Pigg River, Beaverdam Creek, Fryingpan Creek and Poplar Branch Watersheds Implementation Plan

A plan to reduce *Sediment* in the watershed

Technical Document

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Prepared by
Virginia Department of Environmental Quality (DEQ)

In Cooperation with
Local Stakeholders

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- Tri-County Lakes Administrative Commission
- Natural Resource Conservation Service

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List of Abbreviations used in the Implementation Plan

BMP - Best Management Practice
BST - Bacterial Source Tracking
CREP - USDA Conservation Reserve Enhancement Program
CRP - USDA Conservation Reserve Program
CWA - Clean Water Act
CWSR - Clean Water State Revolving Fund
DCR - Virginia Department of Conservation and Recreation
DEQ - Virginia Department of Environmental Quality
DOF - Virginia Department of Forestry
EPA - United States Environmental Protection Agency
EQIP - USDA Environmental Quality Incentives Program
FTE - Full Time Equivalent
GIS - Geographic Information System
GWLF - Generalized Watershed Loading Functions
HUC - Hydrologic Unit Code
IP - Implementation Plan
LA - Load Allocation
LDC - Load Duration Curve
NPDES - National Pollutant Discharge Elimination System
NPS - Nonpoint Source
NRCS - Natural Resources Conservation Service
PDC - Planning District Commission
PS - Point Source
SWCD - Soil and Water Conservation District
SWM - Storm Water Management
TMDL - Total Maximum Daily Load
USDA - United States Department of Agriculture
USGS - United States Geological Survey
VCAP - Virginia Conservation Assistance Program
VCE - Virginia Cooperative Extension
VGIN Virginia Geographic Information Network
VLCD Virginia Land Cover Dataset
VPDES - Virginia Pollutant Discharge Elimination System
VSMP - Virginia Stormwater Management Program
WIP - Watershed Implementation Plan
WLA - Waste Load Allocation
WQIF - Water Quality Improvement Fund
WQMIRA - Virginia Water Quality Monitoring, Information, and Restoration Act
WQMP - Water Quality Management Plan

1 INTRODUCTION

1.1 Background

The 1972 Federal Clean Water Act (CWA) requires that streams, rivers, and lakes meet their state's water quality standards. The CWA also requires that states conduct monitoring to identify those waters that do not meet standards. Under the CWA, Virginia has determined that many streams do not meet state water quality standards for the protection of the six designated uses: fish consumption, swimming, shell fishing, aquatic life, wildlife and public water supply.

When streams fail to meet water quality standards, Section 303(d) of the CWA and the U.S. Environmental Protection Agency's (EPA) Water Quality Management and Planning Regulation both require that states develop a Total Maximum Daily Load (TMDL) for each pollutant. A TMDL is a "pollution budget" that sets limits on the amount of pollution that a waterbody can tolerate and still maintain water quality standards. In order to develop a TMDL, background concentrations, point source loadings, and non-point source loadings are considered. A TMDL accounts for seasonal variations and must include a margin of safety. Through the TMDL process, states establish water-quality based controls to reduce pollution and meet water quality standards.

Once a TMDL is developed, Virginia's 1997 Water Quality Monitoring, Information and Restoration Act (WQMIRA) requires development of a plan, commonly known as an 'Implementation Plan', that provides expeditious implementation of TMDLs in order to achieve fully supporting status for impaired waters. An Implementation Plan (IP) describes the pollutant control measures, which can include the use of better treatment technology and the installation of best management practices (BMPs), which need to be implemented in order to meet the water quality goals established in the TMDL.

1.2 Designated Uses and Applicable Water Quality Standards

Water quality standards are designed 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.). Virginia Water Quality Standard 9 VAC 25-260-10 (Designation of uses.) states:

All state waters, including wetlands, 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 reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources, e.g., fish and shellfish.

1.2.1 Aquatic Life Designated Use and General Standard

Virginia's narrative General Standard (9 VAC 25-260-20), also known as the Aquatic Life Use standard, states in part:
"A. 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" (SWCB, 2011).

DEQ's biological monitoring program is used to evaluate compliance with the above standard. This program monitors the assemblage of benthic (bottom-dwelling) macro (large enough to see) invertebrates (insects, mollusks, crustaceans, and annelid worms) in streams to determine the biological health of the stream. Benthic macroinvertebrates are sensitive to water quality conditions, important links in aquatic food chains, major contributors to energy and nutrient cycling in aquatic habitats, relatively immobile, and easy to collect. These characteristics make them excellent indicators of aquatic health. Changes in water quality are reflected in changes in the structure and diversity of the benthic macroinvertebrate community. Currently, DEQ assesses the health of the benthic macroinvertebrate community using the Virginia Stream Condition Index (VSCI). This index was first developed by Tetra Tech (2003) and later validated by DEQ (2006). The VSCI is a multi-metric index based on eight biomonitoring metrics. The index provides a score from 0-100, and scores from individual streams are compared to a statistically derived cutoff value based on the scores of regional reference sites.

Pigg River has been designated as impaired in three different segments. The first beginning at the confluence of the South Prong Pigg River downstream 1.48 miles to the confluence of Turners Creek (stream segment VAW-L14R_PGG05B12). The second segment begins one mile above the mouth of the South Prong Pigg River downstream 1.01 miles to the South Prong Pigg River confluence on the Pigg River (stream segment VAW-L14R_PGG06A02). The third segment begins one mile above the mouth of the South Prong Pigg River upstream 1.94 miles to near Five Mile Mountain Rd. (Rt.748) (stream segment VAW-L14R_PGG06B12). The Poplar Branch impaired segment of 2.56 miles begins at its headwaters to its confluence with Snow Creek (stream segment VAW-L17R_PAA01A04). The Fryingpan Creek impaired segment begins at headwaters downstream roughly 2.5 miles (stream segment VAW-L18R_FRY01A06). The Beaverdam Creek impaired segment begins from the WQS designated public water supply (PWS) section 6i, e.g. 5 miles above the 795 ft. pool elevation of Smith Mountain Lake on downstream to the inundation

of Beaverdam Creek's waters at Smith Mountain Lake (stream segment VAW-L07R_BDA01A00). The second impaired segment for Beaverdam Creek begins from its headwaters downstream to the WQS designated public water supply (PWS) for approximately 5.36 miles (stream segment VAW-L07R_BDA02A00).

A benthic stressor analysis study was conducted in 2021 to determine the reason for the benthic impairments in the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek watersheds. The stressor analysis study used a formal causal analysis approach developed by USEPA, known as CADDIS Causal Analysis Diagnosis Decision Information System (CADDIS). The CADDIS approach evaluates 14 lines of evidence that support or refute each candidate stressor as the cause of impairment. In each stream, each candidate stressor was scored from -3 to +3 based on each line of evidence. Total scores across all lines of evidence were then summed to produce a stressor score that reflects the likelihood of that stressor being responsible for the impairment. The study found that sediment (measured as total suspended solids or TSS) was a probable stressor in all the impaired study watersheds. For Poplar Branch impairment, the stressor identification analysis also identified hydrologic modification (via small farm ponds) as a probable stressor.

Although the Pigg River, Poplar Branch, Fryingpan Creek and Beaverdam Creek TMDL was developed for sediment, attainment of a healthy benthic community will ultimately be based on biological monitoring of the benthic macroinvertebrate community, in accordance with established DEQ protocols. If a future review should find that the reductions called for in these TMDLs based on current modeling are found to be insufficiently protective of local water quality, then revision(s) will be made as necessary to provide reasonable assurance that water quality goals will be achieved.

2 REQUIREMENTS FOR IMPLEMENTATION PLANS

There are a number of requirements and recommendations for IPs. The goal of this chapter is to clearly define what they are and explicitly states if the "elements" are a required component of an acceptable IP or are merely a recommended topic that should be covered in a thorough IP. This chapter discusses a) the requirements outlined by WQMIRA that must be met in order to produce an IP that is approvable by the Commonwealth, b) IP elements recommended by EPA, and c) components of an IP required in Section 319(h) of the CWA.

2.1 State Requirements

The IP is a requirement of Virginia's 1997 Water Quality Monitoring, Information, and Restoration Act (§62.1-44.19:4 through 19:8 of the Code of Virginia), or WQMIRA. WQMIRA directs the State Water Control Board to "develop and implement a plan to achieve fully supporting status for impaired waters." In order for IPs to be approved by the Commonwealth, they must meet the requirements outlined in WQMIRA (DEQ, 2017), including:

- date of expected achievement of water quality objectives,
- measurable goals,
- necessary corrective actions, and
- associated costs, benefits, and environmental impact of addressing the impairment

2.2 Federal Recommendations

Section 303(d) of the CWA and current EPA regulations do not require the development of IPs. The EPA does, however, outline the minimum elements needed when implementing a TMDL in its 1999 *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA, 1999):

- a description of the implementation actions and management measures,
- a timeline for implementing these measures,
- legal or regulatory controls,
- the time required to attain water quality standards, and
- a monitoring plan and milestones for attaining water quality standards.

Further recommendations are outlined in the *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (EPA, 2008). The handbook describes the steps used in the watershed planning and implementation process and integrates EPA's nine elements as described in the following section.

It is strongly suggested that the EPA recommendations be addressed in the IP, in addition to the components required by WQMIRA.

2.3 Requirements for CWA Section 319(h) Fund Eligibility

The EPA develops guidelines that describe the process and criteria used to award CWA Section 319(h) nonpoint source grants to States. The guidance is subject to revision and the most recent version should be considered for IP development. The "Nonpoint Source Program and Grants Guidelines for States and Territories" (EPA, 2024) identifies the following nine elements that must be included in the IP in order to qualify for CWA Section 319(h) funds:

1. Identify the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed-based plan;
2. Estimate the load reductions expected to achieve water quality standards;
3. Describe the NPS management measures that will need to be implemented to achieve the identified load reductions;
4. Estimate the amounts of 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. Provide 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. Provide a schedule for implementing the NPS management measures identified in the watershed-based plan;
7. Describe interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented;
8. Identify a set of criteria for determining if loading reductions are being achieved and if progress is being made towards attaining water quality standards; if not, identify the criteria for determining if the watershed-based plan needs to be revised; and
9. Establish a monitoring component to evaluate the effectiveness of the implementation effort.

While IPs that include EPA's nine elements are not guaranteed CWA Section 319(h) funds, incorporating these elements opens the door to the possibility of receiving CWA Section 319(h) funds which are awarded annually to the State.

3 REVIEW OF TMDL DEVELOPMENT

3.1 Background

The Beaverdam Creek, Fryingpan Creek, Pigg River, and Poplar Branch watersheds are in Bedford, Franklin, and Pittsylvania Counties, Virginia. Beaverdam Creek is situated in Bedford County and drains the area east of the City of Roanoke, including the town of Stewartsville. Beaverdam Creek flows into upper Smith Mountain Lake (Roanoke River), and is largely a mosaic of cropland, forest, and pasture. Fryingpan Creek is situated in Pittsylvania County and flows northwest into the Pigg River, just before it joins Leesville Lake. The study portion of Fryingpan Creek runs from its headwaters for 2.5 miles, ending roughly a mile after it crosses under route 40. Fryingpan Creek's watershed consists mostly of cropland, forest, and pasture. The study portion of the Pigg River lies in Franklin County, and its watershed consists primarily of cropland, pasture and forested land. The impaired reach extends from the junction of the Pigg River and Turners Creek upstream 2.95 miles. Poplar Branch is situated in Franklin County, running from its confluence with Snow Creek upstream 2.56 miles. Poplar Branch's watershed, like the other study watersheds, consists primarily of cropland, pasture, and forested land. All study reaches are either direct or indirect tributaries to the Roanoke River (also referred to as the Staunton River in some areas) which flows southeast through North Carolina into the Albemarle Sound and the Atlantic Ocean.

Beaverdam Creek, Fryingpan Creek, Pigg River, and Poplar Branch are listed as impaired on Virginia's 2020 Section 305(b)/303(d) Water Quality Assessment Integrated Report due to water quality violations of the general aquatic life (benthic) standard. The impaired segments addressed in this document are shown in Table 3-1 and Figure 3-1.

Table 3-1. Impaired segments addressed in the implementation plan.

Waterbody Name	County	VAHU6	HUC12	Impaired Assessment Units/ATTAINS ID	Pollutant	Listing Year	Size (miles)
Pigg River	Franklin	RU29	030101010801	VAW-L14R_PGG05B12	Benthic	2012	1.49
				VAW-L14R_PGG06A02	Benthic	2012	1.02
				VAW-L14R_PGG06B12	Benthic	2012	1.95
Beaverdam Creek	Bedford	RU17	030101010702	VAW-L07R_BDA01A00	Benthic	2010	4.99
				VAW-L07R_BDA02A00	Benthic	2010	5.36
Poplar Branch	Franklin	RU35	030101010903	VAW-L17R_PAA01A04	Benthic	2008	2.57
Fryingpan Creek	Pittsylvania	RU37	030101011002	VAW-L18R_FRY01A06	Benthic	2006	2.56

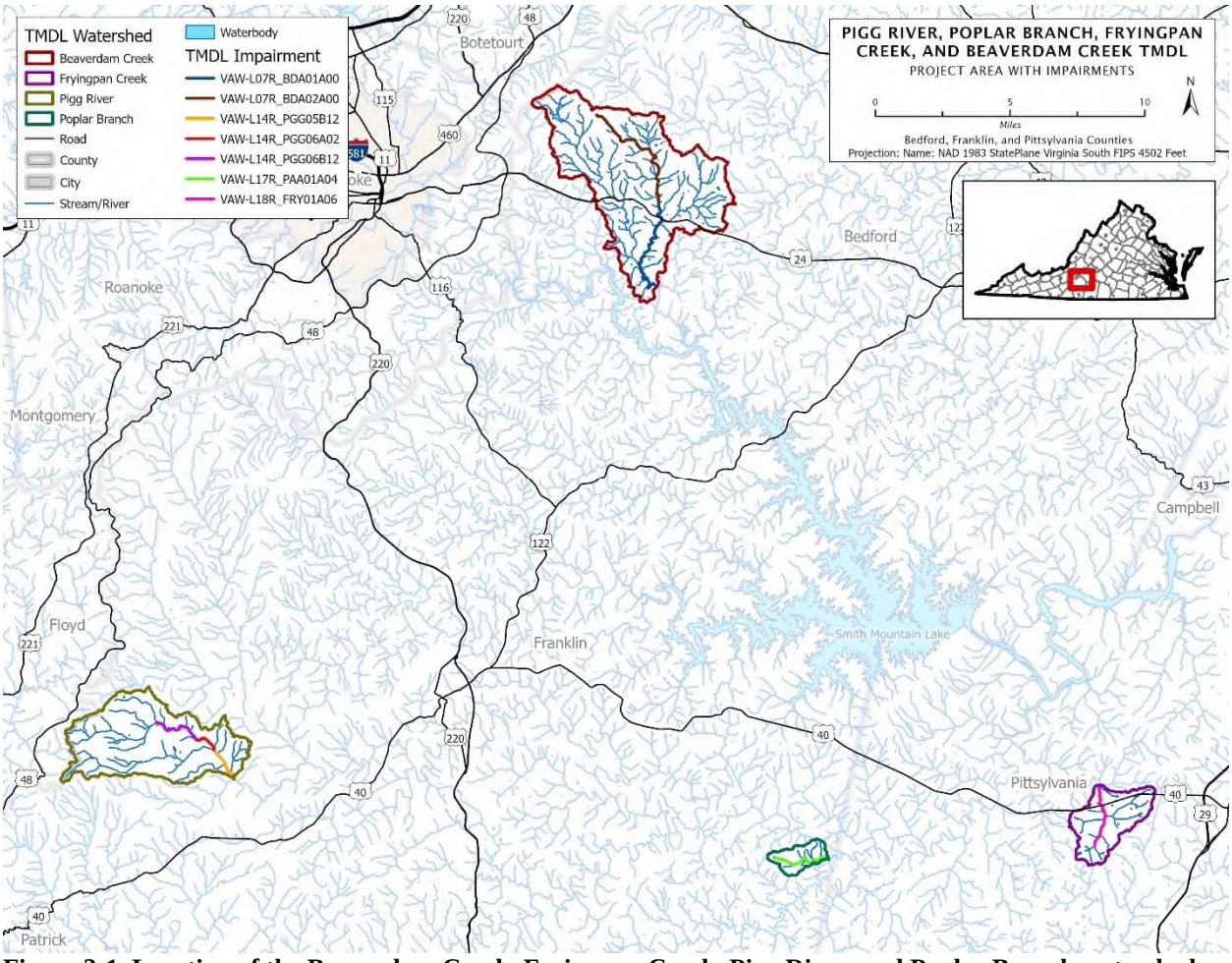

Figure 3-1. Location of the Beaverdam Creek, Fryingpan Creek, Pigg River, and Poplar Branch watersheds and impairments.

The Pigg River, Poplar Branch, Fryingpan Creek and Beaverdam Creek associated National Watershed Boundary Datasets include RU29, RU35, RU37, RU17 respectively. The Pigg River watershed is approximately 9,975 acres in size. The watershed is predominantly forested (74.55%) with the remaining 25.45% consisting of pasture (12.36%), tree (4.2%), cropland (3.85%), turd grass (1.95%), impervious (1.34%), harvested/ disturbed (0.86%), other (0.54%), shrub (0.21%), barren (0.05%) and water (0.10%) land use (Figure 3-2). The Poplar Branch watershed is approximately 1,075 acres in size. The watershed is predominantly forested (52.96%) with the remaining 47.04% consisting of pasture (19.14%), tree (6.18%), cropland (7.53%), turf grass (5.04%), impervious (2.56%), harvested/ disturbed (4.07%), other (0.59%), shrub (1.11%), barren (0%) and water (0.83%) land use (Figure 3-3). The Fryingpan Creek watershed is approximately 3,450 acres in size. The watershed is predominantly forested (51.70%) with the remaining 48.30% consisting of pasture (26.45%), tree (4.95%), cropland (6.87%), turf grass (3.51%), impervious (1.48%), harvested/ disturbed (1.23%), other (1.81%), shrub (0.95%), barren (0.16%) and water (0.89%) land use (Figure 3-4). The Beaverdam Creek watershed is approximately 17,250 acres in

size. The watershed is predominantly forested (60.39%) with the remaining 39.61% consisting of pasture (18.47%), tree (10.06%), cropland (0.28%), turf grass (5.98%), impervious (2.74%), harvested/ disturbed (1.11%), other (0.03%), shrub (0.52%), barren (0%) and water (0.43%) land use (Figure 3-5). All watersheds either directly or indirectly drain to the Roanoke River (Staunton River/ Smith Mountain Lake/ Leesville Lake), which flows southeast through North Carolina and into the Albemarle Sound and the Atlantic Ocean.

For this report, the Virginia Geographic Information Network (VGIN) 2016 Virginia Land Cover Dataset (VLCD) was used to represent the current land use. The land cover distribution for each impaired watershed is shown in Figures 3-2 to 3-5. Most of the land cover in all study watersheds is forest, ranging from 57 to 76%, followed by pasture, ranging from 15 to 26%. Except for Beaverdam creek, cropland is the third most common land cover type, ranging from 5 to 7%. None of the watersheds are significantly developed.

This land cover dataset combined with an accounting of the permitted discharges represent the major pollutant sources in the watersheds. To study the problem of excess sediment in the Beaverdam Creek, Fryingpan Creek, Pigg River, and Poplar Branch watersheds, a combination of monitoring and computer modeling was utilized. Monitoring was used to determine how much sediment is in the streams at any given time and how aquatic life conditions have changed over time. The computer model was used to estimate where the sediment is coming from and make predictions about how stream conditions would change if those sources were reduced. For this purpose, a computer model, the Generalized Watershed Loading Function model (or GWLF), was used. GWLF considers the slope, soils type, land cover, soil erodibility, and runoff to estimate the amount of soil eroded from the watershed and deposited in the stream. The model was calibrated against real-world flow measurements taken from the stream to ensure that it was producing accurate results. The tested model was then used to estimate the sediment reductions that would be needed to restore a healthy condition for aquatic life in the impaired streams. Figures 3-2 through 3-5 show the distribution of sediment contributions from various sources in the watersheds. The permitted sources include one Virginia Pollutant Discharge Elimination System (VPDES) individual permit and two domestic sewage permits, all in Beaverdam Creek. The sediment loads from permitted sources were calculated based on the permit language, reported discharge data, and land cover type and area. In all four of these TMDL watersheds, pasture or cropland were the primary sources of sediment.

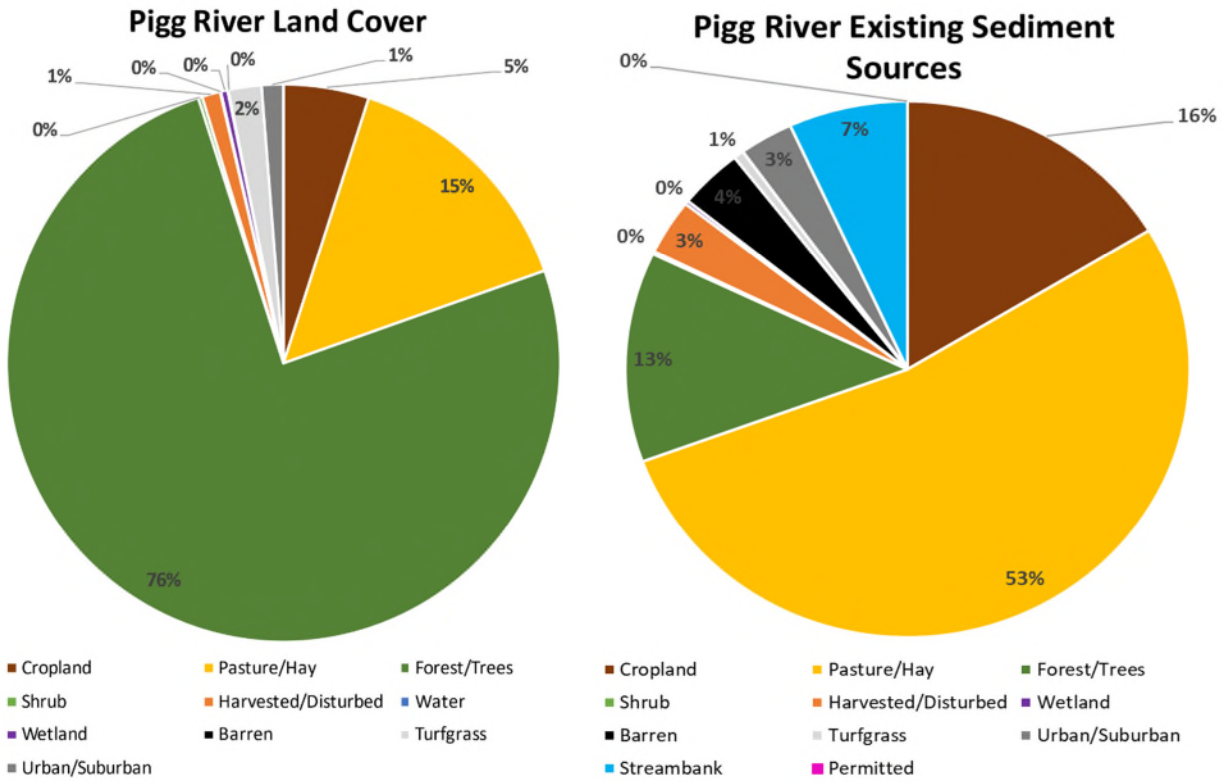

Figure 3-2. Land cover and existing source load distributions in the Pigg River watershed.

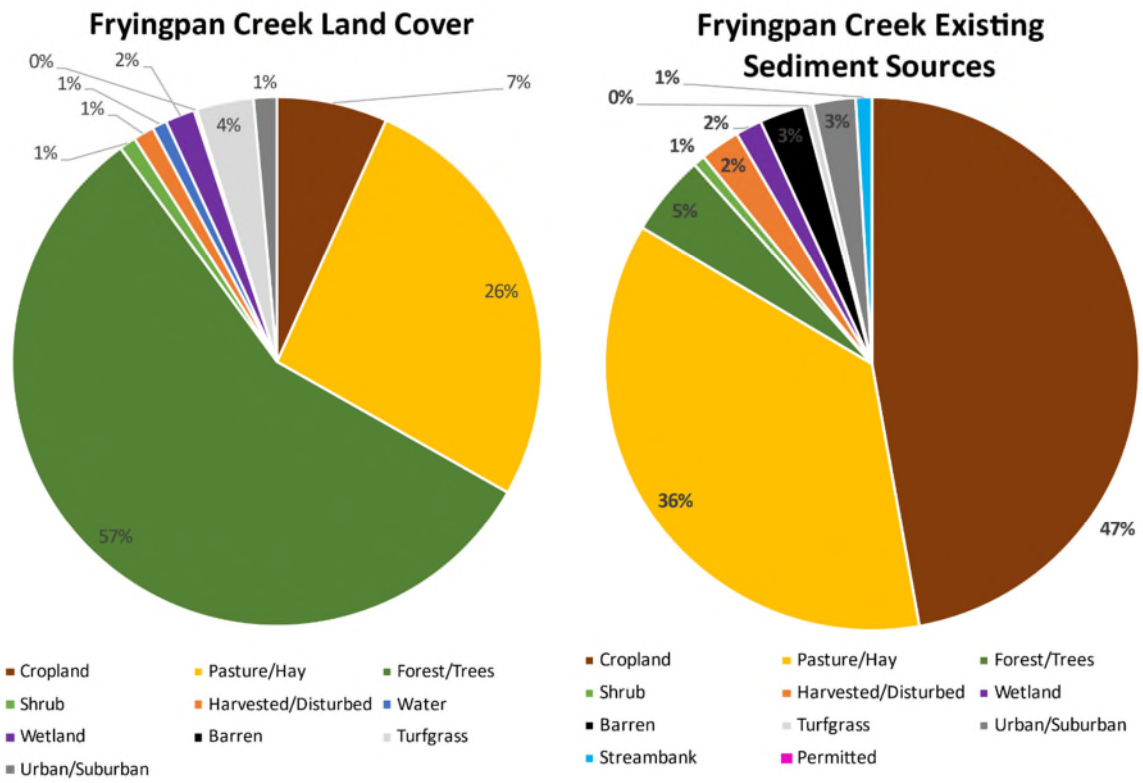

Figure 3-3. Land cover and existing source load distributions in the Fryingpan Creek watershed.

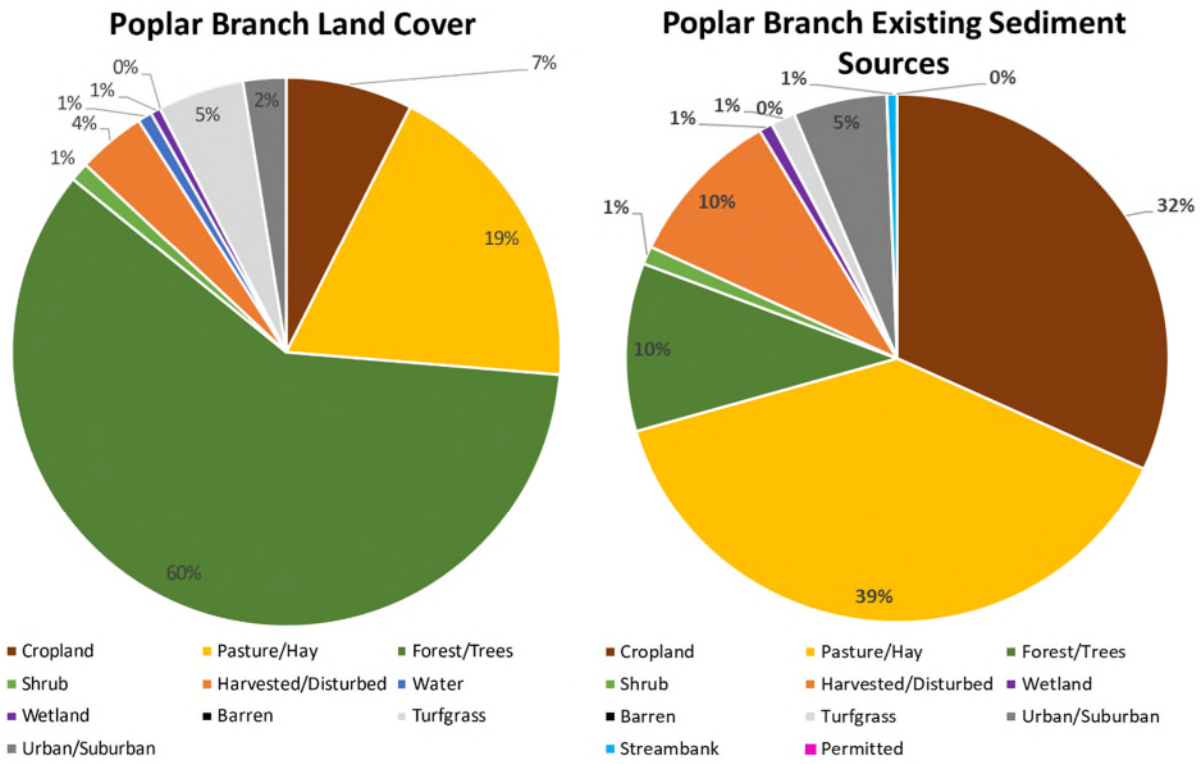

Figure 3-4. Land cover and existing source load distribution in the Poplar Branch watershed.

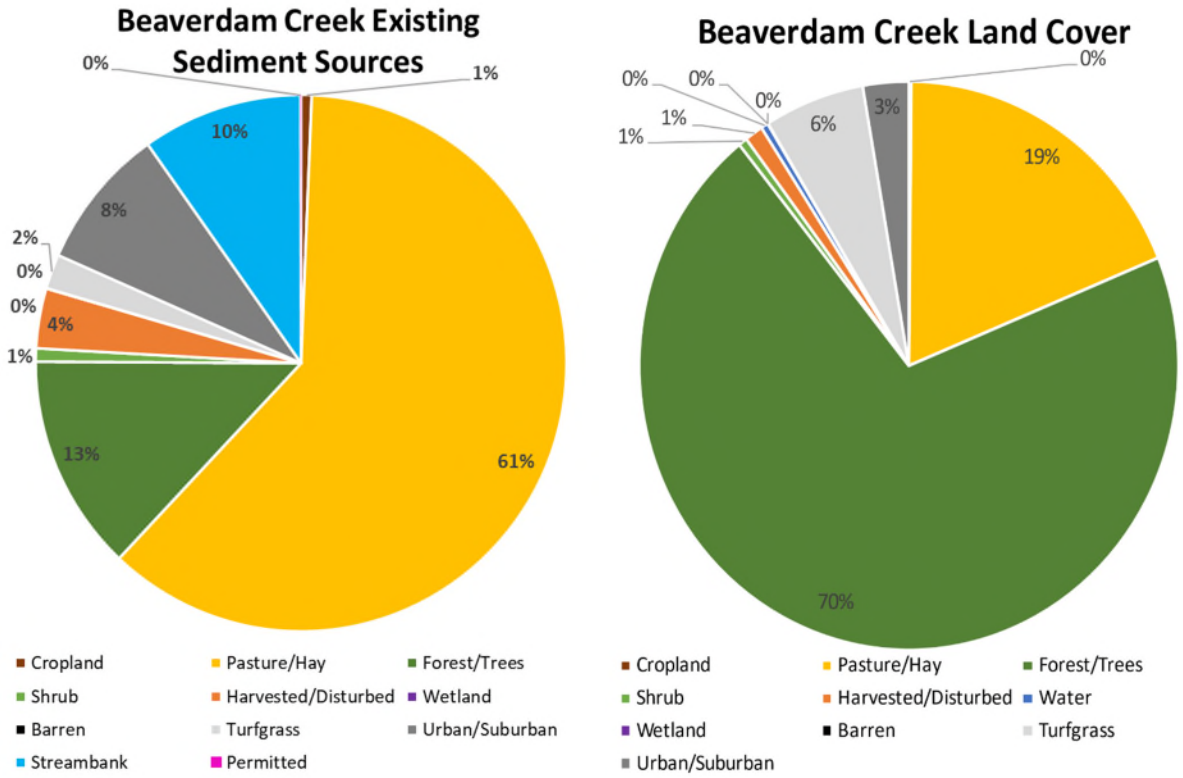

Figure 3-5. Land cover and existing source load distribution in the Beaverdam Creek watershed.

DEQ started development of the Beaverdam Creek, Fryingpan Creek, Pigg River, and Poplar Branch Benthic TMDL in 2019, and the final TMDL report was completed in October 2022 (DEQ, 2022). The TMDL report is available by contacting the DEQ Blue Ridge Regional Office TMDL Coordinator.

In 2006 a TMDL was developed for a bacteria impairment in Beaverdam Creek. The TMDL was developed using a load duration method to calculate the bacteria reduction needed, and bacterial source tracking (BST) to determine the relative contribution of bacteria by source (i.e., human, pet, livestock, and wildlife). A 94% reduction in E. coli load was estimated to meet the TMDL, with a 99% reduction from human, pet and livestock sources, and an 86% reduction in wildlife load.

DEQ's intention prior to development of this IP was to quantify best management practices (BMPs) to meet the bacteria TMDL goal in Beaverdam Creek in addition to addressing the benthic impairment. The hope was that an updated source assessment, a query of BMPs implemented in the watershed since TMDL development, and review of the water quality monitoring since 2006 would provide necessary information to estimate BMPs needed. However, because the TMDL was developed using the load duration method, a link between the reduction of bacteria loads from the sources (e.g., livestock direct deposition, failing septic systems, pasture runoff) and the in-stream bacteria concentrations could not be established, and the water quality milestones could not be estimated. Also complicating the attempt, the water quality standard has changed since TMDL development, and without a computer model, there was no way to simulate conditions to compare to the current standard.

The effort to address the bacteria impairment in Beaverdam Creek was still worthwhile in that it was identified during project planning phase that the bacteria sources identified in the 2006 TMDL can also be managed by BMPs typically selected to address an unhealthy benthic community. DEQ's approach during development of this IP aims to achieve co-benefits through recommending implementation of BMPs that address more than one pollutant.

3.2 Water Quality Monitoring Data

Data collected from the biological monitoring stations in the Pigg River, Poplar Branch, Fryingpan Creek and Beaverdam Creek watershed were used to list the stream segments as impaired for aquatic life use and to develop the sediment TMDLs. Table 3-2 provides a summary of the data collected from these stations and Figure 3-6 shows the locations of the DEQ monitoring stations.

Table 3-2. Summary data type collected at each monitoring station.

Benthic Station ID	Location	Monitoring Program Type	Years Sampled	Parameters Sampled
4AFRY006.08	At Route 40 Bridge	Ambient, Bio, TM, APROB	2003- 2018	Biology, Nutrients, Total Habitat, Chemical Data
4APGG077.15	At Route 602 Bridge	Ambient, Bio, TM	2013- 2019	Biology, Nutrients, Total Habitat, Chemical Data
4APGG076.93	Upstream of South Prong Pigg confluence	Probabilistic	2009	Biology, Nutrients, Metals, Total Habitat, Chemical Data, Fish community
4APAA000.71	Route 629 Crossing	Ambient, Bio, TM	2013-2018	Biology, Nutrients, Total Habitat, Chemical Data
4APAA000.24	LaPrade Farm below Rte. 629	Probabilistic	2001	Biology, Nutrients, Total Habitat, Chemical Data
4ABDA011.79	Lick Mountain Road off Rte. 635	Probabilistic	2001	Biology, Nutrients, Total Habitat, Chemical Data
4ABDA006.72	Below Rte. 24 Bridge	Bio	2008	Biology, Total Habitat
4ABDA004.14	Route 757 Bridge	Ambient, Bio	2017-2018	Biology, Nutrients, Total Habitat, Chemical Data
4ABDA003.63	STA #7 off Rte. 757 Bedford County	Ambient, Trend	1992-2012	Bacteria, nutrients

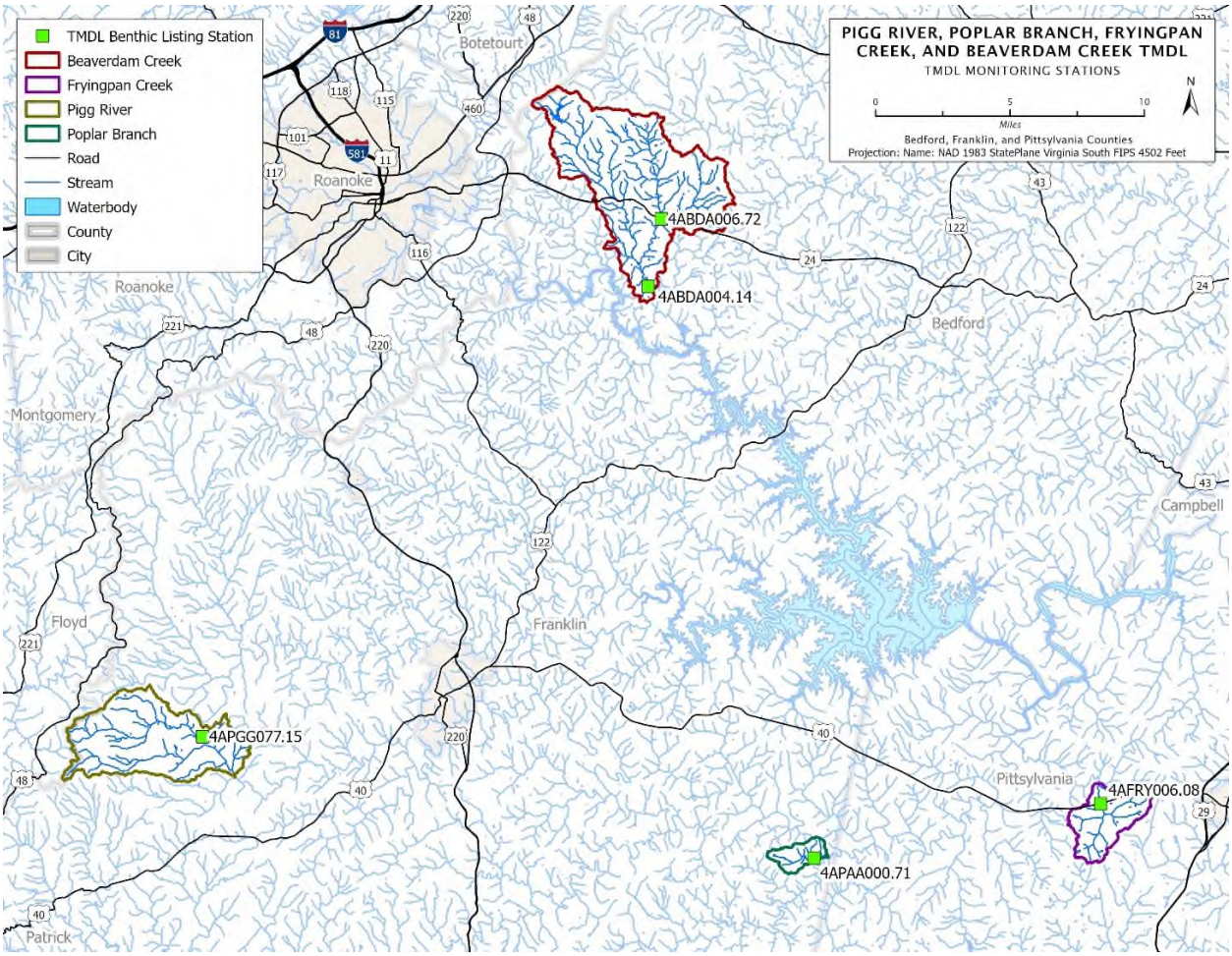

Figure 3-6. Location of DEQ monitoring stations in the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek watersheds.

Data collected to evaluate streams in the watersheds are collected by DEQ and other government officials. These streams are considered impaired for failure to support aquatic life use (i.e., a benthic impairment). All study streams are also considered impaired for recreational use (i.e., bacteria); however, previous TMDL studies/IPs address those impairments, with the exception of Beaverdam Creek in terms of bacteria. During the 2020 assessment window (January 1, 2013 to December 31, 2018) the median VSCI score was 54.61 in Beaverdam Creek, 53.59 in Fryingpan Creek, 55.98 in the Pigg River, and 52.95 in Poplar Branch; this indicates impairment of the benthic macroinvertebrate community in all segments. A summary of each stream's listing is presented below.

Beaverdam Creek is impaired from its headwaters to its confluence with the Roanoke River (roughly 10.3 miles) and was initially listed on Virginia's 303(d) Report in 2010 based on data collected in 2008. Beaverdam Creek was placed on this list based on data collected at DEQ monitoring station 4ABDA006.72.

Fryingpan Creek is impaired from its headwaters downstream roughly 2.5 miles and was first listed on Virginia's 303(d) Report in 2006 for an aquatic life use impairment based on biomonitoring in 2003 for DEQ's probabilistic monitoring program. Fryingpan Creek was listed due to low VSCI scores at station 4AFRY006.08.

The Pigg River is impaired from a point near Five Mile Mountain Road (Rt. 748) to its confluence with Turners Creek (roughly 4.4 miles in total) and was initially listed on Virginia's 303(d) Integrated Report in 2012 for an aquatic life use impairment based on data collected for the probabilistic program in 2009. The Pigg River was listed due to low VSCI scores at stations 4APGG076.93 and 4APGG077.15.

Poplar Branch is impaired from its headwaters to its confluence with Snow Creek (roughly 2.5 miles) and was initially listed on Virginia's 303(d) Report in 2008 based on data collected in 2001. Poplar Branch was listed due to low VSCI scores at stations 4APAA000.24 and 4APAA000.71.

Biological, physical, and chemical data from nine monitoring stations within the TMDL watersheds were used in developing a stressor analysis study. This includes eight benthic and nine water quality monitoring stations (eight sites are co-located benthic and water quality monitoring stations). The various benthic monitoring stations are shown in Figure 3-6**.**

The stressor analysis study determined too much sediment as the main reason for benthic impairments in the watersheds. Total habitat scores in Fryingpan Creek were within the medium to high probability for aquatic stress category and were driven by poor scores for bank stability, pool variability, instream sediment conditions, and substrate. Observations of the sediment deposition and embeddedness also indicate that sedimentation is a primary stressor to the benthic community. Total habitat scores in Beaverdam Creek and the impaired section of the Pigg River were generally within the medium probability range for aquatic stress, generally having poor riparian vegetation, unstable and poorly vegetated banks, and excess sediment. Both Beaverdam Creek and the impaired section of Pigg River had several spikes of TSS and turbidity, indicating high levels of sediment. Hydromodification was identified as a likely stressor to the Poplar Branch benthic community due to the impoundments observed upstream that appear to impact the stream flow. The total habitat scores were higher in Poplar Branch than the other impaired streams; however, the individual scores of sediment, flow regime, and bank stability were in the poor or suboptimal categories.

3.3 Sediment Source Assessment

Potential sources of sediment considered in the development of the TMDL included point source sewer system influence and nonpoint source contributions (Table 3-3).

Table 3-3. Existing sediment loads in all watersheds, accounting for known BMPs (not including MOS or Future Growth).

Land Cover Category	Existing TSS load (lb/yr)			
	Pigg River	**Poplar Branch**	**Fryingpan Creek**	**Beaverdam Creek**
Cropland	387,800	92,610	470,800	17,810
Hay	48,590	11,130	27,880	132,100
Pasture	1,211,000	101,300	318,100	1,686,000
Forest	270,100	25,070	42,260	304,700
Trees	30,640	4,793	6,609	96,380
Shrub	3,872	3,200	7,081	24,450
Harvested	79,560	27,970	24,080	110,800
Wetland	5,177	2,359	16,030	405
Barren	87,440	0	27,380	0
Turfgrass	13,990	4,205	5,384	64,030
Developed Pervious	1,929	595	296	5,339
Developed Impervious	71,400	15,630	25,490	258,700
Streambank Erosion	161,900	1,768	9,796	279,300
Permitted	-	-	-	1,000
Total	***2,370,000***	***291,000***	***981,000***	***3,000,000***

3.3.1 Point Sources

Point sources include permitted sources such as wastewater treatment facilities.

Several point sources of sediment exist within the Beaverdam Creek watershed (none were identified in the other TMDL watersheds). In the TMDL study, the permits included are based on data for March 2021. These point sources are permitted under the Virginia Pollutant Discharge Elimination System (VPDES) program and include domestic sewage permits and a VPDES individual permit. The approach for determining loads from each of these permit types is described below. Typically, waste load allocations for VPDES general permits in a TMDL are aggregated by permit type.

VPDES Individual Permit

There is one VPDES individual permit within the Beaverdam Creek watershed, associated with an elementary school. The typical sediment load from the facility was calculated from discharge monitoring report data and used to model existing conditions (Table 3-4). The permitted load, which is included in the waste load allocation of the TMDL, was calculated based on the permitted discharge and concentration for the facility.

Table 3-4. Sediment loads associated with VPDES individual permit.

Permit No	Facility Name	Watershed	Permitted Discharge (MGD)	Permitted Concentration (mg/L TSS)	Typical (Existing) Load (lb/yr TSS)	Permitted Load (lb/yr TSS)
VA0020842	Bedford County Schools - Stewartsville Elementary	Beaverdam Creek	0.006	45	83	822

Domestic Sewage Permits

There are two domestic sewage general permits in the Beaverdam Creek watershed (Table 3-5). The domestic sewage general permit specifies a maximum flow rate of 1000 gallons per day at a sediment concentration of 30 mg/L. These permit limits were used to calculate a wasteload allocation of 91.44 lb/yr TSS for each of the domestic sewage permits in the TMDL.

Table 3-5. Domestic sewage general permit in the study area.

Receiving Stream	Permit Number	Permitted Load (lb/yr TSS)	Aggregate Permitted Load (lb/yr TSS)
Beaverdam Creek	VAG402101	91.44	182.88
	VAG402030	91.44	

Construction Stormwater General Permits

There is one active Virginia Stormwater Management (VSMP) Construction General Permit within the Beaverdam Creek watershed. While there are no active VSMP permits in the Pigg River study watershed, there was one previously terminated VSMP permit within the past ten years located in the Pigg River watershed. There have been no VSMP Construction General Permits within the past ten years in either the Fryingpan Creek or Poplar Branch watersheds.

These permits are a potential source of sediment and are often assigned wasteload allocations in the TMDL based on the typical annually disturbed area associated with the permits, which is generally based on a snapshot of the current conditions. At the time of the permit data pull (October 2022), there was only one active construction permit in the TMDL study area, which was not adequate to develop an estimate of the typical annually disturbed area associated with construction permits. To account for the transient nature of construction permits, a portion of the future growth was set aside to address potential future construction efforts in the study watersheds.

Based on these calculations, assuming that all future construction permits fully comply with all erosion and sediment control requirements, and not anticipating any significant change in the rate of development in the study watersheds, construction permit allocations for the study watersheds

were based on setting aside a portion of the total TMDL target load. For the Pigg River, 0.5% of the TMDL was allocated and for Beaverdam, Creek, Poplar Branch, and Fryingpan Creek 0.2% of each TMDL was allocated for construction permits.

3.3.2 Nonpoint Sources

Nonpoint source pollution originates from sources across the landscape (e.g., agriculture and residential land uses) and is delivered to waterbodies by rainfall and snowmelt. In some cases, a precipitation event is not required to deliver nonpoint source pollution to a stream (e.g., pollution from straight pipes or livestock directly defecating in a stream). A benthic stressor analysis study was conducted in 2021 to determine the reason for the benthic impairments in the Beaverdam Creek, Fryingpan Creek, Pigg River, and Poplar Branch watersheds. The study found that the main cause of all benthic impairments was too much sediment.

3.3.2.1 Surface runoff

Sediment can be transported from both pervious and impervious surfaces during runoff events. Between rainfall events, sediment accumulates on impervious surfaces and can then be washed off these impervious surfaces during runoff events. On pervious surfaces, soil particles are detached by rainfall impact and shear stress from overland flow and then transported with the runoff water to nearby streams. Various factors including rainfall intensity, storm duration, surface cover, topography, tillage practices, soil erosivity, soil permeability, and other factors all impact these processes.

VGIN 2016 land cover data was used to determine the distribution of different land cover types in the watersheds. Values for various parameters affecting sediment loads were gleaned from literature guidance (CBP, 1998; Haith et al., 1992; Hession et al., 1997).

3.3.2.2 Streambank erosion

Increases in impervious areas and impacts to riparian (streambank) vegetation from livestock access and other management practices can cause streambank erosion. As impervious surface increases in a watershed, so does the amount and rate of flow in streams following rainfall events. This is often the cause of the entrenchment, or downcutting, of urban streams – disconnecting higher flow events from the surrounding floodplain.

Additionally, impacts to riparian (streambank) vegetation from livestock access and other management practices weaken the stability of the streambanks themselves as root system matrices break down. Weakened streambanks are more easily eroded by storm flows and can lead to excessive channel migration and eventual channel over-widening. Increasing channel width decreases stream depth which can lead to increased sediment deposition and increased water temperatures, which both negatively impact aquatic life.

GWLF was used to calculate streambank and channel erosion in the Beaverdam Creek, Fryingpan Creek, Pigg River, and Poplar Branch TMDLs. This model uses and algorithm that estimates average annual streambank erosion as a function of cumulative stream flow, fraction of impervious cover in the watershed, and livestock density in the watershed with the area-weighted curve number and soil erodibility factors and the mean slope of the watershed (Evans et al., 2001).

3.4 TMDL Development

The model selected for the development of the sediment TMDL was the Generalized Watershed Loading Functions (GWLF) model. The model allows for multiple different land cover categories to be incorporated. The GWLF manual served as the primary source of guidance in developing input parameters. In addition, daily rainfall and temperature data for the watershed was obtained from Oregon State's spatially distributed Parameter-Elevation Regressions on Independent Slopes Model (PRISM). PRISM was used to obtain a more exact estimate of historical weather within the watershed. The large watersheds were then divided into smaller subwatersheds that were simulated individually to get an assessment of pollutant loads.

3.5 TMDL Allocation Scenario

3.5.1 Setting Target Sediment Loads

The TMDL includes sediment reduction scenarios needed to meet the aquatic life use standard. Since sediment does not have a numeric criterion, the "all-forest load multiplier" (AllForX) approach was used to establish endpoints in the Beaverdam Creek, Fryingpan Creek, Pigg River, and Poplar Branch TMDL. AllForX is the ratio of the simulated pollutant load under existing conditions to the pollutant load from an all-forest simulated condition for the same watershed. In other words, AllForX is an indication of how much higher current sediment loads are above an undeveloped condition. These multipliers were calculated for three TMDL study subwatersheds and nine comparison subwatersheds of similar size and within the same ecoregion as the TMDL study watersheds. A regression was then developed between the Virginia Stream Condition Index (VSCI) scores at monitoring stations and the corresponding AllForX ratio calculated for each watershed. The 33rd percentile of scores was used in the calculation for all of the watersheds.

After determining the source of sediment in the impaired stream, a computer model was used to determine the amount that sediment loads need to be reduced to promote healthy aquatic life in each stream. The goal for these reductions is for the impaired streams to have sediment levels that allow for diverse and abundant aquatic life. The reductions in sediment needed to meet these goals are shown in Table 3-6.

Table 3-6. Percent reductions in sediment needed to clean up the impaired waters.

Watershed	Crop, Pasture, Hay (%)	Forest, Trees, Shrubs, Wetland (%)	Developed Pervious and Impervious Areas, Barren, Turfgrass (%)	Streambank Erosion (%)	Permitted Sources (%)
Beaverdam Creek	30.4	0	30.4	30.4	0
Fryingpan Creek	76.1	0	76.1	76.1	0
Pigg River	31.5	0	31.5	31.5	0
Poplar Branch	56.1	0	56.1	56.1	0

To obtain healthy sediment levels in the impaired streams, significant reductions are needed from several sediment sources. Sediment loads from agricultural and urban/suburban land covers within Beaverdam Creek, Fryingpan Creek, Pigg River, and Poplar Branch need to be reduced by 30.4%, 76.1%, 31.5%, and 56.1%, respectively. The total amount of sediment per year that would be entering each of these streams after the recommended reductions are made represent the total maximum daily load of sediment for each stream (Tables 3-7 through Table 3-10). This load includes permitted sources as well as future growth to account for potential future permitted sources. These annual loads are converted to daily maximum loads as well (Table 3-11 through Table 3-14). If sediment loads are reduced to these amounts, healthy aquatic life is expected to be restored in these streams.

Table 3-7. Annual sediment loads that will meet the water quality standard in Beaverdam Creek.

Impairment	Allocated Permitted Point Sources (WLA) (lb/yr)	Allocated Nonpoint Sources (LA) (lb/yr)	Margin of Safety (MOS) (lb/yr)	Total Maximum Daily Load (TMDL) (lb/yr)	Existing Load (lb/yr)	Overall Reduction (%)
Beaverdam Creek (VAW-L07R_BDA01A00, VAW-L07R_BDA02A00)	**51,410**	**2,216,000**	**252,000**	**2,520,000**	3,300,000	23.7%
VA0020842	*822*					
Domestic Sewage Permits	*183*					
Construction Permits (0.2% of TMDL)	*5,040*					
Future Growth (1.8% of TMDL)	*43,360*					

Table 3-8. Annual sediment loads that will meet the water quality standard in Fryingpan Creek.

Impairment	Allocated Permitted Point Sources (WLA) (lb/yr)	Allocated Nonpoint Sources (LA) (lb/yr)	Margin of Safety (MOS) (lb/yr)	Total Maximum Daily Load (TMDL) (lb/yr)	Existing Load (lb/yr)	Overall Reduction (%)
Fryingpan Creek (VAW-L18R_FRY01A06)	**6,593**	**289,300**	**32,960**	**329,000**	1,020,698	67.8%
Construction Permits (0.2% of TMDL)	*659*					
Future Growth (1.8% of TMDL)	*5,933*					

Table 3-9. Annual sediment loads that will meet the water quality standard in the Pigg River.

Impairment	Allocated Permitted Point Sources (WLA) (lb/yr)	Allocated Nonpoint Sources (LA) (lb/yr)	Margin of Safety (MOS) (lb/yr)	Total Maximum Daily Load (TMDL) (lb/yr)	Existing Load (lb/yr)	Overall Reduction (%)
Pigg River (VAW-L14R_PGG05B12, VAW-L14R_PGG06A02, VAW-L14R_PGG06B12)	**39,200**	**1,720,000**	**196,000**	**1,960,000**	2,610,000	24.9%
Construction Permits (0.5% of TMDL)	*9,799*					
Future Growth (1.5% of TMDL)	*29,400*					

Table 3-10. Annual loads that will meet the water quality standard in Poplar Branch.

Impairment	Allocated Permitted Point Sources (WLA) (lb/yr)	Allocated Nonpoint Sources (LA) (lb/yr)	Margin of Safety (MOS) (lb/yr)	Total Maximum Daily Load (TMDL) (lb/yr)	Existing Load (lb/yr)	Overall Reduction (%)
Poplar Branch (VAW-L17R_PAA01A04)	**3,357**	**147,500**	**16,780**	**168,000**	311,000	46.1%
Construction Permits (0.2% of TMDL)	*336*					
Future Growth (1.8% of TMDL)	*3,021*					

Table 3-11. Maximum daily sediment loads for Beaverdam Creek.

Impairment	Allocated Permitted Point Sources (WLA) (lb/day)	Allocated Nonpoint Sources (LA) (lb/day)	Margin of Safety (MOS) (lb/day)	Maximum Daily Load (MDL) (lb/day)
Beaverdam Creek (VAW-L07R_BDA01A00, VAW-L07R_BDA02A00)	**141**	**14,300**	**1,600**	**16,000**
VPDES Individual Permit	*2.25*			
Domestic Sewage Permits	*0.5*			
Construction Permits	*13.8*			
Future Growth	*124*			

Table 3-12. Maximum daily sediment loads for Fryingpan Creek.

Impairment	Allocated Permitted Point Sources (WLA) (lb/day)	Allocated Nonpoint Sources (LA) (lb/day)	Margin of Safety (MOS) (lb/day)	Maximum Daily Load (MDL) (lb/day)
Fryingpan Creek (VAW-L18R_FRY01A06)	**18.1**	**1,910**	**214**	**2,140**
Construction Permits	*1.8*			
Future Growth	*16.3*			

Table 3-13. Maximum daily sediment loads for the Pigg River.

Impairment	Allocated Permitted Point Sources (WLA) (lb/day)	Allocated Nonpoint Sources (LA) (lb/day)	Margin of Safety (MOS) (lb/day)	Maximum Daily Load (MDL) (lb/day)
Pigg River (VAW-L14R_PGG05B12, VAW-L14R_PGG06A02, VAW-L14R_PGG06B12)	**107**	**11,300**	**1,270**	**12,700**
Construction Permits	*26.8*			
Future Growth	*80.5*			

Table 3-14. Maximum daily sediment loads for the Poplar Branch.

Impairment	Allocated Permitted Point Sources (WLA) (lb/day)	Allocated Nonpoint Sources (LA) (lb/day)	Margin of Safety (MOS) (lb/day)	Maximum Daily Load (MDL) (lb/day)
Poplar Branch (VAW-L17R_PAA01A04)	**9.19**	**981**	**110**	**1,100**
Construction Permits	*0.92*			
Future Growth	*8.27*			

There are many ways to reduce pollutants to reach the TMDL goals. Several versions of these reduction plans, or allocation scenarios, were developed. These were presented to a Technical Advisory Committee which determined that Scenario 1 was preferred for each watershed (see Table 3-15 through Table 3-18). Model results were rounded to four significant figures, and calculated totals of those results were rounded to three significant figures.

3.6 Implications of the TMDL on the Implementation Plan

Based on the sediment reductions developed for the TMDL, reductions are needed to meet the aquatic life use standard for benthic impairments, particularly with respect to agriculture, both direct deposition and pasture runoff.

Although the benthic TMDLs were developed for sediment, attainment of a healthy benthic community will ultimately be based on biological monitoring of the benthic macroinvertebrate community, in accordance with established DEQ protocols. If a future review should find that the

reductions called for in these sediment TMDLs based on current modeling are found to be insufficiently protective of local water quality, then revision(s) will be made as necessary to provide reasonable assurance that water quality goals will be achieved.

Table 3-15. Allocation scenarios for Beaverdam Creek sediment loads.

Beaverdam Creek Watershed		Scenario 1 (preferred)		Scenario 2		Scenario 3	
Source	**Existing TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**
Cropland	17,820	30.4	12,400	25.2	13,330	-	17,820
Hay	132,100	30.4	91,970	25.2	98,840	43.0	75,320
Pasture	1,686,000	30.4	1,173,000	25.2	1,261,000	43.0	961,000
Forest	304,700	-	304,700	-	304,700	-	304,700
Trees	96,380	-	96,380	-	96,380	-	96,380
Shrub	24,450	-	24,450	-	24,450	-	24,450
Harvested	110,800	30.4	77,130	25.2	82,890	-	110,800
Wetland	405	-	405	-	405	-	405
Barren	-	-	-	-	-	-	-
Turfgrass	64,030	30.4	44,560	25.2	47,890	-	64,030
Developed Pervious	5,339	30.4	3,716	25.2	3,994	-	5,339
Developed Impervious	258,700	30.4	180,000	25.2	193,500	-	258,700
Streambank Erosion	297,300	30.4	206,900	70.0	89,180	-	297,300
VA0020842	822	-	822	-	822	-	822
Domestic Sewage Permits	183	-	183	-	183	-	183
Construction Permits (0.2%)	5,041	-	5,041	-	5,041	-	5,041
Future Growth (1.8%)	45,360	-	45,360	-	45,360	-	45,360
MOS (10%)	252,000	-	252,000	-	252,000	-	252,000
TOTAL	**3,300,000**	**23.6**	**2,520,000**	**23.6**	**2,520,000**	**23.6**	**2,520,000**

Table 3-16. Allocation scenarios for Fryingpan Creek sediment loads.

Fryingpan Creek Watershed		Scenario 1 (preferred)		Scenario 2		Scenario 3	
Source	**Existing TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**
Cropland	470,800	76.1	112,500	70.0	141,200	82.8	80,980
Hay	27,880	76.1	6,662	82.5	4,878	65.0	9,756
Pasture	318,100	76.1	76,010	82.5	55,660	65.0	111,300
Forest	42,260	-	42,260	-	42,260	-	42,260
Trees	6,609	-	6,609	-	6,609	-	6,609
Shrub	7,081	-	7,081	-	7,081	-	7,081
Harvested	24,080	76.1	5,756	82.5	4,215	82.8	4,142
Wetland	16,030	-	16,030	-	16,030	-	16,030
Barren	27,380	-	6,544	-	4,792	-	4,710
Turfgrass	5,384	76.1	1,287	82.5	942	82.8	926
Developed Pervious	296	76.1	71	82.5	52	82.8	51
Developed Impervious	25,490	76.1	6,092	82.5	4,461	82.8	4,384
Streambank Erosion	9,796	76.1	2,341	82.5	1,714	82.8	1,685
Construction Permits (0.2%)	659	-	659	-	659	-	659
Future Growth (1.8%)	5,934	-	5,934	-	5,934	-	5,934
MOS (10%)	32,960	-	32,960	-	32,960	-	32,960
TOTAL	**1,020,000**	**67.7**	**329,000**	**67.7**	**329,000**	**67.7**	**329,000**

Table 3-17. Allocation scenarios for Pigg River sediment loads.

Pigg River Watershed		Scenario 1 (preferred)		Scenario 2		Scenario 3	
Source	**Existing TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**
Cropland	387,800	31.5	265,700	34.2	255,200	25.0	290,900
Hay	48,590	31.5	33,290	34.2	31,980	25.0	36,450
Pasture	1,211,000	31.5	829,800	34.2	797,100	25.0	908,600
Forest	270,100	-	270,100	-	270,100	-	270,100
Trees	30,640	-	30,640	-	30,640	-	30,640
Shrub	3,872	-	3,872	-	3,872	-	3,872
Harvested	79,560	31.5	54,500	34.2	52,350	25.0	59,670
Wetland	5,177	-	5,177	-	5,177	-	5,177
Barren	87,440	31.5	59,900	34.2	57,540	64.6	30,950
Turfgrass	13,990	31.5	9,586	34.2	9,208	64.6	4,954
Developed Pervious	1,929	31.5	1,322	34.2	1,270	64.6	683
Developed Impervious	71,400	31.5	48,910	34.2	46,980	64.6	25,280
Streambank Erosion	161,900	31.5	110,900	-	161,900	64.6	57,330
Construction Permits (0.5%)	9,799	-	9,799	-	9,799	-	9,799
Future Growth (1.5%)	29,400	-	29,400	-	29,400	-	29,400
MOS (10%)	196,000	-	196,000	-	196,000	-	196,000
TOTAL	**2,610,000**	**24.9**	**1,960,000**	**24.9**	**1,960,000**	**24.9**	**1,960,000**

Table 3-18. Allocation scenario for Poplar Branch sediment loads.

Poplar Branch Watershed		Scenario 1 (preferred)		Scenario 2		Scenario 3	
Source	**Existing TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**	**Reduction (%)**	**Allocation TSS (lb/yr)**
Cropland	92,610	56.1	40,660	45.1	50,840	75.0	23,150
Hay	11,140	56.1	4,888	70.0	3,340	45.3	6,091
Pasture	101,300	56.1	44,490	70.0	30,400	45.3	55,440
Forest	25,070	-	25,070	-	25,070	-	25,070
Trees	4,793	-	4,793	-	4,793	-	4,793
Shrub	3,200	-	3,200	-	3,200	-	3,200
Harvested	27,970	56.1	12,280	45.1	15,360	45.3	15,300
Wetland	2,359	-	2,359	-	2,359	-	2,359
Barren	-	-	-	-	-	-	-
Turfgrass	4,205	56.1	1,846	45.1	2,309	45.3	2,300
Developed Pervious	595	56.1	261	45.1	326	45.3	325
Developed Impervious	15,630	56.1	6,861	45.1	8,580	45.3	8,549
Streambank Erosion	1,768	56.1	776	45.1	971	45.3	967
Construction Permits (0.2%)	336	-	336	-	336	-	336
Future Growth (1.8%)	3,021	-	3,021	-	3,021	-	3,021
MOS (10%)	16,780	-	16,780	-	16,780	-	16,780
TOTAL	**311,000**	**46.0**	**168,000**	**46.0**	**168,000**	**46.0**	**168,000**

4 PUBLIC PARTICIPATION

Collecting input from the public on implementation and outreach strategies to include in the Implementation Plan was a critical step in this planning process. Since the plan will be implemented voluntarily by watershed stakeholders, local input and support are the primary factors that will determine the success of this plan.

4.1 Public Meetings

The first public meeting was held on the evening of February 29, 2024, at the Franklin County Public Library to kick off the development of the Implementation Plan. This meeting served as an opportunity for local residents to learn more about the problems facing the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek watersheds and work together to come up with new ideas to protect and restore water quality in their community. This meeting was publicized through a public notice and direct e-mail communications with the Blue Ridge Soil and Water Conservation District, Peaks of Otter Soil and Water Conservation District, Pittsylvania Soil and Water Conservation District, Virginia Cooperative Extension, Virginia Department of Forestry , Leesville Lake Association, Smith Mountain Lake Association, Lynchburg College, Ferrum College, Franklin County, Bedford County, Pittsylvania County, Central Virginia Planning District , Tri-County Lakes Administrative Commission, Natural Resource , Conservation Service, Friends of Rivers of Virginia, and more stakeholders.

Approximately 15 people attended the meeting. The first public meeting summary is provided in Appendix B.

The meeting included a presentation by DEQ on the process to be used to complete an IP for Pigg River, Poplar Branch, Fryingpan Creek and Beaverdam Creek. The presentation also included a discussion on existing water quality conditions in the river and what types of actions and information could be included in the Implementation Plan to improve water quality.

The final public meeting was held on **September 26, 2024,** at the Franklin County Public Library to present the draft Pigg River, Poplar Branch, Fryingpan Creek and Beaverdam Creek Watershed Implementation Plan and the strategy to address the bacteria impairment. Approximately XX people attended. The final public meeting summary is provided in Appendix X. After the meeting, a 30-day public comment period extended to October 28, 2024. XX comments were received during the period. The comments and response to comments are provided in Appendix X.

4.2 Additional Meeting

To accommodate the stakeholders who were integral parts to the development of this IP, the nonpoint source coordinator and TMDL Modeler met with Peaks of Otter Soil and Water

Conservation District on June 10th to discuss the impairments identified in the Beaverdam Creek watershed.

4.3 Community Engagement Group

The role of the IP community engagement group was to discuss methods needed to reduce human, pet and livestock sources of bacteria in the Beaverdam Creek watershed and discuss methods to reduce livestock and agricultural sources of sediment from entering the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek watersheds. For livestock sources, the community engagement group's aim was to review BMP practices and outreach strategies from an agricultural perspective. For the sediment reduction goals, the community engagement group's goal was to focus on BMP practices and outreach strategies from an agricultural perspective. Overall, the community engagement group's objective was to provide input about the type, number, and costs of BMPs and to identify any barriers (and possible solutions) that could impede BMP implementation.

During their first meeting on February 29, 2024, at the Franklin County Public Library in Rocky Mount VA, the community engagement group discussed sediment and bacteria reductions by focusing on Agricultural, Residential and Urban best management practices.

A second community engagement group meeting was held on June 25, 2024, the Franklin County Public Library in Rocky Mount, to discuss draft Best Management Practices (BMPs) for agriculture and urban, failing residential septic; BMP costs, timeline and implementation priority areas within the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek watershed. The group recommended completing 50% of BMPs in Stage 1 and 50% in Stage 2 (with Stage 1 being 5 years and Stage 2 being 5 years). The group agreed that the proposed BMPs seemed reasonable and to consider adding the Continuing Conservation Initiative (CCI) practices for agriculture. They also recommended some changes in the agriculture BMP costs to better reflect current expenses for various components. The priorities for implementation within these watersheds was discussed. The timeline to complete the plan was also discussed and next steps for the final public meeting. Meeting minutes can be found in Appendix A.

5 IMPLEMENTATION ACTIONS

An important part of the implementation plan is the identification of specific best management practices and associated technical assistance needed to improve water quality in the watersheds. Since this plan is designed to be implemented by landowners on a voluntary basis, it is necessary to identify management practices that are both financially and technically realistic and suitable for this community. As part of this process, the costs and benefits of these practices must be examined and weighed. Once the best practices have been identified for implementation, the number of each practice that is needed to meet the water quality goals is estimated.

5.1 Identification of Best Management Practices

Potential best management practices, their associated costs and efficiencies, and potential funding sources were identified through review of the TMDLs, input from stakeholders, and literature reviews. Measures that can be promoted through existing programs were identified, as well as those that are not currently supported by existing programs and their potential funding sources. Practices were selected through a process of stakeholder review and analysis of their effectiveness in these watersheds. Various scenarios were developed and presented to the stakeholders, who considered both their economic costs and the water quality benefits that they produced. Most of these practices are included in state and federal agricultural cost share programs that promote conservation. The final set of best management practices (BMPs) identified, and the efficiencies used in this study to estimate needs are listed in Table 5-1.

Continuing Conservation Initiative (CCI) practices are not eligible for the CWA Section 319(h) funding at the time of completion of this plan, but the stakeholder group is interested in including practices in the implementation plan to protect water quality as initial practice lifespans end. CCI practices offer an incentive for producers to continue to maintain the original practice in order to extend the life of a practice. This becomes especially important in watersheds that are a part of the larger Chesapeake Bay watershed where CCI practices allow for up to five more years of reduction ‘credits’ in the bay model. Some of the CCI practices that would be applicable in the IP subwatersheds are:

1 CCI-SE-1, Stream Exclusion – Maintenance Practice
2 CCI-SL-6N, Stream Exclusion with Narrow Width Buffer – Maintenance Practice
3 CCI-SL-6W, Stream Exclusion with Wide Width Buffer – Maintenance Practice
4 CCI-FRB-1, Forested Riparian Buffer – Maintenance Practice
5 CCI-HRB-1, Herbaceous Riparian Buffer – Maintenance Practice
6 CCI-CNT, Long Term Continuous No-Till Planting Systems

Table 5-1. Proposed best management practices and associated pollutant reductions.

BMP (Cost-share code in parenthesis)	Units	% Effectiveness	Reference
Livestock Exclusion Practices			
CREP Stream Exclusion with Grazing Land Management (CRSL-6)	System	30% + Land use change	1
Stream Exclusion with Narrow Width Buffer and Grazing Land Management (SL-6N)			
Stream Exclusion with Wide Width Buffer and Grazing Land Management (SL-6W, SL-6F)			
Exclusion Fence Maintenance (CCI-SE-1, CCI-SL-6N, CCI-SL-6W)	Lin. ft.	-	-
Pasture/Hayland Practices			
Extension of Watering System (SL-7)	System	10%	1
Precision Intensive Rotational/Prescribed Grazing (NRCS-CSP, SL-10)	Acres	30%	
Streamside Buffer (35-100 feet): forested, grass or shrub	Acres treated	50% + Land use change	2
Permanent Vegetative Cover on Critical Areas (SL-11)	Acres	75%	3
Afforestation of Erodible Pasture (FR-1)		Land use change	4
Animal Waste Control Facility: beef (WP-4)	System	0%	5
Barnyard Runoff Management (WQ-12)		40%	2
Sediment Retention, Erosion or Water Control Structure (WP-1)	Acres treated	60%	5
Cropland Practices			
Long Term Vegetative Cover on Cropland (SL-1)	Acres	75%	3
Continuous No-Till (SL-15A)		79%	5
Cover Crop (SL-8B, SL-8H, SL-8M)		4%	
Conversion of High Till to Low Till		Land use change	4
Residential Practices			
Raingardens (RG)	Acres treated	72%	5
Erosion & Sediment Control on Transitional Areas		82%	2

BMP (Cost-share code in parenthesis)	Units	% Effectiveness	Reference
Forest Harvesting Practices	Acres treated	60%	5
Streambank Stabilization: agricultural and urban/residential (WP-2A)	Lin. ft.	248 lb/ft/yr	1
Riparian Buffers: forested (FR-3, DOF-RFFL)	Acres treated	50% + Land use change	2

References:

1. Sediment: DEQ NPS BMP Program, May 2024.
2. Chesapeake Assessment Scenario Tool - BMP effectiveness values by land use and pollutant, May 2024.
3. DEQ Guidance Manual for TMDL Implementation Plans, June 2017.
4. Modeled land use change.
5. DEQ NPS BMP Program, May 2024.

5.2 Quantification of Control Measures

The quantity of control measures, also called best management practices, recommended during implementation was determined through spatial analyses, modeling alternative implementation scenarios, and using input from the stakeholders. Data on land use, stream networks, and elevation were used in spatial analyses to develop estimates of the number of control measures recommended overall, in each subwatershed. Data from the Virginia Department of Conservation and Recreation (VADCR) Agricultural BMP Database, the Blue Ridge SWCD and the Peaks of Otter SWCD showing where best management practices are already in place in the watersheds were considered when developing these estimates (Table 5-2). Estimates of streamside fencing and the number of full livestock exclusion systems were made through these analyses. The quantities of additional control measures were determined through developing alternative scenarios and applying the related pollutant reduction efficiencies to their associated sediment loads.

Table 5-2. Agricultural best management practices (BMPs) installed in the watersheds since the development of the sediment TMDLs (2021).

BMP Name	BMP Code	Extent Installed		
		Number	Units	Amount
BMPs installed since 2021				
CREP woodland buffer filter area	CRFR-3	1	acres	6
Harvestable cover crop	SL-8H	1	acres	148
Stream exclusion with grazing land management	SL-6	1	linear feet	1,140
Stream exclusion with wide buffer	SL-6W	2	linear feet	12,761
Small grain and mixed cover crop	SL-8B	1	acres	111

Implicit in the TMDL is the need to avoid increased delivery of pollutants from sources that have not been identified as needing a reduction, and from sources that may develop over time. One potential for additional sources of the pollutants identified is future residential development. Care should be taken to monitor development and its impacts on water quality. Where residential development occurs, there is potential for additional pollutant loads from increased impervious surfaces and land disturbance associated with new development.

5.2.1 Agricultural Control Measures

Livestock Exclusion BMPs

Excluding livestock from streams and establishing vegetated streamside buffers helps prevent streambank erosion and traps sediment from eroding pastures before it enters the stream. As a co-benefit, livestock exclusion fencing also provides bacteria reductions in direct deposition from livestock. Consequently, this plan includes recommendations for livestock exclusion/riparian buffer practices implemented in conjunction with improved pasture management. To estimate fencing needs, the perennial stream network was overlaid with land use using GIS mapping software (ArcGIS Pro 3.1.2). Stream segments that flowed through or were adjacent to land use areas that had a potential for supporting cattle (*e.g.*, pasture) were identified using 2016 VBMP Orthophotography and the 2023 National Hydrography Dataset (NHD) streams layer. If the stream segment flowed through the land-use area, it was assumed that fencing was needed on both sides of the stream. If a stream segment flowed adjacent to the land-use area, it was assumed that fencing was required on only one side of the stream. Not every land-use area identified as pasture has livestock on it at any given point in time. However, it is assumed that all pasture areas have the potential for livestock access. Following GIS analyses of fencing needs, any fencing already installed was subtracted from the length of potential fencing in the watershed. Approximately 14,000 linear feet of livestock exclusion fencing has been installed in the watersheds since the sediment TMDLs were developed. This fencing was

subtracted from the length of fencing needed to accomplish the sediment reduction goals. Approximately 18 miles of exclusion fencing is still needed to meet the goals (Table 5-3).

Table 5-3. Stream fencing needed in the implementation watersheds.

Sub-watershed	Estimated total length of streambank in pasture (feet)	Approximate fencing installed to date (feet)	Fencing still needed to meet goal (feet)
Pigg River	51,331	-	16,426
Poplar Branch	804	-	450
Fryingpan Creek	6,029	4,561	0
Beaverdam Creek	106,568	24,926	45,409
Total	**164,732**	**29,487**	**62,285**

It is expected that the majority of livestock exclusion fencing will be accomplished through the VA Agricultural BMP Cost Share Program (VACS), DEQ Nonpoint Source BMP Implementation Program, and federal National Resource Conservation Service (NRCS) cost-share programs. Some applicable cost-shared BMPs for livestock exclusion in the programs are the SL-6W (Stream Exclusion with Wide Buffer Width and Grazing Land Management Practice), the SL-6N (Livestock Exclusion with Narrow Buffer Width and Grazing Land Management), the WP-2N or WP-2W (Stream Protection Fencing with Narrow Width Buffer or Wide Width Buffer, respectively), and CREP (Conservation Reserve Enhancement Program) practice CRSL-6 (CREP Stream Exclusion with Grazing Land Management).

To develop an estimate of the number of fencing systems needed in the watersheds, aerial imagery was utilized in conjunction with local data from the VADCR Agricultural BMP Database to determine typical characteristics (e.g., streamside fencing length per practice) of livestock exclusion systems in the region. In addition, input was collected from the stakeholders, the Blue Ridge SWCD and the Peaks of Otter SWCD regarding typical components of each system, associated costs, and preferred fencing setbacks. These characteristics were then utilized to identify the mix of fencing practices available through state and federal cost-share programs to include in the Implementation Plan (Table 5-4).

The VACS Program includes a series of livestock exclusion practices that may be used to meet exclusion goals in priority implementation watersheds. For areas where greater setbacks are possible, the Stream Exclusion with Wide Width Buffer and Grazing Land Management (SL-6W) offers between 85% to 100% cost-share rate for off stream watering, establishment of a rotational grazing system, stream crossings, and stream exclusion fencing with a 35 to 50-foot setback and a lifespan of 10 to 15 years. The Stream Exclusion in Floodplains (SL-6F) is like the SL-6W and is intended for areas prone to flooding.

Table 5-4. Livestock exclusion needed to achieve reduction of sediment load from livestock direct deposition. Assumes one exclusion system averages 2,000 linear feet of stream fencing.

	Fencing needed	SL-6N or WP-2N (10 – 25 ft buffer): 10%		SL-6W, SL-6F, WP-2W or CRSL-6 (35 – 50 ft buffer): 90%	
Sub-watershed	**feet**	**feet**	**systems**	**feet**	**systems**
Pigg River	16,426	1,643	1	14,783	7
Poplar Branch	450	0	0	450	1
Fryingpan Creek	0	0	0	0	0
Beaverdam Creek	45,409	4,541	2	40,868	20
Total	**62,285**	**6,184**	**3**	**56,101**	**28**

Stream Protection Fencing with Wide Width Buffer (WP-2W) offers between 75% to 80% cost-share rate over a lifespan of 5 to 10 years. It is like the SL-6W practice except it does not include an alternative watering system. The WP-2W practice can be combined with the Extension of Watering Systems (SL-7) to provide watering facilities. Landowners may receive up to 75% cost share for the SL-7 practice and must maintain the practice for a period of ten years.

Another option for areas where greater setbacks are possible is the CREP Stream Exclusion with Grazing Land Management (CRSL-6). The CRSL-6 practice is implemented under CREP and offers up to 50% cost-share rate. It is like the SL-6W practice with a minimum 35-foot riparian buffer. CREP does not provide funding for cross fencing to establish rotational grazing systems, however, this practice is commonly combined with the SL-7 practice for rotational grazing.

Based on discussions with the stakeholders, it was determined that these practices would be the most appealing to producers in the watershed due to the financial incentives. It was estimated that approximately 90% of fencing in the watershed would be installed using the SL-6W, SL-6F, WP-2W/SL-7 and CRSL-6/SL-7 practices.

Stream Exclusion with Narrow Width Buffer and Grazing Land Management (SL-6N) offers between 60% to 75% cost-share rate for off stream watering, establishment of a rotational grazing system, stream crossings, and stream exclusion fencing with a 10 to 25-foot setback and a lifespan of 10 to 15 years. Another option is Stream Protection Fencing with Narrow Width Buffer (WP-2N). The WP-2N practice offers between 55% to 70% cost-share rate over a lifespan of 5 to 10 years. The WP-2N practice is suitable to provide livestock access to water using a controlled hardened access when no other water source is feasible. It was estimated that approximately 10% of fencing in the watershed would be installed using the SL-6N and WP-2N practices.

While the suite of BMPs outlined in this plan will satisfy the sediment reductions needed to meet water quality goals, the quantity and details of these BMPs are subject to change in the future to reflect updates to related policies and programs, including cost share programs. Additionally, in

outlining certain BMPs to address sediment reductions, there appears to be potential for implementation efforts to effectively resolve both the benthic impairments that had been addressed by TMDLs, as well as the bacteria impairments that have not.

Land Based Agricultural BMPs

To meet the sediment reductions outlined in the TMDLs, best management practices to treat land-based sources of sediment must also be included in implementation efforts. Table 5-5 provides a summary of land based agricultural BMPs by watershed needed to achieve water quality goals. It is expected that funding assistance for most agricultural practices will be provided by VACS, DEQ NPS BMP Implementation Program, and federal NRCS cost-share programs.

Afforestation of Crop, Hay and Pasture Land (FR-1)

A small portion of agricultural land is designated for tree planting. This practice will be performed on agricultural land that is not well suited for farming due to slope and other characteristics. The intent of including this practice is not to reduce the presence of agriculture in the watershed, but rather to optimize the use of suitable farmland in the watershed and prevent runoff and soil loss from marginal agricultural lands. Cost-share funding is available for tree planting, and a flat rate payment per acre is also made through this practice depending on the length of the BMP contract.

Permanent Vegetation on Critical Areas (SL-11)

This practice supports land shaping and planting permanent vegetative cover on critically eroding areas. This may include measures such as grading, shaping, and filling, the establishment of grasses, and trees or shrubs. Landowners may receive up to 75% cost share for this practice and must maintain the practice for a period of five years. This practice is particularly applicable in highly denuded areas where concentrated runoff of manure is occurring.

Table 5-5. Land based agricultural BMPs needed to achieve sediment reduction goals.

BMP (Cost-share code in parenthesis)	Pigg River	Poplar Branch	Fryingpan Creek	Beaverdam Creek
	Acres (unless otherwise noted)			
Pasture				
Extension of Watering and Grazing Management System (SL-7)	2 systems	2 systems	2 systems	2 systems
Improved Pasture Management (SL-10)	605	63	289	864
Forest Riparian Buffers (DOF-RFFL, FR-3)	12 acres treated	0	20 acres treated	18 acres treated
Afforestation of Erodible Pasture (FR-1)	28	7	48	38
Permanent Vegetative Cover on Critical Areas (SL-11)	0.9	0.2	0.8	1.4
Sediment Retention, Erosion, or Water Control Structure (WP-1)	0	30	219	0
Hayland				
Forest Riparian Buffers (DOF-RFFL, FR-3)	29 acres treated	13 acres treated	0	0
Afforestation of Hayland (FR-1)	2	1	0	0
Cropland				
Forest Riparian Buffers (FR-3, DOF-RFFL)	0	30 acres treated	0	0
Continuous No Till (SL-15A)	154	28	57	0
Cover Crop (SL-8B, SL-8H, SL-8M)	154	28	57	0
Conversion from High Till to Low Till	0	4	128	0
Long Term Vegetation on Cropland (SL-1)	25	2	2	0

Grazing Systems and Improved Pasture Management (SL-7, SL-10)

Establishment of rotational grazing systems for cattle is recommended in conjunction with livestock exclusion projects. Many fencing programs will provide cost-share for the establishment of cross fencing and alternative watering sources to establish these systems. In cases where livestock exclusion is not necessary, improved pasture management was prescribed. Like a grazing system, improved pasture management allows a farmer to better utilize grazing land and associated forage production. Improved pasture management includes:

- Implementing a grazing management plan
- Maintaining adequate soil nutrient and pH levels
- Managing livestock rotation to paddock subdivisions to maintain minimum grazing height recommendations and sufficient rest periods for plant recovery
- Maintaining adequate and uniform plant cover (≥ 60%) and pasture stand density
- Locating feeding and watering facilities away from sensitive areas and away from streams

- Managing distribution of nutrients and minimizing soil disturbance at hay feeding sites by unrolling hay across the upland landscape in varied locations
- Designating a sacrifice lot/paddock to locate cattle for feeding when adequate forage is not available in the pasture system. Sacrifice lot/paddock should not drain directly into ponds, creeks or other sensitive areas and should not be more than 10% of the total pasture acreage.
- Mowing pastures as needed to control woody vegetation

Sediment Retention, Erosion, or Water Control Structure (WP-1)

This practice supports the installation of structures that collect and store debris to reduce the movement of sediment and materials from agricultural land to a receiving stream. Types of structures include erosion sediment control dams, desilting reservoirs, sediment basins, or similar structures.

Forest Riparian Buffers (FR-3, DOF-RFFL)

This practice supports the creation of a woodland buffer filter area to protect waterways by reducing erosion, sedimentation, and pollution from agricultural non-point sources. Landowners may receive up to 95% cost share for this practice through VACS. In addition, the Virginia Department of Foresty (DOF) offers no-cost forest buffer installation in riparian areas and one year of maintenance to landowners through the Virginia Riparian Forests for Landowners program (RFFL).

Continuous High Residue Minimal Soil Disturbance Tillage System (SL-15A)

Continuous no-till is a practice that is effective in controlling cropland runoff by reducing tillage of the soil. Farmers can conserve valuable soil and fertilizer and increase organic matter, which is an important factor in determining soil quality. VACS offers a one-time incentive payment for converting from a minimum till or conventional till system to a high residue minimal soil disturbance tillage system.

Cover Crop (SL-8B, SL-8H, SL-8M)

Farmers are implementing the use of cover crops because of the benefits associated with improved soil quality, reduction of nutrient losses, decreased field maintenance, and erosion control. Cost-share funding and/or tax credit are available for cover crop practices. Cost share for cover crop practices is also offered as part of VADCR's Whole Farm Approach – Cover Crop Bundle (WFA-CC). Implementation of VADCR's Whole Farm Approach – Nutrient Management Bundle (WFA-NM) is required to be eligible for the WFA-CC practice.

Conversion from High Tillage to Low Tillage

In situations where continuous no-till of the soil is not a viable option, such as with tobacco crops, or when a producer does not have the resources to commit to continuous no-till, converting high till cropland to low till cropland will result in considerable reductions in soil loss.

Long Term Vegetative Cover on Cropland (SL-1)
This practice supports the establishment of grass and/or legume vegetation on cropland converting to pasture or hay land to reduce soil erosion and improve water quality. Cost-share funding and/or tax credit are available.

5.2.2 Residential Control Measures

Residential Stormwater BMPs

A series of residential stormwater BMPs were identified to treat runoff from developed areas, turfgrass and barren areas in the watersheds (**Error! Reference source not found.**). Due to the largely agricultural land base of the watersheds, opportunities for residential stormwater BMPs are relatively limited.

Table 5-6. Residential stormwater BMPs needed in the implementation watersheds.

BMP (Cost-share code in parenthesis)	Units	Pigg River	Poplar Branch	Fryingpan Creek	Beaverdam Creek
Erosion and Sediment Control in Transitional Areas (ESC-0)	Disturbed area/acres	4	0	6	0
Raingardens (BR-10/RG)	system	1	1	3	1
Forest Riparian Buffers (DOF-RFFL, DOF-RT)	acres treated	0	0	0.1	2

Sediment loads from construction areas in the watersheds arise primarily from stormwater runoff over areas where land has been disturbed and vegetative cover removed. Some of these areas may have had transient erosion and sediment (E&S) permits, may have been disturbed prior to the issuance of a permit, or may represent smaller areas of disturbance that do not require a permit. Areas with E&S permits are already required to control sediment runoff from these sites, but may require increased setback distances, faster establishment of vegetation in setback areas, or for increased plantings in setback areas, as determined by state inspectors.

Rain gardens are small landscape features designed to catch runoff from paved surfaces and rooftops and filter out pollutants as the runoff moves down through a special soil mix. These practices are suitable for implementation in residential areas. The Virginia Conservation Assistance Program (VCAP) is a stormwater management cost-share program that provides cost-share payments to landowners that install a rain garden (BR-10/RG) that meets specific site and design criteria.

Riparian buffer plantings are a low cost, highly effective way to trap and filter runoff from urban and residential areas. Homeowners can be engaged to identify areas for potential riparian buffer installations. Groups like Virginia Master Gardeners and Master Naturalists can be included as partners to educate residential property owners on the benefits of riparian buffers, and to work

with landowners to design buffers that provide attractive plants that blend with their existing landscaping.

5.2.3 Streambank Stabilization

Streambank stabilization practices can be implemented at sites where streambanks have become incised and are actively eroding. Restoration activities may include grading and shaping of streambanks, stabilization of banks through vegetative plantings and installation of structures, and the installation of instream structures to properly direct streamflow to avoid future scouring and erosion of streambanks. The extent of streambank stabilization (WP-2A) called for in the subwatersheds is shown in Table 5-7. It is expected that most of these practices will be implemented on agricultural properties where livestock no longer have access to the stream. In some cases, bank restoration may occur in concert with livestock exclusion fencing.

Table 5-7. Streambank stabilization needed in the watersheds.

BMP (Cost-share codes in parentheses)	Pigg River	Poplar Branch	Fryingpan Creek	Beaverdam Creek
	Linear Feet			
Streambank Stabilization (WP-2A)	650	0	35	1,210

5.2.4 Forest Harvesting BMPs

The main source of sediment on forested lands comes from commercial forest harvesting operations. In Virginia, loggers are required to protect water quality, and the DOF developed BMPs as guidelines for proper timber harvesting for Virginia's loggers. To ensure voluntary compliance with these guidelines, DOF began conducting Best Management Practice Field Audits in 1993. Conducted four times a year, the field audits provide a useful tool in gauging the status of Virginia's water quality protection efforts. If loggers do not follow "best management practices" on harvest sites, sediment deposition may occur, and that can cause them to face civil penalties under the Silvicultural Water Quality Law. The forest harvesting BMP is a system of integrated conservation practices that are designed to prevent off-site sediment impact, protect stream crossings, and neutralize storm water runoff.

Additional harvested forest BMPs such as vegetative establishment, water bars (diversion) and putting down gravel on steeper slopes on haul roads are recommended to reduce the loss of sediment from disturbed forest areas. VACS offers cost-share and tax credit for land shaping and planting of permanent vegetation on critically eroding areas on forest harvesting sites. Landowners may receive up to 75% of the estimated cost to install the Woodland Erosion Stabilization practice (FR-4). It was estimated that approximately 10% of the harvested sites was not receiving the extent of BMP implementation needed. Table 5-8 provides a summary of forest harvesting BMPs by watershed needed to achieve water quality goals.

Table 5-8. Forest harvesting BMPs needed in the watersheds.

BMP (Cost-share codes in parentheses)	Pigg River	Poplar Branch	Fryingpan Creek	Beaverdam Creek
	Acres			
Woodland Erosion Stabilization (FR-4)	53	21	22	95

5.2.5 Technical Assistance and Education

To get landowners involved in implementation, it will be necessary to initiate education and outreach strategies and provide technical assistance with the design and installation of various best management practices. There must be a proactive approach to contact farmers and residents to articulate exactly what the IP means to them and what practices will help meet the goal of improved water quality. The stakeholders recommended several education/outreach techniques, which will be utilized during implementation.

The following general tasks associated with agricultural and residential programs were identified:

Agricultural Programs

- Contact landowners in the watersheds to make them aware of cost-share assistance, and voluntary options that are available to agricultural producers interested in conservation.
- Provide technical assistance for agricultural programs (e.g., survey, design, layout).
- Give presentations at local Farm Bureau events including annual membership meetings. Provide information for distribution with semiannual newsletters.
- Organize educational programs for farmers including farm tours in partnership with NRCS, Blue Ridge SWCD, Peaks of Otter SWCD and Pittsylvania SWCD, VA Cooperative Extension and Farm Bureau.
- Work with NRCS, Blue Ridge SWCD, Peaks of Otter SWCD and Pittsylvania SWCD to conduct outreach regarding agricultural BMPs.
- Work with county Boards of Supervisors representatives to contact vast agricultural landowners in the watersheds to discuss water quality issues and potential management strategies.
- Utilize social media and local newspaper to promote agricultural practices and cost-share programs.
- Assess and track progress toward BMP implementation goals.
- Evaluate use of existing agricultural programs and suggest modifications, i.e., adaptive management.

Residential Programs

- Pursue opportunities for riparian tree plantings in residential areas.
- Conduct a conservation landscaping workshop for residential property owners.
- Utilize educational programs already established within the local schools.

- Assess and track progress toward implementation goals.

A critical component in the successful implementation of this plan is the availability of knowledgeable staff to work with landowners on implementing conservation practices. While this plan provides a general list of practices that can be implemented in the watershed, property owners face unique management challenges including both design challenges and financial barriers to implementation of practices. Consequently, technical assistance from trained conservation professionals is a key component to successful BMP implementation. Technical assistance includes helping landowners identify suitable BMPs for their property, designing BMPs and locating funding to finance implementation.

The staffing level needed to implement the agricultural and residential components of the plan was estimated based on staffing levels used in similar projects. Staffing needs were quantified using full time equivalents (FTE), with one FTE being equal to one full-time staff member. Based on the size of the watersheds, the extent of implementation needed, and the overall project timeline, an estimate of 2 FTE was used for technical assistance. This estimate was based on similar implementation projects in other watersheds where one staff member is administering both the residential and agricultural programs.

6 COSTS AND BENEFITS

6.1 BMP Cost Analysis

The costs of agricultural best management practices included in the implementation plan were estimated based on data for Franklin and Bedford Counties from the DCR Agricultural BMP Database, and the NRCS cost lists for BMP components.

Most agricultural practices recommended in the implementation plan are included in state and federal cost share programs. These programs offer financial assistance in implementing the practices and may also provide landowners with an incentive payment to encourage participation. Consequently, both the potential cost to landowners and the cost to state and federal programs must be considered. Table 6-1 shows total agricultural BMP costs by watershed.

The total cost of livestock exclusion systems includes not only the costs associated with fence installation, repair, and maintenance, but also the cost of developing alternative water sources. The cost of streamside fence maintenance can often be a deterrent to participation. Producers may be eligible to receive an annual 25% tax credit for fence maintenance through the VA State Cost Share Program, though associated costs frequently exceed the value of this credit. In developing the cost estimates for fence maintenance shown in Table 6-1, a figure of $5.00/linear foot of fence was used. It was estimated that approximately 10% of fencing would need to be replaced over the 10-year timeline of this project.

Residential stormwater BMP cost estimates were developed using stakeholder input and information from other recent implementation plans (Table 6-2). The cost of streambank restoration practices is shown in Table 6-3. These estimates are based on natural stream channel restoration practices in similar implementation plans. Streambank stabilization and channel restoration practices are applicable to all land uses in the watersheds. Forest harvesting BMPs are needed to reduce the sediment loads in the watersheds. The estimated costs of recommended forest harvesting BMPs were approximated based on previous implementation plans and other literature. Table 6-4 shows total forest BMP costs for the implementation period.

Table 6-1. Agricultural BMP costs for the watersheds.
Assumes one exclusion system averages 2,000 linear feet of stream fencing.

BMP (Cost-share codes in parentheses)	Unit	Average Unit Cost ($)	Pigg River		Poplar Branch		Fryingpan Creek		Beaverdam Creek		Total	
			Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost
Stream Exclusion with Narrow Width Buffer and Grazing Land Management (SL-6N)	system	60,000	1	60,000	0	0	0	0	2	120,000	3	180,000
Stream Exclusion with Wide Width Buffer and Grazing Land Management (SL-6W, SL-6F)	system	95,000	6	570,000	1	95,000	0	0	18	1,710,000	25	2,375,000
CREP Stream Exclusion with Grazing Land Management (CRSL-6)	system	100,000	1	100,000	0	0	0	0	2	200,000	3	300,000
Exclusion Fence Maintenance (10 yrs) (CCI-SE-1, CCI-SL-6N, CCI-SL-6W)	feet	5.50	1,642	9,031	44	242	456	2,508	8,058	44,319	10,200	56,100
Extension of Watering System (SL-7)	system	13,000	2	26,000	2	26,000	2	26,000	2	26,000	8	104,000
Improved Pasture Management (SL-10)	acre	150	605	90,750	63	9,450	289	43,350	864	129,600	1,821	273,150
Critical Area Stabilization (SL-11)	acre	3,000	0.9	2,700	0.2	600	0.8	2,400	1.4	4,200	3.3	9,900
Sediment Retention, Erosion, or Water Control Structure (WP-1)	acres treated	4,000	0	0	30	120,000	219	876,000	0	0	249	996,000
Afforestation of Erodible Pasture/Hayland (FR-1)	acre	2,000	30	60,000	8	16,000	48	96,000	38	76,000	124	248,000
Forest Riparian Buffers (FR-3, DOF-RFFL, DOF-RT)	acres treated	2,000	41	82,000	43	86,000	20	40,000	18	36,000	122	244,000
Continuous No Till (SL-15A)	acre	100	154	15,400	28	2,800	57	5,700	0	0	239	23,900
Cover Crop (SL-8B, SL-8H)	acre	75	154	11,550	28	2,100	57	4,275	0	0	239	17,925
Conversion from High Till to Low Till	acre	80	0	0	4	320	128	10,240	0	0	132	10,560
Long Term Vegetation on Cropland (SL-1)	acre	500	25	12,500	2	1,000	2	1,000	0	0	29	14,500
Total Estimated Agricultural Cost by watershed				**$1,039,931**		**$359,512**		**$1,107,473**		**$2,346,119**		**$4,853,035**

Table 6-2. Residential stormwater BMP costs for the watersheds.

BMP (Cost-share codes in parentheses)	Unit	Average Unit Cost ($)	Pigg River		Poplar Branch		Fryingpan Creek		Beaverdam Creek		Total	
			Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost
Erosion and Sediment Control in Transitional Areas (ESC-0)	Disturbed area/acres	500	4	2,000	0	0	6	3,000	0	0	10	5,000
Raingardens (BR-10/RG)	system	3,000	1	3,000	1	3,000	3	9,000	1	3,000	6	18,000
Forest Riparian Buffers (DOF-RFFL, DOF-RT)	acres treated	1,750	0	0	0	0	0.1	175	2	3,500	2.1	3,675
Total Estimated Stormwater Cost by watershed				**$5,000**		**$3,000**		**$12,175**		**$6,500**		**$26,675**

Table 6-3. Streambank restoration BMP costs for the watersheds.

BMP (Cost-share codes in parentheses)	Unit	Average Unit Cost ($)	Pigg River		Poplar Branch		Fryingpan Creek		Beaverdam Creek		Total	
			Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost
Streambank Stabilization (WP-2A)	feet	750	650	487,500	0	0	35	26,250	1,210	907,500	1,895	1,421,250
Total Estimated Streambank Cost by watershed				**$487,500**		**$0**		**$26,250**		**$907,500**		**$1,421,250**

Table 6-4. Forest harvesting BMP costs for the watersheds.

BMP (Cost-share codes in parentheses)	Unit	Average Unit Cost ($)	Pigg River		Poplar Branch		Fryingpan Creek		Beaverdam Creek		Total	
			Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost
Woodland Erosion Stabilization (FR-4, DOF-RT)	acre	130	53	6,890	21	2,730	22	2,860	95	12,350	191	24,830
Total Estimated Streambank Cost by watershed				**$6,890**		**$2,730**		**$2,860**		**$12,350**		**$24,830**

Total estimated costs for implementation practices needed to meet the sediment reduction goals are summarized in Table 6-5. In Table 6-6, implementation costs are shown for two planned stages of implementation. These stages, the associated timeline, prioritization, and the adaptive approach used are explained in greater detail in Chapter 7.

Table 6-5. Total BMP costs for the watersheds.

BMP Application	Pigg River	Poplar Branch	Fryingpan Creek	Beaverdam Creek	Total
Agricultural	$1,039,931	$359,512	$1,107,473	$2,346,119	$4,853,035
Residential	$5,000	$3,000	$12,175	$6,500	$26,675
Streambank restoration	$487,500	$0	$26,250	$907,500	$1,421,250
Forest harvesting	$6,890	$2,730	$2,860	$12,350	$24,830
Total Estimated Cost	**$1,539,321**	**$365,242**	**$1,148,758**	**$3,272,469**	**$6,325,790**

Table 6-6. Staged BMP implementation costs for the watersheds.

BMP Application	Cost by Stage		Total
	Stage 1 (Years 1 - 5)	Stage 2 (Years 6 - 10)	
Agricultural	$2,218,240	$2,634,795	$4,853,035
Residential	$8,425	$18,250	$26,675
Streambank restoration	$1,421,250	$0	$1,421,250
Forest harvesting	$9,880	$14,950	$24,830
Total Estimated Cost	**$3,657,795**	**$2,667,995**	**$6,325,790**

6.2 Technical Assistance

Technical assistance costs were estimated for two full time positions for Stages 1 and 2 (years 1-10) of the project using a cost of $65,000/position per year. This figure is based on the existing staffing costs included in the Virginia Department of Environmental Quality's grant agreements with the Soil & Water Conservation Districts across the state to provide technical assistance to landowners in implementation plan watersheds. Stakeholders at the second Community Engagement meeting suggested that one full time position be allocated to the Blue Ridge SWCD to address impairments in the Pigg River and Poplar Branch watersheds, three-quarters position to the Peaks of Otter SWCD to address the impairments in the Beaverdam Creek watershed, and one-quarter position to the Pittsylvania SWCD to address the impairment in the Fryingpan Creek watershed. Based on the 10-year timeline of this plan (described in the Implementation Timeline section of this plan), this would make the total cost of technical assistance approximately $1,300,000. When factored into the cost estimate for BMP implementation shown in Table 6-5, this would make the total cost of implementation approximately $7.63M.

6.3 Benefit Analysis

The primary benefit of implementing this plan will be restoration of aquatic life and overall cleaner water in Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek. Specifically, sediment in the streams will be reduced to a level at which the streams can support a healthy and diverse population of aquatic life. In addition, Beaverdam Creek should also see reductions in bacteria loadings as many of the practices that will be implemented in this plan will provide co-benefits to reducing both sediment and bacteria. Beaverdam Creek is impaired for both sediment and bacteria. In 2006 a bacteria TMDL was developed (DEQ, 2006). Although there is no implementation plan covering the bacteria impairment for Beaverdam Creek, it is a secondary goal of this plan to indirectly address the bacteria impairment. The agricultural and residential practices that reduce runoff or provide filtration prior to entering the creek will reduce both sediment and bacteria loadings.

An important objective of the implementation plan is to foster continued economic vitality. 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 and residential 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 livestock from streams, improved pasture management, and improved residential stormwater management will each provide economic benefits to landowners. Additionally, money spent by landowners and state agencies in the process of implementing this plan will stimulate the local economy.

6.3.1 Agricultural Practices

It is recognized that every farmer faces unique management challenges that may make implementation of some BMPs more cost effective than others. Consequently, costs and benefits of the BMPs recommended in this plan must be weighed on an individual basis. The benefits highlighted in this section are based on general research findings.

Many livestock illnesses can be spread through contaminated water supplies. For instance, coccidia can be delivered through feed, water and haircoat contamination with manure (VCE, 2005). Additionally, keeping cattle in clean, dry areas has been shown to reduce the occurrence of mastitis and foot rot. Horses drinking from marshy areas or areas accessed by wildlife or cattle carrying Leptospirosis tend to have an increased incidence of moonblindness associated with Leptospirosis infections (VCE, 1998a; VCE, 1998b). A clean water source can prevent illnesses that reduce production and incur the added expense of avoidable veterinary bills.

Taking the opportunity to implement an improved pasture management system in conjunction with installing clean water supplies will also provide economic benefits for the producer. Improved pasture management can allow a producer to feed less hay in winter months, increase stocking rates by 30 to 40% and, consequently, improve the profitability of the operation. With feed costs typically responsible for 70 to 80% of the cost of growing or maintaining an animal, and pastures

providing feed at a cost of 0.01 to 0.02 cents/lb of total digestible nutrients (TDN) compared to 0.04 to 0.06 cents/lb TDN for hay, increasing the amount of time that cattle are fed on pasture is clearly a financial benefit to producers (VCE, 2009). 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. In addition to reducing costs to producers, intensive pasture management can boost profits by allowing higher stocking rates and increasing the amount of gain per acre. Another benefit is that cattle are closely confined allowing for quicker examination and handling. In general, many of the agricultural BMPs recommended in this document will provide both environmental benefits and economic benefits to the farmer.

In addition to reducing the likelihood of animals contracting waterborne illnesses by providing a clean water supply, streamside fencing excludes livestock from wet, swampy environments as are often found next to streams where cattle have regular access. Keeping cattle in clean, dry areas has been shown to reduce the occurrence of mastitis and foot rot. The VCE (1998a) reports that mastitis costs producers $100 per cow in reduced quantity and quality of milk produced. On a larger scale, mastitis costs the U.S. dairy industry about $1.7 billion to 2 billion annually or 11% of total U.S. milk production. While the spread of mastitis through a dairy herd can be reduced through proper sanitation of milking equipment, mastitis-causing bacteria can be harbored and spread in the environment where cattle have access to wet and dirty areas. Installation of streamside fencing, and well managed loafing areas will reduce the amount of time that cattle have access to these areas.

6.3.2 Residential Stormwater Practices

The primary benefits of stormwater management practices to private property owners include flood mitigation and improved water quality. A 2004 study assessing the economic benefits of stormwater management showed that these services can be valued at 0-5% of the market value of a home (Braden and Johnston, 2004). In addition, residential BMPs have several economic benefits to localities. Increased retention of stormwater on site can lower peak discharges, thereby reducing the drainage infrastructure needed to prevent flooding. This can result in cost savings to local governments through reduced engineering and land acquisition costs, and reduced materials and installation costs for stormwater culverts and streambank armoring to prevent scour. Lastly, implementation of residential BMPs greatly reduces soil erosion and sediment transport to our rivers, streams, and lakes. A 1993 study of the economic cost of erosion-related pollution showed that national off-site damages from urban sediment sources cost between $192 million and $2.2 billion per year in 1990-dollar values (Paterson et al, 1993). This cost range would be far greater today if adjusted for inflation.

6.3.3 Watershed Health and Associated Benefits

Focusing on reducing sediment in the watersheds will have associated watershed health benefits as well. Reductions in streambank erosion, excessive nutrient runoff, and water temperature are additional benefits associated with streamside buffer plantings. In turn, reduced nutrient loading and erosion and cooler water temperatures improves habitat for fisheries, which provides associated benefits to anglers and the local economy. Riparian buffers can also improve habitat for wildlife such as ground-nesting quail and other sensitive species. Data collected from Breeding Bird Surveys in Virginia indicate that the quail population declined 4.2% annually between 1966 and 2007. Habitat loss has been cited as the primary cause of this decline. As a result, Virginia has experienced significant reductions in economic input to rural communities from quail hunting. The direct economic contribution of quail hunters to the Virginia economy was estimated at nearly $26 million in 1991, with the total economic impact approaching $50 million. Between 1991 and 2004, the total loss to the Virginia economy was more than $23 million from declining quail hunter expenditures (DGIF, 2009). Funding is available to assist landowners in quail habitat restoration (see Chapter 9).

In addition to the benefits to individual landowners, the economy of the local community will be stimulated through expenditures made during implementation, and the infusion of dollars from funding sources outside the impaired areas. Building contractors and material suppliers who deal with fencing and other BMP components can expect to see an increase in business during implementation. Additionally, income from maintenance of these systems should continue long after implementation is complete. As will be discussed in greater detail in Chapter 9, a portion of the funding for implementation can be expected to come from state and federal sources. This portion of funding represents money that is new to the area and will stimulate the local economy. In general, implementation will provide not only environmental benefits to the community, but economic benefits as well, which in turn will allow for individual landowners to participate in implementation.

An implementation plan addressing bacteria impairments was developed for the Pigg River watershed in 2009 (Virginia Tech, 2009). Implementation practices recommended in the bacteria plan apply to Poplar Branch, Fryingpan Creek and the portion of Pigg River in this current project area. Many of the practices in this sediment implementation plan will also reduce bacteria loads, supporting the prior accepted bacteria implementation plan. Similarly, many of the best management practices recommended in this implementation plan will address the bacteria impairment in Beaverdam Creek. The source assessment from the Beaverdam Creek bacteria TMDL (2006) was updated to 2024 conditions and benefits were estimated with the application of the sediment implementation practices. It is expected that full implementation of the practices over the ten-year implementation period will result in a 38% reduction in bacteria in Beaverdam Creek. Although a percent reduction in bacteria was calculated as a part of the development of this plan for Beaverdam Creek, this IP does not have corollary control measure goals as this plan is taking a co-benefit approach.

7 MEASURABLE GOALS AND MILESTONES

Given the scope of work involved with implementing this IP, full implementation and de-listing from the Virginia Section 305(b)/303(d) list shall be expected within 10 years provided that full funding for technical assistance and BMP cost-share are available. Described in this section are a timeline for implementation, water quality and implementation goals and milestones, and strategies for targeting of best management practices.

7.1 Milestone Identification

The end goals of implementation are restored water quality of the impaired waters and subsequent delisting of the waters from the Commonwealth of Virginia's Section 305(b)/303(d) list within 10 years. Progress toward end goals will be assessed during implementation through tracking of best management practices through the Virginia Agricultural Cost-Share Program and BMP Warehouse (DEQ-hosted statewide BMP database) and continued water quality monitoring.

Expected progress in implementation is established with two types of milestones: *implementation milestones* and *water quality milestones*. Implementation milestones establish the amount of control measures installed within certain timeframes, while water quality milestones establish the corresponding improvements in water quality that can be expected as the implementation milestones are met. The milestones described here are intended to achieve full implementation of the TMDL within 10 years.

Following the idea of a staged implementation approach, resources and finances will be concentrated on the most cost-efficient control measures and areas of highest interest first. For example, concentrating on implementing more livestock exclusion fencing and streambank stabilization within the first several years may provide the highest return on water quality improvement with less cost to landowners. Implementation has been divided into two stages: Stage 1 includes years 1 through 5 and Stage 2 includes years 6 through 10. Each stage provides approximately half of the sediment reductions needed in each watershed to achieve the sediment water quality improvement goals. Tables 7-1 through 7-8 show implementation goals and the sediment water quality improvement goals for each watershed in each implementation stage.

Table 7-1. Staged BMP implementation goals for Pigg River.

BMP Type	BMP (Cost-share code in parenthesis)	Units	Extent		
			Stage 1	Stage 2	Total
Livestock stream exclusion	Stream Exclusion with Narrow Width Buffer and Grazing Land Management (SL-6N)	system	1	0	1
	Stream Exclusion with Wide Width Buffer and Grazing Land Management (SL-6W, SL-6F)		4	2	6
	CREP Stream Exclusion with Grazing Land Management (CRSL-6)		1	0	1
	Exclusion Fence Maintenance (10 yrs) (CCI-SE-1, CCI-SL-6N, CCI-SL-6W)	linear feet	821	821	1,642
Pasture	Extension of Watering and Grazing Management System (SL-7)	system	1	1	2
	Improved Pasture Management (SL-10)	acre	259	346	605
	Afforestation of Erodible Pasture (FR-1)		0	30	30
	Permanent Vegetative Cover on Critical Areas (SL-11)		0	0.9	0.9
	Forest Riparian Buffers (DOF-RFFL, FR-3)	acres treated	0	12	12
Hayland	Forest Riparian Buffers (DOF-RFFL, FR-3)	acres treated	0	29	29
	Afforestation of Hayland (FR-1)	acre	0	2	2
Cropland	Continuous No Till (SL-15A)	acre	0	154	154
	Cover Crop (SL-8B, SL-8H, SL-8M)		0	154	154
	Long Term Vegetation on Cropland (SL-1)		0	25	25
Residential stormwater	Erosion and Sediment Control in Transitional Areas (ESC-0)	acres treated	1	3	4
	Raingardens (BR-10/RG)	system	0	1	1
Streambank	Streambank Stabilization (WP-2A)	linear feet	650	0	650
Forest	Woodland Erosion Stabilization (FR-4)	acres	21	32	53
Average annual sediment load (tons/yr) (Existing LA = 1,187) (TMDL LA goal = 862)			**1,024**	**862**	**862**
% Reduction in sediment load (TMDL LA goal = 27.4%)			**13.7**	**27.4**	**27.4**

Table 7-2. Estimated sediment reductions for each BMP type in Pigg River.

BMP Type	BMP (Cost-share code in parenthesis)	Estimated Sediment Reduction (tons/yr)		
		Stage 1	Stage 2	Total
Livestock stream exclusion	Stream Exclusion with Narrow Width Buffer and Grazing Land Management (SL-6N)	1	0	1
	Stream Exclusion with Wide Width Buffer and Grazing Land Management (SL-6W, SL-6F)	6	3	9
	CREP Stream Exclusion with Grazing Land Management (CRSL-6)	5	0	5
	Exclusion Fence Maintenance (10 yrs) (CCI-SE-1, CCI-SL-6N, CCI-SL-6W)	NA	NA	NA
Pasture	Extension of Watering and Grazing Management System (SL-7)	5	5	10
	Improved Pasture Management (SL-10)	49	71	120
	Afforestation of Erodible Pasture (FR-1)	0	19	19
	Permanent Vegetative Cover on Critical Areas (SL-11)	0	<1	<1
	Forest Riparian Buffers (DOF-RFFL, FR-3)	0	<1	<1
Hayland	Forest Riparian Buffers (DOF-RFFL, FR-3)	0	1	1
	Afforestation of Hayland (FR-1)	0	<1	<1
Cropland	Continuous No Till (SL-15A)	0	23	23
	Cover Crop (SL-8B, SL-8H, SL-8M)	0	1	1
	Long Term Vegetation on Cropland (SL-1)	0	9	9
Residential stormwater	Erosion and Sediment Control in Transitional Areas (ESC-0)	11	23	34
	Raingardens (BR-10/RG)	0	<1	<1
Streambank	Streambank Stabilization (WP-2A)	81	0	81
Forest	Woodland Erosion Stabilization (FR-4)	5	7	12
Estimated total reduction in annual sediment load from existing nonpoint source load (1,187 tons/yr)		**163**	**162**	**325**
Estimated % Reduction in sediment load from existing nonpoint source load		**13.7**	**13.7**	**27.4**

Table 7-3. Staged BMP implementation goals for Poplar Branch.

BMP Type	BMP (Cost-share code in parenthesis)	Units	Extent		
			Stage 1	Stage 2	Total
Livestock stream exclusion	Stream Exclusion with Wide Width Buffer and Grazing Land Management (SL-6W, SL-6F)	system	1	0	1
	Exclusion Fence Maintenance (10 yrs) (CCI-SE-1, CCI-SL-6N, CCI-SL-6W)	linear feet	22	22	44
Pasture	Extension of Watering and Grazing Management System (SL-7)	system	1	1	2
	Improved Pasture Management (SL-10)	acre	42	21	63
	Afforestation of Erodible Pasture (FR-1)		3	4	7
	Permanent Vegetative Cover on Critical Areas (SL-11)		0.1	0.1	0.2
	Sediment Retention, Erosion, or Water Control Structure (WP-1)	acres treated	0	30	30
Hayland	Forest Riparian Buffers (DOF-RFFL, FR-3)	acres treated	1	12	13
	Afforestation of Hayland (FR-1)	acre	0.5	0.5	1
Cropland	Forest Riparian Buffers (FR-3, DOF-RFFL)	acres treated	18	12	30
	Continuous No Till (SL-15A)	acre	14	14	28
	Cover Crop (SL-8B, SL-8H, SL-8M)		14	14	28
	Conversion from High Till to Low Till		4	0	4
	Long Term Vegetation on Cropland (SL-1)		2	0	2
Residential stormwater	Raingardens (BR-10/RG)	system	0	1	1
Forest	Woodland Erosion Stabilization (FR-4)	acres	8	13	21
Average annual sediment load (tons/yr) (Existing LA = 146) (TMDL LA goal = 74)			**109**	**74**	**74**
% Reduction in sediment load (TMDL LA goal = 49.3%)			**24.9**	**49.3**	**49.3**

Table 7-4. Estimated sediment reductions for each BMP type in Poplar Branch.

BMP Type	BMP (Cost-share code in parenthesis)	Estimated Sediment Reduction (tons/yr)		
		Stage 1	Stage 2	Total
Livestock stream exclusion	Stream Exclusion with Wide Width Buffer and Grazing Land Management (SL-6W, SL-6F)	1	0	1
	Exclusion Fence Maintenance (10 yrs) (CCI-SE-1, CCI-SL-6N, CCI-SL-6W)	NA	NA	NA
Pasture	Extension of Watering and Grazing Management System (SL-7)	<1	<1	<1
	Improved Pasture Management (SL-10)	8	4	12
	Afforestation of Erodible Pasture (FR-1)	2	3	5
	Permanent Vegetative Cover on Critical Areas (SL-11)	<1	<1	<1
	Sediment Retention, Erosion, or Water Control Structure (WP-1)	0	16	16
Hayland	Forest Riparian Buffers (DOF-RFFL, FR-3)	<1	<1	<1
	Afforestation of Hayland (FR-1)	<1	<1	<1
Cropland	Forest Riparian Buffers (FR-3, DOF-RFFL)	9	6	15
	Continuous No Till (SL-15A)	2	2	4
	Cover Crop (SL-8B, SL-8H, SL-8M)	<1	<1	<1
	Conversion from High Till to Low Till	12	2	14
	Long Term Vegetation on Cropland (SL-1)	<1	<1	<1
Residential stormwater	Raingardens (BR-10/RG)	0	<1	<1
Forest	Woodland Erosion Stabilization (FR-4)	2	3	5
Estimated total reduction in annual sediment load from existing nonpoint source load (146 tons/yr)		**36**	**36**	**72**
Estimated % Reduction in sediment load from existing nonpoint source load		**24.9**	**24.4**	**49.3**

Table 7-5. Staged BMP implementation goals for Fryingpan Creek.

BMP Type	BMP (Cost-share code in parenthesis)	Units	Extent		
			Stage 1	Stage 2	Total
Livestock stream exclusion	Exclusion Fence Maintenance (10 yrs) (CCI-SE-1, CCI-SL-6N, CCI-SL-6W)	linear feet	228	228	456
Pasture	Extension of Watering and Grazing Management System (SL-7)	system	1	1	2
	Improved Pasture Management (SL-10)	acre	108	181	289
	Afforestation of Erodible Pasture (FR-1)		12	36	48
	Permanent Vegetative Cover on Critical Areas (SL-11)		0.4	0.4	0.8
	Forest Riparian Buffers (DOF-RFFL, FR-3)	acres treated	5	15	20
	Sediment Retention, Erosion, or Water Control Structure (WP-1)	acres treated	0	219	219
Cropland	Continuous No Till (SL-15A)	acre	26	31	57
	Cover Crop (SL-8B, SL-8H, SL-8M)		26	31	57
	Conversion from High Till to Low Till		84	44	128
	Long Term Vegetation on Cropland (SL-1)		2	0	2
Residential stormwater	Erosion and Sediment Control in Transitional Areas	acres treated	6	0	6
	Raingardens (RG)	system	0	3	3
	Forest Riparian Buffers (DOF-RFFL, DOF-RT)	acres treated	0.1	0	0.1
Streambank	Streambank Stabilization (WP-2A)	linear feet	35	0	35
Forest	Woodland Erosion Stabilization (FR-4)	acres	9	13	22
Average annual sediment load (tons/yr) (Existing LA = 490) (TMDL LA goal = 145)			**317**	**145**	**145**
% Reduction in sediment load (TMDL LA goal = 70.5%)			**35.5**	**70.5**	**70.5**

Table 7-6. Estimated sediment reductions for each BMP type in Fryingpan Creek.

BMP Type	BMP (Cost-share code in parenthesis)	Estimated Sediment Reduction (tons/yr)		
		Stage 1	Stage 2	Total
Livestock stream exclusion	Exclusion Fence Maintenance (10 yrs) (CCI-SE-1, CCI-SL-6N, CCI-SL-6W)	NA	NA	NA
Pasture	Extension of Watering and Grazing Management System (SL-7)	<1	<1	<1
	Improved Pasture Management (SL-10)	19	20	39
	Afforestation of Erodible Pasture (FR-1)	14	16	30
	Permanent Vegetative Cover on Critical Areas (SL-11)	<1	<1	<1
	Forest Riparian Buffers (DOF-RFFL, FR-3)	<1	1	1
	Sediment Retention, Erosion, or Water Control Structure (WP-1)	0	62	62
Cropland	Continuous No Till (SL-15A)	4	7	11
	Cover Crop (SL-8B, SL-8H, SL-8M)	<1	<1	<1
	Conversion from High Till to Low Till	120	63	183
	Long Term Vegetation on Cropland (SL-1)	2	0	2
Residential stormwater	Erosion and Sediment Control in Transitional Areas	10	0	10
	Raingardens (RG)	<1	<1	<1
	Forest Riparian Buffers (DOF-RFFL, DOF-RT)	<1	0	<1
Streambank	Streambank Stabilization (WP-2A)	4	0	4
Forest	Woodland Erosion Stabilization (FR-4)	1	3	4
Estimated total reduction in annual sediment load from existing nonpoint source load (490 tons/yr)		**174**	**171**	**345**
Estimated % Reduction in sediment load from existing nonpoint source load		**35.5**	**35.0**	**70.5**

Table 7-7. Staged BMP implementation goals for Beaverdam Creek.

BMP Type	BMP (Cost-share code in parenthesis)	Units	Extent		
			Stage 1	Stage 2	Total
Livestock stream exclusion	Stream Exclusion with Narrow Width Buffer and Grazing Land Management (SL-6N)	system	1	1	2
	Stream Exclusion with Wide Width Buffer and Grazing Land Management (SL-6W, SL-6F)		12	6	18
	CREP Stream Exclusion with Grazing Land Management (CRSL-6)		1	1	2
	Exclusion Fence Maintenance (10 yrs) (CCI-SE-1, CCI-SL-6N, CCI-SL-6W)	linear feet	4,029	4,029	8,058
Pasture	Extension of Watering and Grazing Management System (SL-7)	system	1	1	2
	Improved Pasture Management (SL-10)	acre	288	576	864
	Afforestation of Erodible Pasture (FR-1)		0	38	38
	Permanent Vegetative Cover on Critical Areas (SL-11)		0.7	0.7	1.4
	Forest Riparian Buffers (DOF-RFFL, FR-3)	acres treated	0	18	18
Residential stormwater	Raingardens (RG)	system	1	0	1
	Forest Riparian Buffers (DOF-RFFL, DOF-RT)	acres treated	1	1	2
Streambank	Streambank Stabilization (WP-2A)	linear feet	1,210	0	1,210
Forest	Woodland Erosion Stabilization (FR-4)	acres	38	57	95
Average annual sediment load (tons/yr) (Existing LA = 1,500) (TMDL LA goal = 1,108)			**1,259**	**1,105**	**1,105**
% Reduction in sediment load (TMDL LA goal = 26.1%)			**16.1**	**26.4**	**26.4**

Table 7-8. Estimated sediment reductions for each BMP type in Beaverdam Creek.

BMP Type	BMP (Cost-share code in parenthesis)	Estimated Sediment Reduction (tons/yr)		
		Stage 1	Stage 2	Total
Livestock stream exclusion	Stream Exclusion with Narrow Width Buffer and Grazing Land Management (SL-6N)	1	1	2
	Stream Exclusion with Wide Width Buffer and Grazing Land Management (SL-6W, SL-6F)	24	12	36
	CREP Stream Exclusion with Grazing Land Management (CRSL-6)	5	5	10
	Exclusion Fence Maintenance (10 yrs) (CCI-SE-1, CCI-SL-6N, CCI-SL-6W)	NA	NA	NA
Pasture	Extension of Watering and Grazing Management System (SL-7)	1	1	2
	Improved Pasture Management (SL-10)	53	98	151
	Afforestation of Erodible Pasture (FR-1)	0	26	26
	Permanent Vegetative Cover on Critical Areas (SL-11)	<1	<1	<1
	Forest Riparian Buffers (DOF-RFFL, FR-3)	0	1	1
Residential stormwater	Raingardens (BR-10/RG)	<1	<1	<1
	Forest Riparian Buffers (DOF-RFFL, DOF-RT)	<1	<1	<1
Streambank	Streambank Stabilization (WP-2A)	150	0	150
Forest	Woodland Erosion Stabilization (FR-4)	7	10	17
Estimated total reduction in annual sediment load from existing nonpoint source load (1,500 tons/yr)		**241**	**154**	**395**
Estimated % Reduction in sediment load from existing nonpoint source load		**16.1**	**10.3**	**26.4**

7.2 Water Quality Monitoring

7.2.1 DEQ Monitoring

Improvements in water quality will be evaluated through biological monitoring conducted at DEQ monitoring stations located in the watersheds as shown below in Figure 7-1. Descriptions of these stations are provided in Table 7-9. The map shows stations that are part of DEQ's Biological Monitoring Program and are co-located with ambient monitoring stations as well.

Table 7-9. Water quality monitoring stations used to evaluate implementation in the Pigg River, Poplar Branch, Fryingpan Creek and Beaverdam Creek Watersheds.

Assessment Unit	Station ID	Stream Name	Station Description
VAW-L14R_PGG05B12	4APGG077.15	Pigg River	Segment begins at the confluence of the South Prong Pigg River downstream to the confluence of Turners Creek. (1.49 miles)
VAW-L14R_PGG06A02	4APGG077.15	Pigg River	Segment begins one mile above the mouth of the South Prong of the Pigg River downstream to the South Prong Pigg River confluence on the Pigg River. (1.02 miles)
VAW-L14R_PGG06**1**2	4APGG076.93	Pigg River	Segment begins one mile above the mouth of the South Prong Pigg upstream to near Five Mile Mountain Rd. (Rt. 748). (1.95 miles)
VAW-L17R_PAA01A04	4APAA000.71	Poplar Branch	Segment begins at its headwaters to its confluence with Snow Creek. (2.57 miles)
VAW-L18R_FRY01A06	4AFRY006.08	Fryingpan Creek	Segment begins at headwaters downstream roughly 2.5 miles and ~0.85 miles of the Rt. 40 crossing. (2.56 miles)
VAW-L07R_BDA01A00	4ABDA004.14	Beaverdam Creek	Segment begins from the WQS designated public water supply (PWS) section 6i, eg. 5 miles above the 795 ft. pool elevation of Smith Mtn. Lake on downstream to the inundation of Beaverdam Creek's waters at Smith Mtn. Lake. (4.99 miles)
VAW-L07R_BDA02A00	4ABDA006.72	Beaverdam Creek	Segment begins from its headwaters downstream to the WQS designated public water supply (PWS) ending section 6i, eg. 5 miles above the Smith Mtn. Lake 795 ft. pool elevation. (5.36 miles)

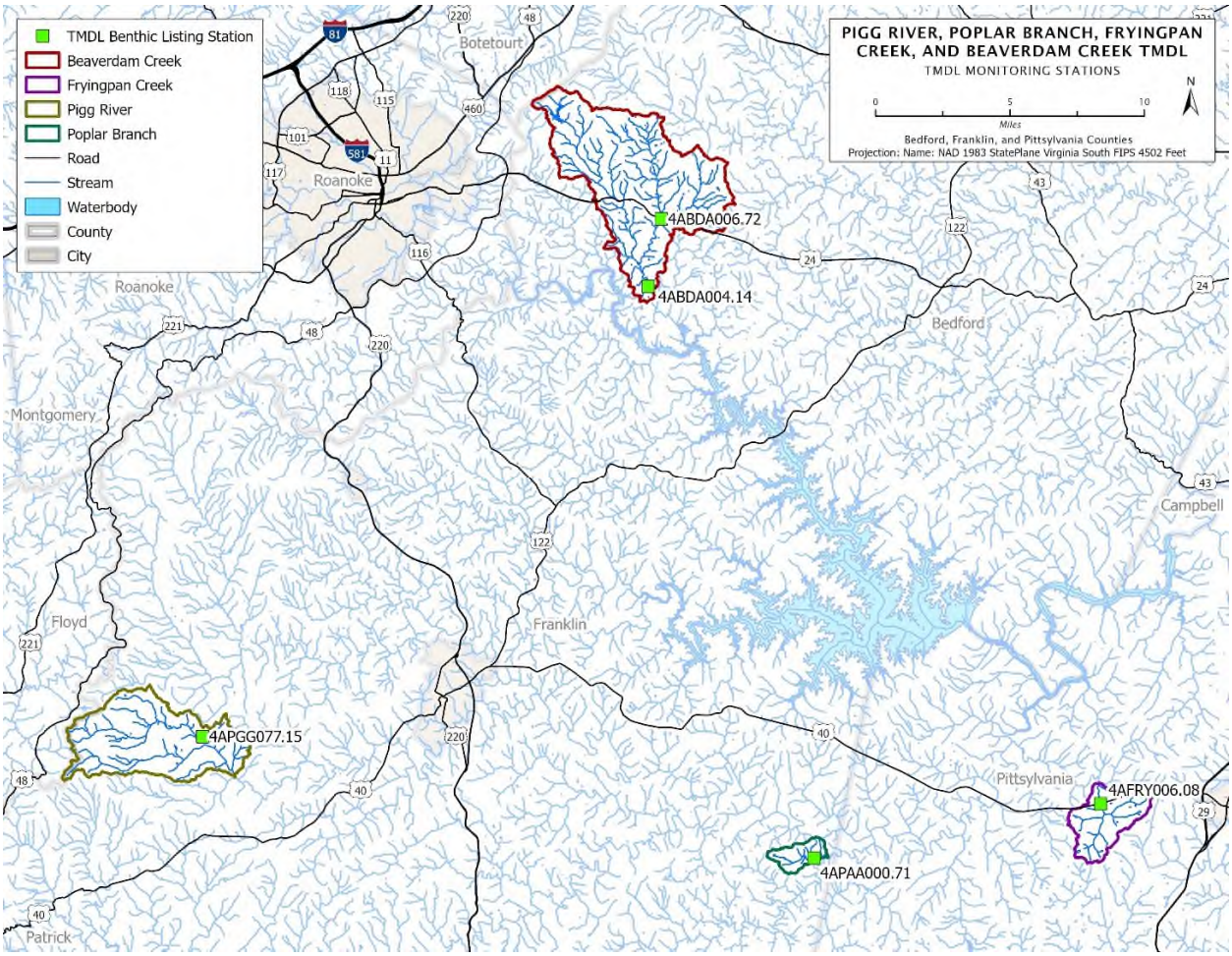

Figure 7-1. Water quality monitoring stations used to evaluate implementation in the Pigg River, Poplar Branch, Fryingpan Creek and Beaverdam Creek Watersheds.

Biological monitoring is conducted in the spring and fall and takes place on a rotating basis within a six-year assessment cycle. Monitoring will begin no sooner than the second odd numbered calendar year following the initiation of implementation. Beginning monitoring after 2 to 3 years of BMP implementation will help ensure that time has passed for remedial measures to have stabilized and BMPs to have become functional. At a minimum, the frequency of sample collections will be every spring and fall for two years. After two years of bi-annual monitoring an assessment will be made to determine if the segments are no longer impaired. If full restoration, as defined in the current or most recent version of the DEQ Final Water Quality Assessment Guidance Manual, has been achieved, monitoring will be suspended. If the two listing stations shown on the map do not show signs of improvement within this two-year period, monitoring will be discontinued for two years. Bi-annual monitoring will be resumed for another two years on the odd numbered calendar year in the third two-year period of the six-year assessment window. After this, the most recent two years of data will be evaluated, and the same criteria as was used for the first two-year monitoring cycle will apply.

7.2.2 Citizen Monitoring

Citizen monitoring is another valuable tool for assessing water quality. Citizen monitoring can supplement DEQ monitoring, identify priority areas for implementation, and detect improvements in water quality following implementation. DEQ offers information on Citizen Water Quality Monitoring on the Virginia DEQ homepage: https://www.deq.virginia.gov/our-programs/water/water-quality/monitoring/citizen-monitoring.

7.3 Prioritizing Implementation Actions

The priorities for implementation within these watersheds was discussed during the public participation process. Figure 7-2 was presented to the community engagement group. Ultimately, due to the size and participation, it was noted that prioritizing the areas based on funding application and the geography of the watersheds was the most efficient approach. Beaverdam Creek and Fryingpan Creek are each its own areas as high priority (1) because they are in two different districts and would facilitate the RFA funding process for the applicants. Pigg River and Poplar Branch are both under BRSWCD. While both are high in priorities, the focus to prioritizing Pigg River over Polar Branch was based on the understanding of the area. Pigg River watershed has a few large properties which take up a large portion of the impaired section. These properties may be difficult to target, but the larger area in comparison to Poplar Branch will provide more opportunities to implement BMPs. The alternative option of focusing on Poplar Branch as it is smaller and may be faster to target was also proposed. The participants decided to focus on prioritizing Pigg River watershed.

Staged implementation implies the process of prioritizing BMPs to achieve the greatest sediment reduction benefits early in the process. The sediment TMDL study indicated that runoff from pasture contributes most of the total sediment load in the watersheds. Prioritizing implementation practices such as livestock exclusion from the stream and improved pasture management will provide the highest return on water quality improvement. This is especially important for Beaverdam Creek considering it also has a bacteria impairment that has not been addressed in an implementation plan.

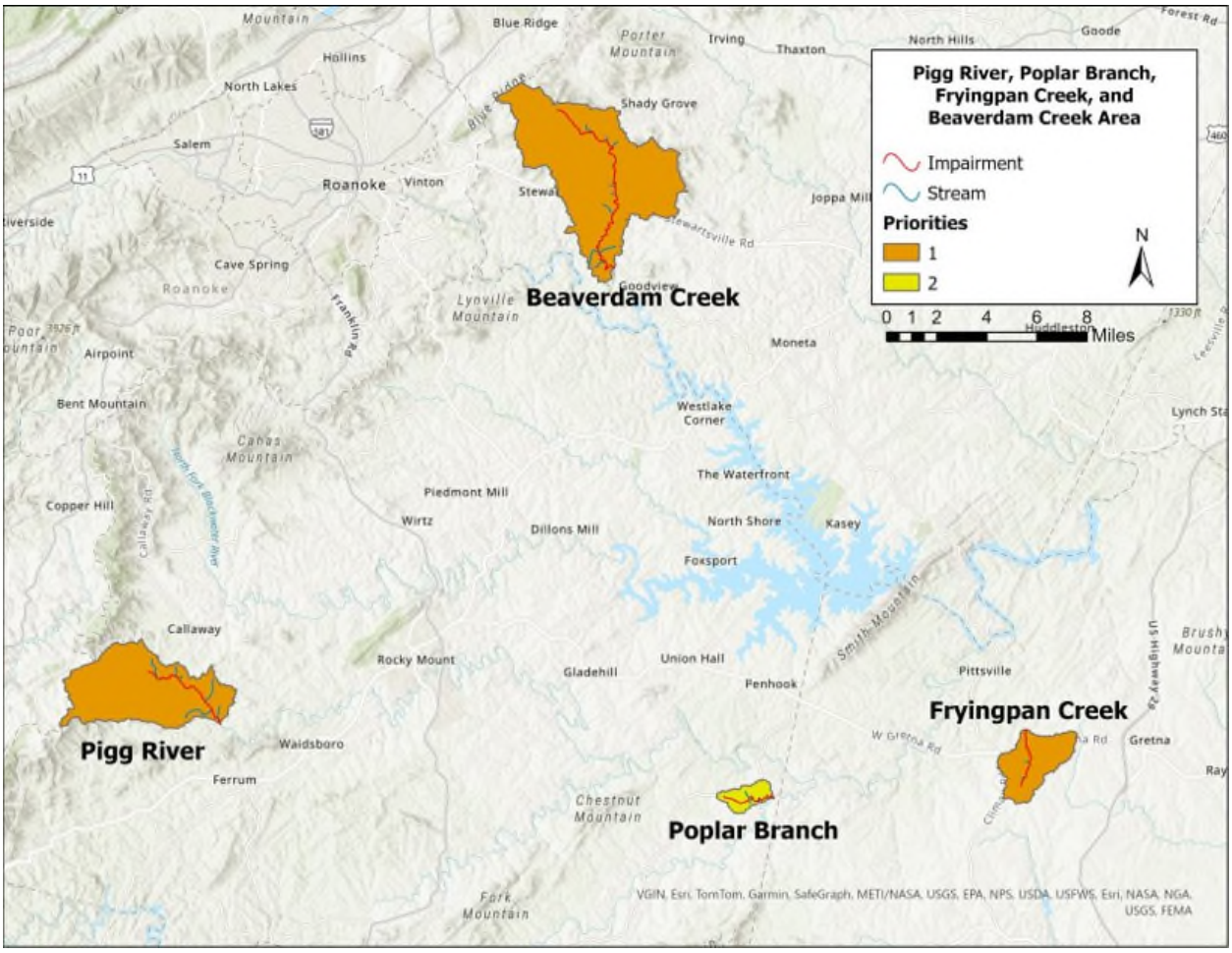

Figure 7-2. A map showing the priority ranking for the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek watersheds.

7.4 Adaptive Management Strategy

An adaptive management strategy will be utilized in the implementation of this plan to achieve the water quality goals. Throughout the course of implementation, the management measures and water quality goals will be assessed, and adjustments of actions will be made as appropriate.

The assessment of these measures and goals will be accomplished through monitoring of water quality, as discussed in Section 7.2 of this report, and evaluation of BMP implementation. Both mechanisms are documented in DEQ's triennial Progress Reports. The Progress Report is developed at the watershed/IP level and includes a summary of the watershed, implementation highlights, and water quality monitoring results. Information in the Progress Report can be used to determine if adaptive management is necessary. Furthermore, at the end of Stage 1, if assessments of water quality and implementation milestones find that progress toward achieving the water quality reduction goals is not as expected, the implementation strategy can be adjusted. Stakeholders, such as Blue Ridge SWCD, Peaks of Otter SWCD, Pittsylvania SWCD, NRCS, and

DEQ, will be responsible for making this determination. Stakeholders' roles are described in Chapter 8.

As new technologies and innovative BMPs to address sediment reduction become available, these practices will be evaluated for implementation in the watersheds. In addition, as new funding opportunities become available, they will be reviewed and pursued if applicable in the watersheds.

8 STAKEHOLDERS AND THEIR ROLE IN IMPLEMENTATION

Achieving the goals of this plan is dependent on stakeholder participation and strong leadership on the part of both community members and conservation organizations. The Blue Ridge Soil and Water Conservation District, Peaks of Otter Soil and Water Conservation District, and Pittsylvania Soil and Water Conservation District cover all the project area with respect to administration of the VA Agricultural BMP Cost Share Program. Additional partners will be necessary to address urban/residential implementation needs including Franklin County, Pittsylvania County, and Bedford County. The following sections in this chapter describe the responsibilities and expectations for the various components of implementation.

8.1 Partner Roles and Responsibilities

8.1.1 Watershed Landowners

The majority of practices recommended in this plan are related to agriculture since it is a predominant land use in the watersheds. Participation from local farmers is thus a key factor to the success of this plan. Consequently, it is important to consider characteristics of farms and farmers in the watersheds that will affect the decisions farmers make when it comes to implementing conservation practices on their farms. For example, the average size of farms is an important factor to consider, since it affects how much land a farmer can give up for a riparian buffer. SWCD and NRCS conservation staff will work with farmers to select the most applicable and cost-efficient practices for their farms. To assist with this selection, it is important to consider characteristics of farms and farmers in the watersheds that will affect the decisions farmers make when it comes to implementing conservation practices on their farms. For example, the average size of farms is an important factor to consider, since it affects how much land a farmer can give up for a riparian buffer.

In addition to local farmers and homeowners, participation from elected officials is critical to the success of this plan. Elected officials make important decisions with respect to land use and development that are likely to affect water quality. It is critical that the goals of this plan are considered as these decisions are evaluated.

8.1.1.1 Blue Ridge Soil and Water Conservation District (SWCD), Peaks of Otter Soil and Water Conservation District and Natural Resource Conservation Service (NRCS)

Both the SWCD and NRCS are continually reaching out to farmers in the watersheds and providing them technical assistance with conservation practices. SWCD and NRCS staff responsibilities include promoting available funding for BMPs and providing assistance in the design and layout of agricultural BMPs.

SWCD and NRCS staff can assist with conducting outreach activities in the watersheds to encourage participation in conservation programs; however, staff time for targeted outreach is limited due to existing workloads. In addition, the SWCD is prepared to work with landowners to pursue grant opportunities through the VA Conservation Assistance Program (VCAP) to implement stormwater BMPs in the region. Most practices included in this program are eligible for 80% cost share and some practices provide a flat rate incentive payment up to the installation cost. Landowners interested in participating in the program can reach out to the SWCD to discuss their eligibility for assistance. SWCD staff will conduct a site visit to the property and assist with development of a design plan. The SWCD Board and the VCAP Steering Committee review applications for assistance and make decisions on approval. All practices are required to be maintained for 10 years. Through this program, the SWCD could play an important role in working with Franklin County, Pittsylvania County, and Bedford County to implement priority stormwater BMPs in the watersheds.

8.1.1.2 Virginia Department of Environmental Quality

The Virginia Department of Environmental Quality (DEQ) has a lead role in the development of implementation plans to address non-point source pollutants such as sediment from agricultural operations and urban/residential stormwater that contribute to water quality impairments. DEQ provides available grant funding and technical support for the implementation of NPS (non-point source) components of implementation plans. DEQ will work closely with project partners including the Natural Bridge Soil and Water Conservation District to track implementation progress for best management practices. In addition, DEQ will work with interested partners on grant proposals to generate funds for projects included in the implementation plan. When needed, DEQ will facilitate additional meetings of the steering committee to discuss implementation progress and make necessary adjustments to the implementation plan.

DEQ is also responsible for monitoring state waters to determine compliance with water quality standards. DEQ will continue monitoring water quality in Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek to assess water quality and determine when restoration has been achieved and the streams can be removed from Virginia's impaired waters list.

8.1.1.3 Virginia Department of Conservation and Recreation

The Virginia Department of Conservation and Recreation (DCR) administers the Virginia Agricultural Cost Share Program, working closely with Soil and Water Conservation Districts to provide cost share and operating grants needed to deliver this program at the local level. DCR works with the SWCDs to track BMP implementation as well. In addition, DCR administers the state's Nutrient Management Program, which provides guidelines and technical assistance to

producers in appropriate manure and poultry litter storage and application, as well as application of commercial fertilizer.

8.1.1.4 Other Potential Local Partners

There are numerous opportunities for future partnerships in the implementation of this plan and associated water quality monitoring. A list of additional organizations and entities with which partnership opportunities should be explored is provided below:

- VA Cooperative Extension
- Virginia Department of Forestry
- Leesville Lake Association
- Smith Mountain Lake Association
- Friends of Rivers of Virginia
- Lynchburg College
- Ferrum College
- Franklin County
- Bedford County
- Pittsylvania County
- Central Virginia Planning District
- Tri-County Lakes Administrative Commission
- Natural Resource Conservation Service

8.2 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 Programs, and local comprehensive plans. Coordination of the implementation project with these existing programs could result in additional resources and increased participation.

8.3 Legal Action

The Clean Water Act Section 303(d) calls for the identification of impaired waters. It also requires that the streams be ranked by the severity of the impairment and that TMDLs be calculated for streams to meet water quality standards. Implementation Plans are not required in the Federal Code; however, Virginia State Code does include the development of Implementation Plans for impaired streams. EPA largely ignored the nonpoint source section of the Clean Water Act until citizens began to realize that regulating only point sources was no longer maintaining water quality standards. Lawsuits from citizens and environmental groups citing EPA for not carrying out the statutes of the CWA began as far back as the 1970s and have continued until the present. In

Virginia in 1998, the American Canoe Association and the American Littoral Society filed a complaint against EPA for failure to comply with provisions of §303(d). The suit was settled by Consent Decree, which contained a TMDL development schedule through 2010. It is becoming more common for concerned citizens and environmental groups to turn to the courts for the enforcement of water quality issues.

Successful implementation depends on stakeholders taking responsibility for their role in the process. The primary role, of course, falls on the landowner. However, local, state and federal agencies also have a stake in ensuring that Virginia's waters are clean and provide a healthy environment for its citizens. An important first step in correcting the existing water quality problem is recognizing that there is a problem, and that the health of citizens is at stake. Virginia's approach to correcting NPS pollution problems has been, and continues to be, encouragement of participation through education and financial incentives.

9. FUNDING

A list of potential funding sources available for implementation has been developed. A brief description of the programs and their requirements is provided in this chapter. Detailed descriptions can be obtained from the SWCD, DEQ, VADCR, NRCS, and VCE.

9.1 Virginia Nonpoint Source Implementation Program

Virginia's nonpoint source (NPS) implementation program is administered by DEQ through local Soil & Water Conservation Districts (SWCD), local governments, nonprofits, planning district commissions (PDC), and local health departments to improve water quality in the Commonwealth's streams and rivers and in the Chesapeake Bay. DEQ, through its partners, provides cost-share assistance to landowners, homeowners, and agricultural operators as an incentive to voluntarily install nonpoint source (NPS) best management practices (BMPs) in designated watersheds. The program uses funds from a variety of sources, including CWA Section319(h) and the state-funded Water Quality Improvement Fund (WQIF) to install BMPs with the goal of ultimately meeting Virginia's NPS pollution water quality objectives. Although resource-based problems affecting water quality can occur on all land uses, this program addresses cost-share assistance on agricultural, residential, and urban lands. The geographic extent of eligible lands is identified in grant agreements and in watershed-based plans (WBPs), including IPs approved by DEQ and EPA.

9.2 Virginia Agricultural Best Management Practices Cost-Share Program (VACS)

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.

9.3 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. Any practice approved by the local SWCD Board must be completed within the taxable year in which the credit is claimed. The credit

is only allowed for expenditures made by the taxpayer from funds of his/her own sources. 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. If the amount of the credit exceeds the taxpayer's state tax obligation, the excess will be refunded to the taxpayer by the Virginia Department of Taxation. 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.

Tax credits are also available for the purchase of precision agricultural equipment and conservation tillage equipment. This includes manure applicators, sprayers, variable rate application equipment, and equipment used to reduce soil compaction. Individuals may claim a state tax credit of 25% of all expenditures made for purchasing and installing the equipment, up to a set maximum amount.

9.4 Virginia Water Quality Improvement Fund (WQIF)

This is a permanent, non-reverting fund established by the Commonwealth of Virginia to assist local stakeholders in reducing point and nonpoint nutrient loads to surface waters. Eligible recipients include local governments, SWCDs, and individuals. Grants for both point and nonpoint source pollution remediation are administered through DEQ.

9.5 Conservation Reserve Program (CRP)

Through this program, cost-share assistance is available to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality. Applications for the program are ranked, accepted and processed during signup periods that are announced by the Farm Service Agency (FSA). If accepted, contracts are developed for a minimum of 10 and not more than 15 years. To be eligible for consideration, land and applicants must meet certain criteria set by FSA. Payments may include cost share for practice establishment, incentive payments, and rental payments on enrolled acres.

9.6 Conservation Reserve Enhancement Program

This program is an "enhancement" of the existing USDA Conservation Reserve Program. It has been enhanced by combining federal funds with state funds in a partnership to address high priority conservation concerns. In exchange for removing environmentally sensitive land from production and establishing permanent resource conserving plant species, farmers are paid an annual rental rate along with state and federal incentives. Contracts are typically established for 10 or 15 years in support of CREP goals, which include reducing sediment, nutrients, nitrogen and other

pollutants entering waterbodies, reducing soil erosion, wetland restoration, and enhancement of wildlife habitat.

The landowner can obtain and complete CREP application forms at the FSA center. The forms are forwarded to local NRCS and SWCD offices while FSA determines land eligibility. If the land is deemed eligible, NRCS and the local SWCD determine and design appropriate conservation practices. A conservation plan is written, and fieldwork is begun, which completes the conservation practice design phase.

FSA then measures CREP acreage, conservation practice contracts are written, and practices are installed. The landowner submits bills for cost-share reimbursement to FSA. Once the landowner completes BMP installation and the practice is approved, FSA and the SWCD make the cost-share payments. The SWCD also pays out the state's one-time, lump sum rental payment. FSA conducts random spot checks throughout the life of the contract, and the agency continues to pay annual rent throughout the contract period.

9.7 Environmental Quality Incentives Program (EQIP)

This program was established in the 1996 Farm Bill to provide a single voluntary conservation program for farmers and landowners to address significant natural resource needs and objectives. EQIP is administered by NRCS and offers landowners and farmers cost-share assistance to implement a wide range of conservation practices on agricultural and forest land. Applications are ranked and priority is given to conservation practices that will result in greater environmental benefits.

9.8 National Fish and Wildlife Foundation (NFWF)

Grant proposals for this funding are accepted throughout the year and processed during fixed signup 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. Grants are awarded for the purpose of conserving fish, wildlife, plants, and their habitats. Special grant programs are listed and described on the NFWF website (http://www.nfwf.org). 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.

9.9 Clean Water State Revolving Fund

EPA awards grants to states to capitalize their Clean Water State Revolving Funds (CWSRFs). The states, through the CWSRF, make loans for high-priority water quality activities. As loan recipients make payments back into the fund, money is available for new loans to be issued to other recipients. Eligible projects include point source, nonpoint source and estuary protection projects. Point source projects typically include building wastewater treatment facilities, combined sewer overflow and sanitary sewer overflow correction, urban stormwater control, and water quality aspects of landfill projects. Nonpoint source projects include agricultural, silvicultural, rural, and some urban runoff control; on-site wastewater disposal systems (septic tanks); land conservation and riparian buffers; leaking underground storage tank remediation, etc.

9.10 Wetland and Stream Mitigation Banking

Mitigation banks are sites where aquatic resources such as wetlands, streams and streamside buffers are restored, created, enhanced, or in exceptional circumstances, preserved expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources. Mitigation banking is a commercial venture that provides compensation for aquatic resources in financially and environmentally preferable ways. Not every site or property is suitable for mitigation banking. Mitigation banks are required to be protected in perpetuity, to provide financial assurances and long-term stewardship. The mitigation banking process is overseen by an Inter-Agency Review Team made up of state and federal agencies and chaired by DEQ and the Army Corps of Engineers.

9.11 Other Potential Funding Sources

Additional potential funding sources that have been identified by the stakeholder group or in previous IPs include:

- Department of Forestry- Riparian Forests for Landowners Program. *For more information:* https://dof.virginia.gov/water-quality-protection/water-quality-protection-landowner-assistance/financial-assistance-programs-protecting-water-quality/riparian-forests-for-landowners-program/#:~:text=The%20DOF%20Riparian%20Forests%20for,a%20unique%20watershed%2Dbased%20partnership .accessed 7/21/2024.
- Virginia Outdoors Foundation. *For more information:* https://www.vof.org, accessed 7/25/2024.
- U. S. Fish and Wildlife Service (FWS) Conservation Grant Program. *For more information:* https://www.fws.gov/grants/, accessed 7/25/2024.

- USDA Agricultural Conservation Easement Program. *For more information:* https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/, accessed 7/25/2024.
- Virginia Environmental Endowment. *For more information:* http://www.vee.org, accessed 2/21/2023.
- Trout Unlimited. *For more information:* https://www.tu.org/, accessed 2/21/2023.
- Ducks Unlimited. *For more information:* https://www.ducks.org/, accessed 2/21/2023.

As part of adaptive management, the state recognizes that other funding opportunities may become available. These opportunities will be utilized if appropriate.

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APPENDICES

APPENDIX A: Public Outreach

Fryingpan Creek, Pigg River, Poplar Branch and Beaverdam Creek IP First Public Meeting Summary

Franklin County Public Library, Rocky Mount VA

4:30 PM on 29 February 2024

ATTENDEES:

Meeting purpose: To kick start the development of a cleanup plan for the Pigg River, Poplar Branch, Fryingpan Creek, Beaverdam Creek Watersheds in Franklin, Bedford and Pittsylvania Counties; Share information; Engage the public in this process with their participation.

Meeting goal: Answer questions and identify stakeholders to help develop the Clean Up Plan (also known as an Implementation Plan (IP)).

Kim Romero kicked off the initial public meeting for the Fryingpan Creek, Pigg River, Poplar Branch, and Beaverdam Creek implementation plan process at 4:31 PM. She introduced herself as the Non-Point Source Coordinator for the Blue Ridge Region and Valley Region of Virginia's Department of Environmental Quality. She also made physical copies of the slideshow presentation, maps, and other supporting documents available for those in attendance.

After Kim's own introduction, the attendees to the meeting went around and introduced themselves as well. There were members of the community and a Ferrum College Professor present, as well as representatives from the Tri-County Lakes Administration, Smith Mountain Lake Association, Leesville Lake Association, Blue Ridge Soil and Water Conservation District, Franklin County Public Works, Virginia Department of Conservation and Recreation, University of Lynchburg, Virginia Department of Forestry, and various other Department of Environmental Quality staff. All attendees signed the attendance sheet at the door as well, that sheet is where specific names and contact information is recorded.

Following Introductions, Kim laid out meeting objectives and introduced the clean up study, implementation plan, she hopes to develop within this community to address bacteria and benthic impairments on the four referenced streams. Describing a total maximum daily load and the authorization to distribute funds, thanks to the Clean Water Act, Kim outlined Virginia's Water Quality Process and how it can help address Not-Point Sources of pollutants of concern within the community. The total maximum daily load equation and how it is used to establish reductions was displayed and explained to the room. Kim also covered water quality monitoring

and how the Department of Environmental Quality gets the data they base these management strategies on.

In a displayed map, Kim showed the impaired stream segments and provided context for how many miles the impairments spanned and what year these segments were first listed as impaired in the biannual integrated report. The impairments included both bacteria and benthic. Kim explained that Virginia uses the Virginia Stream Condition Index to score streams ability to support aquatic life, as is necessary per the Clean Water Act. This aquatic life score is what determines benthic impairments.

Stressor analyses were used to help determine the sources for these impairments and concluded sediment and fecal coliform bacteria from humans, pets, livestock, and wildlife were the sources causing impairments.

Question: Was E. coli included in the bacteria TMDL on Beaverdam Creek?
Answer: No, at the time of that TMDL and original impairment, the bacteria standard was much different than it is today. They only looked at fecal coliform at the time. ***This will be addressed and revised at our first community engagement meeting****.*

Question: Are there a lot of pets in this area? 21% of the source of bacteria being from pets seems like a lot.
Answer: In 2006 when this study was done, a practice, more common at the time, called bacteria source tracking, was used to model bacteria in watersheds, that has since proved to not be as reliable as once thought. ***We will look at these source assessments and revisit that number to make it more accurate during this implementation planning process****. Modelling is now done using land use data.*

Question: Is poultry included in livestock (regarding sources of bacteria)?
Answer: Yes.

Question: Has subsequent monitoring been going on since this 2006 study?
Answer: Yes, there has been monitoring happening since then. These watersheds are visited on a cycle of monitoring for two years, not monitoring for four years, then back to being monitored for two years straight. There are also trend stations in these watersheds that are visited and monitored consistently every other month. While monitoring has occurred, land use does tend to change a lot so that will still need to be reevaluated.

Following the previous discussion, Kim moved on to display the monitoring stations where data has been collected that is used for the studies and once again, the impaired segments. This moved the discussion on to land use. Breaking down each watershed, the land use, acquired from VGINs 2021 dataset and NLCDs 2019 dataset, was discussed and Kim highlighted how different land uses produced different quantities of sediment. Pasture, Hay, and cropland were the largest sources of sediment in each watershed, despite forest being the dominant land cover.

Next, Kim broke down how a computer model used that land use data to estimate the sediment loads to the streams. She also described the modelled necessary reductions in sediment for each stream, so they can meet water quality standards.

Question: Why are the numbers consistent across the reduction chart (reference to the chart, example, indicating crop/pasture/hay and developed land and streambanks all needed to see a 31.5% reduction in the Pigg River)?
Answer: When the modelling was done and allocations for the pollutant were determined, it was decided to reduce the contribution of sediment equally from all sources to meet the total allocation of sediment. This is something we can look into during the implementation planning process to determine if that is feasible in this area, and if not, what ratio of reductions would work better in this community.

Question: How can the condition of the stream banks throughout the whole watershed be determined?
Answer: A computer model was used to determine the sediment contribution from eroding streambanks. To have more data from landowners describing the real state of their streambanks would be better. That is why community engagement is so important. With help from the community, we can address this problem more realistically in the future. Participation from the community is important so we can use best management practices that the community actually wants and feels like would benefit them.

Question: A power dam was removed in 2016 and has caused a lot of problems downstream in Leesville and beyond. Overtime, the flow pattern of the water has changed and carved away large chunks of the bank since then. Is it part of the total maximum daily load to make physical recommendations for how to stabilize the bank or to remove the deadwood that is gouging the banks?
Answer: Yes, we can look at best management practices within the implementation plan that can address those specific issues. Streambank erosion kept coming up during the total maximum daily load development process as well. We recorded this as a major concern during the development side and ***now with implementation side, we will be able to target those specific interests****.*

Next, the presentation looked at the suggested reduction in bacteria loads needed to return Beaverdam Creek to meeting water quality standards. These numbers come from the 2006 study and will be reevaluated with updated modelling.

After establishing the base of information that has been curated to begin the implementation process, Kim switched the topic to looking more ahead. This implementation planning is what establishes the clean up for these watersheds for the foreseeable future. Kim laid out what an implementation plan is and how it helps generate funding for the previously mentioned best management practices. She again stressed that community participation is crucial. These practices can take 5-15 years to be implemented and are completely voluntary. Potential common best management practices for agricultural lands, residential lands, stormwater, and pet waste were outlined.

Question: Do agencies like Virginia Department of Transportation have any interest in this? One of their bridges over the Pigg River on Snow Creek Road was just washed out.
Answer: Virginia Department of Transportation does not have a history of participating in implementation planning, however, ***we can reach out to the local Virginia Department of Transportation Office to see if they are interested in this project****.*

Question: Do the Army Corps of Engineers get included in this planning?

Answer: Their involvement depends on what lands we are working on. They tend to only participate in implementation plans that affect their land specifically. Blue Ridge Soil and Water Conservation District is involved though and has been a long-time partner to these projects. They are an entity that has managed funds and implementation for these practices in this area.

Question: Aren't there very few landowners in this section of the Pigg River?
Answer: There are not many landowners with riverfront property, but those landowners have been involved in different projects in the past. Headwaters work on smaller contributing streams is usually easier to accomplish. Less landowners does make outreach a little easier as well.

Question: Do you work with the best management practice database and is that database public?
Answer: We do work with that database, and it is public. The public facing data is more so a summary of the best management practices in a hydrologic unit than specific details that could be used to identify a property or individual. This summary information is available on the Department of Conservation and Recreation's website. Information is also available on the Virginia Stormwater BMP Clearinghouse website. ***We will have a summary of best management practices already present in the watershed at the first Community Engagement Meeting****.*

After this discussion, Kim resumed explaining the "RFA" process and extra grant money that can help enact best management practices within the total maximum daily load areas. She stressed that implementation plans are only as good at the information the Department of Environmental Quality receives. She invited the attendees to share information and future meetings with others in the community to solicit more involvement. Finally, she displayed a tentative timeline to the attendees could know what to expect next in this process and when future meetings may be held. Kim also shared that a 30-day public comment period begins with this meeting for comments on the coming implementation plan. She then took the remaining questions.

Question: Can you share the attendance sheet with us so we can get in contact with people we met here tonight?
Answer: ***Yes****, those in attendance and that sheet become part of the implementation plan.*

Question: Where should we send our comments?
Answer: Comments about the implementation plan should go to Kim.

Question: It seems like this implementation plan could require a lot of streambank restoration which is extremely expensive. Is there a plan to fund that? There has been interest from landowners in the county to do that.
Answer: ***We are going to try and determine how much streambank restoration is feasible with a cost-benefit-analysis during our modelling process****. With cost share going up, the water quality improvement fund, and 319 funding, there should be funding to try and tackle a large project like a streambank restoration. We are also going to be providing connections to other grant opportunities as well.*

This concluded the meeting.

APPENDIX B: Community Engagement Meetings

1st Community Engagement Meeting for the development of a Clean Up Plan (Implementation Plan) for the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek Watersheds Summary

Franklin County Public Library, Rocky Mount, VA

4:30 PM on 18 April 2024

ATTENDEES:

Kimberly Romero kicked off the first community engagement meeting (CEM) for the developing implementation plan (IP) for the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek watersheds. She introduced herself as the Non-Point Source (NPS) Coordinator for the Department of Environmental Quality's Blue Ridge Regional Office in Salem, Virginia. Kim provided physical copies of the slideshow presentation, maps of the watersheds, and a map of all the IPs in the vicinity of the watersheds. All attendees signed the attendance sheet at the door. This sheet detailed the attendee's names and email addresses. There were **15** meeting attendees present.

Following Kim's introduction and expression of gratitude for those in attendance, she introduced the goals for the meeting, which included reviewing Virginias water quality process and the total maximum daily load (TMDL) that this IP will be based on. Other goals she hoped to accomplish were to facilitate a discussion about how to reduce sediment and bacteria in the respective impaired watersheds and which best management practices (BMPs) should be prioritized when writing the IP.

Kim displayed the slides to review the water quality process and the previous TMDLs as she provided a brief summary of what was discussed at the first implementation plan meeting. She discussed the Clean Water Act and its basis for this process, what an impairment is, and details of the TMDLs that were written to address the impairments within the watersheds the meeting focused on. The TMDLs are a 2006 Bacteria TMDL on Beaverdam Creek and a 2023 Benthic TMDL for the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek. The earlier TMDL addresses bacteria while the second addresses excessive sediment.

After introducing the TMDLs, land use maps for each watershed, as well as pie charts displaying sediment contributions from each type of land use, were shown to provide background for the BMPs that would be discussed. Most of the sediment is coming from pasture/hay and cropland in all four watersheds. With this information, Kim described the necessary reductions in each watershed. Reductions are necessary from croplands,

pasture/hay areas, developed pervious and impervious areas, barren lands, turf grass, and eroding streambanks to meet water quality standards and reduce sediment in every watershed. Reductions in bacteria loading need to come from human sources, livestock, agricultural nonpoint sources, urban nonpoint sources, and wildlife. These reductions are necessary in only the Beaverdam Creek watershed. These reductions were all calculated in the original TMDLs written, they have not been recalculated for the IP yet.

Question: (Attendee) These numbers are from 2006, that was more than a decade ago, is that data anywhere close to what is present in that creek now?

Answer: (Kim) We are going to discuss the current conditions now, that slide was covering the previously calculated numbers from the original TMDL. Thank you for the transition into the next slide.

Kim transitioned from the information and background section of the CEM into the discussion portion of the CEM. Kim displayed popular BMPs used to reduce sediment and bacteria loadings in the watersheds since the TMDLs were written. There are 6 sediment reducing BMPs that have been implemented since March of 2021 in all four watersheds. There are 22 bacteria reducing BMPs that have been implemented since 2006 in the Beaverdam Creek watershed.

Moving onto the BMPs that could help further reduce bacteria loadings into Beaverdam Creek, Kim sought to understand from the community what the trends have been in the agricultural community surrounding Beaverdam Creek. Data from the USDA National Agricultural Statistics Service (NASS) was displayed showing the estimated numbers of farm acres, cattle, beef cattle, dairy cattle, sheep, and horses in Bedford County, which is where the Beaverdam Creek watershed is located, from 2002 and 2022. Kim pointed out the percent change in each of those categories over 20 years which help indicate the trends in land use and then asked the meeting attendees if those numbers looked consistent with what they have noticed in their community.

Question: (Attendee) Can you explain the 87% reduction in dairy cattle?

Answer: (Kim) We are using the statistics from the USDA who estimated there were about 230 dairy cows in Bedford County in 2022.

Answer: (Attendee) That looks correct. There has only been one dairy farm in Bedford County survive the last two decades.

Question: (Attendee) Does anyone know what farm that is?

Question: (Attendee) Is that number real?

Answer: (Karen) These numbers are based off voluntary self-reporting to the USDA.

Question: (Kim) Do these numbers seem consistent with what you're seeing in this community?

Answer: (Attendee) You have better data than me.

Answer: (Attendee) You have better numbers than we do.

Answer: (Attendee) That does seem consistent with what we have seen.

Question: (Kim) Does this change with sheep seem consistent?

Answer: (Attendee) Based on Franklin County, I'd say so.

Question: (Attendee) So, are farmers making a change from cattle to sheep?

Answer: (Attendee) Well, it's more so new farmers are coming in and sheep are more profitable right now than cattle. Meat sheep that is.

Question: (Kim) Does this number for horses seem consistent as well?

Answer: (Attendee) We don't have a good way of tracking horses. This is still for Bedford County, right?

Answer: (Kim) Yes, the data on this slide is specific to Bedford County because we are looking at the potential agricultural contributions to bacteria in Beaverdam Creek right now. We are interested in the current trends in land use and whether they have been increasing, decreasing, or steady in the area.

Question: (Attendee) Doesn't the USDA have this data?

Answer: (Kim) Yes, but we want to talk to the community members and make sure these numbers are consistent with what they have noticed.

Statement: (Attendee) I'm going to abstain.

Statement: (Attendee) You should check with the Farm Bureau.

Statement: (Attendee) You could reach out to the local FFAs (Future Farmers of America).

Following a lively discussion about the potential agricultural contributions of bacteria into Beaverdam Creek, Kim directed the discussion towards potential urban sources of bacteria. A chart with estimated numbers for population, septic systems, failing septic systems, straight pipes, and pets within Beaverdam Creek watershed from the 2020 United States Census was displayed. Kim told the meeting attendees that this is the data she has currently but will be touching base with Virginia Department of Health (VDH) to confirm those numbers and potentially receive better details to inform the modeling for the bacteria IP. She then asked the meeting attendees if these numbers looked reasonable to base the IP on.

Question: (Attendee) So, there are no trends on this slide?

Answer: (Kim) No, these numbers have not changed much since the Bacteria TMDL in 2004.

Question: (Attendee) So which pets are the greater polluter (referring to cats and dogs)?

Answer: (Attendee) Well people may let their cats and dogs out…

Answer: (Karen) Well dogs (feces) contain more bacteria than cats.

Answer: (Kim) Loading would be important to consider as well. That is why there is usually such an emphasis on cattle in clean-up plans.

Answer: (Attendee) Also, cats will bury their feces so that's not much of a source.

Question: (Attendee) Don't most cats have a litter box inside of a house?

Question: (Attendee) So, where do those litter boxes go?

Statement: (Attendee) That's much better than where dogs go.

Kim called the meeting back on track and rephrased her question to facilitate a discussion about what the community members were seeing in the Bedford County area.

Question: (Attendee) Is this for Bedford County still?

Answer: (Kim) Yes, this is for Bedford County which is the location of the Beaverdam Creek watershed.

Statement: (Attendee) Well, it doesn't say that at the top of this slide.

Question: (Attendee) Have we considered surveying realtors in the area?

Answer: (Kim) We could, right now we are just gathering information, we will have compiled information from many different sources for the second CEM. Right now, we are focused on what you have seen.

Question: (Attendee) Doesn't the county have that information?

Answer: (Kim) We have asked people from the county to attend these meetings but they have not been able to come yet.

Question: (Attendee) I get asking the public is important, but government offices have that information, wouldn't they be better to ask?

Answer: (Kim) We will reach out and talk to these different government offices, but we want to keep the community involved. I'm trying to be as transparent as possible.

Question: (Attendee) So you don't have the data now?

Answer: (Kim) We are gathering it now. We will have it at the second CEM.

Statement: (Attendee) Well you should have it at this meeting tonight.

Statement: (Attendee) Well, that's backwards.

Statement: (Aerin) Kim is giving you, the community, your opportunity now to contribute to that data collection and have your time to speak on what is occurring within your communities.

Question: (Attendee) Well shouldn't the county and VDH be here tonight?

Answer: (Kim) Yes, the county and VDH were both invited to be here tonight.

Statement: (Attendee) I think it's tough because we started in Bedford, there's a lot more information in the room tonight from Franklin County. I will say, from all the builders I know, there's a back up of houses being built in the are for the next few years. There are a lot of new houses being built.

Question: (Attendee) Isn't that opposite from Franklin County?

Answer: (Attendee) A little bit, maybe we could look at build permits to look for those trends.

Statement: (Attendee) I don't believe I've heard of any sewer coverage going in.

Statement: (Attendee) I want data from the county first before we all take wild guesses.

Statement: (Attendee) I want to know for question 3 (refers to question from the slide, "Is there any information regarding straight pipes in the watershed?") if VDH has data on straight pipes.

Statement: (Kim) VDH was invited to this meeting, that data will be what we focus on for the second CEM.

Question: (Attendee) So, is there a survey monkey already built for this?

Answer: (Kim) This has been sent to them via PDF and I'm waiting on their response currently.

Statement: (Attendee) We are also waiting on that information.

Statement: (Ashley) I want to say, I go to other meetings across the state, and I've never heard VDH give a definitive number of straight pipes.

Question: (Attendee) Is that purposeful?

Answer: (Ashley) They are in a tough position because they have to tabulate complaints for the communities they serve. They would have to walk a creek to know for certain.

Statement: (Attendee) You can get a list of known violations. They charge the public for those. They might know that number.

Statement: (Attendee) Bedford's VDH has had a lot of turnover the past few years. I know they don't come out to site visits anymore. They also have not kept up with records so that may be difficult to find.

Question: (Attendee) So, we have acknowledged that some agencies may be less forthcoming, what if they don't get back to you?

Answer: (Karen) There are general presumptions from national studies that we can base the numbers on if we need to.

Question: (Attendee) What if you file a FIOA request?

Question: (Kim to Ashley) Can DEQ do that?

Answer: (Ashley) We can't provide personal identifying information (PII) and neither can VDH so I'm not sure if they could give us much information.

Statement: (Attendee) When I asked for violations once through FIOA, they gave it to me.

Statement: (Ashley) Well, they can do that as long as it does not include PII.

Statement: (Attendee) I don't know about the capabilities of your office but, typically with straight pipes, the houses with them predate the 1970s and are within 300 feet of a creek. Maybe you could go through with GIS and determine potential straight pipes that way.

Answer: (Kim) Yes, maybe that could work, we might also be able to take a look at a realtor website.

Statement: (Attendee) I know in Roanoke, there is an NGO that can fix septics and failed systems, what is their name? They would have data because they do that.

Statement: (Kim) We know we won't get the exact number. What we are looking for is a good estimate so when we write the clean up plan, when we say it will cost X amount of dollars to do

these BMPs, we can get adequate grant funding that will allow us to address the watershed. These are all good resources and this is good feedback.

Kim moved the meeting forward by shifting to the prioritization of different BMPs that can reduce sediment in all four watersheds for this IP. Kim explained each of the practices that could be used for sediment reduction and displayed them along with the cost/unit for each BMP. She informed the meeting attendees that this is the time to provide input on BMP practice types and what makes sense for these watersheds. She also explained that once the IP is submitted to the EPA, it will not be able to be changed. Only the BMPs that are on the EPA approved implementation plans will be eligible for funding. Kim asked meeting attendees about each BMP practice and whether the cost per unit looks appropriate for the region.

Question: (Attendee) Is this for all the watersheds now?

Answer: (Kim) Yes, these are BMPs for all four watersheds.

Statement: (Attendee) Your slides could use a heading, so we know what we are looking at.

Answer: (Kim) Yes, that is why I provide those handouts with the graphs and charts next to the questions they pertained to.

Question: (Kim) Does this price for livestock exclusion look too high or too low ($75,000/system)?

Answer: (Attendee) That number might be low because incentives have increased on those practices. I would put it at $100,000 because buffer payments have increased.

Question: (Kim) Okay, thank you. Are any of these exclusion systems more popular in this area?

Answer: (Attendee) The SL-6W is the most popular of those.

Question: (Kim) Do all these exclusion practices cost about the same?

Answer: (Attendee) No, off-stream water is less, and narrow buffers are less because the water systems tend to be smaller and come with less of a buffer payment.

Questions: (Kim) Great, thank you! On to the pasture practices, how do these costs look?

Answer: (Attendee) I don't think those practices are going to be popular because those have to come after a lot of management. Some of those practices overlap with CSP from NRCS. NRCS is more popular with those practices than us.

Answer: (Attendee) The SL-9 is no longer. You should add SL-7 to that list though because that is a popular pasture practice that implements rotational grazing. That practice can come off any of the other practices.

Answer: (Attendee) Theres one practice that is also popular you could add, SL-6F. That is a stream exclusion practice as well. The concept behind that one is you can put the fence farther from the stream and create a hay field between the fence and the creek. This is a good one for areas that flood. That practice has been very popular.

Question: (Attendee) (directed at another attendee) Do y'all do many FR-3's?

Answer: (Attendee) Most of that is through CREP. We have had a few. We should add that to the list. That is a stream side buffer of trees in an SL-6 buffer.

Question: (Kim) Do you have any information on the average cost of that practice?

Answer: (Attendee) That varies big time on the species, contractor, and how far they have to go with it.

Question: (Karen) Is there anything else more specific that we could use for development?

Answer: (Attendee) Could be $1,000 to $5,000 an acre. It really depends on the goals of the landowner?

Question: (Attendee) What does permanent vegetation mean?

Answer: (Attendee) That practice takes a field out of production to maintain permanent vegetation on the field.

Question: (Attendee) Is that payment for just one year out of production?

Answer: (Attendee) No, that is for many years. The payment is determined by how many years the field remains out of production.

Question: (Attendee) So, are they paid every year they don't use their field?

Answer: (Attendee) No, this is a one-time payment.

Statement: (Attendee) This practice is usually used on smaller areas, usually areas being affected by erosion that are difficult to farm anyway.

Statement: (Attendee) Thank you for explaining that. I'm starting with a very big learning curve for a lot of this stuff.

Question: (Kim) Is this practice popular? Should we include it?

Answer: (Attendee) Yes, include it. It is used for such small areas; it doesn't usually rank well. If there was more money for it, we might be able to get more on the ground.

Question: (Kim) Okay. Does that number (cost) look accurate?

Answer: (Attendee) We will have to circle back on that one.

Question: (Karen) Would you able to share your cost list with us for this year?

Answer: (Attendee) Yes. We can also share the NRCS ones as well.

Statement: (Attendee) Careful with the NRCS ones because they are very outdated. Especially their fencing, that number is very outdated.

Question: (Kim) Is afforestation of eroded pasture popular? Should we include that one or not?

Answer: (Attendee) Yes, that one is popular.

Question: (Kim) What about that cost?

Answer: (Attendee) Yes that number is okay if you're planting pines ($570/acre), but hardwoods are much more expensive. Those cost over $3,000 an acre, up to $10,000 an acre.

Statement: (Attendee) You should add the RT practice from DOF (Department of Forestry). That is a newer practice that can cover planting trees in retired fields.

Statement: (Attendee) Don't forget to add the incentive rate to the costs as well because that adds considerable cost per acre.

Question: (Kim) Should we keep the SL-1 practice?

Answer: (Attendee) Yes, keep it. We don't do a lot of those, but we do some. I would raise that number (cost) for that practice though.

Question: (Kim) Should we keep the no till practice?

Answer: (Attendee) We don't have the ability to pay much for that practice, so we haven't done one in over a decade.

Statement: (Attendee) You should add the SL-15B for Bedford County. That is popular up there. You should also add SL-8M for cover crops because we use that one more.

Question: (Kim) What would the cost be for those?

Answer: (Attendee) For the Sl-15B, $60/acre, and for the SL-8 $90/acre.

Statement: (Attendee) Cover crops don't always compete well, but, if there was more money set aside, it might.

Question: (Kim) Are there additional BMPs we haven't mentioned that we should include?

Answer: (Attendee) We have a suite of animal waste practices that can reduce erosion from animal traffic. They cost a lot, but they may be helpful.

Statement: (Kim) We can add that.

Statement: (Attendee) I have a negative practice to add. Don't plant bamboo on the creek. We have lost so many acres to it. I'm seeing more and more of it. It's everywhere now.

Statement: (Attendee) I believe it's classified as invasive now.

Statement: (Attendee) Farms planted it along their creeks and it's now out of control. I can make a list of the horrendous places with bamboo in the county. There's even a house I know of that is being taken over by it.

Question: (Attendee to the foresters in the room) Is there anything that can be done about it?

Answer: (Attendee) You need a backhoe because it's roots are really strong. It is also chemical resistant most times. It does also usually grow along streams so you really can't spray it with chemicals anyway.

Kim took adequate notes of the BMP practices for agriculture that were discussed. She then transitioned to a slide displaying urban/residential BMPs with their cost/unit for discussion. She first posed the questions to the meeting attendees asking if there are opportunities in these areas already to establish these BMPs? Is VCAP (Virginia conservation assistance program) available in this area? The room shakes their heads yes and Kim moves on the ask about specific BMPs and their cost/unit.

Question: (Kim) Would we like to have bioretention on our list? Does this cost look reasonable?

Question: (Attendee) Is a bioretention filter a filter or just a term?

Answer: (Kim) That is just a term. You could just call it bioretention.

Answer: (Attendee) So, a typical rain garden is around $7,500 but bioretention can go for around $12-15K.

Question: (Kim) Is there interest for this practice in this area?

Answer: (Attendee) Not much, there's a lot of forested areas and rural areas. With our topography, most rain events would overwhelm those systems anyway.

Question: (Kim) What about stream bank stabilization? Is there interest in that BMP? It was mentioned at the first IP meeting?

Answer: (Attendee) Yes, there is definitely interest in that. And, that number (cost) seems about right.

Question: (Attendee) Does DEQ have the funding to get streambank restoration done? It usually needs designed by private engineers and it's hard to get a cost estimate on those prior to starting the project.

Question: (Kim) Ashley, is there a better process for getting cost estimates for streambank restoration?

Answer: (Ashley) New River Soil and Water Conservation District did one with a TMDL grant. Maybe we could reach out and ask them for their numbers?

Statement: (Attendee) We haven't done one, but we have to potential to do two right now if there was funding for that.

Question: (Kim) How about bioswales? Is there interest? Does this cost look realistic?

Answer: (Attendee) We don't do anything that covers that.

Answer: (Attendee) Get numbers from VCAP program for that. I think the cost would cap out the VCAP cost share.

Answer: (Attendee) The Chesapeake Bay Landscape folks could tell us more about pricing for urban and residential BMPs. I can get in contact with someone I know to find out their numbers.

Answer: (Attendee) I think that's used more in the coal fields where properties have been decimated. Am I correct on that?

Answer: (Attendee) It's more like a vegetated stormwater conveyance channel. It is usually done in more residential settings.

Question: (Attendee) What is the difference between a Bioswale/Dry swale and a retention pond?

Answer: (Attendee) One is supposed to hold water, the other is not. Water is supposed to pass through a swale quickly, not sit in it.

Statement: (Attendee) VCAP doesn't fund dry swales.

Question: (Kim) What is the most popular rainwater collection practice? (Rain barrels, rain gardens, dry wells) Would these other practices not be very popular?

Answer: (Attendee) There might be some interest in dry wells. Like I said, in our area, most rainstorms would overwhelm any of those systems. None of those would be very popular. You should leave streamside buffers though because we can cost share on conservation landscaping.

Question: (Kim) Are there any BMPs of interest that you are not seeing on our list?

Answer: (Attendee) There are a few different grant programs through DOF that will help with afforestation on public lands and lands promoting clean water.

Kim took the appropriate notes from the discussion of the urban/residential BMPs that could reduce sediment loadings. She then displayed the BMP list for reducing bacteria in the Beaverdam Creek watershed with the cost/unit. Kim acknowledged from the earlier conversation that there were no representatives from Bedford County in the room but still asked the meeting attendees who live near the Bedford County community about the potential interest and accuracy of the cost/unit.

Question: (Kim) What do we think of these numbers?

Answer: (Attendee) Based on Franklin County, that cost for vegetative cover is low. You'll be able to see most of these numbers from our cost list.

Question: (Kim) Would it be better to just look at that cost list and try to continue reaching out to folks in Bedford County?

Answer: (Ashley) Yes, we can try to use a regional average for costs. We can also try to reach back out to Peaks of Otter for their cost list as well.

Statement: (Attendee) Don't forget to remove the SL-9 practice, which we don't have anymore, and add in the SL-7.

Statement: (Kim) Okay, as long as we are all in agreement, we can move on since we don't have any representatives from Bedford County here.

Kim carried the meeting forward to the general questions section. These are questions for the meeting attendees to think about prior to the second community meeting. The questions were displayed and available in a handout. The group was asked what methods of outreach would be best used in the community and whether there are other potential funding sources that could be available to implement BMPs. Kim also displayed, and provided in a handout, a map displaying all of the Implementation Plans currently in effect in the surrounding areas. This map was to show that there is funding available in adjacent areas as well. Kim also told the room she would follow up on animal waste practices that could reduce both sediment and bacteria loadings.

To wrap up the meeting, Kim detailed what the next steps would be following this meeting and proposed four dates for consideration for next CEM. She then opened the meeting back up for more questions and discussion.

Question: (Attendee) Can you talk about the pedigree of cost estimates?

Question: (Kim) Karen, would you be able to talk about that more?

Answer: (Karen) At the next meeting, we will come back with a list of practices for each watershed. We will work with the community to determine which practices will be used more or less. There is a cost associated with each practice and we can use the cost to help weigh which practices we want to implement the most in these watersheds.

Question: (Attendee) Are you baking inflation into that cost?

Answer: (Karen) We don't usually but we might be able to look into that.

Question: Well, how long does a BMP take to do?

Answer: (Kim) It depends on the funding sources. The VACS program receives annual funding. If we are only talking about EPA 319 funding, this IP will first need EPA approval, following approval, applying for funding is an annual process that takes place in late may to early June. If we finish the IP this year and EPA approves it quickly, next summer, the district and NGOs can apply for 319 funding and they will receive that funding the following fall.

Question: (Attendee) But how long will a BMP take to do?

Answer: (Attendee) Anywhere from a week to four years. If the participant is ready and has the money, it can be done quick. It really depends on the eagerness of the participant.

Statement: (Kim) Even residential septic BMPs can take some time, they have to go out and get bids and installers for the BMPs. What I was going to say is, at the end of the IP, we will have all the practices and how much everything will cost, based on the average cost to do it, and then we will begin seeking opportunities to implement these practices over a 10-15 year period.

Question: (Attendee) Does permitting time time need to be factored in?

Answer: (Attendee) Somewhat. Streambank work, that's the longest, so that could be a factor.

Statement: (Attendee) I used to do cost estimating for ship building. These were multiyear projects. What you're describing won't cover 50% of the cost to implement if you aren't factoring in inflation.

Statement: (Attendee) That's because with ship building, the contractors have to do the work, but with this we have to convince landowners.

Statement: (Kim) These are all voluntary practices. We will have to try and encourage people to communicate with the districts to do these BMPs.

Statement: (Attendee) Accessibility to funding is dependent on the aggressiveness of the people going after the funding.

Statement: (Attendee) From the conversation held at the first meeting, it sounds as though, if we got a few of the large landowners on board, we could solve a lot of problems very quickly. That's either a really good or a really bad thing. If we can get this going, if we can convince one of them to implement these practices, we can do this. It only takes one putting in the practices to warm the others up to the idea.

Statement: (Attendee) We will have to convince them first that there's a value in improving the environment.

Question: (Attendee) Can I get everyone's business cards?

Kim thanked the meeting attendees for coming to the meeting and ensured to them she would be following up with a survey to pick a day for the next meeting.

This concluded the meeting.

APPENDIX C: Second Community Engagement Meetings

2nd Community Engagement Meeting for the development of a Clean Up Plan (Implementation Plan) for the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek Watersheds Summary

Franklin County Public Library, Rocky Mount, VA

4:30 PM on 25 June 2024

ATTENDEES:

Kimberly Romero kicked off the second community engagement meeting (CEM) for the developing implementation plan (IP) for the Pigg River, Poplar Branch, Fryingpan Creek, and Beaverdam Creek watersheds. She introduced herself as the Non-Point Source (NPS) Coordinator for the Department of Environmental Quality's Blue Ridge Regional Office in Salem, Virginia. Kim provided physical copies of the slideshow presentation, BMP cost table summary and timeline, and had handouts

provided by the Department of Forestry (DOF) for the new Riparian Forest for Landowners Program. All attendees signed the attendance sheet at the door. This sheet detailed the attendee's names and email addresses. There were 12 meeting attendees present.

Following Kim's introduction and expression of gratitude for those in attendance, she provided an agenda overview which included: outlining the meeting goals, a reminder of where we are in the process, proposed Best Management Practice (BMP) discussion with the associated costs and timeline, discussion of priority areas to reduce sediment and bacteria in the watersheds, and next steps regarding the Implementation Plan (IP) timeline. Kim also introduced meeting takeaways which were as follows: to understand what the proposed BMPs are for this IP, including understanding the costs and timelines associated with them, and to gather input and feedback from today's meeting and do any remaining adjustments to the data. There will be one more final meeting which will discuss the draft. Following this step, a finalized draft will be sent to EPA for approval in hopes of hearing back by winter 2025 to begin applying for the 319 (h) grant.

Kim displayed the slides to review the water quality process and the previous TMDLs as she provided a brief summary of what was discussed at the first community engagement meeting. This consisted of indicating where we were in the process, reminding the group of what stream segments are impaired, brief overview of 2022 TMDL study pie charts indicating focus is on the sediment impairments in the project area with the exception of Beaverdam Creek which also will be addressing a bacteria impairment. From there, she went on to display the updated best management practices (BMP) tables which reflected updated costs and timeline based on the last meeting discussion. Kim met with the districts to discuss this proposed staged implementation goals and costs table prior to the current meeting. Discussion focused popularity of each practice in each watershed and whether it would be a beneficial practice to include in the project area. The costs of agricultural best management practices included in the Implementation Plan come from data from the: Average Annual Cost List for BMP components, and NRCS Cost list. Each stage is set to five years. In total both stages and implementation should be completed in 10 years. For Pigg River, Poplar Branch, and Fryingpan Creek both stages must be completed in order to meet TMDL sediment reduction goals. Kim walked through the table explaining each section and the totals of how many systems would be needed to meet reduction goals.

To further explain the justification of the reductions needed in the Pigg River watershed, Kim referred to Karen Kline, the TMDL Modeler, to explain the balance of costs amongst the stages.

Statement: (Karen) For the first stage we try to focus on getting half of the reductions needed, Pigg River we need 21% reductions, we want half of that in stage one and we focus on practices that are popular, talked to SWCD to understand demand in area, focused on that, then monitoring, then stage 2 is less popular practices that may be needed to reach full reductions.

Question: (Attendee) So is this come up randomly or how are these numbers determined?

Statement: (Karen) So we have number of acres and estimated load per acre and can look at on a watershed scale, if you get the right people in the first half, you might meet the reductions because e these are based on averages, based on practices, we may get it done in stage one,

Question: (Attendee) Is this voluntary? I farmed there for decades.

Answer- (Kim) Yes, it is voluntary. We did take into consideration the note from previous meetings, there aren't many landowners over there so getting participation from a few landowners could make a large impact. 319h funding goes towards BMPs included in the IP so that's why I've stressed to put all BMPs there is interest in now, this more so based on allocation of district time as well.

Statement: (Attendee) You need a giant fund raiser.

Statement: (Kim) I'm happy to hear your ideas!

Kim moved the meeting forward by continuing the updated BMP table discussion. The sections focused on Stream Exclusion, Pasture, Cropland and Hayland, Urban and Residential, and Streambank.

Question: (Ashley) Is this just for AG (agricultural) lands code?

Answer: (Karen) No it can address any.

Statement: (Ashley) I think we should add most cost share codes, like the VCAP ones then.

Statement: (Attendee) Trees for clean water can also help fund that on public land the handout pays for this on private lands, grants pay 100% cost share.

Kim took adequate notes of the suggestion and transitioned to the slides focused on the Poplar Branch watershed. These had the same practices as Pigg River tables, but with different values.

Statement: (Karen) This also accounts for what practices have been put into this watershed when looking at these numbers, one BMP practice was already there.

Kim paused to ask for any questions before she continued the discussion for the Fryingpan Creek watershed.

Statement: (Kim) This [watershed] was one that has some systems already, livestock exclusions. Again, these values are based on discussions with the district.

Question: (Ashley)- Those acres seem like a lot, would that be one retention basin, how many systems would that look like?

Answer: (Attendee) That would be a big one there, that's not a common one.

Statement (Kim) That's more of a last-ditch effort when we still need reductions. That's how a lot of the stages are, we hope to meet those goals while the second stage helps give that cushion in case, we aren't meeting those goals.

Kim moved on to Beaverdam Creek watershed and displayed the Residential Overview table that was presented at the last meeting. There were no changes on this table based on the updated information that Kim had received from VDH. It was also noted that for Beaverdam Creek, sediment reduction goals will be met with stage 1 practices. These changes were updated based on the conversation that Kim had with Peaks of Otter SWCD and the information they were able to provide. Before continuing, Kim asked the group if anyone was from the Beaverdam Creek watershed area. After confirming there was no one, Kim quickly walked through the tables and figures. She mentioned the reduction from three stages to two stages to help meet reduction goals.

Beaverdam Creek is the only watershed that will have septic practices as it primarily in function to reduce the bacteria impairments that were identified in the TMDL.

Kim then focused on to the priority map discussion.

Statement: (Kim) This is what I was explaining earlier, we looked at priority areas to help meet those reductions goals, due to the size of the watersheds and applications received, different districts for each of the priority one areas, this is based on previous discussions, poplar branch has lowest amount of BMPs needed? Pigg river only has a few areas, but they require a lot more projects areas, we can change the focus though, we could delist poplar branch sooner.

Question: (Attendee) Is this just the mainstem?

Answer: (Attendee) Yes if you look at this section it is (describes location).

Question: (Attendee) Can't we do them simultaneous because they are two small areas?

Answer: (Ashley) The Implementation Plan requires priority areas, you could include it in the application, to include multiple IPs to get more funding? The way this is so pocketed is not how we typically have done this; This is not the average layout for a plan.

Question: (Attendee) Ours are sediment here, we don't offer anything for tree replanting but DOF may, what do you do? Should those be included?

Answer: (Attendee) If there is any sedimentation coming from harvested sited, DOF should be included, that can be limited by acres per years and how many acres are signed up, code is RT, that is a good one to add there.

Statement: (Attendee) I haven't looked at Pigg recently, Poplar Branch has had a lot of harvesting over there.

Statement: (Attendee) We haven't seen the same rains since 2018, and our practices have been, I will send you the parameters.

Statement: (Karen) Fryingpan Creek may have some recent harvesting that could benefit from that as well

Question: (Attendee) FR4 practice that provides funding for someone who harvest timber, BMPs blew out, there's money to revegetate skid trails and such in harvested areas do y'all do much with that?

Answer: (Attendee) There is a new practice, but not much, no.

Statement: (Attendee) Yeah, it's not common but if we have another 2018/19 then we may need there.

Question: (Kim) Do you think we're good to move on?

Kim touched on the end goals of implementation while walking through the overall cost summary table for all of the watershed. She then moved on to the Technical Assistance section of the presentation.

Statement: (Karen) This is for one per district, I like the idea of putting ips together

Question: (Attendee) Would you be mandated to hire somebody?

Answer: (Ashley) No you can adjust funding for staff, up to three years. TA will be included as a portion of the 319(h) fund.

Statement: (Kim) TA cap is 30% of total budget of project.

Question: (Attendee) How long is the grant?

Answer: (Ashley) 3 years but up to 5 years. We have to move money sometimes if it takes too long, so five years is not common.

Statement: (Attendee) I think one full time employee could cover most of those things.

Statement: (Kim) I have noted that down. If you have additional thoughts, please contact me and we can work that in before the final public meeting.

Kim walked through a few additional funding sources as 319(h) funding only covers a small portion of the costs. She made note of the DOF Financial Assistance Programs tool: https://dof.virginia.gov/financial-assistance-programs/ which allows people to look up based on issues and has a breakdown of the program, eligibility, and deadline.

Statement: (Kim) 319 does NOT only provide money to SWCD. Local governments, county health departments, SWCDs, Virginia institutes of higher education, Planning District Commissions, Regional Commissions, nonprofits, and other agencies/departments of the Commonwealth.

Kim also touched on identification of education and outreach strategies. Before moving on to review additional information provided to her. Kim walked through the DOF Riparian Forest for Landowner Program and briefly discussed the Pigg River Debris Diversion Device that is under review.

To wrap up the meeting, Kim detailed what the next steps would be following the meeting. The final public meeting is anticipated to be the second week of September. This meeting will provide a brief overview of what had been discussed throughout all of the meetings and present the finalized draft. This meeting will mark the start of the 30-day public comment period.

Kim asked the group for any final questions or comments before thanking the meeting attendees for coming to the meeting.

This concluded the meeting.

Appendix D: Final Public Meeting