Little River and Tributaries
Water Quality Implementation Plan

A Plan to reduce bacteria, sediment, and temperature in the water

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Prepared by: The Virginia Department of Environmental Quality

In Cooperation with:

Local Stakeholders

MapTech, Inc.

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Town of Floyd, Virginia
Government of Floyd County, Virginia
Natural Resources Conservation Service (NRCS)
Local citizens and stakeholders in the Little River watershed
New River Highlands Resource Conservation and Development
Skyline Soil & Water Conservation District (Skyline SWCD)
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Jessie Peterman Memorial Library, Floyd, VA
Virginia Department of Forestry (VDOF)
Virginia Cooperative Extension (VCE)
Virginia Department of Health (VDH)
Steering Committee Members
Working Group Members

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Introduction

Report Outline

This report summarizes steps taken to create the implementation plan. The report also gives background information regarding the impairments and the effort put into creating the TMDL studies. Following are particular segments within this report:

1. Review of the **pollutants** and impairments
2. Review of findings and **recommendations** of TMDL studies
3. **Identify** and **quantify** measures necessary to accomplish recommendations called for in the TMDL studies
4. Provide **cost** estimate and **timeline** for implementation of measures

It is a federal requirement that all streams, rivers, and lakes meet state water quality standards.

Several stream segments within the Little River drainage area were identified, based on monitoring, as impaired segments by the Virginia Department of Environmental Quality (VDEQ). The impaired segments violated one or more of three water quality standards dealing with bacteria, benthic health, and temperature. Following this identification, a pollutant budget study named Total Maximum Daily Load (TMDL) mandated by the Federal Clean Water Act (CWA) was conducted. The TMDL study examined the existing conditions in the drainage area and specified needed reductions and/or measures to address the excessive bacteria and sediment and the high temperatures. This report summarizes the implementation plan (IP) that is built on the TMDL study. This report translates the recommendations of the TMDL study into specific measures detailing their types, extent, and cost in addition to the expected benefits. The ultimate goal is healthier waters that meet the state water quality standards.

Water Quality Problems Addressed In This Report

A TMDL study was recently developed for waterbodies addressed in this report due to the following impairments:

Bacteria Impairments

A total of 16 segments within the Little River drainage area are listed for violating the State's bacteria standards for recreational use. Eleven of those impairments are along the Little River itself. Tributaries to the Little River that are also impaired for bacteria include Meadow Run, Pine Creek, Meadow Creek, Brush Creek, and Laurel Creek. The bacteria TMDL developed to meet the *E.coli* geometric mean standard of 126 coliform forming unit per 100 mL (cfu/100mL).

Benthic Impairments

A total of three segments within the Little River drainage area are listed for violating the State's general (benthic) standard. The benthic standard deals with the health of stream's benthic macroinvertebrate community. There are two impairments on the Little River and one impairment on Meadow Run. A procedure called "stressor analysis" was utilized to determine the cause of the impairments. Results of the analysis showed sediment as the most probable cause of imapirments. A sediment TMDL was developed where an unimpaired reference watershed was used to determine the appropriate sediment load that can enter the streams without harming the benthic community.

Temperature Impairments

A total of eight segments within the Little River drainage area are listed for violating the State's maximum temperature standards. Two different standards are violated. Two stream segments on Dodd Creek and one on Big Indian Creek are in violation of the stockable trout standard of maximum temperature of 21^{o}C (70F). The natural trout standard of 20 ^{o}C (68F) is violated in three segments on the Little River, one segment on Pine Creek and one on West Fork Dodd Creek.

Review of TMDL Studies

A recently completed TMDL study is in the process of approval by state agencies and the U.S. Environmental Protection Agency (USEPA). The study addressed the bacteria, sediment, and

high temperature issues within the Little River and its tributaries. Figure 1 shows the location of the drainage area. The impaired stream segments are shown in Figure 2.

The study area includes two bacteria TMDLs that have already been completed with implementation underway. Estimates given in this report do not include populations and measures from these two TMDLs.

Watershed Characteristics

The majority of the Little River watershed (USGS Hydrologic Unit Code 05050001) is located in Floyd County, Virginia with smaller portions in Pulaski and Montgomery Counties in Virginia. The Little River flows west-northwest from the headwaters near Copper Hill in northeastern Floyd County downstream to its confluence with the New River at the Pulaski/Montgomery county line south of Radford, Virginia. This watershed is a part of the New/Kanawaha River basin, which drains via the Mississippi River to the Gulf of Mexico.

Forest lands comprise approximately 57% of the 225,000 acre drainage area. Pasturelands are sizable and cover more than a third of the entire area. The remaining area is split among small percentages of developed, cropland, wetlands, and water surfaces.

Figure 1. Location of the Little River watershed.

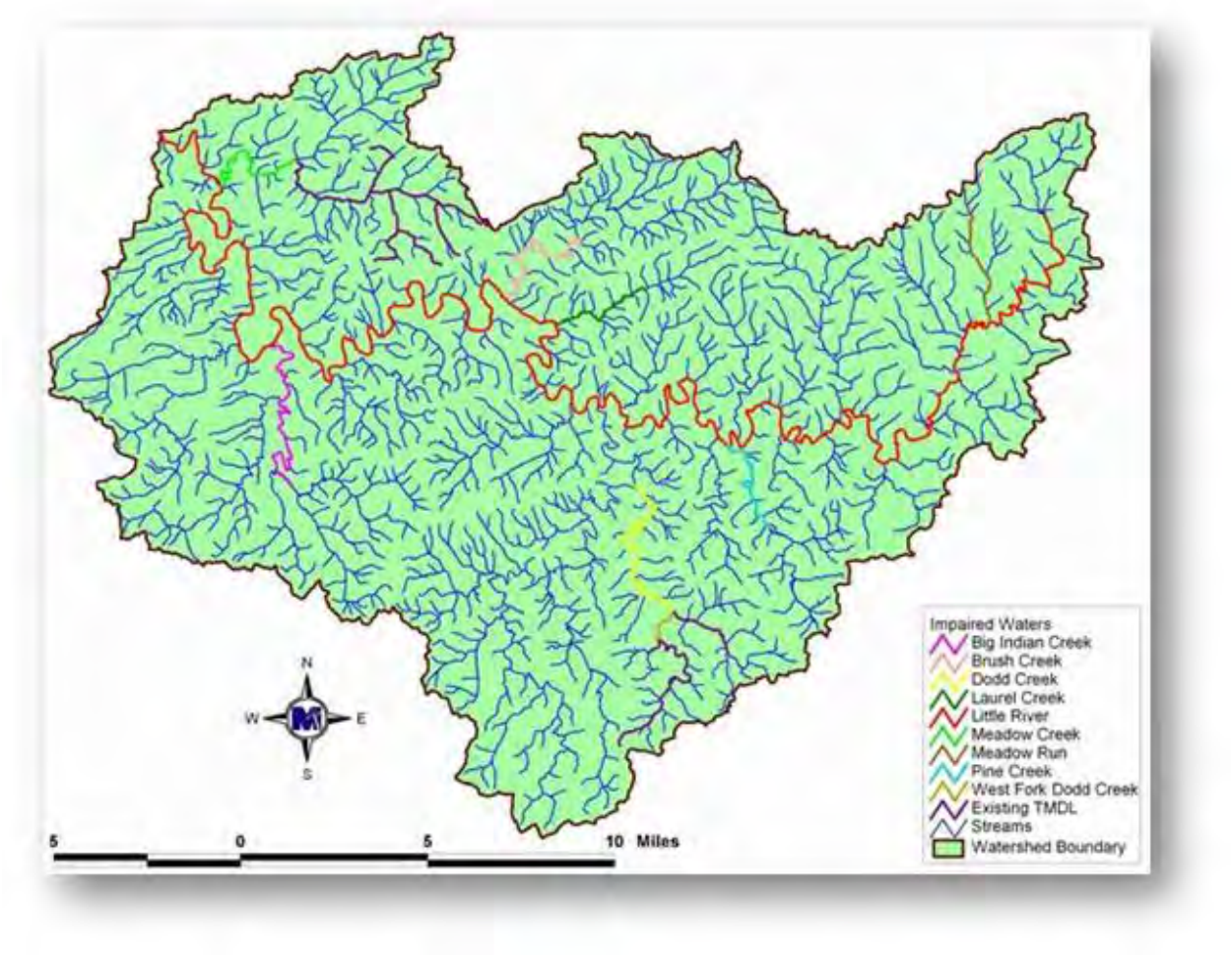

Figure 2. The impaired segments within the Little River watershed included in this project.

As for the climatic conditions in the Little River watershed, during the period from 1933 to 2006 Floyd, Virginia (NCDC station# 443071) received an average annual precipitation of approximately 41.49 inches, with 54% of the precipitation occurring during the May through October growing season (SERCC, 2010). Average annual snowfall is 17.9 inches, with the highest snowfall occurring during January (SERCC, 2010). The highest average daily temperature of 82.2 ºF occurs in July, while the lowest average daily temperature of 23.1 ºF occurs in January (SERCC, 2010).

Sources of Bacteria

Potential sources of *E. coli* considered in the TMDL development included both point source and nonpoint source contributions. Permitted point sources that discharge fecal bacteria to surface water are shown in Table 1. Other permitted point sources exist within the drainage area but are included in previously conducted bacteria TMDLs. The output from such areas is considered as a whole.

Table 1. Permitted Point Sources in the Little River Watershed.

Permit	Receiving Stream	Facility Type
VAG402042	Big Run Creek	Domestic
VAG402018	UT to Big Run Creek	Domestic
VAG402051	UT to Meadow Run	Domestic
VAG402090	UT to Little River	Domestic

At the time that this TMDL was created, permitted point discharges that may contain pathogens associated with fecal matter were required to maintain a *E. coli* concentrations at or below 126 cfu/100 mL. One method for achieving this goal is chlorination. Chlorine is added to the discharge stream at levels intended to kill off any pathogens. The monitoring method for ensuring the goal is to measure the concentration of total residual chlorine (TRC) in the effluent. If the concentration is high enough, pathogen concentrations, including *E. coli* concentrations, are considered reduced to acceptable levels. Typically, if minimum TRC levels are met, *E. coli* concentrations are reduced to levels well below the 126 cfu/100 mL limit.

Both urban and rural nonpoint sources of *E. coli* bacteria were considered in water quality modeling. Sources included residential sewage treatment systems, land application of waste, livestock, wildlife, and domestic pets. Populations within the watershed were estimated during the TMDL development and are shown in Table 2. Loads were represented either as land-based loads (where they were deposited on land and available for wash off during a rainfall event) or as direct loads (where they were directly deposited to the stream). Land-based nonpoint sources are represented as an accumulation of pollutants on land, where some portion is available for transport in runoff. The amount of accumulation and availability for transport vary with land use type and season. The model allows a maximum accumulation to be specified. The maximum accumulation was adjusted seasonally to account for changes in die-off rates, which are dependent on temperature and moisture conditions. Some nonpoint sources, rather than being land-based, are represented as being deposited directly to the stream (*e.g.,* animal defecation in stream, straight pipes). These sources are modeled similarly to point sources, as they do not require a runoff event for delivery to the stream.

Table.2 Bacteria sources used during the TMDL development and updated to reflect changes since, for the Little River watershed.

Bacteria Source	Little River Populations
Human:	
Houses with Failing septic systems	1,096
Houses with Straight Pipes	357
Livestock:	
Beef Adult	21,225
Beef Calves	26,477
Dairy Milkers	568
Diary Dry	284
Dairy Calves	284
Sheep	1,788
Horses	1,089
Pets:	
Dogs	3,381
Cats	3,786
Wildlife:	
Deer	6,865
Turkey	1,742
Muskrat	63,619
Beaver	1,567
Raccoon	14,082
Goose	74
Duck	151

Bacteria Reductions Called for by TMDL

The bacteria TMDL study determined that certain reductions to bacteria load in streams were necessary in order to meet the water quality standard. For the Little River and tributaries, all elicit discharges into streams through straight pipes must be eliminated. Moreover, 73% reduction in direct deposition of bacteria from livestock into streams must be eliminated.

Sources of Sediment

Excessive sedimentation is considered the primary cause of the listed benthic impairment in the Little River. Unstable streambanks can break and cause sediment to be dumped directly into streams and become readily available to be transported downstream. Any activity that exposes and/or breaks down the top soil tends to increase erosion of topsoil. Such activities exist within the Little River drainage area and include conventional methods of tilling cropland, overgrazing of pastures, land clearing for construction, dirt road construction, and forest logging.

Sediment Reductions Called for by TMDL

The sediment TMDL study determined that certain reductions to sediment load in streams was necessary in order to meet the water quality standard. For the Little River and tributaries, approximately 18% reduction to sediment load from the major contributors was deemed necessary. Reductions were called for from streambank erosion, barren lands, conventional tillage lands, disturbed forest, and unimproved pasture lands. In addition to these reductions, it was assumed the load, while relatively small, from straight pipes should be completely eliminated.

Cause of High Temperature

No major point sources exist within the watershed with processes that cause temperature to increase. The elevated levels of temperature in the Little River and its tributaries were attributed to solar radiation (a background source).

Actions Called for by Temperature TMDLs

The temperature TMDL study determined that forested buffers (shading) along stream sides was necessary to bring temperatures down to acceptable levels. Areas adjacent to streams that currently do not have forested buffers were identified. The temperature TMDLs call for implementing forested riparian buffers on approximately 56 miles of stream banks.

Public Participation

Public participation was encouraged in developing the implementation plan to address excessive bacteria and sediment and high temperatures within the Little River and its tributaries. Public participation during the implementation plan phase was a continuation to the public participation during the TMDL development phase. Preliminary findings and proposed control measures were included in the final public meeting for the TMDL development conducted on March 16, 2011 in Jessie Peterman Memorial Library in Floyd, VA. Participants were encouraged to participate in various working groups to contribute in finalizing the action plan. Two groups were formed with agricultural and residential interests.

The residential group met on April 20, 2011 at Jessie Peterman Memorial Library in Floyd, VA. The agricultural group met the next day (April 21, 2011) at the same

location. The two meetings discussed the proposed control measures in terms of variety and extent, cost, feasibility, and need. Feedback from the meetings was incorporated where applicable and findings were presented to the steering committee during the meeting on April 25, 2011 at the Floyd County Administration Building in Floyd, VA. The steering committee reviewed the recommendations of the two working groups and added recommendations to move forward towards holding final public meeting which took place on May 3, 2011 at the Jessie Peterman Memorial Library in Floyd, VA. The meeting was used to present the findings and the implementation plan to the public.

Some key input that was received from the Working Groups and Steering Committee include:

- Implementation needs to be locally driven.
- Add management practices to address
    - stormwater,
    - failing septic systems,
    - stream restoration,
    - livestock waste management, and
    - relocation of concentrated feeding areas.
- A source of information on proper streamside plantings is needed.
- BMP incentive programs need to be more flexible.
- A better approach to the BMP incentive program would be to encourage protection of wetlands, which would, in turn, protect water quality.
- A focus on programs that are similar to and include Conservation Reserve Enhancement Program (CREP) and Wetland Reserve Program (WRP) which compensate landowners for protection of these lands.
- Water Quality monitoring needs include
    - tracking the results of implementation, and
    - spatially intensive monitoring to help to identify specific areas of concern.

Control Measures

Some control measures were determined by TMDL and others were selected by stakeholders

Some of the control measures were specifically recommended by the TMDLs to address pollutants. For example, eliminating straight pipes was directly called for by the TMDL. Other control measures such as streambank stabilization were deemed necessary by stakeholders and therefore, were added to the implementation plan.

Control Measures for Straight Pipes

A total of 360 straight pipes were estimated to be in the watershed. Three fixes were suggested for straight pipes. Five percent (18 units) of houses with straight pipes were assumed to not have adequate area field for septic system and therefore would be corrected via an alternative waste treatment system (RB-5). Based on GIS analysis using census tracks, 26 houses with straight pipes were estimated to be fixed via connecting to town sewer. The remaining 316 units are estimated to be corrected by installing standard septic systems. Table 3 shows the breakdown of the three different measures.

Table 3. Proposed measures for addressing straight pipes.

Measure	Connecting to Town Sewer (RB-2)	Alternative Waste Treatment System (RB-5)	Septic System Installation (RB-4)
Count	18	26	316

Control Measures for Livestock Direct Deposition

The bacteria TMDL calls for 73% reduction in livestock direct deposition to streams.

The length of livestock exclusion, such as streamside fencing (LE-1T), was estimated using GIS analysis utilizing land use and stream network maps. Areas of pasture intersecting a stream were assumed to need exclusion. This length was scaled down based on the TMDL findings suggesting 73% exclusion of livestock. This total was divided into a number of systems utilizing the average length of stream addressed per system, based on historical records of VDCR for the Skyline SWCD area and Floyd County. An average of **1,400 ft** per system was obtained.

Several different fencing options are available through state, federal, and private cost share programs. *Livestock Exclusion with Riparian Buffers for TMDL Implementation* (**LE-1T**) systems include streamside fencing, cross fencing, an alternative watering system, and a 35-ft buffer from the stream. It offers an 85% cost share and is only available in targeted TMDL watersheds with implementation plans.

Livestock Exclusion with Reduced Setback Practice for TMDL Implementation (**LE-2T**) systems are only available in targeted TMDL areas with implementation plans. This practice requires a

10 foot setback for stream fencing, and is more flexible in fencing materials allowed. Cost share is provided for stream fencing and cross fencing, and off stream waterers at a rate of 50%.

Financial assistance for streamside fencing is also available through cost-share programs such as the Conservation Reserve and Enhancement Program (CREP). In general, cost-shares of 50% - 100% are available to help pay for fencing which excludes livestock from farmland adjacent to streams, creating a riparian buffer. It is recommended that participants consult the experienced personnel at the Skyline SWCD in order to choose the most applicable exclusion system (WP-2T) and the funding sources to match. Several fencing practices are summarized in Table 4.

Table 4. Fencing cost-share practices comparison

DCR Spec. #	Required Buffer Distance	Maximum Cost Share	Components Available for Cost-share				
			Permanent Stream Fencing	Cross Fencing	Alternate Water Supply	Restricted Crossing	Hardened Access or Crossing
LE - 1T	35	85%	√	√	√	√	
WP- 2T	35	75%	√				√

For Little River and tributaries, **1,081** LE-1T and **25** WP-2T systems are recommended. The breakdown between the two types of systems was determined based on historical ratios from systems already installed in the area.

Land-based Agricultural Control Measure

Stormwater runoff from farmland picks up bacteria from manure and causes soil-loss and erosion of valuable land along its path to the stream. There are several BMPs that can be applied to farmland that will help prevent soil and bacteria from ending up in streams. The two recommended practices were improved pasture management for pasturelands and conservation tillage for croplands. While the two measures were prescribed here for soil erosion reduction, they also reduce bacteria load into streams.

Improved Pasture Management includes: maintaining forage height during growing season, application of lime and fertilizer when needed, controlling woody vegetation, distribution of

manure through managed rotational grazing, and reseeding if necessary. Employing the pasture management practices listed above can produce significant economic gains to producers at a very low investment cost. A total of **3,670 acres** of pasture were recommended for improved pasture management.

Conservation tillage involves managing the intensity (frequency and aggressiveness) of soil-disturbing activities related to residue management, seedbed preparation, nutrient application, planting, and pest control while planting and growing crops. Employing conservation tillage helps prevent erosion, which also helps keep bacteria found in manure fertilizers from running off the land. Benefits include improved soil quality and reductions in time, fuel, and production costs. A total of **18 acres** of conventionally tilled lands were recommended to be transformed into conservation tillage.

Many agricultural BMPs qualify for financial assistance. It is recommended that participants discuss funding options with experienced personnel with the Skyline SWCD staff in order to choose the best option.

Control Measures for Residential and Barren Lands

The Little River sediment TMDL requires reductions to sediment load from land-based residential areas. In order to meet these requirements, *Erosion and Sediment control (E&S)* were recommended for **30 acres** of transitional lands.

Erosion and sediment control (E&S) are a set of measures regulating land disturbing activities such as clearing, grading, excavating, transporting, and filling of land. There is a set of minimum standards that need to be met during such activities with the goal of minimizing sediment mobilization out of the given site.

While quantification of the number of failing septic systems was not necessary for implementation plan purposes, septic systems should be maintained and fixed when failing as a good practice. Other measures not called for directly by the plan but are encouraged are educational programs such as those dealing with proper ways of disposing of pet waste, septic tank pump-out programs, information on septic maintenance, and other water quality tips.

Stormwater carrying bacteria and sediment may be addressed even though modeling procedures showed that was not necessary. Measures such as rain gardens and retention ponds may be helpful. Rain gardens are planted in low-laying areas that absorb water resulting from rainfall over impervious surfaces such as rooftops. This practice reduces surface runoff by allowing water more time to soak into the ground resulting in less flow into storm drains and subsequently less flow downstream. This practice helps reduce flooding and channel erosion downstream. It can also add to the esthetic value of the property.

Control Measures for Disturbed Forest

One of the measures called for here is forest harvesting BMPs. The Virginia Department of Forestry (VDOF) is in charge of regulating any logging operations from commercial or private entities. A total of **27 acres** of forest harvesting BMPs was recommended. Some BMPs recommended on logging areas are not harvesting trees near streams (leaving a vegetated stream buffer), water bars, hardened stream crossings (*i.e.,* culverts, bridges), and seeding and mulching bare areas upon completion.

Another measure recommended for addressing sediment from logged areas was replanting the disturbed areas. Once mature, the planted trees provide a similar forest cover to pre-disturbed conditions. A total of **270 acres** of disturbed forest lands were recommended for reforestation.

A measure that was discussed in working group meetings that is helpful in reducing sediment load is dirt road stabilization. Dirt road stabilization involved mixing soils with binding compounds and compacting the surface of the dirt road which results in minim erosion and dust.

Control Measures for Streambank Erosion

Excluding livestock from streams is expected to reduce streambank erosion due to limiting livestock trampling. Participants of the residential group meeting expressed interest in having streambank stabilization added as a standalone measure in the implementation plan. Several measures exist that can help stabilizing the banks of streams. Residents are encouraged to contact the proper authorities when they intend to start applying these BMPs for technical

assistance in selecting the most suitable BMP and possible financial aid. A total of **15,000 ft** of streambanks are recommended to be stabilized.

Control Measures for Temperature Reduction

To provide the extra shading necessary to bring down temperature in the Little River and its tributaries, **297,000 ft** of forested riparian buffer was recommended in specific areas. Based on modeling, it is important to plant the trees as close as possible to edge of streams and also to select trees that have as large canopy as possible to provide maximum shading.

The stream segments recommended for forested riparian buffers are as follows: Little River from confluence with West Fork Little River upstream to headwaters, Pine Creek from confluence with Little River for 3.6 river miles, Dodd Creek from confluence with West Fork Little River to confluence with West Fork Dodd Creek, West Fork Dodd Creek from confluence with Dodd Creek upstream to headwaters, and Big Indian Creek from confluence with Little River upstream to headwaters.

Timeline for Implementing Measures

Control measures were divided into two stages. In Stage I which lasts five years, all measures dealing with correcting straight pipes and livestock exclusion will be implemented. In addition, part of the land-based control measures will also be implemented in Stage I. The remaining BMPs will all be implemented in Stage II which also lasts for five years. The grouping of measures into stages allows for evaluation of the impact of implementation where the steering committee will determine, at the end of Stage I, if implementing measures in Stage II is

necessary. This effort will be aided by continued monitoring to assess improvement in conditions. Table 5 below shows the breakdown between Stage I and Stage II.

Stage I will last for five years starting the summer of 2011 and ending the summer of 2016. Stage II actions are planned for the period of 2016 to 2021. The third stage (Stage III) is reserved for monitoring where delisting is anticipated in 2026.

Table 5. Stage I and Stage II implementation goals for the Little River watershed.

		Little River	
Control Measure	**Unit**	**Stage I**	**Stage II**
Agricultural			
Livestock Exclusion with Riparian Buffers for TMDL Implementation (LE-1T)	System	1,081	0
Stream Protection Systems (WP-2T)	System	25	0
Streamside Fencing Maintenance-perennial	ft-maintained	283,763	851,288
Conservation Tillage	Acres	18	0
Improved Pasture Management - Pasture	Acres	2,000	1,670
Residential			0
Sewer Connection (RB-2)	System	26	0
Alternative Waste Treatment System Installation (RB-5)	System	18	0
Septic System Installation/Replacement (RB-4)	System	316	0
Erosion and Sediment Control	Acre	30	0
Other			0
Reforestation of Disturbed Forest	Acre	200	70
Forest Harvesting Best Management Practices	Acre of BMP	100	170
Streambank Stabilization	ft	7,500	7,500
Forested Riparian Buffer	ft	148,500	148,500

Cost of Implementation Measures

Cost of proposed control measures were estimated and shared with state agencies and attendees of meetings for verification and comments. The cost for fencing was obtained from VDCR Agricultural BMP database and revised upwards based on feedback from the meetings. Estimates for control measures to address straight pipes were also revised upwards based feedback from local agencies. The final pricing for measures prescribed for the bacteria, sediment, temperature problems in the Little River and tributaries are given in Table 6.

Table 6. Residential control measure costs and needs.

Agricultural Control Measures	Unit	Units Needed	Unit Cost	Total Practice Cost
Livestock Exclusion with Riparian Buffers for TMDL Implementation (LE-1T)	System	1,081	$18,000	$19,458,000
Stream Protection Systems (WP-2T)	System	25	$5,250	$131,250
Improved Pasture Management - Pasture	Acres	3,670	$75	$275,250
Conservation Tillage	Acres	18	$100	$1,800
Streamside Fencing Maintenance-perennial	ft-maintained	1,135,050	$3.5	$3,972,675
Residential Control Measures				
Sewer Connection (RB-2)	System	26	$6,000	$156,000
Alternative Waste Treatment System Installation (RB-5)	System	18	$20,000	$360,000
Septic System Installation/Replacement (RB-4)	System	316	$8,000	$2,528,000
Erosion and Sediment Control	Acre	30	$2,000	$60,000
Other Control Measures				
Reforestation of Disturbed Forest	Acre	270	$300	$81,000
Forest Harvesting Best Management Practices	Acre of BMP	27	$10,000	$270,000
Streambank Stabilization	ft	15,000	$71	$1,065,000
Forested Riparian Buffer	ft	297,000	$1	$297,000

In addition to cost of cost of control measures, technical assistance cost was also estimated in consultation with Skyline SWCD. It was determined that two full time employees (2 FTE) were needed for the length of implementation at an annual rate of **$52,000 each** covering salaries, travel, and training. Another **$5,000** per year was added to cover outreach efforts.

Table 7 shows the breakdown of cost between stages and types of measures.

Table 7. Costs to implement Stage I and II for Little River.

Stage	Agricultural BMPs ($)	Residential BMPs ($)	Other BMPs ($)	Tech. Assist. ($)	Total ($)
Stage I	20,734,219	3,104,000	841,000	545,000	25,224,219
Stage II	3,104,756	0	872,000	545,000	4,521,756
Total	23,838,975	3,104,000	1,713,000	1,090,000	29,745,975

Benefits of Implementation Measures

The primary benefit of implementation is cleaner waters in Virginia. Fecal and sediment contamination in Little River and elevated temperatures will be reduced to meet water quality standards, and the aquatic community in these streams will be restored. Reducing temperature in segments with elevated levels allows for more adequate conditions for fish and therefore can improve fishing in both natural trout streams and stockable trout streams.

An important objective of the implementation plan is to foster continued economic vitality and strength. This objective is based on the recognition that healthy waters improve economic opportunities for Virginians and a healthy economic base provides the resources and funding necessary to pursue restoration and enhancement activities. The agricultural, residential, and other practices recommended in this document will provide economic benefits to the community as well as the expected environmental benefits. Specifically, alternative (clean) water sources, exclusion of cattle from streams, improved pasture management, and private sewage system maintenance will each provide economic benefits to land owners. Additionally, money spent by landowners and state agencies in the process of implementing this plan will stimulate the local economy.

Targeted Implementation

Implicit in the process of a staged implementation is targeting of control measures: this ensures optimum utilization of resources. Targeting of critical areas for livestock fencing was accomplished through analysis of livestock population and the fencing requirements for each subwatershed. The subwatersheds were ranked in descending order based on the ratio of animals per fence length. If feasible, effort should be made to prioritize resources in the order of subwatersheds in Table 8 (please refer to Figure 1 for Little River Subwatershed). The targeting priority list should be used to focus outreach by promoting the cost-share programs available. However, interested parties should not be turned away if their land is in a low ranking subwatershed.

The subwatersheds were also prioritized in order of most fecal load from straight pipes. The results of the targeting analysis show the order in which straight pipes should be identified and corrected (Table 8).

Table 8. Targeting subwatershed order for streamside fencing (LE-1T).

Livestock Fencing		Straight Pipe Correction	
Subwatershed Priority	**Subwatershed ID**	**Subwatershed Priority**	**Subwatershed ID**
1st (highest priority)	2	1st (highest priority)	16
2nd	1	2nd	21
3rd	3	3rd	12
4th	5	4th	3
5th	4	5th	11
6th	12	6th	18
7th	13	7th	17
8th	6	8th	13
9th	19	9th	4
10th	7	10th	7
11th	20	11th	26
12th	9	12th	14
13th	16	13th	5
14th	8	14th	2
15th	21	15th	25
16th	11	16th	10
17th	17	17th	19
18th	26	18st	27
19th	10	19nd	6
20th	27	20rd	8
21st	18	21th	1
22nd	14	22th	9
23rd (lowest priority)	25	23rd (lowest priority)	20

In addition to the outlined method for targeting practices within the whole watershed, individual impairments were ranked based on the targeting results above, as well as the number of impairment types (higher priority for more impairment types), the size of impairment (higher priority for smaller watersheds), and the frequency of water quality violations (higher priority for more frequent violations). The top five results of this ranking are shown in Table 9, ending with the entire watershed.

Table 9. Ranking of implementation areas based on priority scoring (0-10).

Impairment	Score
Meadow Run	8.8
Little River (above Meadow Run)	6.5
Laurel Creek	6.1
Little River – (upstream from the outlet of the benthic impairment)	5.8
Little River – (entire watershed)	5.6

Stakeholders' Role in Implementation

Stakeholders are individuals who live in, or have land management responsibilities in the watershed, including government agencies, businesses, private individuals and special interest groups. Stakeholder participation and support is essential for achieving the goals of this TMDL implementation plan effort.

Environmental Protection Agency

Multiple Federal and State agencies share the responsibilities with the USEPA 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 with regard to this implementation plan. These agencies include: VDEQ, VDCR, VDH, VCE, DOF, and Virginia Department of Agriculture and Consumer Services (VDACS).

Department of Environmental Quality

VDEQ has responsibility for monitoring the waters to determine compliance with state standards and for requiring permitted point dischargers to maintain loads within permit limits. They have the regulatory authority to levy fines and take legal action against those in violation of permits. Beginning in 1994, animal waste from confined animal facilities in excess of 300 animal units (cattle and hogs) has been managed through a Virginia general pollution abatement permit. These operations are required to implement a number of practices to prevent groundwater

contamination. In response to increasing demand from the public to develop new regulations dealing with animal waste, in 1999 the Virginia General Assembly passed legislation requiring VDEQ to develop regulations for the management of poultry waste in operations having more than 200 animal units of poultry (about 20,000 chickens) (ELI, 1999). On January 1, 2008 the Virginia Department of Environmental Quality (VDEQ) assumed regulatory oversight of all land application of treated sewage sludge, commonly referred to as biosolids. VDEQ's Office of Land Application Programs within the Water Quality Division to manages the biosolids program. The biosolids program includes having and following nutrient management plans for all fields receiving biosolids, unannounced inspections of the land application sites, certification of persons land applying biosolids, and payment of a $7.50 fee per dry ton of biosolids land applied.

Department of Conservation and Recreation

DCR is a major participant in the TMDL process. VDCR has a lead role in the development of IPs to address non-point source pollutants such as bacteria from failing septic systems, pet waste, and livestock operations that contribute to water quality impairments. VDCR provides available funding and technical support for the implementation of NPS components of IPs.

Soil and Water Conservation Districts

The Skyline SWCD will provide outreach, technical and financial assistance to farmers and property owners in the Little River and Tributaries watershed through the Virginia Agricultural BMP Cost-Share and Tax Credit programs. Their responsibilities will include promoting implementation goals, available funding and the benefits of BMPs and providing assistance in the survey, design, layout, and approval of agricultural BMPs. Education and outreach activities are a significant portion of their responsibilities.

Virginia Department of Agriculture and Consumer Services

Through Virginia's Agricultural Stewardship Act, the VDACS 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. If a producer fails to implement the plan, corrective action can be taken which can

include a civil penalty up to $5,000 per day. The Commissioner of Agriculture can issue an emergency corrective action if runoff is likely to endanger public health, animals, fish and aquatic life, public water supply, etc. An emergency order can shut down all or part of an agricultural activity and require specific stewardship measures. The enforcement of the Agricultural Stewardship Act is entirely complaint-driven. This Act is considered as a state regulatory tool that can support implementing conservation practices to addresses pollutant sources in TMDL impaired watersheds even though the Act does not specifically reference pathogens as a pollutant.

Virginia Department of Health

VDH is responsible for maintaining safe drinking water measured by standards set by USEPA. Their duties also include septic system regulation and, in the past, regulation of biosolids land application. Like VDACS, VDH's program is complaint-driven. Complaints can range from a vent pipe odor that is not an actual sewage violation and takes very little time to investigate, to a large discharge violation that may take many weeks or longer to effect compliance. In the scheme of this TMDL IP, VDH has the responsibility of enforcing actions to correct or eliminate failed septic systems and straight pipes, respectively. VDH staff also issue permits for the repair and installation of septic systems and the installation of alternative waste treatment systems.

Local Governments

Floyd County in particular as well as Montgomery and Pulaski counties can develop programs and ordinances involving pollution prevention measures and play a very active role in the TMDL implementation process. Actions include, in order of priority:

- Promoting or requiring a septic system maintenance program.
- Exploring options for providing sewer service to more residents, including conventional and alternative systems (e.g., STEG/STEP, decentralized systems)
- Making landowners in the watershed aware of implementation goals, cost-share assistance, and voluntary options that are beneficial. Programs may include:
    - Information for pet owners, signage describing water quality concerns related to pet waste, and disposal bags and receptacles in areas of high pet traffic.
    - Demonstration projects in urban areas, such as, a series of rain barrel demonstrations downtown.
    - A low impact development (LID) information packet, to be distributed to local developers, land design engineers and construction companies.

    - A brochure/mailing, explaining specific practices individuals and small groups can use to reduce pollution (particularly bacteria) from reaching streams.
- Requiring dog kennel owners to produce a plan for the proper disposal of waste from the facility when licenses are issued.
- Establishing set backs from streams to allow for development of a vegetated buffer area.
- Promoting the use of sustainable growth practices that minimize or eliminate storm water runoff in future subdivisions.
- Requiring a septic system drainfield reserve area for land parcels using on-site wastewater treatment. This reserve area is for use in the event the on-site system fails.
- Track BMP installation.

Successful implementation depends on stakeholders taking responsibility for their role in the process. This could include using pet waste composters if they have dogs, getting septic tanks pumped on a regular basis and talking with friends and neighbors about things they can do to protect water quality. While the 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 100% free of risk to human health, it is possible and desirable to minimize anthropogenic problems. Virginia's approach to correcting NPS pollution problems has been, and continues to be, encouragement of participation through education and financial incentives. However, if progress is not made toward restoring water quality using this voluntary approach, regulatory controls may be established and enforced.

Integration with Other Watershed Plans

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.

Implementation efforts in the previously developed bacteria TMDLs in Mill Creek and Dodd Creek are accounted for in this implementation plan. The Skyline SWCD may be able to coordinate efforts between these two projects and the current implementation plan.

Monitoring

Improvements in water quality will be determined in the Little River watershed through monitoring conducted by the VDEQ's ambient monitoring program. The monitoring data includes bacteria, physical parameters (dissolved oxygen, temperature, pH, and conductivity), nutrients and suspended and dissolved solids. The VDEQ uses the data to determine overall water quality status. The water quality status will help gauge the success of implementation aimed at reducing the amount of bacteria in the streams of the Little River watershed.

Additionally, volunteer monitoring is encouraged to supplement the monitoring conducted by VDEQ. Interested parties should contact Skyline SWCD, or the National Committee for the New River.

The Steering Committee, Skyline SWCD, VDH, and VDEQ will assess progress toward end goals during implementation through tracking of control measure installations and continued water quality monitoring.

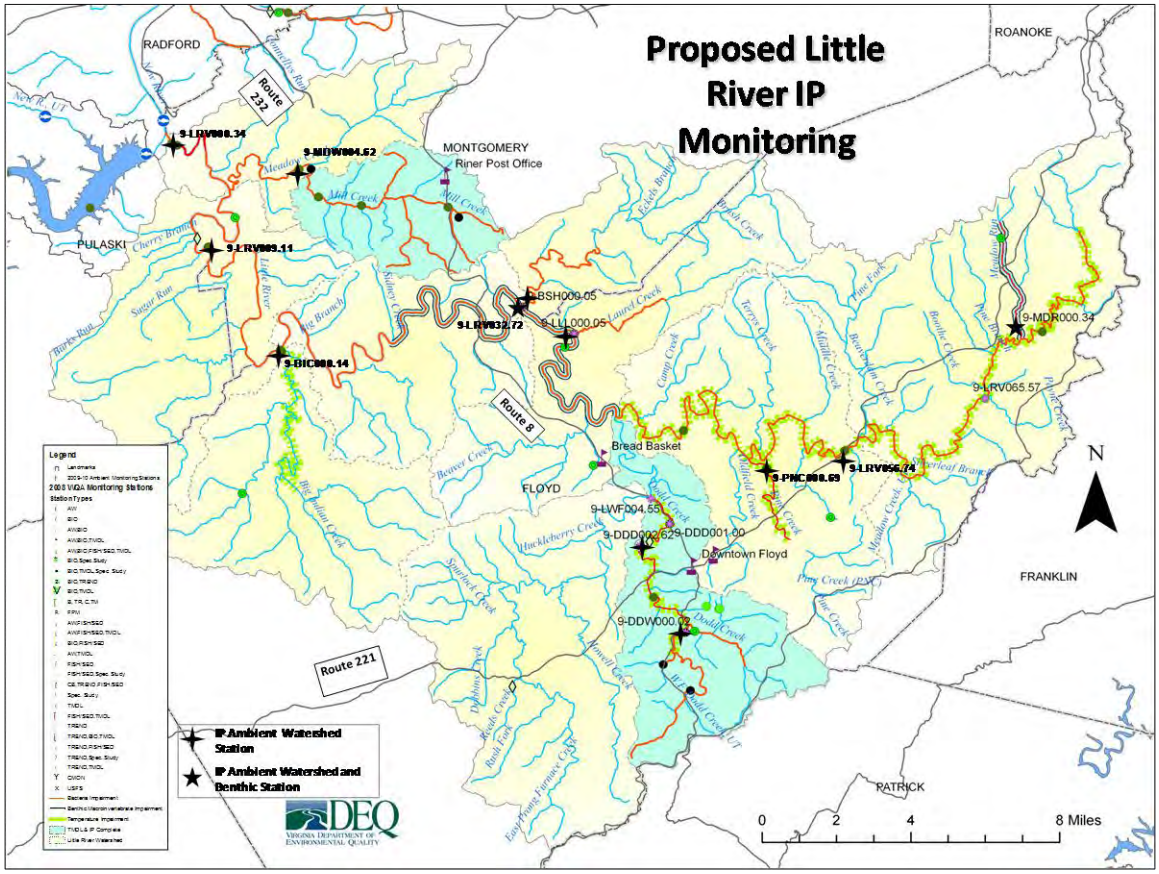

Figure 3. Location of monitoring stations in the Little River watershed.

Table 10. Monitoring station IDs, station locations, and monitoring schedules for the Little River watershed VDEQ stations.

Stream Name	Station Id	Station Description	Spg Code	Listing Type
Brush Creek	9-BSH000.05	Rt. 617 Bridge	AW	Bac,
Laurel Creek	9-LLL000.05	Rt. 705 Bridge	AW	Bac,
Little River	9-LRV000.34	RT. 605 Bridge, S of Radford	AW	Bac,
Little River	9-LRV009.11	RT. 693 Bridge	AW, B	Bac,
Little River	9-LRV032.72	Rt. 617 Bridge	AW, B	Bac,
Little River	9-LRV056.74	Rt 221 Bridge	AW, B	Bac,T
Meadow Run	9-MDR000.34	Rt 641 Bridge	AW, FP	Bac
Meadow Creek	9-MDW004.62	Rt. 600 Bridge	AW	Bac,
Pine Creek	9-PNC000.69	Rt 682 Bridge	AW	Bac,T
Big Indian Creek	9-BIC000.14	Rt. 787 Bridge	AW	T
Dodd Creek	9-DDD002.62	Rt. 696 Bridge below Floyd STP	AW, TM, C	T
Dodd Creek, West Fork	9-DDW000.02	Rt. 8 Bridge	TM	T

AW - Ambient Watershed - 2 yr B – Benthic C - Fish Tissue, Sediment
FP - Probabilistic; Benthic, Conventionals, Metals, Organics, Sediment TM - TMDL Study Station

Funding Sources

Potential funding sources available to assist with implementation were identified during implementation plan development. Detailed descriptions can be obtained from the Skyline SWCD, VDCR, NRCS, and VCE. Sources include:

Federal

Community Development Block Grant Program
Conservation Reserve Program (CRP)
Conservation Reserve Enhancement Program (CREP)
Environmental Quality Incentives Program (EQIP)
Wildlife Habitat Incentive Program (WHIP)
Wetland Reserve Program (WRP)

State

Clean Water State Revolving Fund
Virginia Agricultural Best Management Practices Cost-Share Program
Virginia Agricultural Best Management Practices Tax Credit Program
Virginia Agricultural Best Management Practices Loan Program
Virginia Small Business Environmental Assistance Fund Loan Program
Virginia Water Quality Improvement Fund

Local

Indoor Plumbing Rehabilitation program

Private

Small Watershed Grants Program
Southeast Rural Community Assistance Project (SE/R-CAP)
National Fish and Wildlife Foundation

References

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

SERCC. 2010. Southeast Regional Climate Center. www.water.dnr.state.sc.us/climate/sercc