



# City of Chattanooga Stormwater Management

Total Maximum Daily Load

*E. Coli* Monitoring Plan

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### **PURPOSE**

The purpose of this document is to comply with monitoring requirements associated with the Total Maximum Daily Load (TMDL) for *e. coli* in the Lower Tennessee River Watershed. Specific items addressed in this document includes: sample location, sample frequency and sampling protocols.

## TABLE OF CONTENTS

1. INTRODUCTION.....	4
2. OBJECTIVES .....	7
3. WATER QUALITY ASSESSMENT.....	7
4. MONITORING PLAN .....	8
A. <i>Monitoring Locations</i>	
B. <i>Sampling Protocol – Pathogen Stream Sampling</i>	
C. <i>Sampling Protocol – Visual Stream Surveys</i>	
D. <i>Sampling Frequency</i>	
5. PROJECT MILESTONES .....	12
6. REFERENCES.....	13

## LIST OF TABLES

<i>Table 1. List of Impaired Waterbodies in Hamilton Co .....</i>	<i>4</i>
<i>Table 2. List of e. coli TMDLs for Waterbodies within the City .....</i>	<i>6</i>
<i>Table 3. N. Market Street Branch Sampling Location.....</i>	<i>8</i>
<i>Table 4. Citico/Unnamed Tributary of Citico Sampling Locations .....</i>	<i>9</i>
<i>Table 5. Chattanooga Creek and Dobbs Branch Sampling Locations .....</i>	<i>10</i>
<i>Table 6. S. Chickamauga Creek/Friar Branch Sampling Locations .....</i>	<i>11</i>

## LIST OF FIGURES

<i>Figure 1. Location Map of 303(d) Streams in Hamilton Co .....</i>	<i>5</i>
<i>Figure 2. Location Map for TMDL e. coli % Reduction .....</i>	<i>6</i>
<i>Figure 3. N. Market Street Branch Sample Location .....</i>	<i>8</i>
<i>Figure 4. Citico/Unnamed Tributary of Citico Sampling Locations.....</i>	<i>9</i>
<i>Figure 5. Chattanooga Creek/Dobbs Branch Sampling Location .....</i>	<i>10</i>
<i>Figure 6. S. Chickamauga Creek/Friar Branch Sampling Locations .....</i>	<i>11</i>

## 1. Introduction

In accordance with Section 303(d) of the Clean Water Act, each State is required to develop Total Maximum Daily Loads (TMDLs) for water bodies that are not meeting water quality standards. Table 1 lists impaired waterbodies, as identified by the Tennessee Department of Environment and Conservation, Division of Water Pollution Control (TDEC), within Hamilton County, Tennessee.

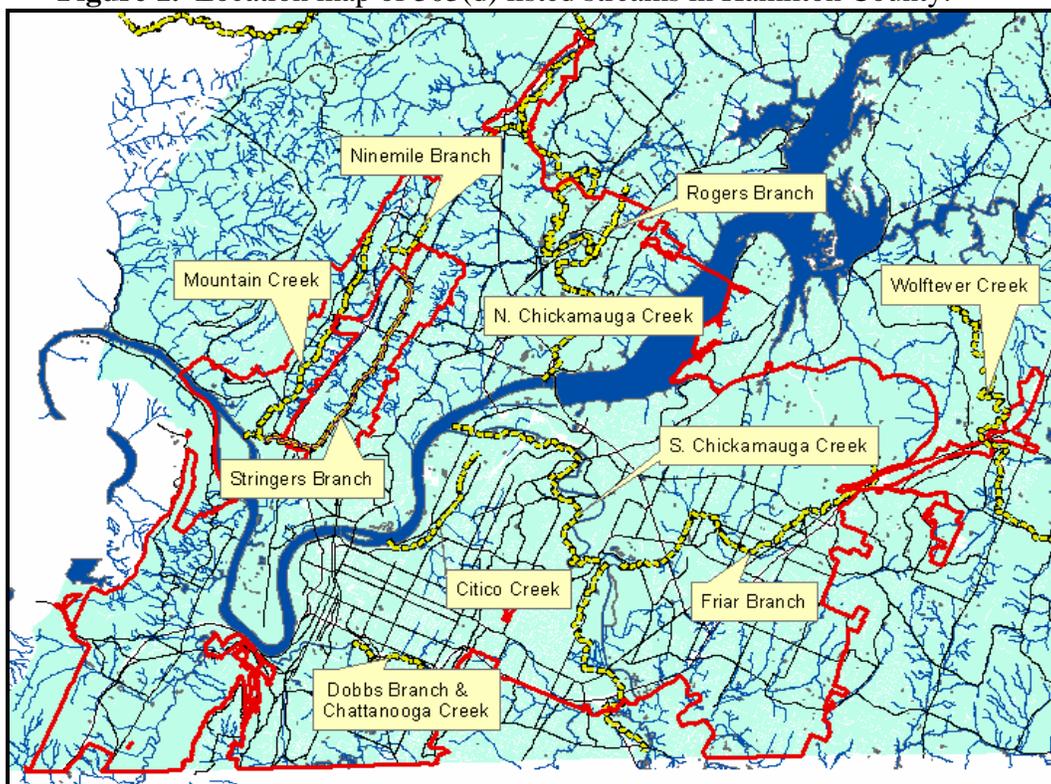
**Table 1.** List of Impaired Waterbodies in Hamilton County.

Waterbody ID	Waterbody	Miles Impaired	Cause/TMDL Priority
TN06020001001T-0200	North Market St Branch	2.5	Pathogens
TN06020001007-0100	Friar Branch	26.9	Siltation Organic Enrichment Low DO Stream Alterations Pathogens
TN06020001007-0200	Unnamed Trib to S. Chickamauga Creek	1.1	Organic Enrichment/Low DO Pathogens
TN06020001007-0510	Spring Creek	9.6	Pathogens
TN06020001007-1000	South Chickamauga Creek <sup>b</sup>	17.6	Phosphorous Habitat Alteration Pathogens Siltation
TN06020001029-0300	Lewis Branch	1.5	Habitat Alteration Pathogens
TN060200011240-0100	Unnamed Trib to Citico Creek	1.2	Phosphorus Thermal Modifications Pathogens Habitat Alteration
TN060200011240-1000	Citico Creek	6.1	Nutrients Low DO Pathogens Habitat Alteration
TN060200011244-0100	Dobbs Branch	5.3	Organic Enrichment Pathogens Habitat Alteration
TN060200011244-0200	Unnamed Trib to Chattanooga Creek	1.4	Pathogens Habitat Alteration

Waterbody ID	Waterbody	Miles Impaired	Cause/TMDL Priority
TN060200011244-0300	McFarland Springs Branch <sup>b</sup>	1.2	Pathogens
TN0600011244-0400	Gillespie Springs Branch	1.9	Pathogens Habitat Alteration
TN060200011244-100 & 2000	Chattanooga Creek <sup>b</sup>	8.4	PCBs, Dioxin Organic Enrichment/Low DO Pathogens Habitat Alterations Oil & Grease
TN06020001426-0100	Stringers Branch	5.8	Pathogens Habitat Alteration
TN06020001-067-0100	Unnamed Trib to N. Chickamauga Creek	4.3	Siltation Habitat Alteration
TN06020001-067-0210	Ninemile Branch	4.0	Low DO Habitat Alteration

<sup>b</sup> Portions of the waterbody is in a different state.

**Figure 1.** Location map of 303(d) listed streams in Hamilton County.

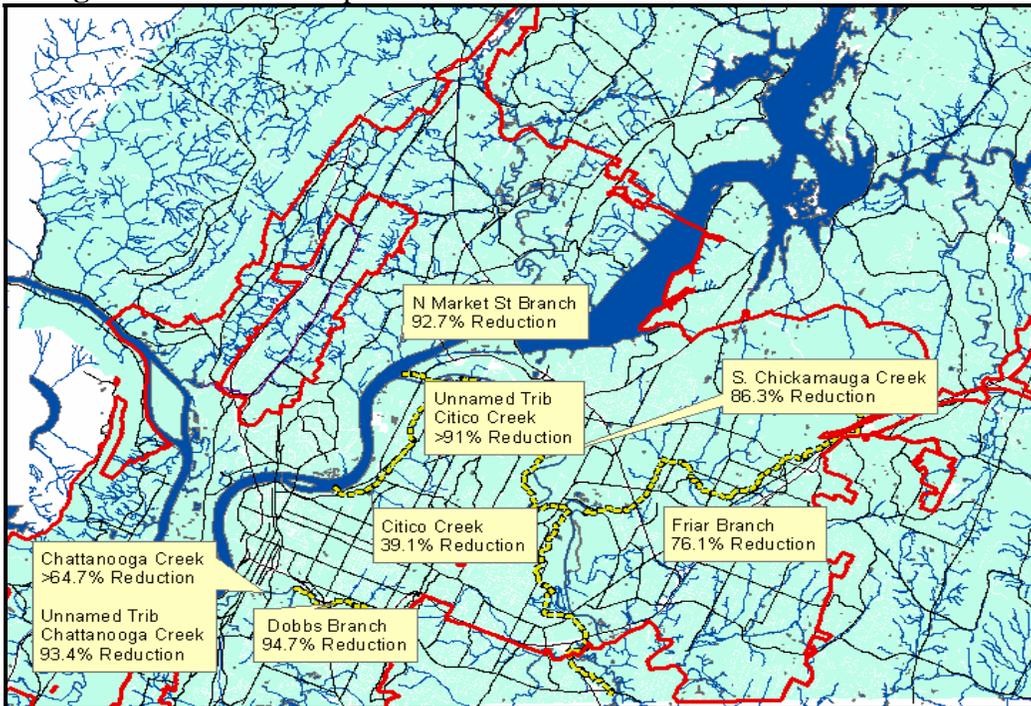


On July 7, 2006, the Environmental Protection Agency (EPA) Region 4 approved the TMDL for *E. Coli* in the Lower Tennessee River Watershed (HUC 06020001). Within the regulatory boundaries of the City of Chattanooga (City), the following water bodies were assigned a TMDL (Table 2):

**Table 2.** List of *e. coli* TMDLs for Waterbodies within the City of Chattanooga.

HUC-12 Subwatershed (06020001_) or Drainage Area	Impaired Waterbody Name	Impaired Waterbody ID	TMDL MS4 %Reduction
0502 (DA)	North Market Street Branch	TN06020001001T-0200	92.7
0502 (DA)	Unnamed Trib of Citico Creek	TN060200011240-0100	>91.0
0502 (DA)	Citico Creek	TN060200011240-1000	39.1
0503	Dobbs Branch	TN060200011244-0100	94.7
0503	Unnamed Trib of Chattanooga Creek	TN060200011244-0200	93.4
0503	Chattanooga Creek	TN060200011244-1000 & 2000	>64.7
0804	Friar Branch	TN06020001007-0100	76.1
0804	South Chickamauga Creek	TN06020001007-1000	86.3

**Figure 2.** Location map associated with TMDL MS4 % *e. coli* reduction.



## 1.0 Objectives

To meet the monitoring requirements mandated by the TMDL program, the City proposes the following surface water quality monitoring plan. This TMDL water quality monitoring plan consists of three specific objectives:

- **Source Identification** – by identifying sources of pollution, site-specific actions will be developed to resolve problems found during monitoring.
- **Prioritization** – once known causes of pollution are identified, a strategic implementation plan will be developed.
- **Evaluation** – subsequent to implementation of Best Management Practices (BMPs), monitoring will be conducted to evaluate the effectiveness of implemented watershed management strategies.

Sampling protocols will comply with the Biological (Pathogen) Analysis Method as identified in the TDEC document, *Quality System Standard Operating Procedure for Chemical and Bacteriological Sampling of Surface Water, March 2004*. In addition to surface water sampling, visual stream surveys will be conducted in accordance with Maryland's *Stream Corridor Assessment Survey, SCA Survey Protocols, September 2001*.

## 2.0 Water Quality Assessment

This monitoring plan incorporates key elements of TDEC's TMDL document (2006). Water quality criteria, used for TMDL development and implementation, has been derived from the coliform water quality criteria for protection of the recreation use classification as defined by the *State of Tennessee Water Quality Standards, Chapter 1200-4-3, General Water Quality Criteria, January 2004*:

“The concentration of the *E. coli* group shall not exceed 126 colony forming units per 100mL, as a geometric mean based on a minimum of 5 samples collected from a given sampling site over a period of not more than 30 consecutive days with individual samples being collected at intervals of not less than 12 hours.”

“Additionally, the concentration of the *E. coli* group in any individual sample taken from a lake, reservoir, State Scenic River, or Tier II or III stream (1200-4-3-.06) shall not exceed 487 colony forming units per 100mL. The concentration of the *E. coli* group in any individual sample taken from any waterbody shall not exceed 941 colony forming units per 100mL.”

All waterbodies included in this TMDL monitoring plan have failed to meet the above referenced water quality criteria.

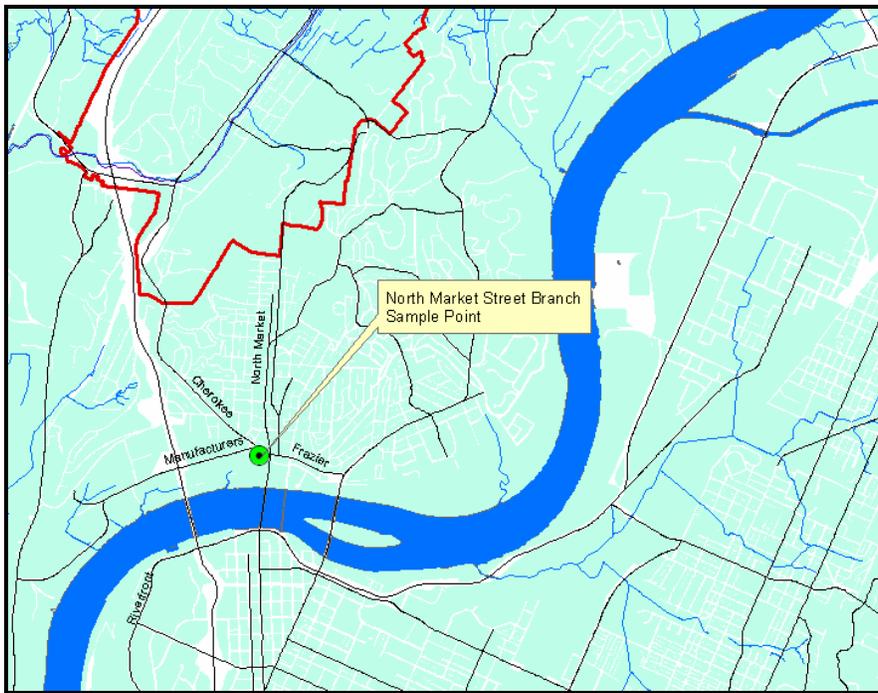
### 3.0 Monitoring Plan

This monitoring plan is organized by HUC Sub-watersheds. The HUC-12 Sub-watershed (06020001\_) 0502 (DA) consists of the: North Market Street Branch, Stringers Branch, Unnamed Tributary to Citico Creek and Citico Creek. **The City will be conducting TMDL monitoring only on waterbody sections within the City limits. Waterbodies contained in Hamilton County, but not within the City of Chattanooga, will be monitored by a different agency.**

#### A. Monitoring Locations

##### North Market Street Branch

**Figure 3.** Area map depicting sampling location at North Market Street Branch.

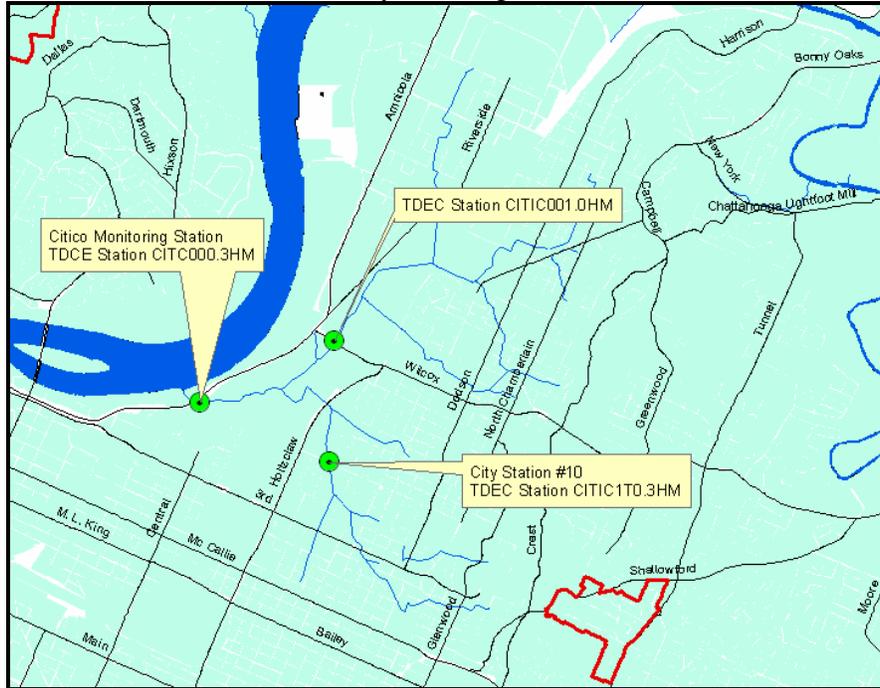


**Table 3.** TMDL sampling location for North Market Street Branch.

City Station #	Location	Stream Section	TDEC ID	TMDL
9	Renaissance Park @ Market Street Bridge	North Market Street Branch	NMSTR000.3HM	<i>e. coli</i>

Citico Creek and Unnamed Tributary to Citico Creek

**Figure 4.** Area map depicting sampling locations for Citico Creek and Unnamed Tributary draining into Citico Creek.



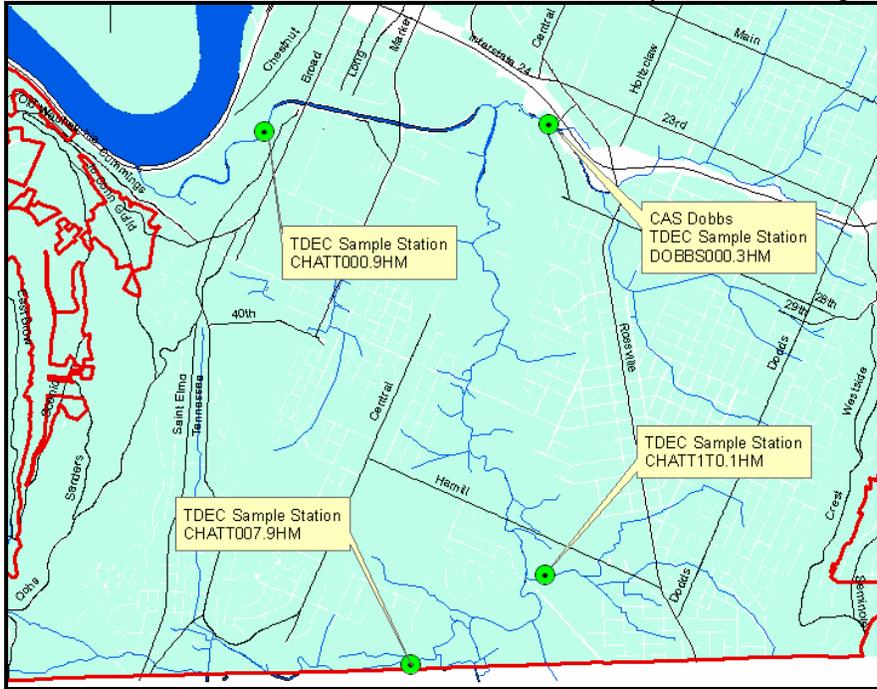
**Table 4.** TMDL sampling locations for Citico Creek and an Unnamed Tributary to Citico Creek.

City Station #	Location	Stream Section	TDEC ID	TMDL
CMS 1	Citico Creek @ Cannon Properties	Citico Creek	CITIC000.3HM	e. coli
	Wilcox Blvd @ Amnicola Hwy	Unnamed Tributary Citico Creek	CITIC001.0HM	e. coli
10	Citico Ave below Carver Recreation	Citico Creek	CITIC1T0.3HM	e. coli

HUC-12 Sub-watershed (06020001\_) 0503 consists of: Dobbs Branch, Chattanooga Creek and an Unnamed Tributary of Chattanooga Creek.

Chattanooga Creek, Unnamed Tributary to Chattanooga Creek, and Dobbs Branch

**Figure 5.** Area map depicting sampling locations for Chattanooga Creek, Dobbs Branch and Unnamed Tributary to Chattanooga Creek.



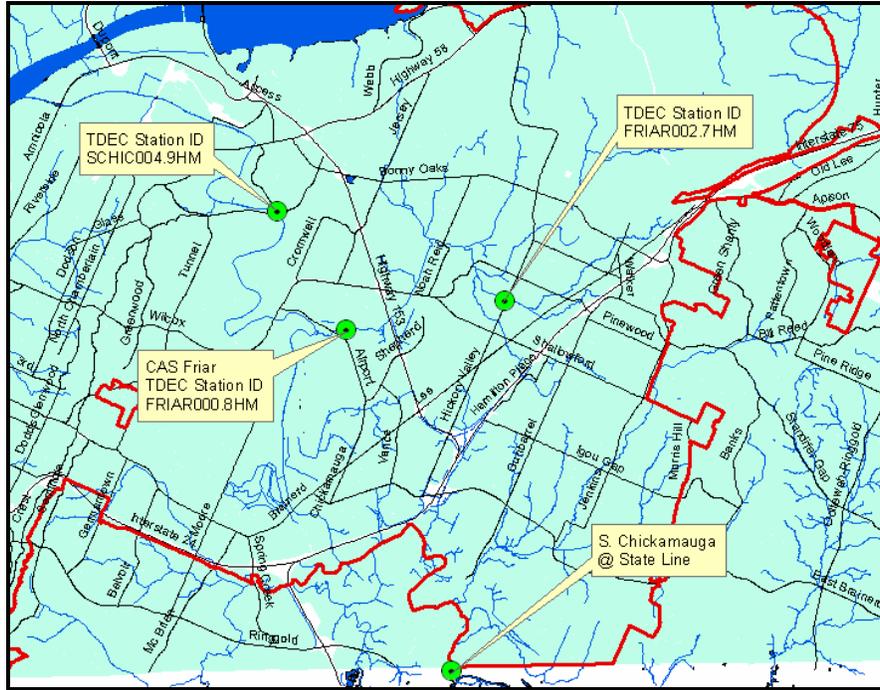
**Table 5.** TMDL sampling locations for Dobbs Branch, Chattanooga Creek and Unnamed Tributary to Chattanooga Creek

City Station #	Location	Stream Section	TDEC ID	TMDL
CAS Dobbs	Bridge @ Cannon Ave	Dobbs Branch	DOBS000.3HM	<i>e. coli</i>
	Chattanooga Creek @ RR bridge @ rendering plant	Chattanooga Creek	CHATT000.9HM	<i>e. coli</i>
	5200 Block Wilson Rd @ bridge	Chattanooga Creek	CHATT007.9HM	<i>e. coli</i>
	Hooker Road	Unnamed Tributary Chattanooga Creek	CHATT1T0.1HM	<i>e. coli</i>

HUC-12 Sub-watershed (06020001\_) 804 consists of: South Chickamauga Creek and Friar Branch.

South Chickamauga Creek and Friar Branch

**Figure 6.** Area map depicting sampling locations for South Chickamauga Creek and Friar Branch.



**Table 6.** TMDL sampling locations for South Chickamauga Creek and Friar Branch.

City Station #	Location	Stream Section	TDEC ID	TMDL
CAS Friar	Friar Branch @ Polymer Dr next to Mayfield	Friar Branch	FRIAR000.8HM	<i>e. coli</i>
	Hickory Valley Rd	Friar Branch	FRIAR002.7HM	<i>e. coli</i>
	South Chickamauga Creek @ State Line	South Chickamauga Creek		<i>e. coli</i>
	South Chickamauga Creek @ Lightfoot Mill Rd	South Chickamauga Creek	SCHIC004.9HM	<i>e. coli</i>

## **B. Sampling Protocol – Pathogen Stream Sampling**

Surface water sampling will be conducted in accordance with the State of Tennessee's Quality System Standard Operating Procedure for Chemical and Bacteriological Sampling of Surface Water, March 2004.

Bacteriological samples will be collected in sterilized, pre-preserved bottles. Bottles will be sealed, labeled, placed in a Ziploc-type bag and stored on ice in a cooler until delivered to the Moccasin Bend Waste Water Treatment (MBWWT) Laboratory for analysis. Appropriate Chain-of-Custody (COC) forms will be completed and transported with the sample. In addition to water sample collection, a suite of field measurements will be collected. Field measurements will include: visual observation, Temperature, pH, Dissolved Oxygen (DO), Specific Conductivity, and flow.

*E. coli* analysis will be conducted by using method 9223B from the American Public Health Association, American Waterworks Association, Water Environment Federation. 1995. 19<sup>th</sup> Edition, Standard Methods for Examination of Water and Wastewater. American Public Health Association. Washington, D.C. MBWWT uses the EPA approved IDEXX Quanti-Tray® method for analyzing *e. coli*.

## **C. Sampling Protocol – Visual Stream Surveys**

Visual stream assessments will be conducted in accordance with Maryland's Stream Corridor Assessment Survey SCA Survey Protocols, (Yetman, 2001). Data collected during stream assessment activity will be electronically stored in a database and accessible by ArcGIS.

## **D. Sampling Frequency**

Pathogen sample sets will be collected once during a five (5) year period. As noted in section 2.0, a sample set is defined as five (5) samples collected within a thirty (30) day period with each individual sample collected more than twelve(12) hours apart.

Visual stream assessments will be conducted on a continuum basis (SCORE, 2007).

## **4.0 Project Milestones**

- Sampling will be conducted at the designated sample locations.
- Data will be compiled and analyzed to assist with: source identification, prioritization and BMP deployment.
- Watershed data will be used to evaluate program effectiveness.

## **5.0 References**

City of Chattanooga (2007). Chattanooga Stream Corridor Evaluation (SCORE) Program.

Tennessee Department of Environment and Conservation. (2006). Total Maximum Daily Load (TMDL) for E. Coli in the Lower Tennessee River Watershed (HUC 06020001) Bledsoe, Bradley, Hamilton, Loudon, Marion, McMinn, Meigs, Rhea, Roane, and Sequatchie Counties, Tennessee.

Tennessee Department of Environment and Conservation. (2004). Quality System Standard Operating Procedure for Chemical and Bacteriological Sampling of Surface Water.

Tennessee Department of Environment and Conservation (2006). Year 2006 303(d) List, Proposed Final Version. State of Tennessee, Department of Environment and Conservation, Division of Water Pollution Control.

State of Tennessee (2004). Rules of Tennessee Department of Environment and Conservation Tennessee Water Quality Control Board Division of Water Pollution Control. Chapter 1200-4-3, General Water Quality Criteria.

Yetman, K.T. (2001). Stream Corridor Assessment Survey, SCA Survey Protocols. Maryland Watershed Restoration Division.