

**FINAL**  
**TOTAL MAXIMUM DAILY LOAD (TMDL)**  
**For**  
**Sediment (Biota Impacted)**  
**In**  
**Rocky Creek, Savannah River Basin**  
**Wilkes County, Georgia**

Prepared by:

US EPA Region 4  
61 Forsyth Street SW  
Atlanta, Georgia 30303

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In compliance with the provisions of the Federal Clean Water Act, 33 U.S.C §1251 et.seq., as amended by the Water Quality Act of 1987, P.L. 400-4, the U.S Environmental Protection Agency is hereby establishing Total Maximum Daily Loads (TMDLs) for sediment for Rocky Creek in the Savannah River Basin. Subsequent actions must be consistent with this TMDL.

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James D. Giattina, Director  
Water Management Division

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Date

## TMDL SUMMARY / SIGNATURE SHEET

**SEDIMENT / Rocky Creek  
Wilkes County, Georgia  
HUC 03060105**

In 2000, EPA Region 4 placed Rocky Creek on the State of Georgia's Section 303(d) list as biota impacted. A designation of "biota" reflects impacted biological community and further studies are needed to determine factor(s) causing impairment. Rocky Creek was placed on the 303(d) list in response to requirements of the settlement agreement of the Georgia "TMDL" lawsuit (Sierra Club v. EPA & Hankinson; No. 194-CV-2501-MHS, N.D.GA). The settlement agreement required a stream to be listed unless data expressly demonstrated the stream supported water quality standards.

The TMDL presented herein is based on the hypothesis that if the impaired waterbody has a long-term annual sediment load similar to reference streams in the same ecoregion, then the impacted waterbody will remain stable and not be impaired due to sediment. Watershed-scale loading of sediment in water was simulated using the Watershed Characterization System for both the impaired and reference streams. The TMDL is expressed in terms of average annual loads as summarized in the TMDL Summary Table. Average annual watershed loads represent the long-term processes of accumulation of sediments in the stream habitat areas that are associated with the potential for habitat alteration and aquatic life effects.

The TMDL assigns wasteload allocations to dischargers with NPDES permits. NPDES activities include municipal and industrial facilities, and stormwater discharge from MS4 areas and construction activities. The City of Washington WPCP is an NPDES facilities discharging into Rocky Creek. There are no MS4 municipalities in the Rocky Creek watershed. NPDES construction activities are considered a significant source of sediment. Compliance with the State of Georgia's Storm Water General Permit should lead to sediment loadings from construction sites at or below applicable targets.

Nonpoint sources of sediment are considered the major sediment producing areas in the watershed. These sources include agriculture (livestock access to streams, agriculture with no riparian buffer), bare ground (e.g., non-permitted construction-type sites), and urban influences. Instream erosion processes (i.e., stream bank and streambed erosion) were observed during field studies, but data were not collected to quantify the load.

**TMDL SUMMARY**

<b>Waterbody Segment / 303(d) Listing ID</b>	<b>Drainage Area (mi<sup>2</sup>)</b>	<b>Wasteload Allocation<sup>1</sup> (tons/day)</b>	<b>Load Allocation (tons/yr)</b>	<b>TMDL (tons/yr)</b>	<b>Percent Reduction</b>
Rocky Creek (GA-SV-Rocky_Creek)	32.4	0.627	3,224	3,224	48%

## Notes:

1. Wasteload allocation shown is maximum permit limit City of Washington WPCP is allocated for TSS; construction activities regulated under the NPDES program are required to comply with the conditions outlined in their permits.

Under the authority of Section 303(d) of the Clean Water Act, 33 U.S.C. 1251 et seq., as amended by the Water Quality Act of 1987, P.L. 100-4, the U.S. Environmental Protection Agency is hereby establishing TMDL for sediment in Rocky Creek. The Total Maximum Daily Loads (TMDLs) established for Rocky Creek requires effluent from point sources and waters originating from nonpoint sources shall not exhibit sediment loadings above the limits set herein.

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James D. Giattina, Director  
Water Management Division

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Date

## **Table of Contents**

TMDL SUMMARY / SIGNATURE SHEET .....	iii
1. Introduction.....	1
2. Watershed Characterization .....	1
3. Target Identification.....	4
3.1 Numerical Target .....	4
3.2 Target Selection .....	4
4. Habitat Assessments .....	5
5. Source Assessment.....	7
5.1 Point Sources .....	7
5.2 Nonpoint Sources.....	8
6. Modeling Approach .....	8
7. Total Maximum Daily Load (TMDL) .....	9
7.1 Wasteload Allocation (WLA).....	10
7.2 Load Allocation (LA) .....	10
7.3 Margin of Safety (MOS).....	11
7.4 Critical Conditions .....	11
7.5 Seasonal Variation .....	11
8. Recommendations.....	11
REFERENCES .....	12
APPENDIX A.....	13

## **List of Tables**

Table 1. Landuse Characteristics (acres) .....	2
Table 2. Habitat Scores for Impaired and Reference Streams .....	6
Table 3. NPDES Permit Limits for City of Washington WPCP (GA0031101) .....	7
Table 4. Estimated Sediment Loadings for Existing (chronic) Conditions .....	9
Table 5. TMDL Components.....	10

## **List of Figures**

Figure 1. Location of Rocky Creek Watershed .....	3
Figure 2. Sediment Yield in the Piedmont Ecoregion (45).....	5

## 1. Introduction

TMDLs are required for impaired waters on a State's Section 303(d) list as required by the Federal Clean Water Act Section 303(d) and implementing regulation 40 CFR 130. A TMDL establishes the maximum amount of a pollutant a waterbody can assimilate without exceeding the applicable water quality standard. The TMDL allocates the total allowable load to individual sources or categories of sources through wasteload allocations (WLAs) for point sources, and through load allocations (LAs) for non-point sources. The WLAs and LAs provide a basis for states to reduce pollution from both point and non-point source activities that will lead to the attainment of water quality standards and protection of the designated use. A summary of TMDL components is included in Appendix A.

The TMDL for sediment in Rocky Creek satisfies the consent decree obligation established in *Sierra Club v. EPA*, Civil Action No: 94-CV-2501-MHS (N.D.GA). The Consent Decree requires TMDLs to be developed for all waters on Georgia's most current Section 303(d) list consistent with the schedule established by Georgia for its rotating basin management approach. Rocky Creek is included on the 2000 303(d) list for partially supporting the Fishing water use classification resulting from biota impacted. Sediment from urban runoff is sited as the cause of the violation. Biological assessments conducted in 1997 by EPA Science and Ecosystem Support Division (SESD) and Tetra Tech, Inc., (Tetra Tech Inc. 1996) were sited as reasons for including Rocky Creek on the 303(d) list.

From 1998 to 2001, Georgia Environmental Protection Division (GAEPD) collected fish community data on stream segments in the Piedmont and Southeastern Coastal Plain ecoregions as a basis for the listings of Biota Impacted stream segments on the 303(d) list. To supplement these findings, habitat assessments were performed at the sampling sites. Fish community and habitat assessment scores were used to identify impaired and potential reference streams.

## 2. Watershed Characterization

Rocky Creek, located in Wilkes County, Georgia, is a tributary to Little River, which discharges to Clark Hill Reservoir on the Savannah River (see Figure 1). Rocky Creek originates less than one mile from the center of Washington, Georgia. The creek originates in an urban setting but much of its reach lies in rural areas amidst pasturelands and forested areas. The drainage area discharging to Rocky Creek is about 32 square miles and is based on the GA EPD's Hydrologic Unit Code (HUC) level 12 watershed boundaries.

Rocky Creek is located in the Piedmont ecoregion. During the habitat assessment conducted by Tetra Tech, it was noted the riffles in Rocky Creek contained predominately sand, gravel, and pebbles. Pools in the creek contained mainly sand. Land cover in the Rocky Creek watershed is primarily forest (71%) followed by

agriculture (24%). Land cover in Rocky Creek and reference streams identified by GA EPD are shown in Table 1. Land cover is based on the National Land Cover Database (NLDC) of 1995. Since 1995, urban sprawl is likely occurring in the watershed, with urban developments replacing forested land cover.

**Table 1. Landuse Characteristics (acres)**

Waterbody	Urban	Barren, Transitional	Commercial, Industry	Agriculture (cropland and pasture)	Water	Wetlands	Forest	Total
Rocky Creek	659 (3.2%)	711 (3.4%)	203 (1%)	4402 (21.3%)	59 (0.3%)	39 (0.2%)	14,642 (70.7%)	20,715
Indian Creek	16 (0.1%)	106 (0.3%)	4 (0.03%)	1203 (9.9%)	14 (0.1%)	36 (3%)	10,726 (89%)	12,105
Upton Creek	0	513 (3.4%)	0	3586 (24%)	27 (0.2%)	23 (0.2%)	10,879 (72%)	15,027

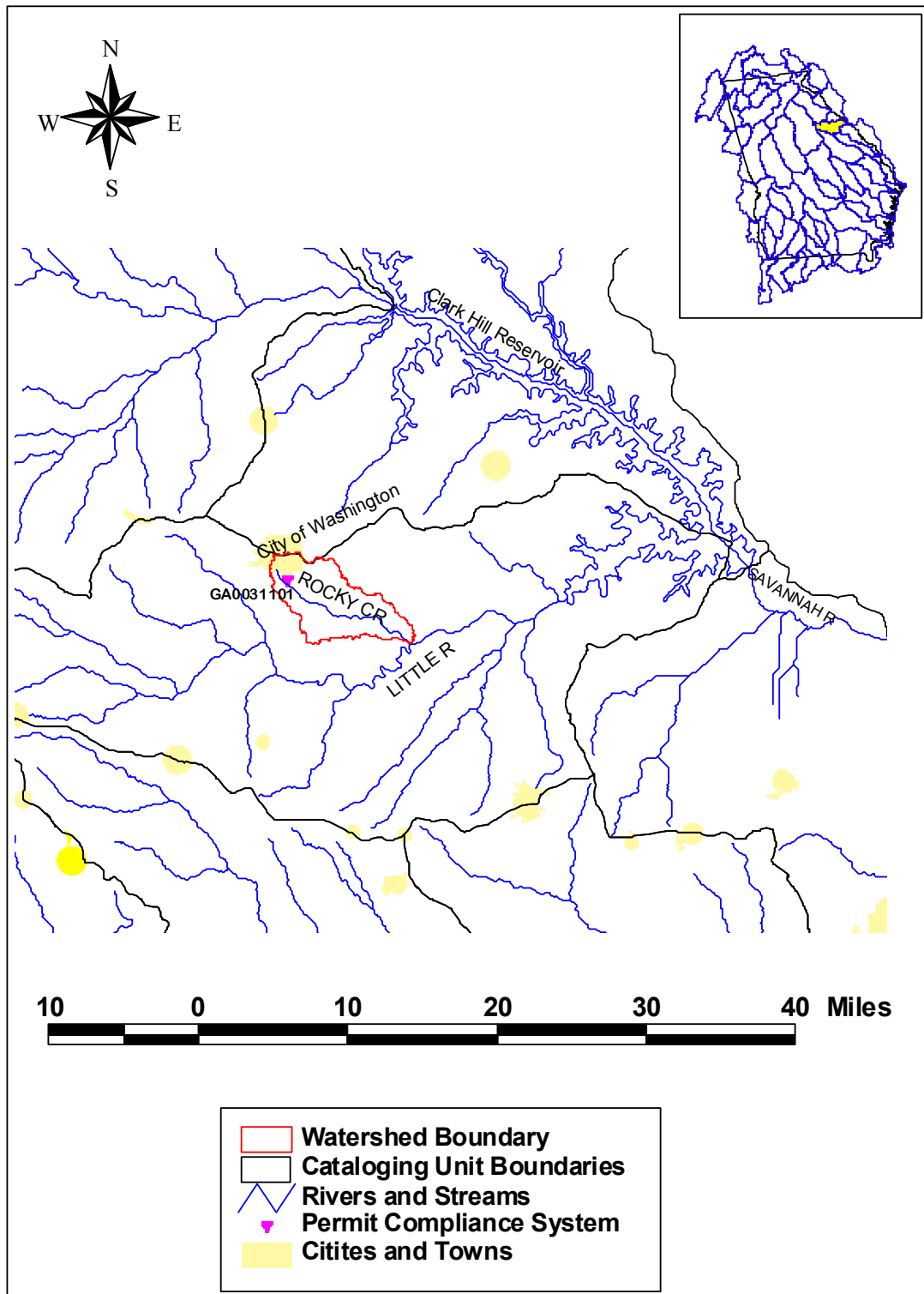


Figure 1. Location of Rocky Creek Watershed



### **3. Target Identification**

#### **3.1 Numerical Target**

The water use classification for the impaired waterbodies is fishing. The fishing classification, as stated in *Georgia's Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03(4)(c) (GAEPD, 2004a) applies to:

Fishing, Propagation of Fish, Shellfish, Game and Other Aquatic Life

GAEPD has established narrative criteria for sediment that applies to all waters of the State. The purpose of the narrative standard is to prevent objectionable conditions that interfere with legitimate water uses, as stated in *Georgia Regulation 391-3-6-.03(5)(c)* (GAEPD, 2004):

All waters shall be free from material related to municipal, industrial, or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

#### **3.2 Target Selection**

The TMDLs presented herein are based on the hypothesis that if the impaired waterbody has a long-term annual sediment load similar to a biologically unimpacted, healthy stream in the same ecoregion, then the impacted waterbody will remain stable and not be biologically impaired due to sediment. Based on studies conducted by GA EPD, Indian Creek and Upton Creek were shown to support healthy habitat and were selected as reference streams for Rocky Creek (GA EPD, 2004b). Habitat assessment and fish community scores for the reference streams can be found in the GA EPD TMDL for Headstall Creek (GA EPD 2004c). In the Headstall Creek TMDL, the average value of the sediment yield in reference stream segments in the Piedmont ecoregion is about 96 tons/mi<sup>2</sup>/yr.

The U.S. Department of Agriculture (USDA), Agricultural Research Service National Sedimentation Laboratory (ARS-NSL), under contract with EPA, is developing average annual sediment yields for ecoregions in Region 4 (USDA-ARS, 2004). Mean daily flow and suspended sediment data collected at U.S. Geological Survey (USGS) sites were used to generate sediment yield rating curves. The NSL conducted rapid geomorphic assessments (RGAs) at the USGS sites to evaluate channel stability and then ranked the sites as either stable or unstable. Values of sediment yield at stable sites in ecoregion 45 (Piedmont) are shown in Figure 2. The sediment yield transported in the reference streams should approximate the range estimated for the ecoregion.

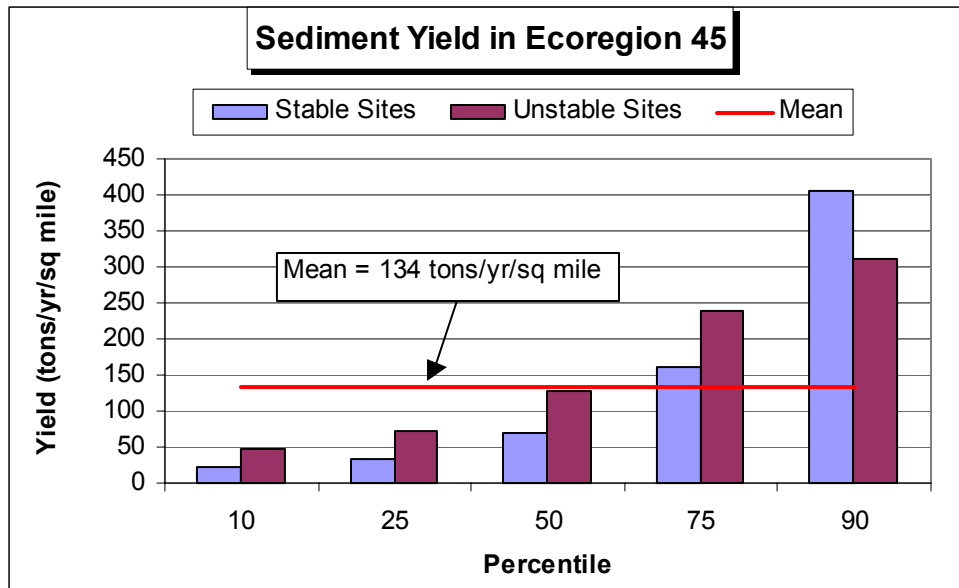


Figure 2. Sediment Yield in the Piedmont Ecoregion (45)

#### 4. Habitat Assessments

Field investigations conducted by GA EPD identified Indian Creek and Upton Creek as having fish communities and habitat of acceptable quality and a macroinvertebrate community that is not adversely impacted by sediment (GAEPD, 2004b). Details of fish sampling techniques and habitat assessment protocols can be found in the Headstall Creek TMDL (GAEPD, 2004c). In summary, fish community health was assessed using the modified IWB and IBI indices. Segments with fish populations (IBI) rated as Poor or Very Poor were listed as Biota Impacted; other ratings (i.e., Excellent, Good, or Fair) were considered potential reference sites. Indian Creek and Upton Creek had IBI scores in the Good category.

Tetra Tech, under contract with the City of Washington, conducted habitat assessments in Rocky Creek at three sites, one upstream of the WPCP, and two downstream of the WPCP (Tetra Tech, 1996). Results of the Tetra Tech assessments indicated habitat quality upstream of the WPCP was poor and clearly restricting aquatic life use in Rocky Creek. Habitat quality downstream of the WPCP showed some improvements in the fauna. Habitat assessment scores for Rocky Creek upstream of the WPCP and the reference streams are shown in Table 2.

EPA Science and Ecosystem Support Division (SESD) conducted additional bioassessments in Rocky Creek in February and March 1997 (USEPA SESD, 1997) in response to concerns regarding the environmental impact of the City of Washington WPCP effluent on habitat in the creek. Results identified Rocky Creek as impacted both above and below the WPCP. The upstream site was affected by runoff from urban areas and agriculture (i.e., pastures with cattle having access to streams). Chlorides are suspected in impacting the fauna downstream of the Washington WPCP because of elevated conductivity and chloride values (USEPA SESD, 1997). A review of current effluent quality from the WPCP indicates chloride levels below detection limit.

**Table 2. Habitat Scores for Impaired and Reference Streams**

<b>Waterbody</b>	<b>Instream Cover (Fish)</b>	<b>Epifaunal Substrate</b>	<b>Embeddedness</b>	<b>Riffle Frequency</b>	<b>Channel Alteration</b>	<b>Sediment Deposition</b>	<b>Channel Flow Status</b>	<b>Bank Vegetation (left)</b>	<b>Bank Vegetationj (right)</b>	<b>Bank Stability (left)</b>	<b>Bank Stability (right)</b>	<b>Riparian Zone (left)</b>	<b>Riparian Zone (right)</b>	<b>Habitat Total</b>
Rocky Creek	4	9	6	16	20	8	7	8	8	5	5	1	10	107
Indian Creek (reference)	5.9	2.2	2	11	4.6	0	10.3	3.9	4.3	4.2	4.2	8.7	8.9	70.2
Upton Creek (reference)	7.4	10.7	10.1	16.2	7.4	11.5	8.9	5.8	6.8	5.8	6.3	3.7	3.9	104.5

Note: Rocky Creek habitat assessment scores from Tetra Tech (1996); habitat assessment scores for reference streams from GAEPD (2004c).

## 5. Source Assessment

A TMDL evaluation examines the known potential sources of the pollutant in the watershed, including point sources, nonpoint sources, and background levels. For the purpose of these TMDLs, facilities under the National Pollutant Discharge Elimination System (NPDES) Program are considered point sources. Construction and nonpoint sources are considered the primary source of sediment in Rocky Creek.

### 5.1 Point Sources

Discharge from municipal and industrial facilities may contribute biologically active and inert solids to receiving waters as Total Suspended Solids (TSS) and/or turbidity. Rocky Creek receives effluent from the City of Washington Water Pollution Control Plant (WPCP). This facility treats sanitary wastewater as well as industrial effluents. TSS permit limits for this facility are expressed in terms of concentration and load, as shown in Table 3. Historically, discharges from the WPCP caused apparent environmental degradation to Rocky Creek, but in 1992 through early 1994, modifications were made in the treatment system to alleviate or reduce environmental impacts (BMI, 1994). In 1995, one of the major industrial users, Concord Fabrics, closed their textile factory resulting in substantial decreases in chlorides, dyes, surfactants, and other chemicals to the WPCP.

**Table 3. NPDES Permit Limits for City of Washington WPCP (GA0031101)**

Ave. Concentration	Maximum Concentration	Average Load	Maximum Load
30 mg/L	45 mg/l	455 kg/day	569 kg/day

Note: average limits represent 30-day average value; maximum limits represent 7-day average values

A review of the City of Washington WPCP Discharge Monitoring Reports (DMRs) available on the EPA web site ([www.epa.gov/enviro](http://www.epa.gov/enviro)), do not indicate violations of suspend solids permit limits. The percent removal efficiency of the plant is over 90 percent. The highest quantity of suspended solids reported in the effluent for the time period March 2003 to May 2004 was 71 kg/day (156 lb/day). Excessive chloride concentration in the WPCP effluent was suspected in impacting the fauna downstream of the WPCP. Chloride levels in the effluent for the time period March 2003 to May 2004 were reported as below detection limits.

Soil erosion from construction sites is a major source of sediment in Georgia's streams. The State of Georgia requires construction sites over one acre to have a General Storm Water NPDES permit. The permit authorize the discharge of storm water associated with construction activity in accordance with the limitations, monitoring requirements, and other conditions set forth in the permit. All construction sites are required to have an Erosion and Sediment Control Plan; to implement, inspect, and maintain BMPs; and to monitor storm water for turbidity. The permit can be considered a water quality-based permit, in that the numerical limits in the permit, if met and enforced, will not cause a

water quality problem in an unimpaired stream or contribute to an existing problem in an impaired stream.

Municipalities defined as MS4 areas are required through the NPDES process to control stormwater. The City of Washington is not considered an MS4 area. In this TMDL, sediment discharging from urban land is considered a nonpoint source of pollution.

## **5.2 Nonpoint Sources**

Roads, agriculture, bare ground (i.e., non-permitted construction type sites, etc.), and silviculture are the major nonpoint source of sediment in the watersheds. During the habitat assessment investigation conducted by Tetra Tech, it was documented that poor riparian zone quality, along with nonpoint source sedimentation resulting from agricultural practices (livestock access to stream degrading stream banks and agriculture with no riparian buffer), result in unstable banks and increased sedimentation instream.

## **6. Modeling Approach**

EPA and Tetra Tech developed the Arcview-based Watershed Characterization System (WCS) to provide tools for characterizing various watersheds (EPA, 2001a). WCS was used to display and analyze geographic information system (GIS) data including landuse, soil type, ground slope, road networks, NPDES discharges, and watershed characteristics. An extension of WCS is the Sediment Tool, which provides a mechanistic, simplistic simulation of precipitation-driven runoff and sediment delivery based on the Universal Soil Loss Equation (USLE).

The USLE equation is designed as a method to predict average annual soil loss caused by sheet and rill erosion. While it can estimate long-term annual soil loss and guide on proper cropping, management, and conservation practices, it cannot be applied to a specific year or storm event. A summary of USLE input parameters used to estimate the watershed loadings is provided in Appendix B. Details of the WCS Sediment Tool are documented in the TMDL developed for sediment in Headstall Creek in the Savannah River Basin (GAEPD, 2004c).

The WCS Sediment Tool assumes all the sediment in the stream originates from the watershed. For streams characterized by extremely unstable banks the Sediment Tool may underestimate the load, as sediment originating from streambank sloughing may be a major source of sediment as compared to the loadings from the watershed. Therefore, the WCS Sediment Tool provides an estimate of the chronic, or long-term, impact of sediment discharging from the watershed and represent average conditions during all seasons.

The Sediment Tool divides the watershed into a grid network based on elevation data (30 by 30 meter data). For each grid cell within the watershed, the Sediment Tool calculates

the potential erosion using the USLE and each cell's specific characteristics. The model routes the sediment through each grid cell until it reaches the stream.

The amount of sediment reaching the stream is controlled primarily by the stream grid value, which defines the density of cells upstream of the stream's headwater cell. The stream grid value parameter was adjusted until the annual sediment load in the reference stream approximated the load in stable streams in the ecoregion. A stream grid value of twenty-five resulted in a sediment yield in Indian and Upton creeks of 45 and 154 tons/mi<sup>2</sup>/yr, respectively. The average of these values (i.e., 99.5 tons/mi<sup>2</sup>/yr) compares favorably with the mean sediment yield value for the ecoregion (i.e., 133 tons/mi<sup>2</sup>/yr) and the target used in the Headstall Creek TMDL (96 tons/mi<sup>2</sup>/yr).

The assumption in this TMDL is a stable stream will support healthy habitat while maintaining the stream's designated use. The model input parameters used to calibrate loadings transported in the reference stream were used to calculate the existing loads in the impaired streams. Sediment loadings in Rocky Creek based on results of the WCS Sediment Tool analysis are shown in Table 4.

**Table 4. Estimated Sediment Loadings for Existing (chronic) Conditions**

<b>Waterbody</b>	<b>Drainage Area (mi<sup>2</sup>)</b>	<b>Yield (tons/mi<sup>2</sup>/yr)</b>	<b>Total Load (tons/yr)</b>
Rocky Creek	32.4	190	6,154
Indian Creek	18.9	44.8	800.41
Upton Creek	23.5	153.6	3626.65

## **7. Total Maximum Daily Load (TMDL)**

A TMDL establishes the total pollutant load a waterbody can assimilate and still achieve water quality standards. The components of a TMDL include a wasteload allocation (WLA) for point sources, a load allocation (LA) for nonpoint sources (including natural background), and a margin of safety (MOS), either implicitly or explicitly, to account for uncertainty in the analysis. Conceptually, a TMDL is defined by the equation:

$$\text{TMDL} = \Sigma \text{WLA} + \Sigma \text{LA} + \text{MOS}$$

The TMDLs for the Savannah River Basin streams are expressed in terms of sediment yield, in units of tons/mi<sup>2</sup>/yr, based on average annual area-weighted loads calculated using the WCS Sediment Tool. It is acceptable for TMDLs to be expressed through other appropriate measures (e.g., sediment yield) other than mass loads per time (40 CFR 130.2). The TMDLs are also expressed as total annual loads as a NPDES facility discharges sediment into Rocky Creek. The WLA for the NPDES facility is expressed in terms of permit limits. TMDL components are shown in Table 5.

**Table 5. TMDL Components**

<b>Waterbody Segment</b>	<b>Wasteload Allocation<sup>1</sup> (tons/day)</b>	<b>Load Allocation<sup>2</sup> (tons/yr)</b>	<b>TMDL (tons/yr)</b>	<b>Area-Weighted TMDL (tons/mi<sup>2</sup>/yr)</b>	<b>Percent Reduction</b>
Rocky Creek	0.627	3,224	3,224	99.5	48%

## Notes:

1. Wasteload allocation shown is for the City of Washington WPCP and is based on maximum permit limits; construction activities regulated under the NPDES program are required to comply with the conditions outlined in their permits.
2. Load Allocation based on an area weighted sediment load of 99.5 tons/mi<sup>2</sup>/yr estimated for reference streams in the ecoregion.

**7.1 Wasteload Allocation (WLA)**

Wasteload allocations are provided to point source discharge from industrial and municipal facilities as well as permitted stormwater discharges. The City of Washington WPCP discharges effluent into Rocky Creek. A review of current DMRs indicates the plant has a suspended solids removal efficiency of over 90% and chloride levels below detection limits. EPA assumes compliance with the NPDES permit limits should not have an adverse impact on habitat in Rocky Creek.

Compliance with the Georgia Storm Water Permit will ensure construction sites meet the TMDL area weighted loadings. EPA assumes that construction activities in the watershed will be conducted in compliance with Georgia's Storm Water Permit including monitoring and discharge limitations. Compliance with these permits should lead to sediment loadings from construction sites at or below applicable targets.

**7.2 Load Allocation (LA)**

Nonpoint sources are considered to be the primary cause of sediment impairment in Rocky Creek. To reduce sediment from agricultural activities, road crossings, and construction activities, restoration of riparian buffer zones is recommended. For streams in the Piedmont Ecoregion where stream banks and streambed erosion appear to be the sources of sediment, instream restoration activities should be the focus to ensure compliance with the TMDL. Further ongoing monitoring needs to be completed to monitor progress and to assure further degradation does not occur.

For land disturbing activities related to silviculture that may occur on public lands, it is recommended that practices as outlined for landowners, foresters, timber buyers, loggers, site preparation and reforestation contractors, and others involved with silvicultural operations follow the practices to minimize nonpoint source pollution as outlined in "Georgia's Best Management Practices for Forestry (GAEPD 1999).

### 7.3 Margin of Safety (MOS)

An MOS is a required component of a TMDL that accounts for the uncertainty in the relationship between the pollutant and the quality of the receiving waterbody. Conservative assumptions were used in the TMDL and include: selection of average USLE factors and use of no conservation practices (P factor in USLE equation = 1.0) for all land uses.

### 7.4 Critical Conditions

The average annual watershed load represents the long-term processes of accumulation of sediments in the stream habitat areas that are associated with the potential for habitat alteration and aquatic life effects.

### 7.5 Seasonal Variation

Sediment is expected to fluctuate according to the amount and distribution of rainfall. Rainfall is typically greatest in the spring and winter seasons, and it is expected that sediment loadings would be highest during these times. Seasonal fluctuations and other short-term variability in loadings due to episodic events are usually evened out by the response of the biological community to habitat alteration, which is a long-term process. Therefore, the average annual sediment load is considered an appropriate indicator of potential impairment due to sediment.

## 8. Recommendations

EPA and EPD have developed Implementation Plans for sediment TMDLs in other impaired waterbodies in the state. Details of this plan can be found in “*Total Maximum Daily Load Evaluation for Headstall Creek in the Savannah River Basin for Sediment (Biota impacted)*” (GAEPD, 2004). In summary, the Implementation Plan includes a list of best management practice and provides for an initial implementation of demonstration projects to address one or more of the major sources of pollutants identified in the TMDL.

The Tetra Tech bioassessment study recommended the following strategies to improve habitat in Rocky Creek (Tetra Tech, 1996). Stabilization of the stream banks; introduction of various materials (logs, rock, etc.) to stabilize the streambed, reduce bedload movement downstream, and create suitable habitat and cover for aquatic life; land use restrictions of the riparian zone, including restricting cattle walking instream and restricting agricultural and urban uses within some distance (at least 100 feet) on either side of the creek and wider riparian vegetation buffers on both sides of the stream.



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**APPENDIX A**  
**TMDL SUMMARY**

### TMDL Summary Components

#### 1. 303(d) Listed Waterbody Information

<b>State:</b>	<b>Georgia</b>
<b>Major River Basin:</b>	<b>Savannah</b>
<b>Ecoregion:</b>	<b>Piedmont (45)</b>
<b>Designated Use:</b>	<b>Fishing</b>
<b>303(d) Listing ID:</b>	<b>GA-SV-Rocky_Creek</b>
<b>Location:</b>	<b>Wilkes</b>
<b>8-Digit Hydrologic Unit Code (HUC):</b>	<b>03060105</b>
<b>Watershed Area:</b>	<b>32.4 square miles (mi<sup>2</sup>)</b>
<b>Tributary To:</b>	<b>Little River</b>
<b>Constituent(s) of Concern:</b>	<b>Sediment (biota impacted)</b>

#### **Applicable Water Quality Standard:**

All waters shall be free from material related to municipal, industrial, or other discharges which produce turbidity, color, odor, or other objectionable conditions which interfere with legitimate water uses.

#### 2. TMDL Development

TMDL is based on the hypothesis if the impaired waterbody has average annual sediment load similar to reference streams in the same ecoregion supporting healthy habitat, the impacted waterbody will remain stable and not be impaired due to sediment. Watershed-scale loadings of sediment were simulated using the Watershed Characterization System Sediment Tool. The Sediment Tool is based on the Universal Soil Loss Equation (USLE).

#### 3. TMDL Allocations

**Wasteload Allocation (WLA):** 0.627 tons/day

Future construction sites must meet requirements of General Storm Water Permit

**Load Allocation (LA):** 3,224 tons/yr

**Total Maximum Daily Load (TMDL):** 99.5 tons/mi<sup>2</sup>/yr (equates to 3,224 tons/yr)

**Reduction:** 48%

**Margin of Safety (MOS):** Implicit (based on conservative modeling assumptions)