two biologists independently perform the assessment and the results are averaged. If the total habitat sources deviate by 30 or more points between the investigators, then the evaluators review each metric and adjust the individual scores based on their consensus. If an agreement can not be reached, the sampling Team Leader has the option to make a third independent assessment and discard the outlier before calculating the average total habitat score.

To obtain an overall assessment of habitat quality at each station, all individual habitat metrics are summed to yield a total score. The total score is compared to the score from a reference station of similar watershed size. The ratio between the study station and reference station provides a “percent comparability” measure for each station.

The study station is then classified based on similarity to expected conditions and its apparent potential to support an acceptable level of biological health. In addition to habitat ratings, field measurements of DO, temperature, pH, specific conductance, and turbidity are made at midstream and mid-depth locations in the steam at each station.

6.4.2 Macroinvertebrates: Sampling

Macroinvertebrates are sampled at each sampling station following qualitative techniques of the draft SOPs for the Georgia Bioassessment Protocols (GBP) (DNR, 1997). The GBP is a multi habitat approach that is modified slightly to maximize efficiency of fieldwork and analysis while providing the data necessary to complete the GEP assessment.

Sampling is conducted over a 100 meter reach using the seven standard qualitative sampling techniques described by Plafkin et al. (1989) and Davis and Simon (1995). These include:

- Riffle kick
- Rock and / or log wash
- Undercut bank sweeps
- Sand kick
- Coarse particulate organic matter (CPOM / leafpack collection
- Aquatic vegetation sweeps
- Visual collections

The purpose of using these seven different sampling techniques is to collect organisms from as many habitats as possible to represent the community structure of the stream reach. Multi-habitat samples provide the broad based information necessary to make the best assessment of biotic integrity and water quality. Two samples (multi-habitat sample and a 15 minute sample) are taken at each sampling station. The multi-habitat sample includes material collected using the sampling techniques listed above. Multi-habitat and 15 minute samples are analyzed separately.

6.4.3 Macroinvertebrates: Analysis

The macroinvertebrate samples are identified to the lowest taxonomic level practical, and the results are used to compute six community, population, and functional metes following the GBP (DNR, 1997). Bath metric or index represents a slightly different component of community structure and/or function and provides a measure of biotic integrity. Assessment scores of 0, 1, 3, or 5 are assigned to each metric based on the degree of deviation from “expected” ‘metric values for relatively undisturbed reference streams. Metrics 1, 2, and 5 are rated based on a percent similarity to the reference stations. Metrics 3, 4,

and 6 are rated against 6xed rating criteria from the GBP. The six metric ratings are then summed, yielding an overall site score for each station. The summed score for each station is then compared to the corresponding fixed criteria score and the percentage of this criterion was determined. Percentages could range from a low of 0 to 21 percent reference indicating “very poor” biotic integrity, to a high of 84 to 100 percent reference, indicating “very good” conditions.

6.4.4 Fish Community Index of Biotic Integrity

The Index of Biological Integrity, or IBI (Karr et al., 1986), is used to evaluate the health of the

stream fish communities in the community watershed study stations within the Chattahoochee and Tallapoosa River Basins of Carroll County. The IBI, which is used as the model for EPA’s RBP (Barbour et at., 1997 and Plafkin et al., 1989) and DNR’s SOP for conducting biomonitoring on fish communities in the piedmont ecoregion (2000), integrates a broad range of fish community attributes into an assessment of stream biotic integrity. The methodology involves a fish community survey using standard field techniques; species identification, enumeration, and external examination of the collected fish; and assignment of ratings to a variety of fish community attributes (metrics), which are summed to obtain an overall measure of biotic integrity.

6.4.5 Fish Community: Sampling

Fish sampling is conducted in accordance with DNR SOP (2000). Representative habitats, including riffles, runs, and pools, sampled in study reaches varying in length from 100 to 500 meters, depending on steam size and the distribution of representative habitats. The principal sampling method is backpack electro-fishing, supplemented by seining. In backpack electro-fishing, electricity is used to stun fish so the can be easily captured using a dip net. The fish sampling progressed upstream, so as not to disturb sediments are decrease visibility while sampling. Team members are careful not to walk through the sampling area prior to sampling to minimize the movement of fish out of the sampling area. After backpack electro-fishing is completed, when necessary a minnow seine is used for further sampling if the habitat is conducive for seining. Seining is particularly effective in collecting darter, minnow, and other smaller fish generally not as vulnerable to backpack electro-fishing. Two seining methods are used: kick sets and downstream hauls. Both methods required two or three field team members. For kick sets, the minnow seine is placed in the stream perpendicular to the current such that the lead line of the seine is located on the bottom of the stream and no fish could escape by going under the net Two field members hold the net, while a third kicks and disturbs the substrate from two to three meters upstream, proceeding downstream to the net. This action causes fish to move downstream away from the disturbance into the net. Once the third field member has completed disturbing the substrate, the net is lifted, and the fish removed. Downstream hauls required two field members to pull the net downstream slightly faster than the current, keeping the lead line dose to the bottom, through runs and pools; and either lifting midstream or continuing to a point where the seine could be dragged up on the bank Fish are identified and enumerated in the field to the extent practical, with some voucher specimens being preserved in formalin for laboratory confirmation of species identifications. Other specimens are released alive at the collection site. A data sheet that included size, weight, and external anomalies of the species collected is completed at each station, along with detailed notes on habitat and surrounding watershed conditions.

6.4.6 Fish Community: Analysis

IBI scores are derived for each station by rating 13 metrics of fish community structure in three broad categories: (1) species richness and composition, (2) trophic composition, and (3) fish abundance and condition. The IBI assumes that each metric correlates either positively or negatively with increased stream degradation. The 13 metrics integrate attributes of the entire fish community that are differentially sensitive to various levels of stream perturbation. For example, some metrics distinguish throughout the low to intermediate range of biotic integrity (i.e., proportion of fish with disease/anomalies), while others are more sensitive in the intermediate range of biotic integrity (i.e., number of sensitive species) (Karr et al, 1988).

6.5 Long-Term Monitoring Schedule

Sampling for all parameters other than fecal coliform will be conducted four times per year during two dry weather days (no rainfall over previous 72 hours) and two wet weather days (less than 0.2 inches rainfall over previous 24 hours). Samples will be collected on one dry and one wet weather day during the summer month period from May through October and one dry and one wet weather day during the winter period from November through April to monitor the seasonal effects on water quality. In Georgia, critical conditions (high temperature/low flow) typically occur during the summer.

Bacteria sampling (including fecal coliform and escherichia coli (E coli) bacteria) will be based on a geomean requiring the collection of four samples over a 30-day period. Sampling to calculate three bacteria geomeans per year will be performed including two geomeans during the summer period from May through October.

Biologic sampling will be performed every other year. DNR's SOP requires that macroinvertebrate sampling be performed from October to February. Note that when fish are sampled; they shall be collected between the months of April through mid-October.

Table 6.3 Water Quality and Biological Monitoring Schedule

Month	Period/Season	Parameter
August	Summer	Wet Day 1 Geomean 1 (Metals and Hardness)[1]
November	Winter	Dry Day 1
February	Winter	Wet Day 2 Geomean 2
May	Summer	Dry Day 2 Geomean 3
Mid-September – February		Macroinvertebrate Sampling
April 1 – mid-October		Fish Sampling

[1] Metals and Hardness will be sampled during the first wet-weather sampling event of each year, however if the level exceed recommended standards, metals and hardness will be sampled during the three remaining events.

When conducting bioassessments, the in-situ measurements and samples for alkalinity and nutrients (i.e., total phosphorus, orthophosphate, total Kjeldahl nitrogen, ammonia, and nitrite/nitrate), should be taken immediately before habitat data and biological samples are collected. The nutrient data can also be used as one of the dry-weather water quality monitoring events.

6.6 Field Procedures

As part of the field procedures, noteworthy environmental conditions should be recorded in field notes. This could include weather conditions, significant activities observed in the watershed such as the presence of animals, dry weather runoff from parking lots, odors, foam, discoloration, leaking pipes, etc.

7 ANNUAL CERTIFICATION AND REPORTING

By June 30th each year an annual report containing water quality data and an assessment of the data is submitted to EPD by Center for Water Resources State University of West Georgia on behalf of the City of Villa Rica.

7.1 Certification Statement

The City of Villa Rica will submit a certification statement to EPD verifying that the WPP is being implemented as approved. The certification statement will include the following wording:

> *"I certify under penalty of law, that the watershed protection plan is being implemented. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."*

7.2 Long-term Monitoring Data

Chemical water quality monitoring data collected over the previous year will be entered in an electronic format (spreadsheet) developed in coordination with EPD. Sampling times and ambient conditions are included with the results. Biologic data is submitted when it has been performed. All records, data, and information pertaining to the WPP shall be maintained permanently. This information is compiled and submitted to EPD by Center for Water Resources State University of West Georgia (Carroll County Watershed Group) on behalf of the City of Villa Rica.

7.3 Progress Report

Center for Water Resources State University of West Georgia (Carroll County Watershed Group) on behalf of the City of Villa Rica submits an Annual Report to EPD on the implementation of the Long-Term Watershed Monitoring Program. The progress report will also document water quality improvements and explain any changes that have been made to the WPP during the evaluation process.

The Annual Reports submitted to satisfy the requirements for the Villa Rica Watershed Protection Plan will also be required to include the following informaiton:

- A brief discussion of the water quality and bioassessment data collected for the reporting period, which consists of an evaluation of the data and discussion of trends compared to previous years.
- Significant activities that occurred or are ongoing within the service area watershed that might impact water quality and aquatic biota.
- Specific actions or BMPs that were implemented.
- Changes or revisions to the Watershed Protection Plan; note that significant changes such as modifying the long-term monitoring program should be discussed with GAEPD prior to implementing the changes.

All water quality sample results and biological and habitat assessment data will be submitted in electronic format using the MS Excel data template for water quality data, developed by WPMP. The Excel worksheet can be found on the GAEPD website at the following URL:

http://www.gaepd.org/Documents/techguide_wpb.html#wappg.

In addition, electronic copies of all field sheets, laboratory taxa lists, macroinvertebrate multi-metric spreadsheets and fish IBI metric calculations will be included. If available, GIS coverages of the City's jurisdictional limits, service area and subwatershed delineations should will also be provided in electronic format.

8 IMPLEMENTATION COSTS AND FUNDING SOURCES

8.1.1 Stormwater Management Implementation Costs

The WPP requires that the City implement a stormwater management program, perform long-term ambient trend monitoring, and provide annual certification and reporting to EPD. At present, the City of Villa Rica will implement the WPP with financial resources budgeted and provided through the Water and Sewer Enterprise Fund. The table below includes the estimated cost for stormwater services over the current five year period.

Table 8.1 Estimated Implementation Costs

VILLA RICA Stormwater Management Program (SWMP) COST OF SERVICE			
Program Administration			
	Salary 2010	FTE	Amount
Watershed Protection Supervisor 3	$65,581	1	$65,581
Director of Planning & Zoning 1	$83,000	0.25	$20,750
E&S Inspector 1	$66,000	0.75	$49,500
Public Work Director 1	$58,000	0.25	$14,500
Crew Personnel 1	$42,000	4	$168,000
Watershed Services Administration (Customer Service, Legal, Grants, Finance, etc.) 1			$11,193
Staff Training & Continuing Education 3			$1,000
Watershed Protection Plan 1			$4,850
Outsourced Services (Professional Design, GIS, Project Admin., etc.) 3			$70,000
Metropolitan North GA Water Planning District Regulatory Compliance 1			$25,000
Stormwater Drainage Master Planning Capital Improvement Program (Planned Capital Improvement Projects) 1			$172,034
West GA Center for Water Resources Long-Term Watershed Monitoring 1			$81,318
Stormwater Utility Set-Up Cost Reimbursement 1			$55,000
Drainage System Operations & Maintenance			
Contracted O&M (street sweeping, vac-truck) 3			$0
Contract Labor / Outsourced Maintenance 1			$50,000
Vehicle & Equipment Maintenance & Repairs 3			$44,600
Operating Budget (Misc. Items/Activities) 1			$0
Capital Improvement Program			
Capital Projects (Projects completed in 2010, future cost estimated to match 2010 cost) 1			$147,034
Capital Maintenance (Projects completed in 2010, future cost estimated to match 2010 cost) 1			$167,176
SWMP Program Total Cost			***$1,147,536***

Funding Source Notes
1 - General Fund
2 - SPLOST
3 - Water & Sewer Enterprise Fund

8.1.2 Stormwater Management Implementation Funding Sources

The following is a summary of funding sources identified by the City for implementation of Stormwater Management Activities.

Table 8.2 SWMP Funding Sources

SWMP Funding Sources	
General Fund	$167,176
SPLOST	$0
Water & Sewer Enterprise Fund	$151,274
SWMP Program Total Funding Sources	***$318,450***

8.1.3 Stormwater Management Finance Recommendations

Due to the requirements to implement stormwater management activities and apparent need for additional financing for Stormwater Management activities, it is recommended that Villa Rica consider development of a Stormwater Utility to provide a stand-alone source of funding for stormwater management. Implementation of a Stormwater Utility would allocate the cost of stormwater management to all contributors as described below.

Typically, a Stormwater Utility assesses a user fee to developed properties based on the amount of impervious surface contained on their parcel. The amount of impervious surface on a parcel is directly correlated to the amount of stormwater runoff that is contributed to the City's MS4 and the cost to the City to provide stormwater services to that parcel. The cost of providing stormwater services to all developed parcels in the City, including costs related to implementation of this WPP are developed as part of the cost of service analysis performed in support of the Stormwater Utility. Revenues from a Stormwater Utility are used to fund programs and BMPs related to drainage system operations and maintenance, regulatory compliance, capital improvements, and program administration.

8.1.4 Watershed Protection Plan Implementation Schedule

Villa Rica intends to implement Watershed Protection Plan best management practices based on the following schedule.

Table 8.3 Watershed Protection Plan Implementation Schedule

Program	Implementation Date / Duration
Long-Term Watershed Monitoring (Chemical and Biological Assessments) Carroll County Watershed Group – Villa Rica	Ongoing / 5+ years anticipate watershed monitoring will continue
Watershed Related Ordinance Review & Updates to Resolve Ordinance/City Code Conflicts	2010 - 2011
Map and create a GIS database of the Municipal Separate Storm Sewer System (MS4), Update the Map / GIS database as needed	Completed 2010 / Update Map/GIS data as needed
Storm Drainage System Assessment & Capital Improvement Program Development	Ongoing
Prepare Stormwater Drainage System Master Plan	2011-2015
Implement Stormwater Capital Improvement Projects as funds become available	Ongoing

Program	Implementation Date / Duration
Seek Grant funding sources for Implementation of Stormwater Capital Improvements (e.g., 319 Grants, etc.)	2011 - Ongoing
Evaluate Stormwater Utility (SWU) for funding source for Watershed Management Activities / Implement SWU if deemed appropriate.	2011 - 2012
Illicit Discharge Detection & Elimination Program	2010 / Ongoing
Pollution Prevention/Good Housekeeping – Preparation of Stormwater Pollution Prevention Plans for municipal sites with industrial activities	Jan. 1, 2011 – Dec. 31, 2011
Public Education / Public Awareness Program – Continue ongoing public education program required as part of Metro District stormwater program compliance	Ongoing

APPENDIX A

Location Map - Long-Term Watershed Monitoring Sites

Source: Carroll County Watershed Group Long-Term Monitoring Plan

APPENDIX B

Long-Term Watershed Monitoring Contract between Villa Rica and Center for Water Resources

Source: Villa Rica / Carroll County Watershed Group

APPENDIX C

Southern Inner Piedmont Subecoregion Metric Indices

APPENDIX D

Inventory of Stormwater Management Facilities