

Water Quality Improvement Plan



*A plan to reduce sediment loadings in Ash Camp Creek and
Twittys Creek Watersheds, Charlotte County, Virginia*

Technical Report

October, 2010

Prepared by:

Virginia Department of Conservation and Recreation (VADCR)

101 North, 14th Street, Richmond, Virginia 23219

TABLE OF CONTENTS

LIST OF TABLES.....	V
LIST OF FIGURES.....	VII
ACKNOWLEDGEMENT.....	1
CHAPTER 1. INTRODUCTION.....	3
Background	3
Water Quality Problems in Ash Camp Creek and Twittys Creek Watersheds	4
Designated Uses and Applicable Water Quality Standards	5
Project Methodology	6
CHAPTER 2. STATE AND FEDERAL REQUIREMENTS FOR IMPLEMENTATION PLAN	7
State Requirements.....	7
Federal Requirements.....	7
Requirements of Section 319 Fund Eligibility.....	9
CHAPTER 3. REVIEW OF TMDL STUDIES OF ASH CAMP CREEK AND TWITTYS CREEK.....	11
Ash Camp Creek Watershed.....	11
Characteristics of Watershed.....	11
Sources of Sediment in the Creek	12
Water Quality Modeling.....	14
Goals for Reducing Sediment Loads.....	15
Twittys Creek Watershed	16
Characteristics of Watersheds	16
Sources of Sediment in the Creek	18
Water Quality Modeling.....	19
Goals for Reducing Sediment Goals.....	20

CHAPTER 4. PUBLIC PARTICIPTION PROCESS.....	22
Public Meetings for Ash Camp Creek and Twittys Creek Watersheds	22
Working Groups Meetings for Ash Camp Creek and Twittys Creek Watersheds.....	23
Summary	24
 CHAPTER 5. ASSESSMENT OF IMPLEMENTATION ACTIONS.....	26
Control Measures Selected through Stakeholder Review	26
Assessment of Best Management Practices Needs	29
Agricultural Best Management Practices	29
Urban/Residential Best Management Practices	33
Educational and Technical Assistance Needs	35
 CHAPTER 6. COST ESTIMATION OF IMPLEMENTATION ACTIONS	37
Cost Estimates of BMPs.....	37
Technical Assistance	37
 CHAPTER 7. BENEFITS OF IMPLEMENTATION ACTIONS	40
 CHAPTER 8. GOALS AND MEASURABLE MILESTONES.....	43
Staged Implementation Approach.....	43
Tracking BMPs Implementation and Water Quality Monitoring	47
 CHAPTER 9. STAKEHOLDERS' ROLES AND RESPONSIBILITIES.....	49
Federal and State Government	49
Local Government and Citizens.....	51
Integration with other Water Quality Programs and Activities	51
 CHAPTER 10. POTENTIAL FUNDING SOURCES.....	53
 CHAPTER 11. REFERENCES	58

APPENDIX A	61
Working Group and Steering Committee Meetings.....	63
APPENDIX B	69
Soil and Water Conservation District BMPs Progress.....	71

LIST OF TABLES

Table 1.	Land use distribution in Ash Camp Creek watershed study area.....	13
Table 2.	TMDL sediment reductions required in Ash Camp Creek watershed.....	16
Table 3.	Land use distribution in Twittys Creek watershed study areas.....	17
Table 4.	TMDL sediment reductions required in Twittys Creek watershed.....	21
Table 5.	Meetings held during Implementation Plan development process of Ash Camp Creek and Twittys Creek watersheds.....	24
Table 6.	Best management practices and associated pollutant reductions.....	28
Table 7.	All agricultural BMPs recommended for Ash Camp Creek and Twittys Creek watersheds.....	33
Table 8.	All urban/residential BMPs recommended for Ash Camp Creek and Twittys Creek watersheds.....	35
Table 9.	All agricultural, urban/residential BMPs, and technical assistance cost estimates for Ash Camp Creek watershed.....	38
Table 10.	All agricultural, urban/residential BMPs and technical assistance cost estimates for Twittys Creek watershed.....	39
Table 11.	Stage I and Stage II BMPs implementation goals and technical assistance cost estimates for Ash Camp Creek watershed	45
Table 12.	Stage I and Stage II BMPs implementation goals and technical assistance cost estimates for Twittys Creek watershed.....	46
Table 13.	Sediment reductions expected at the end of Stage I and II.....	47
Table 14.	DEQ's water quality monitoring stations in Ash Camp Creek and Twittys Creek watersheds.	48

LIST OF FIGURES

Figure 1.	Location map of Ash Camp Creek watershed and impaired stream segments.....	12
Figure 2.	Land uses in Ash Camp Creek watershed.....	14
Figure 3.	The location map of Twittys Creek watershed and impaired stream segments.....	17
Figure 4.	Land uses in Twittys Creek watershed.....	18
Figure 5.	Streamside fencing suggested for Ash Camp Creek watershed.....	29
Figure 6.	Streamside fencing suggested for Twittys Creek watershed.....	30

ACKNOWLEDGEMENT

We would like to acknowledge the following for their support for and participation in the development of this plan:

- Steering committee and working group members
- Charlotte County
- Southside Soil & Water Conservation District
- Old Dominion Resource Conservation & Development Council
- Virginia Department of Forestry
- Natural Resources Conservation Service
- VA Department of Environmental Quality
- VA Department of Conservation & Recreation
- VA Co-operative Extension Service
- VA Department of Health

For additional information, please contact:

Virginia Department of Conservation and Recreation (VADCR)

Richmond Regional Office: Ram Gupta (804) 371-0991

Virginia Department of Environmental Quality (VADEQ): Paula Nash (434) 582-6216

1. INTRODUCTION

Background

A healthy and vibrant aquatic community indicates a healthy stream. A healthy stream is more attractive than a degraded or impaired stream. Excessive sedimentation can adversely affect invertebrate communities through the loss of habitat or food sources. The aquatic life impairment indicates that the stream is not able to support a healthy aquatic community and does not meet the general water quality standards. The Federal Clean Water Act (CWA) that became law in 1972 requires that all U.S. streams, rivers, and lakes meet their state's water quality standards. The CWA also requires that states conduct monitoring to identify polluted waters or those that do not meet standards. Through this required program, the state of Virginia has found that many streams do not meet state water quality standards for protection of the five beneficial uses: fishing, swimming, shellfish, aquatic life, and drinking. When streams fail to meet standards they are placed on the state's impaired waters list, and the state must then develop a Total Maximum Daily Load (TMDL) for each pollutant. A TMDL is a "pollution budget" for a water body. That is, it sets limits on the amount of pollution that a water body can assimilate and still maintain water quality standards. In order to develop a TMDL, background concentrations, point source loadings, and non-point source loadings are considered. Non-point source pollution occurs when pollutants are transported across the land to a body of water when it rains. Point sources pollution occurs when pollutants are directly discharged into a stream. Through the TMDL process, states establish water-quality based controls to reduce pollution and meet water quality standards.

The TMDL process includes three different steps after a stream is listed on the impaired waters or 303(d) list. The first step is to conduct a TMDL study to determine which pollutants are causing the stream to fail at meeting its water quality standards. The second step is development of an implementation plan (IP) that contains corrective actions to reduce those pollutants. The TMDL IP describe control measures, which can include the installation of best management practices (BMPs) and the use of better

treatment technology, to be implemented in a staged process. The third step is implementation of the plan and tracking of the improvements in water quality.

The Ash Camp Creek and Twittys Creek watersheds located in Virginia's Charlotte County are part of the Roanoke River Basin. According to the 1998 Section 303(d) Total Maximum Daily Load Priority List and Report, the VADEQ identified segments of Ash Camp Creek and Twittys Creek as impaired with regard to the general standard for aquatic life developed for Virginia's streams.

Water Quality Problems in Ash Camp Creek and Twittys Creek Watersheds

The TMDLs for impaired segments of Ash Camp Creek and Twittys Creek were approved by EPA in April 2004 and September 2004, respectively. The results of these TMDLs are explained below and in the Review of the TMDL Development Study section of this report.

The Ash Camp Creek and Twittys Creek were violating the general standard for aquatic life use. This standard states that all state waters should support "the propagation and growth of a balanced indigenous population of aquatic life..." Based on biological monitoring conducted by the Virginia Department of Environmental Quality (VADEQ), it was concluded that these water bodies were not meeting this designation. The primary stressor on the aquatic community was identified as sediment.

The TMDLs specified the maximum sediment loads that each creek can handle and still meet the water quality standard for supporting a healthy and diverse aquatic population.

Designated Uses and Applicable Water Quality Standards

According to Virginia Water Quality Standards (9 VAC 25-260-5), the term “Water quality standards” *means provisions of state or federal law which consist of a designated use or uses for the waters of the Commonwealth and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the State Water Control Law (§ 62.1-44.2 et seq. of the Code of Virginia) and the federal Clean Water Act (33 USC § 1251 et seq.).*

Designation of Uses (9 VAC 25-260-10)

A. All state waters are designated for the following uses: recreational uses (e.g., swimming and boating); the propagation and growth of a balanced indigenous population of aquatic life, including game fish, which might reasonable be expected to inhabit them; wildlife; and the production of edible and marketable natural resources (e.g., fish and shellfish). Ash Camp Creek and Twittys Creek do not support the aquatic life designated use due to violations of the general (benthic) standard (see Section 1.2.2).

Water Quality Standards

General Criteria (9 VAC 25-260-20)

A. *All state waters, including wetlands, shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which are inimical or harmful to human, animal, plant, or aquatic life.*

Specific substances to be controlled include, but are not limited to: floating debris, oil scum, and other floating materials; toxic substances (including those which bioaccumulate); substances that produce color, tastes, turbidity, odors, or settle to form

sludge deposits; and substances which nourish undesirable or nuisance aquatic plant life. Effluents which tend to raise the temperature of the receiving water will also be controlled.

Project Methodology

The overall goal of the IP development for Ash Camp Creek and Twittys Creek watersheds is to begin the process of restoring water quality by reducing pollutants in the impaired segments of these water bodies. The key components of the Plan are discussed in detail in the following sections: State and Federal Requirements for Implementation Plans, Review of TMDL Developments, Process for Public Participation, Assessment of Needs, Measurable Goals and Milestones, and cost and benefits of the implementation.

In meeting the state's requirements for the development of a TMDL IP, a framework of action has been established for reducing sediment loads and achieving water quality goals for Ash Camp Creek and Twittys Creek watersheds. With successful completion of IP, water quality of these impaired segments can be restored, which would result enhanced value of this important resource. Additionally, development of an approved IP will provide opportunities for applying and obtaining grant funds to implement various control measures as recommended in this report.

2. STATE AND FEDERAL REQUIREMENTS FOR IMPLEMENTATION PLAN

In developing this implementation plan, both state and federal requirements and recommendations were followed.

State Requirements

The TMDL IP is a requirement of Virginia's 1997 Water Quality Monitoring, Information, and Restoration Act (Section 62.1-44.19:4 through 19:8 of the Code of Virginia) or WQMIRA (the "Act"). WQMIRA directs the State Water Control Board "to develop and implement a plan to achieve fully supporting status for impaired waters" (Section 62.1-44.19.7). In order for implementation plans to be approved by the Commonwealth they must meet the requirements as outlined by WQMIRA. WQMIRA establishes that the implementation plan shall include management actions required to achieve water quality standards and the associated costs, benefits, and environmental impacts of addressing the impairments.

Federal Recommendations

If the water body surpasses the water quality standard during an assessment period, Section 303(d) of the Clean Water Act (CWA) and the United States Protection Environmental Protection Agency's (USEPA) Water Quality Management and Planning Regulation (40 CFR Part 130) both require that states develop a TMDL for each pollutant. Section 303(d) of the Clean Water Act and current EPA regulations do not require the development of TMDL implementation strategies as part of the TMDL process. They, however, do require a reasonable assurance that the load and waste load allocations can and will be implemented. Load allocations refer to nonpoint source pollution (*i.e.*, runoff, septic system seepage, etc.) while waste load allocations are for point sources (permitted discharges). EPA outlines the minimum elements of an approvable IP in its 1999 "Guidance for Water Quality-Based Decisions: The TMDL

Process” in order for states to receive federal grant funds for IP development and/or implementation.

The Virginia Department of Conservation and Recreation (DCR) and Department of Environmental Quality (DEQ) have developed a guidance manual for developing TMDL IPs. The IP should address the EPA recommendations and it must include all required components as described by WQMIRA. According to state requirements and federal recommendations an IP will include the following:

- Description of the necessary implementation actions and management measures
- Timeline for implementing these measures and the expected date of achievement of water quality objectives
- Legal or regulatory controls
- Measurable goals
- Associated costs, benefits, and environmental impact of addressing the impairment
- A monitoring plan and milestones for attaining water quality standards

Beside these, the Plan should also include:

- Potential funding sources
- Description of public participation process
- Stakeholders’ roles and responsibilities
- Integration with other watershed plans

Once developed, VADEQ will present the IP to the State Water Control Board (SWCB) for approval as the plan for implementing pollutant allocations and reductions required to achieve water quality goals. In addition, VADEQ will request the plan to be included in the appropriate Water Quality Management Plan (WQMP), in accordance with the CWA’s Section 303 (e) and Virginia’s Public Participation Guidelines for Water Quality Management Planning.

This document is a technical report detailing implementation plan development. A copy of the document can be obtained by contacting the Virginia Department of Conservation and Recreation (VADCR).

Requirements for Section 319 Fund Eligibility

Once a TMDL is developed, control measures must be installed to reduce pollution levels in the streams. A TMDL IP describes those measures, which can include the installation of best management practices (BMPs) and use of better treatment technology, if possible, to be implemented in order to meet the pollutant reductions established by the TMDL study.

The EPA develops guidelines that describe the process and criteria used to award CWA Section 319 nonpoint source grants to States. The guidance is subject to revision and the most recent version is considered for this IP development. The “Supplemental Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories in FY2003” identifies the following nine elements that must be included in the IP to meet 319 requirements.

1. Causes and sources of pollutant(s) that will need to be controlled to meet the water quality standards,
2. Reductions in pollutant(s) needed to achieve water quality standards,
3. Management measures (BMPs) that will need to be implemented to achieve the pollutant reductions,
4. Technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement the watershed-based plan,
5. An information/education component that will be used to enhance public understanding of the project and encourage the public’s participation in selecting, designing, and implementing NPS management measures,

6. A schedule for implementing the management measures identified in the plan,
7. Goals and milestones for implementing management measures or other control actions,
8. A set of criteria for determining if pollutant(s) reductions are being achieved and if progress is being made towards attaining water quality standards, and
9. A monitoring program to evaluate the effectiveness of the implementation efforts.

3. REVIEW OF TMDL STUDIES OF ASH CAMP CREEK AND TWITTYS CREEK

To develop the TMDLs, the VADEQ contracted Tetra Tech, Inc. for Ash Camp Creek and the George Mason University and Louis Berger Group for Twittys Creek. Once approved by SWCB, the final document of IP will also be available on this website. The [watersheds, water quality, water quality modeling, and allocated reductions](#) were reviewed to determine the modeling procedures and load reductions for IP development.

Ash Camp Creek Watershed

Characteristics of Watershed

The Ash Camp Creek watershed is located in Charlotte County, Virginia, in the Roanoke River Basin (USGS Hydrologic Unit Code, 03010102) (Figure 1). The watershed identification code (WBID, Virginia Hydrologic Unit) is VAC-L39R. The impaired segment is 2.36 miles and extends from the Route 654 Bridge to its confluence with Roanoke Creek. The watershed is approximately 6,155 acres. Land uses in the watershed include various urban, agricultural, and forest categories (Table 1, Figure 2). Approximately 74% of the watershed is forested, while 14% of the watershed is used for agricultural purposes. Open water and wetlands account for almost 7% of the watershed, while residential and commercial development account for only about 5% of the watershed.

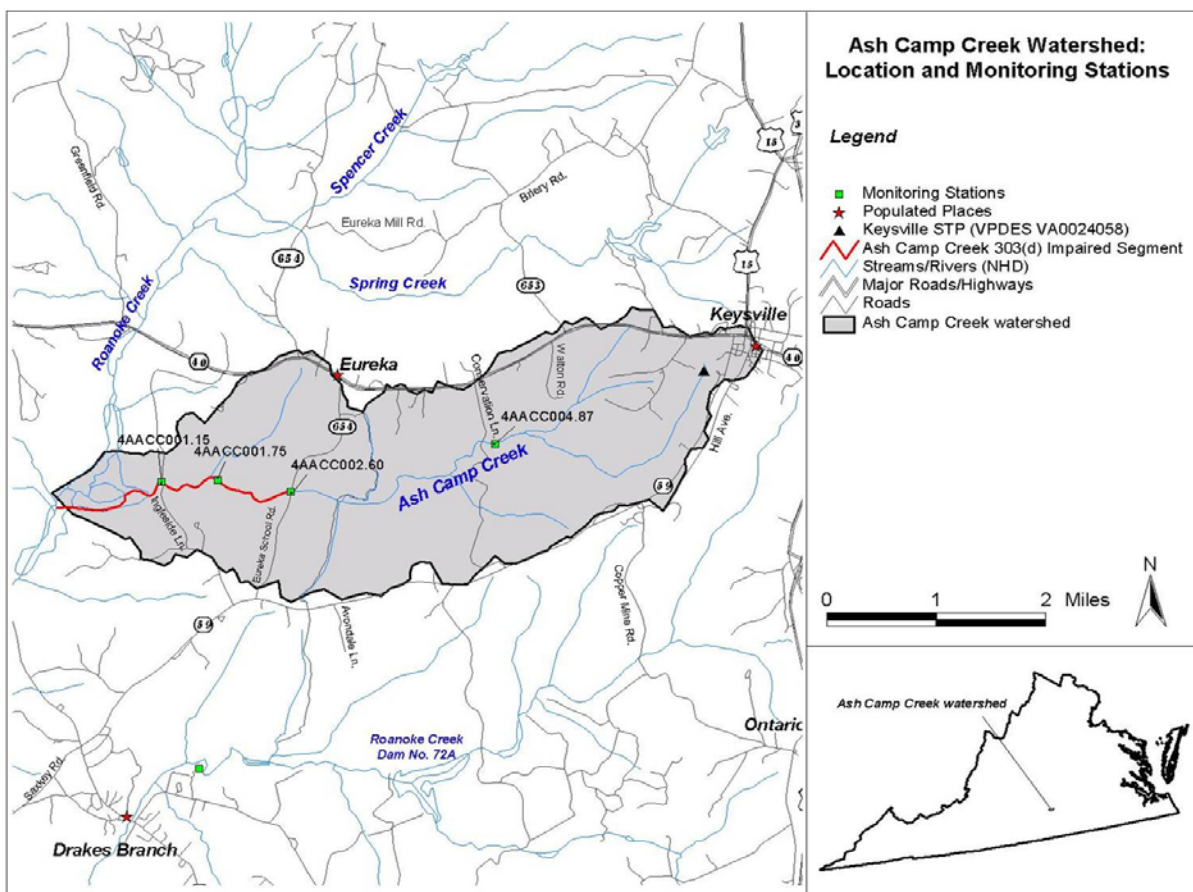


Figure 1. Location map of Ash Camp Creek watershed and impaired stream segment.

Sources of Sediment in the Creek

Sediment sources may be divided into two categories - point sources and nonpoint sources. The sediment in Ash Camp Creek comes primarily from nonpoint sources. The major sources of sediment are agricultural land (cropland and pasture/hay), and transitional lands. The transitional lands are areas of sparse vegetative cover (less than 25% that are dynamically changing from one land cover to another, often due to land use activities). Agricultural lands, such as cropland and pasture/hay areas, can contribute excessive sediment loads through erosion and build-up/surface runoff processes. Agricultural lands are particularly susceptible to erosion due to less vegetative coverage. The one point source in the watershed also discharges sediment to the stream and operates under a VPDES permit.

Table 1. Land use distribution in Ash Camp Creek watershed study area.

Land Use Type	Acres	Percentage of Watershed (%)
Open Water	8	0.14%
Low Intensity Residential	67	0.99%
High Intensity Residential	3	0.04%
Commercial/Industrial/ Transportation	11	0.15%
Transitional	233	3.90%
Deciduous Forest	2460	39.79%
Evergreen Forest	837	13.47%
Mixed Forest	1312	21.10%
Pasture/Hay	826	13.17%
Row Crops	58	0.89%
Woody Wetlands	293	5.94%
Emergent Wetlands	26	0.43%

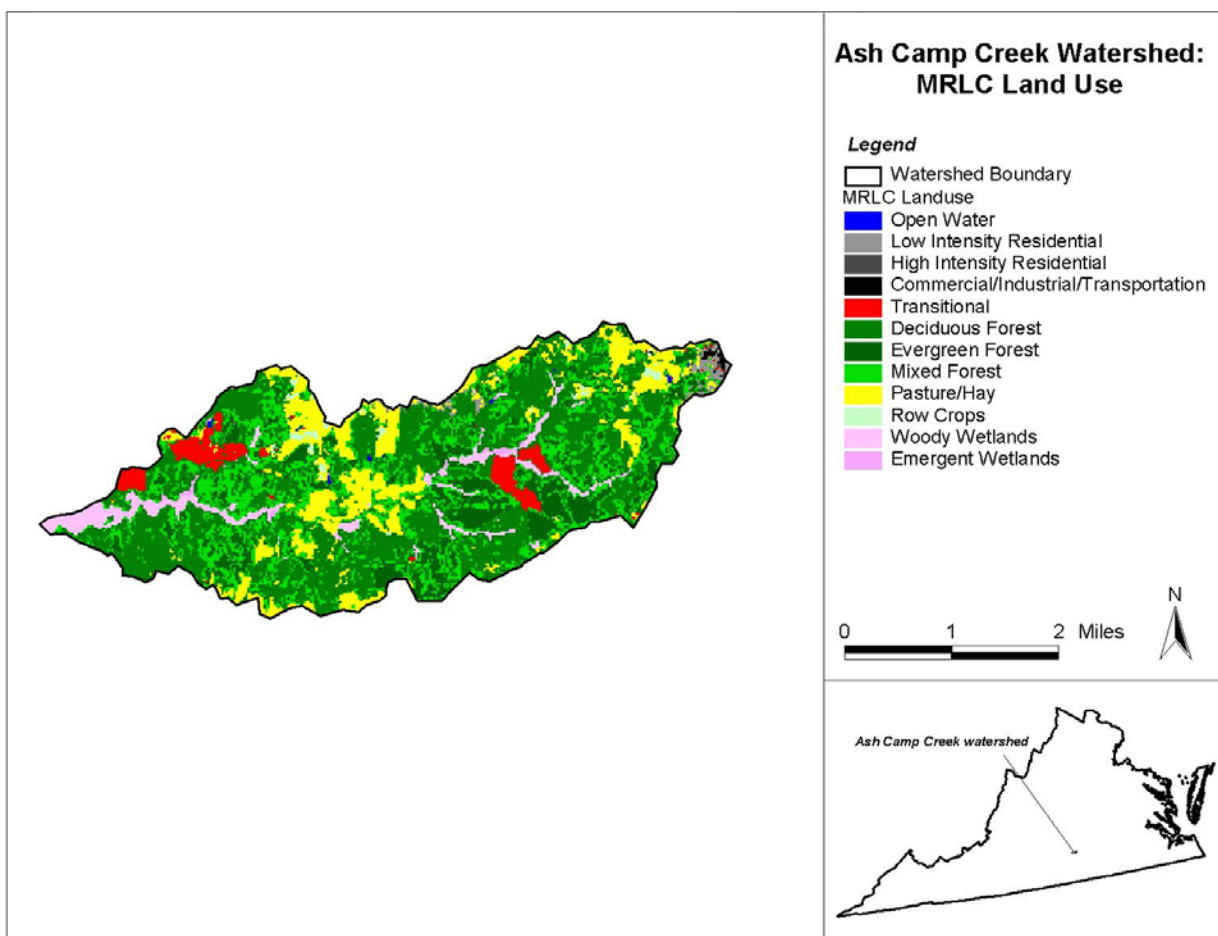


Figure 2. Land uses in Ash Camp Creek watershed.

Water Quality Modeling

For TMDL development, sediment loadings were determined in order to quantify sediment loadings reductions necessary to achieve designated aquatic life use for Ash Camp Creek. It was done by using BasinSim1.0 and the Generalized Watershed Loading Function (GWLF) model. GWLF is a continuous simulation model that uses daily time steps for weather data and water balance calculations. Surface runoff, evapotranspiration and groundwater flows are calculated based on user specified parameters. Surface runoff is computed using the Soil Conservation Service Curve Number equation. The Universal Soil Loss Equation is used to compute erosion for each source area and a sediment delivery ratio is applied to determine the sediment loadings to the stream. Monthly calculations are made for sediment loads, based on daily values that are summed to give

monthly values. The USGS streamflow gage (02051000), located on the North Meherrin River near Lunenburg, VA, was selected in a paired watershed approach to calibrate hydrology for impaired and reference watersheds.

Virginia does not currently have numeric criteria for sediment. A reference watershed approach helps to determine the primary benthic community stressors and to establish pollutant reduction goals. Improvement of the benthic invertebrate community in Ash Camp Creek is dependent upon reducing nonpoint source sediment loading to the creek.

The TMDLs established consist of a point source wasteload allocation, a nonpoint source load allocation and a margin of safety. The flow and pollutant loadings were routed through watershed stream network. The calibration period for model covered a range of varied flow conditions as well as seasonal variations. For TMDL development, modeling runs were made for 11-year period (April 1991 – March 2002) to represent broad range of weather and hydrologic conditions. The means for flow and sediment were determined for each land use and sources category in the watershed. Table 2 presents the estimated loads for Ash Camp Creek watershed.

Goals for Reducing Sediment Loads

Information from the TMDL study determined the water quality goals and associated pollutant reduction needed in the implementation plan. Sediment was identified as the primary pollutant stressing the benthic community (aquatic insects that live at the bottom of the stream). When too much sediment gets into the stream, it alters the stream bottom by filling in the spaces between gravel and other materials in the stream. This harms aquatic insects that live in the spaces by eliminating their habitat. In order to correct this problem, sediment reduction goals were developed in the TMDL study. The recommended sediment reduction scenario is shown in Table 2. No reduction in sediment coming from forest lands was called for based on the assumption that some sediment would enter the stream from the forest under natural, undisturbed conditions. Also, sediment loads from point source was not reduced because the facility after

improvement is currently meeting its pollutant discharge limits and other permit requirements.

Table 2. TMDL sediment reductions required in Ash Camp Creek watershed.

Source Category	Sediment load (ton/yr)	Allocated load (ton/yr)	% Reduction
Pasture/Hay	261.0	120.5	53.8
Row Crop	195.3	72.5	62.9
Transitional	111.5	41.8	62.5
Deciduous Forest	2.5	2.5	0
Evergreen Forest	1.0	1.0	0
Mixed Forest	1.4	1.4	0
Urban	0.0	0.0	0
Groundwater	0.0	0.0	0
Point Source	20.7	20.7	0
Total	593.4	260.3	56.1

Twittys Creek Watershed

Characteristics of Watershed

The Twittys Creek watershed, adjoining Ash Camp Creek, is also located in the south central region of Virginia in Charlotte County. It is a tributary of Roanoke Creek in the Middle Roanoke River Basin (USGS Hydrologic Unit Code, 03010102) (Figure 2). The impaired segment is about 7.25 miles in length, begins at the WestPoint Stevens textile manufacturing plant and extends downstream to the confluence of Twittys Creek with Roanoke Creek. Land uses in the watershed include various urban, agricultural, and forest categories (Table 3). The watershed is approximately 19,760 acres. Approximately 82.6% of the watershed is forested, while 8.5% of the watershed is used for agricultural purpose, 1% under developed land and 1.8% under transitional lands. Pasture is relatively evenly dispersed throughout the watershed.

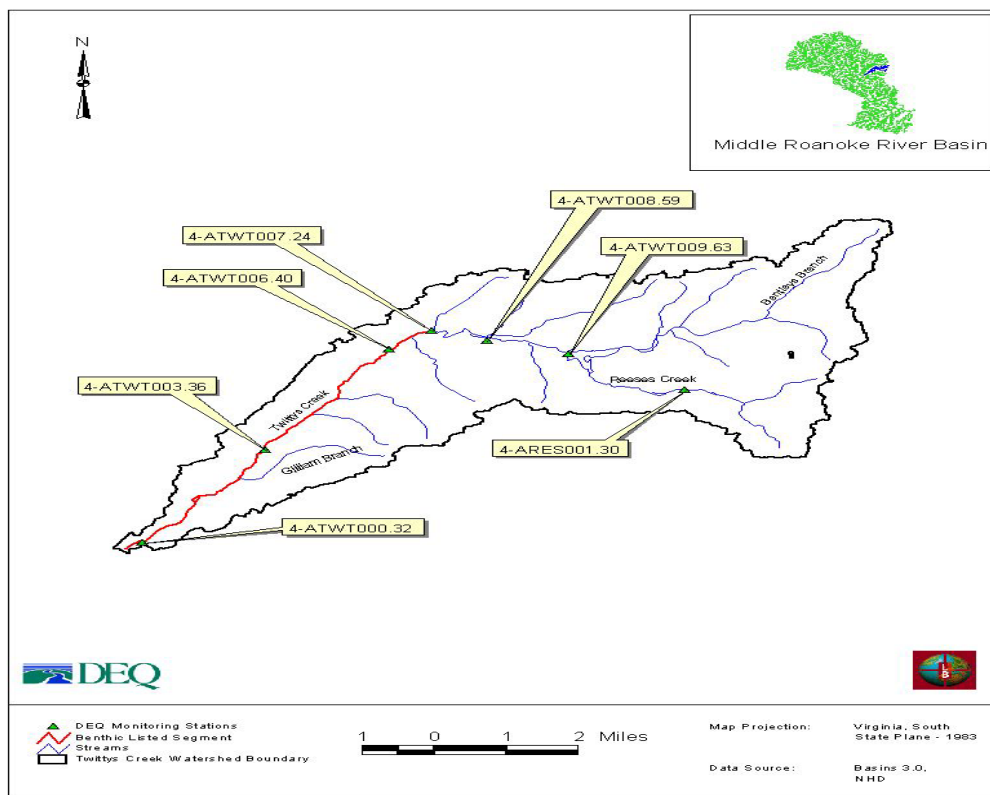


Figure 3. The location map of Twittys Creek and impaired stream segment.

Table 3. Land use distribution in Twittys Creek watershed study areas.

Land Use Type	Acres	Percentage of Watershed (%)
Pasture/Hay	1530	7.8
Row Crop	139	0.7
Deciduous Forest	8437	42.8
Evergreen Forest	4341	22.0
Mixed Forest	3517	17.8
Low Intensity Residential	154	0.8
Commercial/Industrial	34	0.2
Open Water	103	0.5
Woody Wetlands	1065	5.4
Emergent Herbaceous	61	0.3
Transitional	349	1.8
Total	19,730	100.0

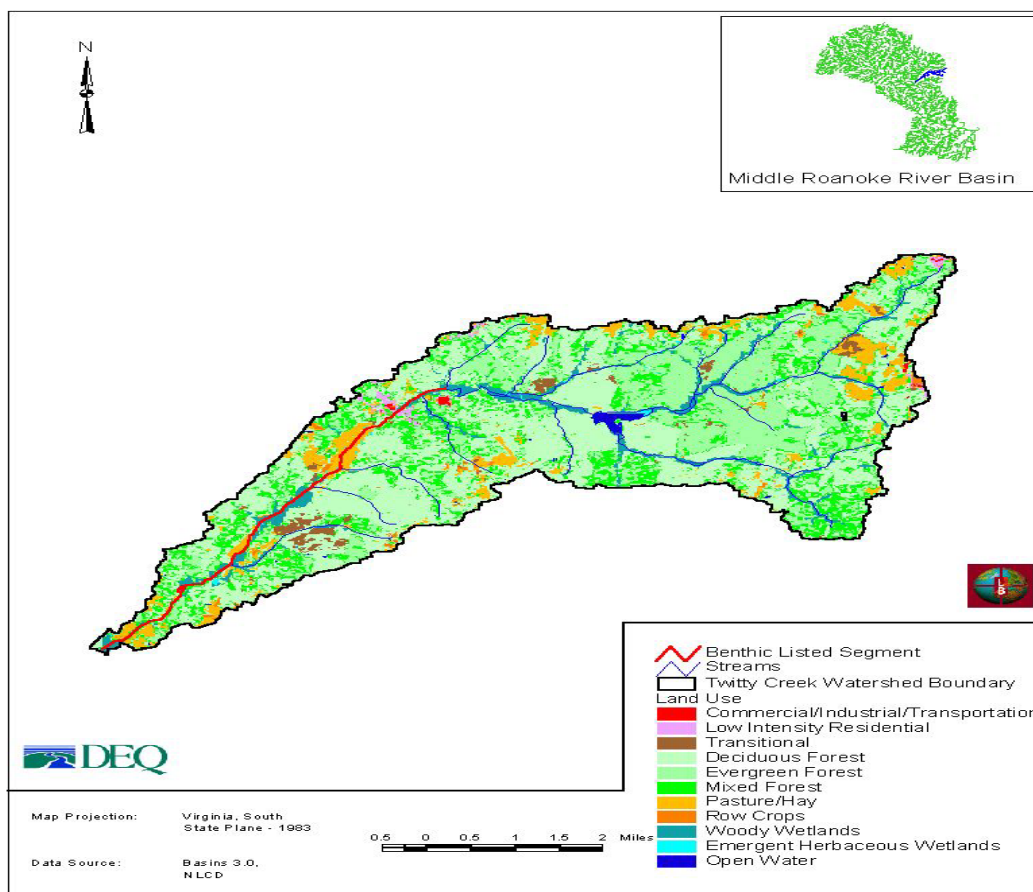


Figure 4. Land uses in Twittys Creek watershed.

Developed lands are associated primarily with the Town of Drakes Branch. The area under open water and wetlands account for almost 7% of the watershed, while residential and commercial development account for only about less than 1% of the watershed.

Sources of Sediment in the Creek

Sediment sources may be divided into two categories - point sources and nonpoint sources. The sediment in Twittys Creek comes primarily from nonpoint sources. The major sources of sediment are agricultural land (cropland and pasture/hay), transitional and residential/commercial/industrial lands. The transitional lands are areas of sparse vegetative cover (less than 25% that are dynamically changing from one land cover to another, often due to land use activities). Agricultural lands, such as cropland and pasture/hay areas, can contribute excessive sediment loads through erosion and build-

up/surface runoff processes. Agricultural lands are particularly susceptible to erosion due to less vegetative coverage. Point source in the watershed also discharges sediment to the stream and operate under VPDES permits.

Water Quality Modeling

For TMDL development, sediment loadings in Twittys Creek were determined in order to quantify sediment loadings reductions necessary to achieve designated aquatic life use for the impaired water. Sediment loading from land erosion were determined using BasinSim 1.0, which is window interface program for Generalized Watershed Loading Function (GWLF) model. It enables creation of model input files and processing of model results. GWLF is a continuous simulation model that uses daily time steps for weather data and water balance calculations. Surface runoff, evapotranspiration and groundwater flows are calculated based on user specified parameters. Surface runoff is computed using the Soil Conservation Service Curve Number equation. The Universal Soil Loss Equation is used to compute erosion for each source area and a sediment delivery ratio is applied to determine the sediment loadings to the stream. GWLF model simulations were performed for 1990-2002 in order to account for seasonal variations and to reflect the period of biomonitoring assessments that resulted in the impairment listing of Twittys Creek. Monthly calculations are made for sediment loads, based on daily values that are summed to give monthly values. Average annual sediment loads were computed for each land source based on the simulation period. In addition, average annual sediment loads from instream bank erosion and point sources were determined. Point source loadings were computed based on the permitted discharge loading rate for total suspended solids. Instream erosion was estimated based on the streambank lateral erosion rate equation introduced by Evans, et al (2003). The equation provides estimates of streambank erosion based on watershed characteristics, including land use type, soil erodibility, and topography. Since daily streamflow data is not available for Twittys Creek, the USGS streamflow gage (02051000), located on the North Meherrin River near Lunenburg, VA, was selected in a paired watershed approach to calibrate hydrology for impaired and reference watersheds.

Virginia does not currently have numeric criteria for sediment. A reference watershed approach helps to determine the primary benthic community stressors and to establish pollutant reduction goals. Improvement of the benthic invertebrate community in Twittys Creek is dependent upon reducing nonpoint source sediment loading to the creek.

The TMDLs established consist of a point source wasteload allocation, a nonpoint source load allocation and a margin of safety. The calibration period for model covered a range of varied flow conditions as well as seasonal variations. For TMDL development, modeling runs were made to represent broad range of weather and hydrologic conditions. The means for flow and sediment were determined for each land use and sources category in the watershed. Table 4 presents the existing and estimated loads for Twittys Creek watershed.

Goals for Reducing Sediment Loads

Information from the TMDL study determined the water quality goals and associated pollutant reduction needed in the implementation plan. Sediment was identified as the primary pollutant stressing the benthic community (aquatic insects that live at the bottom of the stream). When too much sediment gets into the stream, it alters the stream bottom by filling in the spaces between gravel and other materials in the stream. This harms aquatic insects that live in the spaces by eliminating their habitat. In order to correct this problem, sediment reduction goals were developed for in the TMDL study. The recommended sediment reduction scenario is shown in Table 4. No reduction in sediment coming from forest lands was called for based on the assumption that some sediment would enter the stream from the forest under natural, undisturbed conditions. Also, sediment loads from point source was not reduced because the facility is currently meeting its pollutant discharge limits and other permit requirements.

Table 4. TMDL sediment reductions required in Twittys Creek watershed.

Source Category	Sediment load (ton/yr)	Allocated load (ton/yr)	% Reduction
Deciduous Forest	61.0	61.0	0
Evergreen Forest	31.5	31.5	0
Mixed Forest	25.9	25.9	0
Pasture/Hay	354.6	247.6	30
Row Crop	142.0	99.2	30
Low Intensity Residential	0.7	0.5	30
Commercial/Industrial	15.7	11.0	30
Open water	0.0	0.0	0
Woody wetlands	0.0	0.0	0
Emergent Herbaceous	0.0	0.0	0
Transitional	355.0	247.9	30
Instream	80.5	56.2	30
Point Source	20.4	20.4	0
Total	1087.3	801.1	26

4. PUBLIC PARTICIPATION PROCESS

Public participation was an integral component of the TMDL IP development process. It is critical to promote reasonable assurance that the implementation activities will get stakeholders support. Attendance was encouraged through public notices on DEQ website, press releases in local newspapers, and announcement on local radio station.

Due to proximity of Ash Camp Creek and Twittys Creek watersheds, the public participation process, adopted to design management actions, was combined together. The management actions described in this report are drawn together through input from citizens of the watershed, Charlotte County, DEQ, DCR, Old Dominion Resource Conservation and Development Council (RC&D), Southside Soil and Water Conservation District (SSWCD), Virginia Cooperative Extension (VCE), Virginia Department of Forestry (DOF) and other stakeholders. Every citizen in the watershed is encouraged to get involved in the implementation process and contribute to restoring the health of the impaired stream. Public participation in development of the plan took place on three levels: public meetings, working groups, and a steering committee.

Public Meetings for Ash Camp Creek and Twittys Creek Watersheds

The first public meeting was held on August 17, 2009 at the Charlotte County Board of Supervisor Room of the County Administration Office in Charlotte Court House. The meeting was attended by 12 people, including government representatives and citizens. Information shared at the meeting included: general description of TMDL process, importance of water quality improvement, and IP development process. Stakeholders' participation in working groups was solicited. Maps with land use, monitoring stations and watershed features were displayed during the presentation.

A second public meeting was held on January 13, 2010 at the Charlotte County Board of Supervisor Room of the County Administration Office in Charlotte Court House. The meeting was attended by 10 people. The primary purpose of this meeting was to present

the draft TMDL Implementation Plan. A presentation was given describing the implementation plan using major components as an outline: assessment of needs, control measures, cost and benefits. A copy of presentation and draft IP plan was distributed to all attendees.

Working Groups Meetings for Ash Camp Creek and Twittys Creek Watersheds

In addition to the public meetings, a steering committee and three specialized working groups (agricultural, urban/residential and government) were formed from the local government representatives and people interesting in improving water quality in Ash Camp Creek and Twittys Creek watershed. The working groups served as the primary source for seeking public input on various control measures and implementation actions to be included in the plan, associated costs and outreach methods in the watersheds.

Two meetings of the working group (agricultural and urban/residential) were held on August 17, 2009 (12 attendees) and November 4, 2009 (six attendees) at the Charlotte County Board of Supervisor Room of the County Administration Office in Charlotte Court House. The role of these working groups was to review and suggest various control measures most suitable for agricultural and urban/residential areas, identify problems (and solutions) related to BMP implementation, and provide estimates on type, number and market costs of BMPs currently being adopted in Ash Camp Creek and Twittys Creek watersheds.

The Government working group meeting was held on October 19, 2009 (six attendees) to discuss specific implementation strategies for sediment reduction, identify regulatory and funding sources, suggest corrective actions, identify existing programs and technical resources that may enhance implementation efforts to improve water quality in the impaired streams.

A Steering Committee was formed with representatives from DEQ, DCR, SSWCD, Charlotte County Cooperative Extension, and Old Dominion RC&D. The meeting held

on December 1, 2009 was attended by eight people. Meeting minutes summarizing key points and recommendations from each of the working groups was presented to the steering committee for review. The committee reviewed the inputs from the working groups and ensures that the working group recommendations were included into the plan. The committee also reviewed draft IP document before it was presented to the public.

Dates and locations of all meetings conducted during the course of TMDL IP development process are listed in Table 5.

Table 5. Meetings held during Implementation Plan development process of Ash Camp Creek and Twittys Creek watersheds.

Date	Meeting Type	Location
8/17/2009	1 st Public Meeting	Charlotte County School Board Room, Charlotte Court House, VA
8/17/2009	1 st Agricultural and 1 st Urban/Residential Working Group Meeting	Charlotte County School Board Room, Charlotte Court House, VA
10/19/2009	Government Working Group Meeting	Charlotte County School Board Room, Charlotte Court House, VA
11/4/2009	2 nd Agricultural and 2 nd Urban/Residential Working Group Meeting	Charlotte County School Board Room, Charlotte Court House, VA
12/1/2009	Steering Committee Meeting	Charlotte County School Board Room, Charlotte Court House, VA
1/13/2010	Final Public Meeting	Charlotte County School Board Room, Charlotte Court House, VA

Summary

Throughout the public participation process, major emphasis was placed on discussing type and number of suitable control measures, education, technical assistance, water quality monitoring, and funding sources to execute the implementation plan. The minutes and reports on Agricultural and Urban/Residential working groups and the Steering Committee meetings are included in Appendix A.

Most members of the working groups agreed that public involvement is critical and partnership among citizens and government agencies in the watersheds are most essential in order to implement various control measures and reduce sediment loads in Ash Camp Creek and Twittys Creek watersheds. Stakeholders showed interest in participating in the water quality improvement plan and stressed the need for funding availability. Corrective actions discussed for agricultural activities were grazing land protection, improved pasture management, stream protection, restoration of erodible crop and pastureland, and conservation tillage. Urban/Residential corrective actions discussed and found suitable were primarily erosion and sediment controls, forested buffer on residential/commercial lands, and rain gardens.

5. ASSESSMENT OF IMPLEMENTATION ACTIONS

An important element of the TMDL IP is the encouragement of voluntary compliance with implementation actions by local, state, and federal agencies, business owners, and stakeholders. In order to encourage voluntary adoption, information was obtained on various types of control actions that are practically suitable to reduce pollution in the watersheds.

This section presents the implementation actions required in Ash Camp Creek and Twittys Creek watersheds to achieve the water quality standards. An important part of the IP is the identification of specific actions needed to improve water quality in the watersheds. Since this plan is designed to be implemented by landowners primarily on a voluntary basis, it is necessary to identify actions including management strategies that are practical, financially and technically realistic, and suitable for these watersheds.

Potential control measures or best management practices (BMPs) and associated costs and efficiencies, and potential funding sources were identified through review of the TMDL report, input from working groups and the steering committee, and existing implementation projects in Charlotte County. Control measures were assessed based on BMP cost, availability of existing funds, landowner's willingness in cost investment, reasonable assurance of implementation, and their water quality impacts. The reasonable assurance of implementing control measures was assessed through meetings and discussions with working groups and Steering Committee members.

Control Measures Selected through Stakeholder Review

In addition to the management actions that were indicated in the TMDL studies, such as livestock exclusion, cover crops, stream fencing, riparian buffers and few others, a number of measures were needed to control sediment from different sources within the watersheds. Various control measures were presented to the working groups who considered their practical feasibility, cost, and water quality benefits. The majority of the

best management practices (BMPs) recommended here are included in state and federal agricultural cost share programs that promote soil and water conservation. One additional BMP was improved pasture management. The improved pasture management BMP is considered an enhancement of a grazing land protection system. Along with the infrastructure provided by a grazing land protection system, improved pasture management practice includes:

- Maintenance of an adequate forage height (suggested 3-inch minimum) during growing season,
- Application of lime and fertilizer according to soil test results,
- Mowing of pastures to control woody vegetation (except on streambanks),
- Distribution of manure through managed rotational grazing, and
- Reseeding due to severe drought if necessary.

Employing the pasture management practice can produce significant economic benefits to producers at a very low investment cost. The agricultural and residential BMPs identified based on the above outlined factors and their sediment reduction efficiencies used in this Plan are listed below in Table 6.

Table 6. Best management practices and associated pollutant reductions.

<u>BMP</u>	<u>% Reduction</u>	<u>Source</u>
<u>Agricultural BMPs</u>		
Grass riparian buffer*	40%	1
Forested riparian buffer*	40%	1
Reforestation of erodible pasture or cropland	Simulated as land-use conversion	2
Conservation Tillage	60%	1
Cover crop	20%	1
Livestock exclusion fencing	N/A	3
Improved pasture management	92%	4
<u>Suburban/Urban BMPs</u>		
Rain garden**	85%	3
Forested buffer (urban)	50%	1
Erosion and sediment control practices	40%	1

* Includes reductions from upstream runoff: buffers - 4x buffer area.

** Rain garden - 6x

1-EPA-Chesapeake Bay Program, 2008

2-Based on differential loading rates to different land uses.

3-By definition.

4-Based on simulated unit area sediment load difference between “fair” and “good” pasture

Assessment of Best Management Practices Needs

Agricultural Best Management Practices

Streamside fencing is one of the best ways to reduce sediment loads from pasturelands in agricultural watersheds. This will reduce soil disturbances due to livestock movements towards streams and prevent trampling of stream banks. The quantity of fencing needed was determined by the stream network, land use layers, archived data and Geographical Information System (GIS). Stream segments that flowed through or adjacent to land use areas that had a potential for supporting cattle (e.g., pasture) were identified. If the stream segment flowed through the pastureland, it was assumed that fencing was required on both sides of the stream; while if a stream segment flowed through adjacent to the pasture area; it was assumed that fencing was required on only one side of the stream. Additionally, inputs from local agency representatives and citizens were used to verify the analyses conducted by DCR. Potential streamside fencing suggested for Ash Camp Creek and Twittys Creek watershed are shown in Figures 5 and 6, respectively.

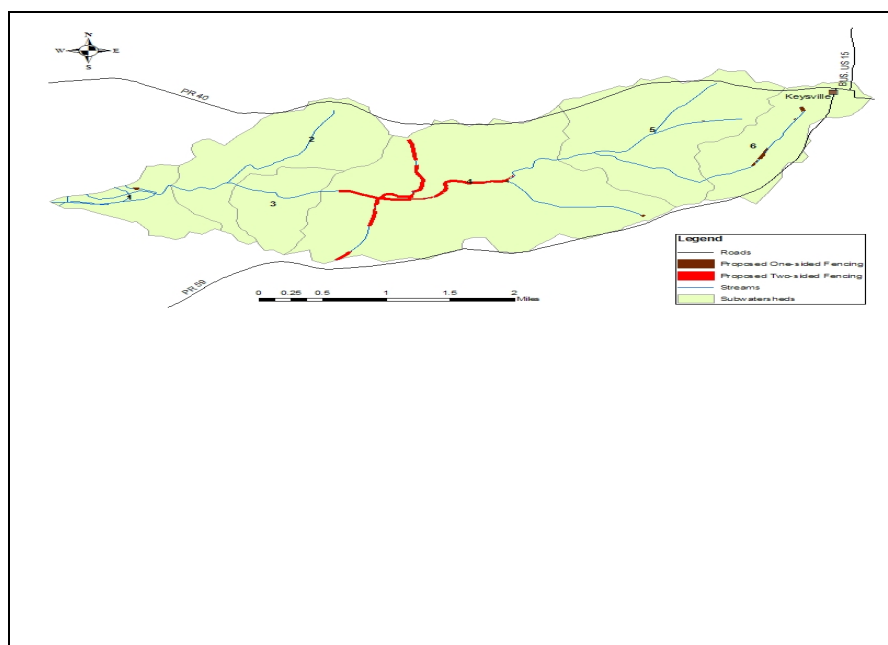


Figure 5. Potential streamside fencing for perennial streams in the Ash Camp Creek watershed.

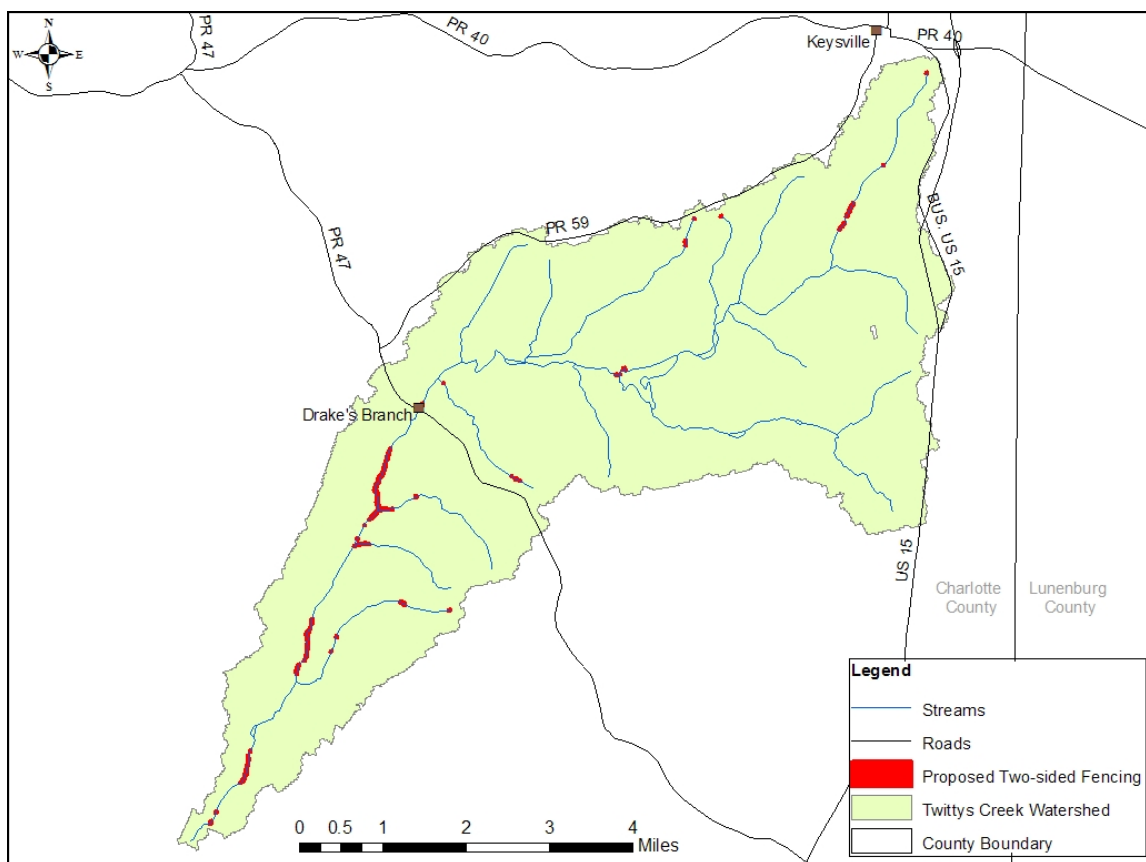


Figure 6. Potential streamside fencing for perennial streams in the Twittys Creek watershed.

The length of fencing required on perennial, flowing year round, streams in the Ash Camp Creek and Twittys Creek is 12 and 44 miles, respectively. In order to assess the stream fencing practices needed to attain water quality goals, the state cost-share program for agricultural best management practices was utilized. The total fencing needed was divided up among the different BMPs offered through the state cost-share program that include a fencing component. The Southside Soil and Water Conservation District has been targeting implementation by assisting in the planning, design and installation of agricultural BMPs in these watersheds. Since 2003, approximately, 7,625 and 3,600 feet of stream fencing have been completed in the Ash Camp Creek and Twitty Creek watersheds, respectively. Also, approximately, 52.6 acres of erodible crop and pasture lands have been reforested in Ash Camp Creek watershed. These are commendable efforts toward livestock exclusion and reducing sediment loadings in the streams. The stream fencing miles and reforestation of crop and pasture lands completed after 2003

were taken into account and were subtracted from total estimated BMPs needed in each watershed.

To establish the total number of full livestock exclusion systems necessary to achieve full implementation, the number of systems needed was calculated by dividing the potential pasture streamside fencing required by the average streamside fencing length per system. The breakdown of number of exclusion systems that are expected to be a SL-6, LE-1T, or WP-2T is based on practical and historic use of these practices in the Ash Camp Creek and Twittys Creek watersheds, and input from the Agricultural Working Group. Based on the cost, maintenance and stakeholders' input, stream bank restoration practices were not included in the suggested BMPs.

The traditional fencing was divided between the SL-6 or LE-1T practice and the WP-2T practice. These livestock exclusion practices are included in the state cost share program. The SL-6 or LE-1T practice includes exclusion fencing, cross fencing for rotational grazing and the installation of an off stream watering system. The WP-2T practice includes exclusion fencing and hardened stream crossings. The average streamside fencing length for these SL-6 and WP-2T practices is approximately 2,150 feet.

Table 7 shows the fencing system required for the impaired watersheds in order to meet the sediment reduction goals. The grazing land protection (SL-6) or Livestock Exclusion with Riparian Buffer (LE-1T), and stream protection system (WP-2T) includes a 35-foot buffer along both sides of the stream where livestock fencing is installed. The resulting riparian vegetation or forested buffer will provide an additional water quality benefit by trapping sediment moving towards the stream through surface runoff. Therefore, these practices will provide some of the best water quality benefits in terms of minimizing soil disturbances caused by livestock movement and reducing surface runoff into the streams. Also, buffers help filter sediment from surface runoff before it enters the streams.

Due to more sediment reductions needed, additional BMPs for pasture, crop, and transitional lands are also included. The conversion of cropland to pasture or forest land

uses results in a sediment load reduction. This practice is recommended in both watersheds. The pastureland management practice that would have a substantial impact on sediment transport is improved pasture management. It is anticipated that this improved management practice will take the form of rotational grazing systems as indicated above. Vegetated livestock exclusion buffers are included in the implementation strategy to treat runoff from pasturelands. These buffers will act as a filter, trap sediment before it flows into the stream.

Conservation tillage and field buffer practices are recommended on cropland. Conservation Tillage is a system of crop production with little, if any, tillage. It increases the residue from the crop in the field after harvest through planting. This practice results in increased natural recycling of crop residues and increases organic matter, and ultimately reduces sediment transport in the flowing surface water. Buffer strips trap sediment, nutrients and pesticides by slowing down surface runoff that could have entered the streams. The root systems of the planted vegetation in these buffer strips hold soil particles together and provide protection against soil erosion. All agricultural BMPs needed in both watersheds are listed in Table 7.



Table 7. All agricultural BMPs recommended for Ash Camp Creek and Twittys Creek watersheds.

BMPs	Units	Ash Camp Creek	Twittys Creek
Grazing Land Protection Practice (SL-6) or Livestock Exclusion with Riparian Buffers (LE-1T)	system	17	81
Improved Pasture Management	acres	127	1,018
Stream Protection Practice (WP-2T)	system	7	27
Reforestation of Erodible Crop and Pastureland (FR-1)	acres	290	237
Conservation Tillage	acres	32	72
Field Buffer on Cropland (WP-1)	acres	-	55

Urban/Residential Best Management Practices

Sediment load reductions on urban and transitional land uses was determined through modeling and the percentage of land areas treated by enhanced erosion and sediment control practices. Forested buffer and rain garden were also considered. The sediment reduction efficiencies of these BMPs are given in Table 6. Sediment from transitional lands in the Ash Camp Creek watershed primarily originates from stormwater runoff from areas that has been disturbed and vegetative cover either changed or removed. Some of these areas may have had transient erosion and sediment (E & SC) permits or may represent smaller areas of disturbance that do not require a permit. The sediment loads from transient lands can be reduced through the local Erosion & Sediment Control (E & SC) program. Acreage treated under this program is listed in Table 8.



Sediment transport from low intensity residential, commercial and industrial sources in the Twittys Creek watershed also comes primarily in form of stormwater runoff from these areas. The Town of Drake's Branch has steep topography and controlling surface runoff is difficult. The sediment reductions in these areas may be obtained by installing buffers along these areas. These buffers will act as a filter, trapping sediment before it flows in to the stream. Therefore, these practices will results in some of the best water quality benefits in reducing surface runoff and minimizing sediment transport. Various discussions held with focus group members verified importance and feasibility of these control measures for both watersheds.

Implicit in the TMDL is the need to avoid increased sediment transport from sources that have not been identified and sources that may develop over time, as future development in these watersheds take place. One potential for additional sources of sediment may be future residential and urban development. Care should be taken to monitor development and its impact on water quality. When residential development occurs, there is potential for additional pollutant loads due to land disturbance. This need to be carefully considered in site plans and during development. The local erosion and sediment control and stormwater management programs must be followed carefully by contractors and enforced by local government staff.

Additionally, educational programs targeted at developers, contractors and owners to make them aware of these controls are needed to implement the program effectively. Estimates of the types of urban and residential BMPs required and acres in both watersheds are provided in Table 8.

Table 8. All urban/residential BMPs recommended for Ash Camp Creek and Twittys Creek watersheds.

BMPs	Units	Ash Camp Creek	Twittys Creek
Erosion & Sediment Control Practices	acres	120	84
Riparian Buffer on Residential/Commercial/Transient Lands	acres	-	36
Rain Gardens	acres	-	18

Educational and Technical Assistance Needs

Personnel from the Southside SWCD will initiate contact with farmers and stakeholders in these watersheds to encourage the installation of agricultural BMPs. This one-to-one contact will facilitate communication of the water quality problems and the corrective actions needed. The technical staff for the IP will conduct a number of outreach activities in the watersheds to raise local awareness, encourage community support and participation in reaching the implementation plan milestones. Such activities will include information exchange through newsletters, postcard mailings, field demonstrations, and presentations at local community events. The technical staff will work with organizations such as Cattleman's Association and Virginia Cooperative Extension to sponsor farm tours and field days. The Southside SWCD will also educate stakeholders about urban/residential BMPs and encourage them to install rain gardens and to implement erosion and sediment control measures. The staff will also use other avenues as deemed necessary to promote water quality improvement programs in the impaired watersheds.

Number of full time equivalent (FTE) considered necessary for technical assistance to implement agricultural and residential BMPs were determined by the quantity of BMPs

needed and the experience of other implementation plans. The technical assistance would be responsible for educational outreach also.

6. COST ESTIMATION OF IMPLEMENTATION ACTIONS

Cost Estimates of BMPs

In general, many agricultural and urban/residential BMPs being recommended will provide both environmental and economic benefits to the farmers. Associated cost of each implementation action was calculated by multiplying the unit cost of each practice by the number of units needed in each watershed.

The cost estimates of agricultural and urban/residential BMPs needed to meet the TMDL pollutant reduction goals are provided below in Tables 9 and 10 for Ash Camp Creek and Twittys Creek watersheds, respectively. These tables also indicate unit cost of each BMP and total costs of implementation. The unit costs for the practices were estimated based on the cost of practices already in place by Southside SWCD in Charlotte County. Also, unit costs were derived and checked from available literature, Virginia Agricultural Cost-Share Database and the TMDL Implementation Plan developed for Cub Creek, Turnip Creek, Buffalo Creek and UT Buffalo Creek (MapTech, Inc., 2009). Streamside fence maintenance at \$3.50 per foot was included for 7.5% of the estimated amount of fence needed. This is equal to 1,822 feet for Ash Camp Creek and 8,605 feet for Twittys Creek watershed. The cost of fence maintenance was identified as a deterrent to participation. Financial assistance possibilities for maintaining fences include a 25 percent state tax credit for maintenance. The costs were verified with the members of all focus groups.

Cost Estimates of Technical Assistance

Technical assistance needed for implementing the required BMPs was calculated in full-time equivalent (FTE), with one FTE being equal to one full-time position per year. For planning purpose, a half-time FTE was budgeted as \$25,000/year, including benefits, for 8 years of the implementation period. During focus group meeting, it was identified that currently Southside SWCD has adequate staff for implementing E & SC program and other urban BMPs. Tables 9 and 10 list the estimated technical assistance cost during the implementation process.

Table 9. All agricultural, urban/residential BMPs and technical assistance cost estimates for Ash Camp Creek watershed.

BMPs	Units	Cost/Unit	Units Needed	BMP Total Cost
Grazing Land Protection Practice (SL-6) or Livestock Exclusion with Riparian Buffers (LE-1T)	system	\$18,500	17	\$314,500
Improved Pasture Management	acres	\$75	127	\$9,525
Stream Protection Practice (WP-2T)	system	\$7,250	7	\$50,750
Streamside Fence Maintenance	Foot	\$3.50	1822	\$6,377
Reforestation of Erodible Crop and Pastureland (FR-1)	acres	\$95	290	\$27,550
Conservation Tillage	acres	\$85	32	\$2,720
Erosion & Sediment Control Practices	acres	\$7,500	120	\$900,000
Technical Assistance	year	\$25,000	0.5	\$200,000
Total BMPs cost				\$1,511,422

Table 10. All agricultural, urban/residential BMPs and technical assistance cost estimates for Twittys Creek watershed.

BMPs	Units	Cost/Unit	Units Needed	BMP Total Cost
Grazing Land Protection Practice (SL-6) or Livestock Exclusion with Riparian Buffers (LE-1T)	system	\$18,500	81	\$1,498,500
Improved Pasture Management	acres	\$75	1018	\$76,350
Stream Protection Practice (WP-2T)	system	\$7,250	27	\$195,750
Streamside Fence Maintenance	Foot	\$3.50	8,605	\$30,117
Reforestation of Erodible Crop and Pastureland (FR-1)	acres	\$95	237	\$22,515
Conservation Tillage	acres	\$85	43	\$3,655
Field Buffer on Cropland (WP-1)	acres	\$350	54	\$18,900
Erosion & Sediment Control Practices	acres	\$7,500	84	\$630,000
Riparian Buffer on Residential /Commercial/Transient Lands	acres	\$360	36	\$12,960
Rain Gardens	acres	\$5,000	18	\$90,000
Technical Assistance	year	\$25,000	0.5	\$200,000
Total BMPs cost				\$2,778,747

The total implementation costs including technical assistance for agricultural and urban/residential BMPs are \$1,511,422 and \$2,778,747 for Ash Camp Creek and Twittys Creek watershed, respectively.

7. BENEFITS OF IMPLEMENTATION ACTIONS

The primary benefit of implementation of recommended BMPs is cleaner water in Ash Camp Creek and Twittys Creek. Specifically, sediment will be reduced to meet water quality standards, and the aquatic communities in these streams will be restored. It is hard to quantify the impact of reducing sediment on public health. But, certainly, above BMPs intended to reduce sediment increase infiltration and filter sediment, resulting in reduced sediment loading and reduced peak flows in the streams.

Additionally, because of stream protection, livestock exclusion, reduced surface runoff that will be provided through various BMPs, the aquatic habitat will be improved in Ash Camp Creek and Twittys Creek. As trees and shrubs in vegetated buffers grow, they provide excellent shade along the streams and leaf litter as a food source for benthic invertebrate. The shade also reduces water temperature in the stream and increase dissolved oxygen, thereby improving aquatic habitat for numerous aquatic organisms. In areas where pasture management is improved, less sediment will be washed into streams following precipitation events.

An important objective of the implementation program is to foster continued economic vitality and strength. A clean water source has been shown to improve livestock and herd health. Many beef producers in several Virginia counties have reported weight gains in cattle after providing alternative water sources. Studies also show increased milk and butterfat production from dairy cattle having access to clean drinking water (Zeckowski, R., Benham, B., and Lunsford, C., 2007, *Streamside Livestock Exclusion: A tool for increasing farm income and improving water quality*). The agricultural and urban practices recommended in this IP will provide economic benefits to the landowners, along with the expected environmental benefits within the watersheds and in downstream areas.

A clean water source coupled with a stream fencing system has been shown to increase weight gains; decrease stress; reduce herd health risks due to drinking muddy, polluted

water. Fresh clean water is a primary nutrient source for livestock with healthy cattle consuming, on a daily basis, close to 10% of their body weight during winter and 15% of their body weight in summer months. A clean water source can prevent illnesses that reduce production and incur the added expense of veterinary bills.

An improved pasture management system in conjunction with installing clean water supplies will also provide economic benefits for the producers. Improved pasture management can allow a producer to feed less hay in winter months and ultimately, improve the profitability of the operation. In addition, improved pasture management can boost profits by increasing the amount of forage production per acre. Standing forage utilized directly by the grazing animal is always less costly and of higher quality than the same forage harvested with equipment and fed to the animal (VCE, 1996).

Several factors contribute to greater profitability: stocking rate can usually be increased by 30% to 50%; high quality, fresh, and unsoiled vegetative growth available throughout the grazing system increase weight gain per acre; vigor of pasture sod is improved; and handling and checking grazing animals is easier.

The urban and residential BMP programs will play a significant role in improving water quality of the Ash Camp Creek and Twittys Creek. The economic benefits of implementing urban and residential BMPs may be less obvious to an individual landowner or business, but the cumulative impacts can benefit the entire watershed community. It is well known that excessive erosion and sediment transport in waterways of the United States results in significant degradation in water quality. The BMPs that include rain gardens, E & SC program, and forested buffer in residential and commercial areas will help increasing rainwater infiltration and reducing surface runoff flowing to the streams, which will result in reduced sediment loads in the streams and resulting changes in stream morphology.

In addition to the benefits to individual landowners, the economy of the Charlotte County and local community will be stimulated through various businesses and expenditures

made during implementation, and the infusion of funding from various sources outside the Ash Camp Creek and Twittys Creek watersheds. Various contractors and material suppliers who deal with stream fencing, alternative water sources, and other BMP related materials can expect to see an increase in business during the implementation period. Also, income from maintenance of these BMP systems will continue even long after the implementation period.

In general, implementation will provide not only environmental benefits to the community, but also economic benefits as well, which in turn, will allow for individual landowners to participate in voluntarily implementation of various BMPs.

8. GOALS AND MEASURABLE MILESTONES

The primary goal of TMDL implementation is to restore the water quality in the impaired streams segments in Ash Camp Creek and Twittys Creek watersheds so that they comply with the general water quality standard and are removed from the Commonwealth of Virginia's 303(d) List of Impaired Waters.

Progress toward these goals will be assessed during implementation through tracking of control measures installed and monitoring the water quality in impaired streams. The milestones establish the implementation actions to be taken within a given time frame. Water quality milestone establish the corresponding improvement in water quality that can be expected as the implementation milestones are achieved.

Staged Implementation Approach

The implementation of all agricultural and urban/residential BMPs will be achieved in two stages, addressing the sediment sources with largest impact on water quality first.

The staged approach is based on meeting water quality goals over an eight-year period. Stage I commences from year 1 (2007) through 5 (2011), while Stage II is from year 6 (2012) through 8 (2014).

Implementations of agricultural and urban/residential BMPs are determined to occur evenly over the implementation period. In Stage I, if all of the BMPs are installed and water quality standard is still not achieved, then BMPs of Stage II will be implemented.



Implementation goals for each stage along with the estimated costs of installing BMPs and technical assistance are shown in Tables 11 and 12 for Ash Camp Creek and Twittys Creek watersheds, respectively. The total costs estimated for Stage I and II for Ash Camp Creek watershed are \$761,422 and \$750,000, respectively; and the costs estimated for Stage I and II for Twittys Creek watershed are \$1,685,509 and \$1,103,830, respectively.

Table 11. Stage I and Stage II BMP implementation goals and technical assistance cost estimates for Ash Camp Creek watershed.

<u>Stage I (1-5 years)</u>				
BMPs	Units	Cost/Unit	Units Needed	BMP Total Cost
Grazing Land Protection Practice (SL-6 or LE-1T)	system	\$18,500	17	\$314,500
Improved Pasture Management	acres	\$75	127	\$9,525
Stream Protection Practice (WP-2T)	system	\$7,250	7	\$50,750
Streamside Fence Maintenance	Foot	\$3.50	1822	\$6,377
Reforestation of Erodeable Crop and Pastureland (FR-1)	acres	\$95	290	\$27,550
Conservation Tillage	acres	\$85	32	\$2,720
Erosion & Sediment Control Practices	acres	\$7,500	30	\$225,000
Technical Assistance	year	\$25,000	0.5	\$125,000
Total cost (Stage I)				\$761,422
<u>Stage II (6-8 years)</u>				
Erosion & Sediment Control Practices	acres	\$7,500	90	\$675,000
Technical Assistance	year	\$25,000	0.5	\$75,000
Total BMPs cost (Stage II)				\$750,000
Total cost (Stage I & II)				\$1,511,422

Table 12. Stage I and Stage II BMP implementation goals and technical assistance cost estimates for Twittys Creek watershed.

Stage I (1-5 years)				
BMPs	Units	Cost/Unit	Units Needed	BMP Total Cost
Grazing Land Protection Practice (SL-6 or LE-1T)	system	\$18,500	49	\$906,500
Improved Pasture Management	acres	\$75	611	\$45,824
Stream Protection Practice (WP-2T)	system	\$7,250	16	\$116,000
Streamside Fence Maintenance	Foot	\$3.50	5,163	\$18,070
Reforestation of Erodible Crop and Pastureland (FR-1)	acres	\$95	142	\$13,490
Conservation Tillage	acres	\$85	43	\$3,655
Field Buffer on Cropland (WP-1)	acres	\$350	33	\$11,550
Erosion & Sediment Control Practices	acres	\$7,500	51	\$382,500
Riparian Buffer on Residential/Commercial/Transient Lands	acres	\$360	22	\$7,920
Rain gardens	acres	\$5,000	11	\$55,000
Technical Assistance	year	\$25,000	0.5	\$125,000
Total cost (Stage I)				\$1,685,509
Stage II (6-8 years)				
Grazing Land Protection Practice (SL-6 or LE-1T)	system	\$18,500	32	\$592,000
Improved Pasture Management	acres	\$75	407	\$30,525
Stream Protection Practice (WP-2T)	system	\$7,250	11	\$79,750
Streamside Fence Maintenance	Foot	\$3.50	3,442	\$12,046
Reforestation of Erodible Crop and Pastureland (FR-1)	acres	\$95	95	\$9,025
Conservation Tillage	acres	\$85	29	\$2,465
Field Buffer on Cropland (WP-1)	acres	\$350	22	\$7,619
Erosion & Sediment Control Practices	acres	\$7,500	34	\$255,000
Riparian Buffer on Residential/Commercial/Transient Lands	acres	\$360	15	\$5,400
Rain gardens	acres	\$5,000	7	\$35,000
Technical Assistance	year	\$25,000	0.5	\$75,000
Total cost (Stage II)				\$1,103,830
Total cost (Stage I and II)				\$2,789,339

The implementation progress towards the sediment reduction end point expected after the Stages I and II is given in Table 13 for both impaired watersheds. Water quality improvement is expected to increase as implementation progresses. It is expected that for Ash Camp Creek and Twittys Creek watersheds, sediment reductions would be 40% and 19% after Stage I, and 56% and 26% after the implementation of Stage II. Considering the dynamics of stream ecosystem, generally, it takes sometime for installed BMPs to mature and function at their full potential (i.e., trees and shrubs planted in buffers have established strong roots structures). There is always a time-lag between installation of BMPs and their observed impact on water quality. It is expected that water quality goals will be achieved by the end of Stage II of implementation.

Table 13. Sediment reductions expected at the end of Stage I and II.

BMPs	Ash Camp Creek	Twittys Creek
Total Reduction Required	56%	26%
Stage I (2007-2011)	40%	19%
Stage II (2012-2014)	56%	26%

Tracking BMPs Implementation and Water Quality Monitoring

Agricultural BMPs will be tracked through the Virginia Agricultural Cost-Share Program. Urban/residential BMPs will be tracked in cooperation with the Southside SWCD and Charlotte County Erosion and Sediment Control Program.

Improvements in water quality will be determined in both impaired watersheds through monitoring conducted by the DEQ's biological monitoring program. The monitoring data include physical parameters (temperature, dissolved oxygen, pH and conductivity) and a host of benthic communities – aquatic habitat and micro-invertebrates. Based on the Stream Condition Index, DEQ determines the aquatic health of a water body. Biological sampling at the DEQ stations (Table 14) will be performed at least every other year in

spring and fall seasons. These stations are shown in Figures 1 and 3 for Ash Camp Creek and Twittys Creek watersheds, respectively. The samples will be collected and evaluated by DEQ using established biological monitoring protocols. Monitoring will continue to ensure data update and to evaluate the effectiveness of the implementation actions.

Table 14. DEQ's water quality monitoring stations in Ash Camp Creek and Twittys Creek watersheds.

Station ID	Stream name	Location	Monitoring
4AACC002.60	Ash Camp Creek	Upstream side of Route 654 bridge	Biological
4AACC004.87	Ash Camp Creek	Upstream side of Conservation Road bridge (private)	Biological
4ATWT003.36	Twittys Creek	Downstream of Route 642	Biological
4ATWT006.40	Twittys Creek	Upstream of Drake Branch on Route 47	Biological

9. STAKEHOLDERS' ROLES AND RESPONSIBILITIES

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

Federal and State Government

The Environmental Protection Agency has the responsibility of overseeing the various programs necessary for the success of the Clean Water Act. However, administration and enforcement of such programs falls largely to the states. In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions. Currently, there are six state agencies responsible for regulating activities that impact water quality in Virginia. These agencies are VADEQ, VADCR, Virginia Department of Health (VDH), and Virginia Department of Agriculture and Consumer Services (VDACS), Department of Forestry (DOF), and Virginia Cooperative Extension (VCE).

VADEQ has responsibility for monitoring waters to determine compliance with state standards, and for requiring permitted point dischargers to maintain loads within permit limits.

VADCR is a major participant in the TMDL process. VADCR has a lead role in the development of implementation plans to address nonpoint source (NPS) pollutants that contribute to the water quality impairments. Historically, most VADCR programs have dealt with agricultural NPS pollution through education and voluntary incentive programs. DCR provides available funding and technical support for the implementation of NPS components of the implementation plan.

VCE is an educational outreach program of Virginia's land grant universities (Virginia Tech and Virginia State University), and a part of the national Cooperative State

Research, Education, and Extension Service, an agency of the United States Department of Agriculture (USDA). VCE is a product of cooperation among local, state, federal governments in partnership with citizens. VCE offers educational programs and technical resources for topics such as crop, grains, livestock, poultry, dairy, natural resources, and environmental management. VCE has published several publications specifically on TMDLs.

Through Virginia's Agricultural Stewardship Act (ASA), the Commissioner of Agriculture has the authority to investigate claims that an agricultural producer is causing a water quality problem on a case-by-case basis (Pugh, 2001). If deemed a problem, the Commissioner can order the producer to submit an agricultural stewardship plan to the local soil and water conservation district.

VDH is responsible for maintaining safe drinking water measured by standards set by the Environmental Protection Agency. VDH has the responsibility of enforcing actions to correct or eliminate failed septic systems and straight pipes.

Southside Soil & Water Conservation District (SSWCD)

The Southside SWCD will provide outreach, technical and financial assistance to farmers and property owners in the Ash Camp Creek and Twittys Creek watersheds through the Virginia Agricultural BMP Cost-Share and Tax Credit programs. SWCD's responsibilities will include promoting implementation goals, available funding and benefits of BMPs and providing assistance in the field survey, design, layout, and approval of agricultural BMPs. Education and outreach activities are a significant portion of their responsibilities. Currently, there is a full-time staff person at the District (position created in 2007) to provide technical assistance to landowners in the Charlotte County TMDL impaired watersheds. The District and stakeholders will also work to seek funding to implement urban/residential BMPs and programs.

Local Governments

The local government plays a very active role in the TMDL implementation process. The staff oversees Erosion and Sediment Control program. It is recommended that Charlotte County enforce sediment control measures vigorously to reduce sediment transport from transitional and residential/commercial areas. Regarding the future correctional center proposed to be developed in Charlotte County, local government should ensure that this and others be developed with sustainable growth practices that minimize or eliminate storm water runoff and sediment transport. The County also needs to ensure that erosion and sediment control and storm water management programs are fully implemented and enforced in current and future development areas.

Citizens

Successful implementation depends on stakeholders taking responsibility for their roles in the process. While primary role falls on the landowner, local, state and federal agencies also have a stake in seeing that Virginia's waters are clean and provide a healthy environment for its citizens. While it is unreasonable to expect that the natural environment (e.g., streams and rivers) can be made one hundred percent free of sediment and other pollutants, it is possible and desirable to minimize man-made contributions. Virginia's approach to correcting NPS pollution has been, and continues to be, encouragement of participation through education, voluntarily and financial incentives. However, if progress is not made towards reducing pollutants and restoring water quality using this approach, regulatory controls may be initiated.

Integration with Other Water Quality Programs and Activities

Each watershed in the state is under the jurisdiction of a multitude of individual yet related water quality programs and activities, many of which have specific geographic boundaries and goals. These include, but are not limited to TMDLs, roundtables, water quality management plans, erosion and sediment control regulations, stormwater

management, source water protection program, and local comprehensive plans. Coordination of the implementation project with these existing programs could result in additional resources, and increased participation and additional water quality improvements.

Successful implementation of various control measures recommended in this plan depends on stakeholders taking responsibility for their role in the process. The primary role falls on the landowners. However, local, state and federal agencies also have a stake in ensuring that Virginia's waters are clean and provide healthy environment for its citizens. An important first step on correcting the existing water quality problem is recognizing that there is a problem and that the improvement in water quality is in best interest of landowners.

10. POTENTIAL FUNDING SOURCES

Potential funding sources available during implementation were identified during plan development. Detailed descriptions can be obtained from the Soil and Water Conservation District (SWCD), VADCR, Natural Resources Conservation Service (NRCS), and Virginia Cooperative Extension (VCE). It is recommended that participants discuss funding options with staff at their local SWCD in order to choose the best option. A brief description of each funding source is provided below.

Virginia Agricultural Best Management Practices Cost-Share Program

The cost-share program is funded with state and federal monies through local SWCDs. SWCDs administer the program to encourage farmers and landowners to use BMPs on their land to better control transportation of pollutants into our waters due to excessive surface flow, erosion, leaching, and inadequate animal waste management. Program participants are recruited by SWCDs based upon those factors, which have a great impact on water quality. Cost-share is typically 75% of the actual cost, not to exceed the local maximum.

Virginia Agricultural Best Management Practices Tax Credit Program

For all taxable years, any individual or corporation engaged in agricultural production for market, who has in place a soil conservation plan approved by the local SWCD, is allowed a credit against the tax imposed by Section 58.1-320 of an amount equaling 25% of the first \$70,000 expended for agricultural best management practices by the individual. The amount of the credit cannot exceed \$17,500 or the total amount of the tax imposed by this program (whichever is less) in the year the project was completed. This program can be used independently or in conjunction with other cost-share programs on the stakeholder's portion of BMP costs. It is also approved for use in supplementing the cost of repairs to streamside fencing.

Virginia Agricultural Best Management Practices Loan Program

Loan requests are accepted through VADEQ. The interest rate is 3% per year and the term of the loan coincides with the life span of the practice. To be eligible for the loan, the BMP must be included in a conservation plan approved by the local SWCD Board. The minimum loan amount is \$5,000; there is no maximum limit. Eligible BMPs include 23 structural practices such as animal waste control facilities, and grazing land protection systems. The loans are administered through participating lending institutions.

Virginia Small Business Environmental Assistance Fund Loan Program

The Fund, administered through VADEQ, is used to make loans or to guarantee loans to small businesses for the purchase and installation of environmental pollution control equipment, equipment to implement voluntary pollution prevention measures, or equipment and structures to implement agricultural BMPs. The loans are available in amounts up to \$50,000 and will carry an interest rate of 3%, with favorable repayment terms based on the borrower's ability to repay and the useful life of the equipment being purchased or the life of the BMP being implemented. To be eligible for assistance, a business must employ 100 or fewer people and be classified as a small business under the federal Small Business Act.

Virginia Water Quality Improvement Fund (WQIF)

This is a permanent, non-reverting fund established by the Commonwealth of Virginia in order to assist local stakeholders in reducing point and nonpoint nutrient loads to surface waters. Eligible recipients include local governments, SWCDs, and individuals. Grants for point sources are administered through VADEQ and grants for nonpoint sources are administered through VADCR. The Southside SWCD is currently receiving WQIF grant funds to implement sediment BMPs on agricultural lands in Ash Camp Creek and Twittys Creek watersheds.

Conservation Reserve Program (CRP)

Through this program, cost-share assistance is available to establish cover of trees or herbaceous vegetation on cropland. To be eligible for consideration, the following criteria must be met: 1) cropland was planted or considered planted in an agricultural commodity for two of the five most recent crop years, and 2) cropland is classified as “highly-erodible” by NRCS. The payment to the participant is up to 50% of the cost for establishing ground cover.

Conservation Reserve Enhancement Program (CREP)

This program is an “enhancement” of the existing USDA CRP Continuous Sign-up. It has been “enhanced” by increasing the cost-share rates from 50% to 75% and 100%, increasing the rental rates, and offering a flat rate incentive payment to place a permanent “riparian easement” on the enrolled area. Pasture and cropland adjacent to streams, seeps, springs, ponds and sinkholes are eligible to be enrolled. Buffers consisting of native, warm-season grasses on cropland, and mixed hardwood trees on pasture, must be established in widths ranging from the minimum of 30% of the floodplain or 35 feet, whichever is greater, to a maximum average of 300 feet. Cost-sharing (75% - 100%) is available to help pay for fencing to exclude livestock from the riparian buffer, watering facilities, hardwood tree planting, filter strip establishment, and wetland restoration. The State of Virginia will make an additional payment to place a perpetual easement on the enrolled areas.

Environmental Quality Incentives Program (EQIP)

Approximately 65% of the EQIP funding for the state of Virginia is directed toward “Priority Areas.” These areas are selected from proposals submitted by a locally led conservation work group. The remaining 35% of the funds are directed toward statewide priority concerns of environmental needs. EQIP offers 5 to 10-year contracts to landowners and farmers to provide 75% cost-share assistance, 25% tax credit, and/or

incentive payments to implement conservation practices and address the priority concerns statewide or in the priority area. Eligibility is limited to persons who are engaged in livestock or agricultural production.

Wildlife Habitat Incentive Program (WHIP)

WHIP is a voluntary program for landowners who want to develop or improve wildlife habitat on private agricultural lands. Participants work with NRCS to prepare a wildlife habitat development plan. This plan describes the landowner's goals for improving wildlife habitat and includes a list of practices and a schedule for installation. A 10-year contract provides cost-share and technical assistance to carry out the plan. Cost-share assistance of up to 75% of the total cost of installation (not to exceed \$10,000 per applicant) is available for establishing habitat. Types of practices include: disking, prescribed burning, mowing, planting habitat, converting fescue to warm season grasses, establishing riparian buffers, creating habitat for waterfowl, and installing filter strips, field borders and hedgerows.

Wetland Reserve Program (WRP)

This program is a voluntary program to restore and protect wetlands on private property. Landowners who choose to participate in WRP may receive payments for a conservation easement or cost-share assistance for a wetland restoration agreement. The landowner will retain ownership but voluntarily limits future use of the land. To be eligible for WRP, land must be suitable for restoration (formerly wetland and drained) or connect to adjacent wetlands. A landowner continues to control access to the land and may lease the land for hunting, fishing, or other undeveloped recreational activities.

National Fish and Wildlife Foundation (NFWF)

Grant proposals for this funding are accepted throughout the year and processed during fixed sign up periods. There are two decision cycles per year. Each cycle consists of a

pre-proposal evaluation, a full proposal evaluation, and a Board of Directors' decision. Special grant programs are listed and described on the NFWF website. Proposals are invited and funded under various conservation areas.

The Wildlife & Habitat program funding addresses conservation needs for invertebrates, plants, and mammals, as well as landscape-level and issue-based conservation. The goal is to find the best conservation resources, fund the best solutions, and deliver measurable results for wildlife and habitat conservation. Under this, initiatives, grant proposals that focus on making a measureable impact on specific species and their habitats are selected. The Freshwater Fish program funding focuses on aquatic species and habitats species that occur in the U.S. or its territories. Freshwater fish and associated aquatic life such as mussels, crayfish, and other invertebrates are included. The goal is to find the best conservation resources, fund the best solutions, and deliver measurable results for fish conservation. The initiatives that focus on making a measurable impact on the status of freshwater fish, aquatic organisms and their habitats are selected. If the project does not fall into the criteria of any special grant programs, a proposal may be submitted as a general grant if it falls under the following guidelines: (1) it promotes fish, wildlife and habitat conservation, (2) it involves other conservation and community interests, (3) it leverages available funding, and 4) project outcomes are evaluated. A pre-proposal that is not accepted by a special grant program may be deferred to the general grant program.

11. REFERENCES

George Mason University and the Louis Berger Group, Inc., 2004. Benthic TMDL for Twittys Creek. Prepared for the Virginia Department of Environmental Quality, Richmond, VA.

EPA, 1994. Water quality standards handbook: Second edition. EPA-823-B-94-005. U. S. Environmental Protection Agency, Water Quality Standards Branch, Office of Science and Technology. Washington, D.C.

Evans, Barry M., Sheedar, Scott A., Corradini, Kenneth J., and Brown, Will S. 2001. AVGWLF version 3.2. Users Guide. Environmental Resources Research Institute, Pennsylvania State University and Pennsylvania Department of Environmental Protection, Bureau of Watershed Conservation.

Evans, B. M., Sheeder, S.A., and Lehning, D. W. 2003. A spatial technique for estimating stream bank erosion based on watershed characteristics. Journal of Spatial Hydrology, Issue 1, Volume. 3.

MapTech, Inc., 2009. Development of Bacterial Total Maximum Daily Load Implementation Plan for Cub Creek, Turnip Creek, Buffalo Creek, and Unnamed Tributary to Buffalo Creek in Appomattox, Campbell, and Charlotte Counties, Virginia, Prepared for Department of Conservation and Recreation.

Pugh, S. 2001. Letter regarding: The Agricultural Stewardship Act and TMDLs. February 13, 2001.

Tetra Tech. 2002. Draft Report. A Stream Condition Index for Virginia non-coastal streams. Draft 1.0; May 1, 2002. Prepared for US EPA Region 3, Wheeling, WV; US EPA Office of Science and Technology, Washington, DC; and Virginia Department of Environmental Quality, Richmond, VA.

Tetra Tech, Inc. 2004. Total Maximum Daily Load (TMDL) Development for Ash Camp Creek. Prepared by Tetra Tech, Inc., Fairfax, VA, for the Virginia Department of Environmental Quality.

VCE, 1996. Controlled grazing of Virginia's pastures, by Harlan E. White and Dale D. Wolf, Virginia Cooperative Extension Agronomists; Department of Forages, Crop and Soil Environmental Sciences, Virginia Tech. Publication Number 418-012. July 1996.

VDCR. 2003. Guidance manual for Total Maximum Daily Load Implementation Plans.

VDEQ. 1998. Virginia 303(d) Total Maximum Daily Load Priority List and Report. Virginia Department of Environmental Quality. Revised June 1998. Richmond, Virginia.

Zeckoski, R., Benham, B., and Lunsford, C. 2007, Streamside Livestock Exclusion: A tool for increasing farm income and improving water quality. Virginia Department of Conservation and Recreation and Virginia Tech, Virginia Cooperative Extension, VCE number 442-766.

APPENDIX A

Public Participation Process

Working Groups and Steering Committee Meetings

**First Meeting - Agricultural and Urban/Residential Working Groups
Ash Camp Creek and Twittys Creek TMDL Implementation Plan**

Held on August 17, 2009

Charlotte County Board Room
Charlotte County Administrative Office Building
250 Le Grande Ave, Suite A
Charlotte Court House, VA 23923

Attendees

Dave Roberts – Old Dominion RC&D
Roy Czesnik
Tammy Hensley
Miller Adams – DOF
Tricia Mays – Southside SWCD
Eugene Morris – Southside SWCD
Garland Hamlett (aka Butch) – Charlotte County Board of Supervisors
P.K. Pettus -Citizen
Paula Nash - DEQ
Catherine Garnett – Southside SWCD
Megan Sommers Bascone - DCR
Ram Gupta - DCR

Dave Roberts welcomed everyone to the meeting and briefly explained the agenda. Paula Nash gave a brief presentation reviewing the TMDL development plan results including impairment source identification and how they were identified.

Ram Gupta explained the TMDL implementation plan process and how the TMDL IP is a plan to improve water quality. The reduction of surface runoff and sedimentation is the goal of this plan. He presented the six elements of an implementation plan and emphasized that public participation is the key element. He indicated that the implementation plan will be developed for two - Ash Camp Creek and Twitty Creek watersheds.

Megan Sommers Bascone reviewed the importance of public participation in the TMDL implementation planning process. She also noted potential funding sources for implementation projects and the challenges involved in funding projects.

Agriculture Working Group

Agricultural issues were discussed first. Ram Gupta discussed why it is important to include land use, BMPs and other changes or updates in the watersheds that have occurred since the TMDL development plan was completed in 2004 into the implementation plan. Land use in both watersheds is predominately forested, followed by agricultural. He presented various BMPs which would be included in the implementation plan.

Eugene Morris asked Garland Hamlett about land use changes in the area since 2004. It was stated that overall land use change has been very minimal. Representatives from Southside SWCD noted that some landowners participated in the tobacco buyout, but not much acreage.

Ram also presented the cost of various agricultural control measures to reduce erosion and surface runoff and asked if there is a need to change the cost values. Group agreed with the type and costs of the BMPs presented.

Trisha Mays of Southside SWCD noted that the entire study area is eligible for CREP funding. It was also noted that there has been some cattle increase in the lower end of the Twittys Creek watershed. Eugene stated that Ash Camp Creek watershed will require more fencing than the Twittys Creek watershed. She also indicated that the streamside fencing estimates completed in TMDL watersheds to date are as follows: 65,000 feet in the Ash Camp Creek watershed and 3,600 feet in the Twittys Creek watershed. Trisha will send updated information on BMPs installed in these watersheds.

Urban/Residential Working Group

Ram noted that the wastewater treatment plant at Keysville was updated since the TMDL study was completed in 2004 and improvements in the water quality have been reflected in the data collected since then. He discussed few BMPs and their associated costs and asked that if any changes are needed. Group agreed with type and costs presented.

Ram also mentioned that the bacterial impairment for Ash Camp Creek was added later on and TMDLs developed in 2004 was for benthic impairment only. This explains why the bacterial impairment was not included in the TMDL development study in 2004.

Eugene Morris stated that the channel near Drake's Branch is well vegetated. Snag removal has occurred but no recent dredging. Bruce noted that there is some sedimentation from stormwater in the Drake's Branch area.

P.K. Pettus addressed a public water supply issue in Keysville, outside the Ash Camp Creek and Twittys Creek watersheds. She was concerned with possible threats to the potential pollution of the reservoir, which is used as municipal drinking water supply source. A brief discussion was held on responsibility of state and/or local agencies for such issues.

Concerns were expressed about the application of biosolids in the watersheds. Ram explained that the permits are required for biosolid applications, which are managed by the Department of Environmental Quality. When biosolids are applied as per permit conditions, bacteria concentrations are at very low levels and should not impact surface water quality.

Trisha Mays volunteered to serve on the Steering Committee as the Agriculture and Urban/Residential Working Groups' representative.

It was indicated that the comments are invited for 30-days, till September 16, 2009. In closing, Dave Roberts noted that the labor and materials involved in the construction of best management practices is locally sourced and the projects help boost the local economy in addition to improving water quality. Meeting adjourned with thanks to all the attendees.

**Second Meeting - Agricultural and Urban/Residential Working Groups
Ash Camp Creek and Twittys Creek TMDL Implementation Plan
Held on November 4, 2009**

Charlotte County Board Room
Charlotte County Administrative Office Building
250 Le Grande Ave, Suite A
Charlotte Court House, VA 23923

Attendees

Martha Powers, NRCS
Bob Jones, Virginia Cooperative Extension Service/Southside SWCD
Tricia Mays, Southside SWCD
Dave Roberts, Old Dominion RC&D
Ram Gupta, DCR Richmond Regional Office
Megan Sommers Bascone, DCR Richmond Regional Office

Dave Roberts welcomed the group and thanked everyone for attending. Ram Gupta briefly described the purpose of the working group meeting – to review progress of IP development and to seek input on any changes or updates within the study watersheds. He stated that TMDL study indicated that sediment reduction of about 30% is needed in Twittys Creek watershed and 56% in Ash Camp Creek watershed. He stated that Twittys Creek watershed requires sediment reductions from cropland, pasture, and residential sources, and in Ash Camp Creek watershed, reductions are needed from cropland, pasture and transitional areas. In a subwatershed-4 of Ash Camp Creek, required reduction is 50-55%, while in subwatershed-5, reduction is 55-60%. Group indicated that some of the sedimentation may be coming from Town of Keysville through surface runoff.

Trisha Mays discussed the use of critical areas BMPs in both watersheds. FR-1 can be used to reduce sedimentation by converting crop and pasture lands into grassland and mixed forest. Mixed forest and grassland will have significant reductions. Ram stated that BMPs for residential areas are expensive compared to agricultural BMPs, therefore in the installation of BMPs, cost is also a factor to be considered.

Ram presented preliminary BMP scenarios and sediment reductions for Twittys Creek and Ash Camp Creek watersheds. The extents of agricultural and urban/residential BMPs were discussed in details. Group agreed with suggested preliminary BMPs. The targeted load reductions are to be achieved over a maximum of 10 year project period. Trisha indicated that one WP-2T practice to three SL-6 practices is appropriate and is generally implemented in these watersheds.

Bob Jones and Trisha Mays stated that the revised crop estimates for Twittys Creek need to be reduced because there is only one active field in the watershed. Since 2003, there has been a change of ownership of cropland. All have been converted to no-till cover crop and credit can be taken for these practices. Beans and wheat are grown under no-till cover crop. Bob noted that there are fairly narrow lowlands in the area. Buffers in cropland might not go well and would negatively affect landowners, because the parcels are long and narrow and would reduce viable land. The group suggested that the cropland acreage estimates for Ash Camp Creek be reduced.

Trisha noted that the cropland is patchy and the number needs to be reduced by half. Tobacco was grown up until 2002, and then converted to pasture and fenced out

Urban/Residential BMPs in the Twittys Creek watershed were discussed. Ram asked if 20-foot buffer on residential areas were feasible. SWCD noted that most residential structures have grass that reduces the rate of runoff and any additional buffer areas are not feasible. DCR staff will analyze aerial imagery of the watersheds using GIS to review the proposed use of buffers in residential areas. It was noted that slope is a major issue in this watershed and that the land around the Town of Drake's Branch forms a bowl.

The current use of urban/residential BMPs was discussed. Trisha noted that the Southside SWCD has held rain barrel workshops, provided rain garden information to citizens and the Master Gardeners are very active in the area. Trisha offered to find out the approximate number of rain gardens in the watersheds.

Bob Jones indicated that currently there is no logging being conducted in these watersheds. The areas listed as transitional in the TMDL study may have been logged back in 2002.

Ram noted that improved pasture management will be needed on all pasture lands. All developed land falls under erosion and sediment control regulations, and E & S and control measures are needed to reduce sediment loadings.

Bob and Trisha mentioned that they were doubtful that there is any possibility of additional pasture conversion. Landowners are not willing to surrender pasture land because it is difficult to establish the pastureland and most people want the open space. Pastureland is also a positive selling point if a landowner decides to sell their land.

Ram reviewed agricultural and urban/residential BMPs cost estimates per unit area. Group indicated that these estimates were reasonable for current market. Trisha reviewed the cost-share payments for forested buffers. She noted the Virginia Agricultural Cost-Share Program pays participants \$250/acre for hardwood trees and \$150/acre for pine trees. If a landowner agrees to maintain the BMP for 15 years instead of 10 years, the District can offer an additional \$50/acre. Trisha also noted that the cost of reforestation of erodible crops is the same as converted crops(approximate \$95.00/acre).

Trisha agreed to represent Government Working Groups and Dave Roberts to represent the Residential Working Group on the Steering Committee. Trisha will also represent Agricultural Working Group. The Steering Committee meeting will be held on Tuesday, December 1, 2009 at 1:00 pm at the Charlotte County Administration Office, Suite A.

Ash Camp Creek and Twittys Creek TMDL Implementation Plan

Steering Committee Meeting
Held on December 1, 2009, 1:00pm

Charlotte County Board Room
Charlotte County Administrative Office Building
250 Le Grande Ave, Suite A
Charlotte Court House, VA 23923

Attendees

Trisha Mays –Southside SWCD
Martha powers – NRCS
Paula Nash –DEQ (Lynchburg)
Dave Roberts – Old Dominion RC&D
Ram Gupta – DCR (Richmond)
Megan Sommers Bascone – DCR (Richmond)
David Waldrep – Virginia Department of Health (Charlotte County)
Carrie Hagin – DCR (Richmond)

Dave Roberts welcomed everyone to the meeting and gave a brief overview of the meeting's purpose. Ram also thanked everyone for attending and briefly presented the objectives and responsibilities of the Steering Committee.

Work Group updates were given. Trisha Mays reviewed the major findings of the Government and Agricultural Work Groups. The Government Work Group met on October 19, 2009. The Agricultural Work Group met on August 17, 2009 and November 4, 2009. Trisha noted that some land use change has occurred in both watersheds. Cropland has been converted to pastureland or no-till covercrop. Trisha distributed a summary sheet from the District detailing completed and contracted BMPs in both watersheds. There are 5 -10 rain barrels currently in use within the two watersheds and no reported rain gardens. It was suggested that a rain garden may be considered for the Eureka School in the Ash Camp Creek watershed. The garden would be beneficial to the community and would serve as a good teaching tool. However, its average cost of \$1,000 per rain garden makes it difficult to include.

Dave Roberts reported the findings of the Urban/Residential Work Group. The group met on August 17, 2009 and November 4, 2009. Members of the groups took a short field trip to Drake's Branch after the November 4th meeting. Most of the town's residential properties have grass cover. The town has steep topography and controlling runoff is complex. The group suggested that rain barrels would be beneficial for properties to control runoff. A Dollar General store is being built and is the only new construction project in the Twittys watershed. There are no new construction projects in the Ash Camp Creek watershed. The group reviewed BMP cost estimates and determined them to be accurate. The group decided that Erosion and Sediment Control program and buffers on residential and community areas will help reduce sediment in these watersheds.

Ram Gupta reviewed the draft implementation plan (IP) prepared for the final public meeting to be held in mid-January 2010. It was noted that the Department of Health and Extension Service should be included in the Acknowledgements on slide 2 of the presentation. The text on slide 6 should be edited for consistency – use “year” or “years” for both stages. Remove duplicated slide 10 “Costs of various Control Measures”. On slide 21 “Best Management Practices Needed for De-listing (Twittys Creek Watershed)”, “grading” should be replaced with “grazing”. Slide 25 should be edited for consistency; “landowner contributions” should be same font size as other text. Ram indicated that the extent of the BMPs presented in the IP is the maximum needed. Water quality will be monitored during the implementation and all BMPs may not be needed to achieve water quality standards.

Paula Nash asked about bacteria impairments noted earlier in the presentation. Only Ash Camp Creek is listed for both bacteria and benthic impairments. Ram indicated that the ACC/Twittys TMDL was developed for one benthic impairment, hence the bacteria impairment is not considered in this IP. She also stated that the percentage of sedimentation needs to be more clearly explained for public understanding. The inclusion of a rating for water quality related to sedimentation may be helpful. Paula noted that she may have related figures that could be used in the presentation.

It was also noted that practice rates are just the maximum limit. The group briefly discussed any impact the proposed jail project may have on erosion and sediment control. It was stated that the jail will need to meet permit standards.

The final public meeting will be held on January 13, 2010 from 6:30pm-8:30pm. The meeting was adjourned.

APPENDIX B

Soil and Water Conservation District BMPs Progress

Southside Soil and Water Conservation District

Serving Charlotte and Lunenburg Counties

Total Maximum Daily Load (TMDL) Program

Introduction

The TMDL BMP assistance program is administered by the Virginia Department of Conservation and Recreation (DCR) and through Virginia Soil and Water Conservation Districts (SWCD). This program can only be utilized in specific watersheds that are considered “impaired,” as determined by the Department of Environmental Quality (DEQ), and can only participate with certain best management practices (BMP’s). Its purpose, through best management practices, is to restore watersheds and water quality, in order to ultimately remove impaired segments from the impaired waters list. This will be accomplished by implementing BMP’s that reduce erosion, bacteria loading and nutrient loading with stream protection practices and riparian buffer practices.

Practices that have been completed or that are currently in progress within Twittys Creek and Ash Camp Creek

The watersheds of interest for these watershed improvement plans are Ash Camp Creek and Twittys Creek. The practices that have been completed or are in progress are the Reforestation of Erodible Cropland or Pastureland (FR-1), the Grazing Land Protection (SL-6) and more recently the newer Livestock Exclusion with Riparian Buffer (LE-1T). The table below has a breakdown of these practices of how many units has been completed and in which watershed it was completed.

Practice	Watershed	Units	Completed/In progress
FR-1	Ash Camp	52.59 acres	Completed
SL-6	Twittys	3,600 feet	Completed
SL-6 or LE-1T	Ash Camp	6,225 feet	Completed
LE-1T	Ash Camp	4,400 feet	In progress

Water-Monitoring for Bacteria

It was reported at the first public meeting that Ash Camp Creek, in addition to being benthic impaired, is bacterial impaired. Southside SWCD had already been monitoring Cub Creek, Turnip Creek, Nottoway River and Big Hounds Creek on a monthly basis, so

Ash Camp was added into the monthly route. Water-monitoring for *E. Coli*, using the *Coliscan* method and 5ml of water sample, has been in effect for Ash Camp Creek since August, at the site on Eureka School Road (Route 654), results are listed on the back.

Month	Results
August	40
September	100
October	100
November	720
December	< 20

* Total Count/100ml water =(number of *E. coli* colonies/ml of water sample) x 100

Outreach

Southside SWCD is present to many community events to promote conservation awareness. Since the first public meeting in August for Ash Camp Creek and Twittys Creek, staff has been present for the Drakes Branch Fall Festival, Family and Farm Day in Blackstone, VA, Kids Fishing Day in Red Oak, VA, and the Cattlemen's Association Dinner. There have also been numerous activities within Charlotte County Public Schools where students were involved in coordinated programs that promote conservation awareness. Very recently, Southside SWCD has been present at town council meetings for awareness of the proper process involved with erosion control. Therefore, citizens will know if there is any construction going in, E and S plans are to be reviewed by Southside SWCD and the Charlotte Co. Building Inspector.

In closing

Public participation at these watershed meetings is important to the implementation and the improvement of these watershed plans. Southside SWCD appreciates your support. If you or someone you know is interested in participating in the TMDL program or wants more information on TMDL, please contact Tricia Mays, TMDL Conservation Specialist, at 434-542-5342, ext. 4.