Second Creek Watershed Based Plan

Agriculture in a Karst Landscape

Partners	**Responsibility**
WV Conservation Agency	Lead (will work with all aspects of the plan)
USDA NRCS	Practice Planning, Design, and Installation
West Virginia Department of Environmental Protection	Monitoring, Possible project funding
Greenbrier River Watershed Association	Education/Outreach
Friends of the Second Creek	Education/Outreach
Greenbrier Valley Conservation District	Administrative
The Greenbrier Sporting Club	Monitoring
West Virginia Farm Bureau	Farmer Networking and outreach
WVU Monroe County Extension Service	Technical Assistance
Monroe County Health Department	Technical Assistance

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Introduction

The Greenbrier River watershed (HUC 05050003) is located in southeastern West Virginia and is part of the New/Kanawha River Drainage (see figure 1). The Greenbrier River watershed includes portions of Pocahontas, Greenbrier, Summers and Monroe Counties making up 1,646 square miles. Second Creek (WVKNG-23) is a sub-watershed (HUC 05050003120) of the Greenbrier River watershed. (WVDEP TMDL 2008) This watershed based plan is focusing on Second Creek sub-watershed located in the southern portion of the Greenbrier River watershed in Monroe County (89%) and Greenbrier County (11%). The drainage area is approximately 124 square miles, 79,346 acres. Dominant land use in the watershed consists of 59% forest, 5% grassland, and 4% pasture, 26% karst pasture, and 5% karst cropland. Less than 1% of the watershed is urban. According to the Greenbrier River Watershed TMDL, impaired streams located in the Second Creek sub-watershed demonstrate the highest levels of fecal coliform than any other within the watershed.

It is documented in historical writings from the early Colonial History of Virginia that Governor Spottswood had sent a party of explorers to explore the land west of the mountains seeking a route to the Pacific Ocean. They mainly followed the James River system to the present site of Covington Va. then up Dunlap Creek (First Creek) across the Great Eastern Continental Divide into the Sweet Springs Valley and down into the Second Creek (the second creek system they came to). They referred to Gap Mills area as the mountain gap of the Second Creek

Second Creek is fed by several main spring systems from Peters Mountain. Aubrey Reed who ran Reeds Mill for around seventy years said the worst drought year he remembered was 1932 when it went from May until October hardly raining any, and yet second creek continued to flow and did not dry up like lots of streams that year. At the spring head waters Second Creek is at an elevation of around 2400 feet at the community of Second Creek the elevation is exactly 1853 feet and at the point it empties in to the Greenbrier River the elevation is around 1700 feet. Due to the steady drop in elevation, Second Creek is an excellent kayak and canoe stream, but more importantly in early times it was a source of industrial power. There where more than 20 water power mills powered by this stream, roughly there was a mill site every mile. These were saw mills, woolen mills, gun powder mills, two iron work mills, and many grist mills. Of these mills, three of the mill buildings are still in existence. Reeds Mill built in 1791 is still running off of water power. The earliest mill presently called Rodgers Mill was built in 1785 as water powered saw mill, grist mill, and gun powder mill.

Main tributaries of second creek are Kitchen Creek, Laurel Creek, Dry Creek, Big Devils Creek, Forest Run, Carpenters Run, and Rayburn Draft Run. There are also several springs and underground streams that are tributaries, these are Fancilers Branch Spring, Mud River stream of the Moniter Limnet, Haminaltons spring at the Molly Dixon place, Dooleys Spring, McDowells spring branch and other individual cave springs. Many of these springs source actually enter the creek under surface water level.

Locally, there are two watershed associations that show a high vested interest in this plan, Friends of the Second Creek and the Greenbrier River Watershed Association. These organizations are very active in environmental education, and take an active role in environmental issues regarding their watersheds.

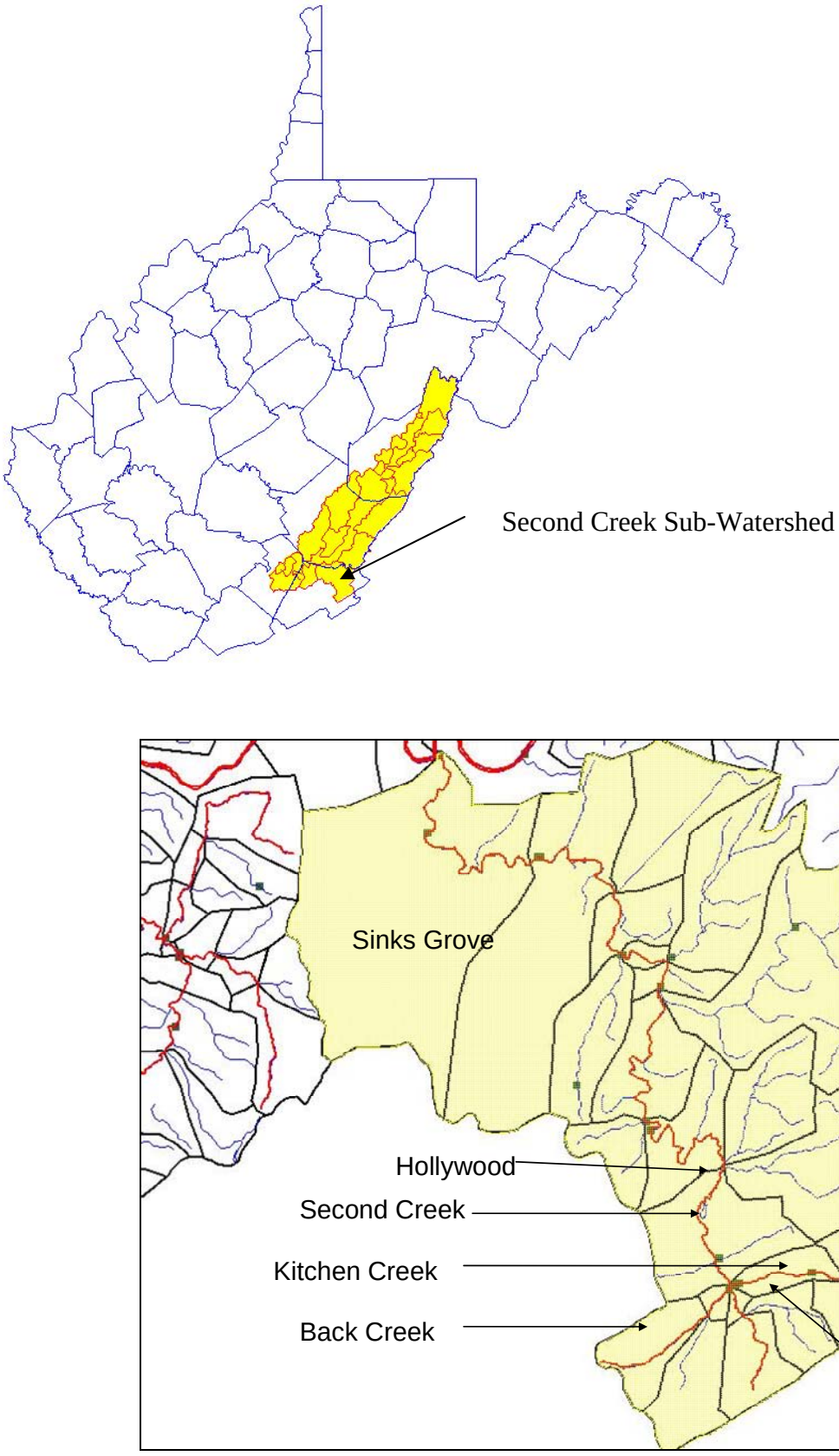
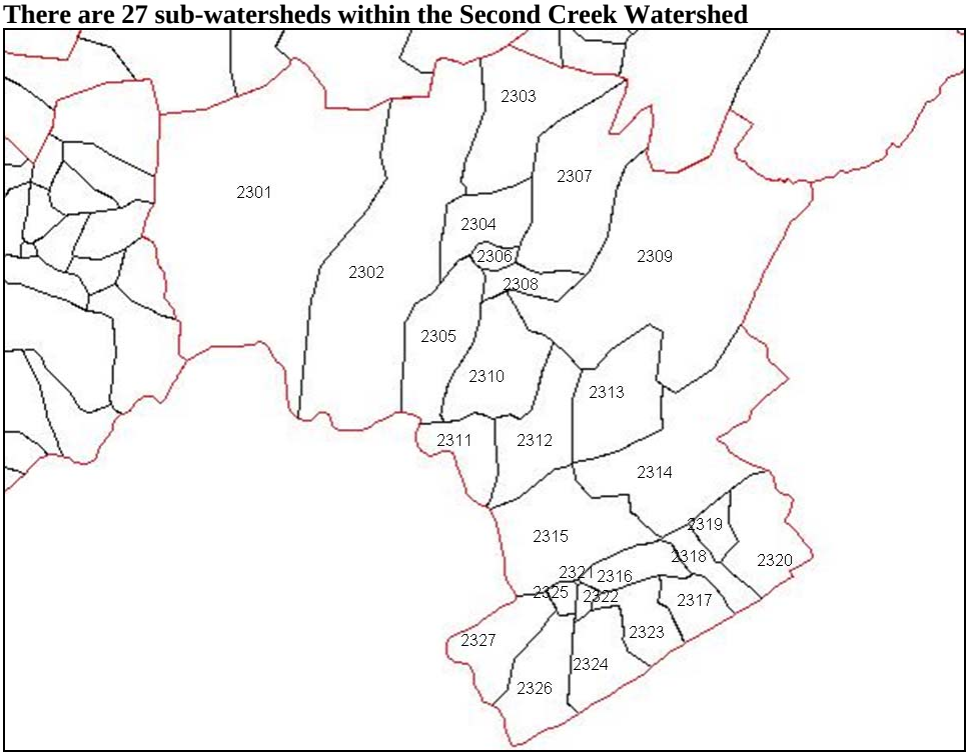


Figure A. Location of impaired streams within the Second Creek Watershed

There are 27 sub-watersheds within the Second Creek Watershed



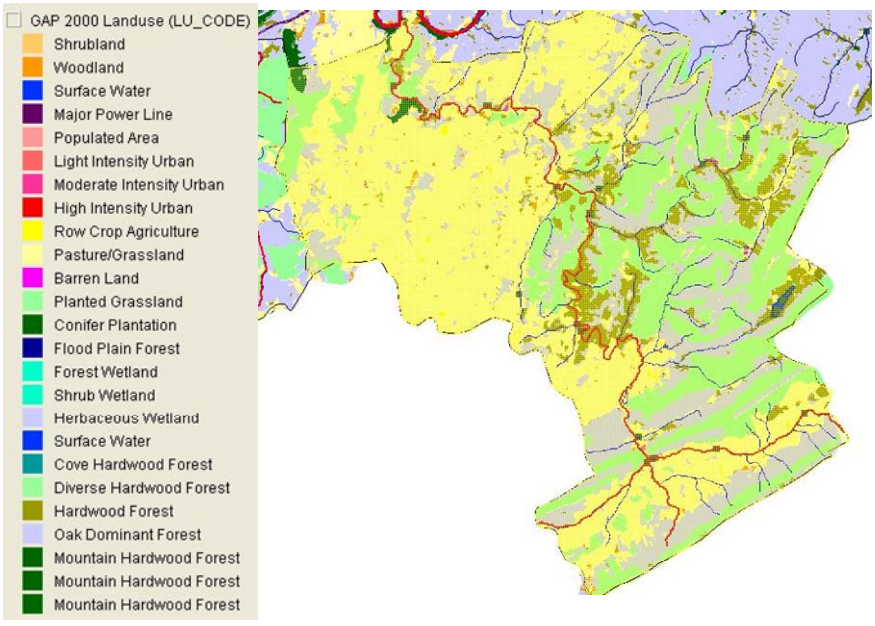


Figure B, Land uses in the Second Creek Watershed

Table 1 Streams with TMDL's developed within the Second Creek watershed.

TMDL watershed	Stream Code	Stream Name
Second Creek	WVKNG-23	Second Creek
Second Creek	WVKNG-23-G	Kitchen Creek
Second Creek	WVKNG-23-H	Back Creek

A. Identification of Causes & Sources

1. Metals

There are no current or past Abandoned Mine Land (AML) Problem Area Descriptions (PAD) located in the Second Creek watershed and the TMDL does not identify metals as a concern for this watershed. Therefore, it is not necessary to address metals in this watershed based plan.

2 Fecal Coliform

Within the Second Creek watershed three streams are listed as impaired on the 2006 WVDEP 303(d) list. These streams are Second Creek, Kitchen Creek, and Back Creek (see figure 2) and listed "relative to numeric water quality criteria for fecal coliform bacteria." Second Creek is listed as impaired for 21.5 miles starting 6.5 miles upstream from the mouth all the way to the headwaters. Kitchen Creek and Back Creek are listed for their entire lengths (Kitchen Creek 5.6 miles and Back Creek 3.5 miles). Second Creek was listed previously on the 2004 303(d) list but neither Kitchen nor Back Creek were listed before 2006.

Table 2. WVDEP 2006 303 (d) listing of Second Creek.

Master Name	Stream Segment ID	Reach	Length	A-Public Water	B-Trout	B- Fishery	C-Contact Recreation	D-Agriculture and Wildlife	E-Industrial	Category
Second Creek	WVKNG-23_01	Mouth to RM 4.6 (Nickell's Mill)	4.6	Fully Supporting		Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting	1
Second Creek	WVKNG-23_02	RM 4.6 (Nickel's Mill) to RM 6.5	1.9	Fully Supporting	Fully Supporting		Fully Supporting	Fully Supporting	Fully Supporting	1

The narrative water quality criterion of 46 CSR 1-3.2.i. prohibits the presence of wastes in state waters that cause or contribute to significant adverse impacts to the chemical, physical, hydrologic and biological components of aquatic ecosystems. Numeric fecal coliform water quality criteria are

applicable to the Water Contact Recreation and Public Water Supply designated uses. Section 8.12 of Appendix E of the West Virginia Water Quality Standards states:

> *Maximum allowable level of fecal coliform content for Primary Contact Recreation shall not exceed 200/100ml as a monthly geometric mean based on not less than five samples per month; nor to exceed 400/100ml in more than 10 percent of all samples taken during the month.*

The 2008 303 (d) list identifies Second Creek impaired for fecal coliform. Fecal coliform bacterium enters the waters through one of two ways: point source or non-point source. There is only one point source located within the Second Creek watershed, a wastewater treatment facility located at Moncove Lake (Permit # WVG550704) on Devil Creek (WVKNG-23-E). The baseline load (counts/yr) and allocated load (counts/yr) are both 2.07E+10, thus calling for 0% reduction. Point sources (WLAs) are permitted entities and are regulated and have to comply with West Virginia water quality standards. According to the TMDL, point source accounted for less than 1% of the fecal coliform bacteria found in Second Creek watershed. Non-point sources (LAs) identified within the Greenbrier River watershed were categorized as pasture land, onsite sewage systems, residential run-off and background. The TMDL calls for reductions of non-point sources from all categories except background that includes wildlife sources from forest and grasslands. A significant fecal coliform non-point loading source identified in the TMDL is agricultural land uses with estimates of 90% contributed by agricultural land uses. According to the TMDL, section 4.2.4, wildlife is not considered to be a significant nonpoint source of fecal coliform bacteria in the Greenbrier River watershed.

a. Agriculture

Second Creek watershed has a large portion of pasture lands along the stream banks, particularly in the headwaters of the streams where it is slow and low flow.

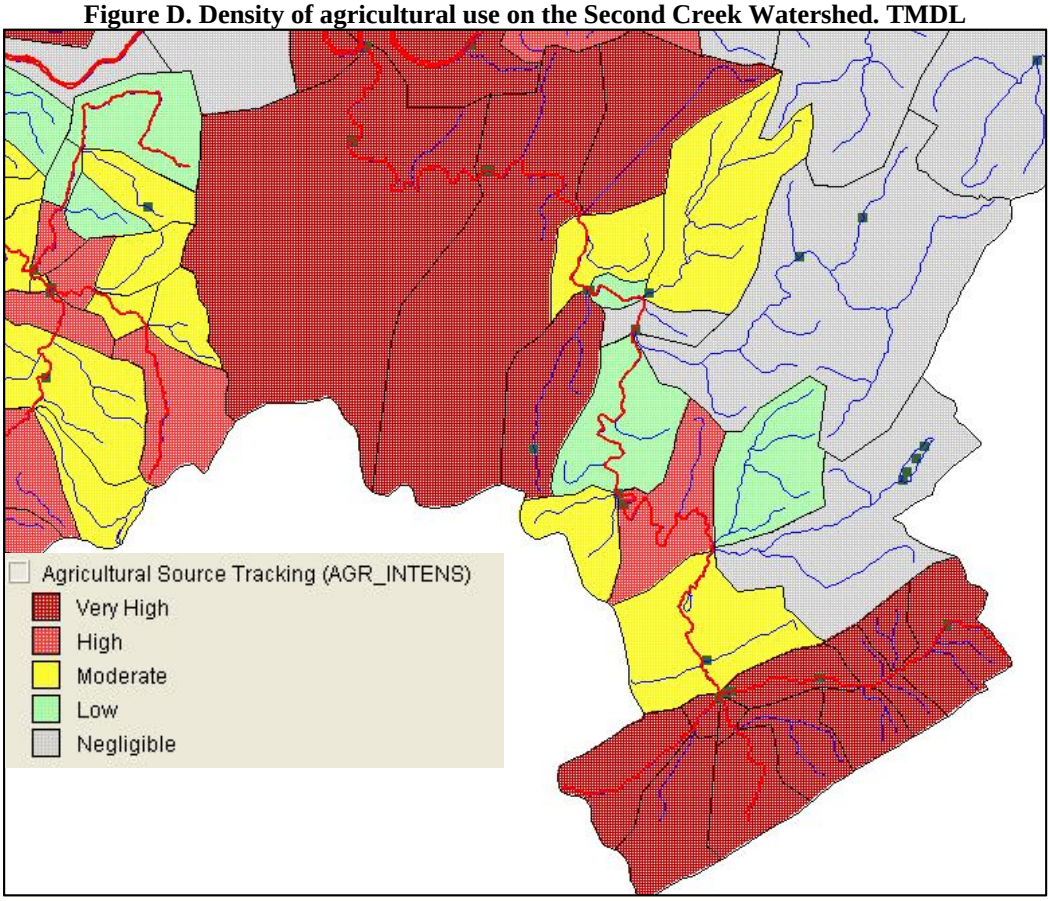
Table 3. Estimated Livestock Population Within the Watershed

	Number of Head	Animal Unit (AU) per Head	Number of Animal Units
Beef Cattle	7017	1.3	9122.1
Dairy Cattle	373	1.3	484.5
Swine	115	0.4	45.9
Sheep	597	0.3	179
Equine	266	1.25	332.5
Total	8351		10173
Total Grazing Acres within the Watershed			24008
Total Grazing Acres within Monroe County			85541
Average Animal Units Per Acre			0.42

This chart was determined by a model based on data from the Monroe County WV 2002 Census of Agriculture and local information.

The above chart demonstrates that livestock within the watershed typically have sufficient area for grazing and feeding based on West Virginia University guidelines of 1 animal unit per acre. It can be determined both by the chart and visual analysis that the fecal coliform contamination of the watershed from livestock is a result of livestock concentrating themselves in or near streams utilizing it as a water source.

Figure D. Density of agricultural use on the Second Creek Watershed. TMDL



According to the USDA NRCS WV Field Office Technical Guide Section III, fecal coliform contamination is a natural resource concern for: Water Quality – Harmful levels of pathogens in surface water. This concern is described as kinds and numbers of viruses, protozoa, and bacteria being present at a level that degrades surface water quality. Sampling conducted by the WV DEP demonstrated constant results over the state standard of 200 counts/1000 ml

Table 4. Fecal coliform counts/1000ml from WVDEP TMDL sampling for Second Creek watershed.

	July 2004	August 2004	Sept 2004	Oct 2004	Nov 2004	Dec 2004	Jan 2005	Feb 2005	March 2005	Late March 2005 (3/22)	May 2005	Average
Second Creek Sampled at Hollywood	62	14000	370	590	140	64	240	2350	50	2	22	1626
Kitchen Creek Sampled at Gap Mills	200	4400	800	12000	220	450	1350	5800	22000	26	600	4350
Back Creek Sampled at Gap Mills	340	12000	490	3400	80	70	150	58	46	112	650	1581

Highlighted numbers indicate samples that exceed the 200/100 ml maximum allowable level

b. Failing On-site Sewage Systems

The TMDL used a model to identify the locations within the watershed that could be contributing fecal coliform from failing septic systems. First, each sub-watershed was identified and divided into one of the four septic failure zones (high, medium, low and very low) by geology, and rates of septic system failure. The map below shows the modeled failing septic flows (gpd) for Second Creek from the TMDL. Two types of failures were considered, complete failure (50 gallons/per house/per day) and partial failure (25 gallons/per house/per day) to determine how much untreated sewage the stream was receiving. Both types of failures (complete and partial) were modeled as daily, year-round flows to simplify calculations. The model assumed that 54% of the the 911 structures are homes with septic systems. That percentage was applied across each of the four zones to get the number of homes. Then the number of homes was multiplied for each failure rate and then totaled to get the baseline load condition.

Figure E. Septic Zones in Second Creek according to the TMDL

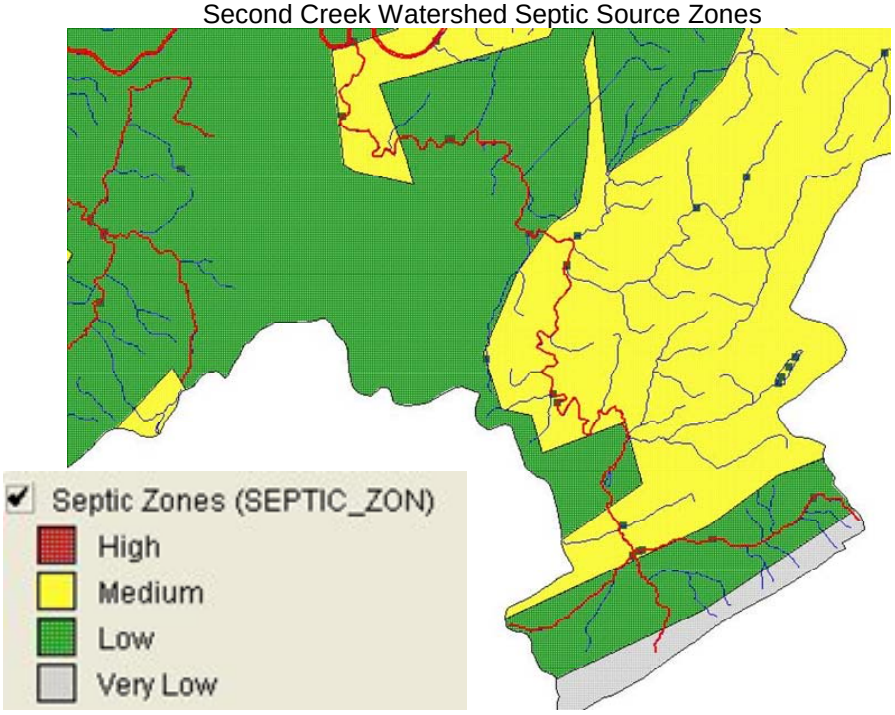


Table 5. Second Creek Watershed Fecal coliform counts from TMDL

SWS ID	Stream	Stream Code	Fully Failing Systems	Partially Failing Systems	Flow (gal/yr)	Fecal {(cts/100 ml)/home}	Base Load (cts/yr)
2301	Second Creek	WVKNG-23	60	39	1,445,876	9.47E+05	1.37E+12
2302	Second Creek	WVKNG-23	41	29	1,021,471	9.47E+05	9.67E+11
2303	UNT/Second Creek RM 9.1	WVKNG-23-0.8A	25	17	612,045	9.47E+05	5.80E+11
2304	Second Creek	WVKNG-23	6	4	140,237	9.47E+05	1.33E+11
2305	Rayburn Draft	WVKNG-23-A	22	13	514,185	9.47E+05	4.87E+11
2306	Second Creek	WVKNG-23	2	1	41,687	9.47E+05	3.95E+10
2307	Carpenter Creek	WVKNG-23-B	15	9	360,102	9.47E+05	3.41E+11
2308	Second Creek	WVKNG-23	2	1	36,069	9.47E+05	3.42E+10
2309	Laurel Creek	WVKNG-23-C	27	15	634,219	9.47E+05	6.01E+11
2310	Second Creek	WVKNG-23	18	10	411,791	9.47E+05	3.90E+11
2311	UNT/Second Creek RM 17.3	WVKNG-23-C.7	10	5	222,329	9.47E+05	2.11E+11
2312	Second Creek	WVKNG-23	12	7	286,140	9.47E+05	2.71E+11
2313	Forest Run	WVKNG-23-D	3	2	72,139	9.47E+05	6.83E+10
2314	Devil Creek	WVKNG-23-E	52	28	1,205,316	9.47E+05	1.14E+12
2315	Second Creek	WVKNG-23	30	17	705,421	9.47E+05	6.68E+11
2316	Kitchen Creek/Second Creek	WVKNG-23-G	11	7	261,798	9.47E+05	2.48E+11
2317	UNT/Kitchen Creek RM 2.87	WVKNG-23-G-1	2	1	37,203	9.47E+05	3.52E+10
2318	Kitchen Creek/Second Creek	WVKNG-23-G	2	2	59,771	9.47E+05	5.66E+10
2319	UNT/Kitchen Creek RM 3.54	WVKNG-23-G-4	2	1	43,904	9.47E+05	4.16E+10
2320	Kitchen Creek/Second Creek	WVKNG-23-G	3	2	68,049	9.47E+05	6.44E+10
2321	Second Creek	WVKNG-23	0	0	9,017	9.47E+05	8.54E+09
2322	Second Creek	WVKNG-23	1	1	34,295	9.47E+05	3.25E+10
2323	UNT/Second Creek RM 26.4	WVKNG-23-I-(S)	3	2	76,475	9.47E+05	7.24E+10
2324	Second Creek	WVKNG-23	2	1	41,884	9.47E+05	3.97E+10
2325	Back Creek	WVKNG-23-H	4	3	94,460	9.47E+05	8.95E+10
2326	UNT/Back Creek RM 0.74	WVKNG-23-H-1	5	4	126,883	9.47E+05	1.20E+11
2327	Back Creek	WVKNG-23-H	3	2	67,852	9.47E+05	6.43E+10
	Totals		363	220	8.63E+06	2.56E+07	8.17E+12

Numbers obtained from Greenbrier River TMDL Technical Document-2008

c. Residential

Run off from lawns and residential areas often contribute nutrients and pesticides into streams. A source of fecal coliform from these areas may be from penned up animals such as cats, dogs, and other animals traditionally used as pets. The TMDL does not require any reductions from residential lands.

d. Wildlife

According to the TMDL, section 4.2.4, wildlife is not considered to be a significant nonpoint source of fecal coliform bacteria in the Greenbrier River watershed. While wildlife surveys are not conducted on a watershed basis, wildlife biologist from the WV Department of Natural Resources has estimated large animal populations for the Second Creek Watershed (see chart below).

Table 6

Whitetail Deer	40-50	Per Square mile
Black Bear	1-2	Per Square mile
Wild Turkey	20-30	Per Square mile

Table 5. Wildlife populations in the Second Creek Watershed. WV DNR

e. Sediment

Sediment was not identified in the TMDL as an issue that needed addressed in the Second Creek watershed. Even though it was not addressed, it should be monitored. As livestock enter the stream to water, stream bank erosion is inevitable.

B. Estimate of the Load Reductions Expected

1. Fecal Coliform

The TMDL sets goals for pollutant reductions from nonpoint and point source activities that, if enacted, should improve water quality so that the stream segments are removed from the 303(d) list and meet standards (USEPA, 2001).

a. Agriculture

Load reductions for agricultural conservation practices will be calculated using efficiency data from the EPA approved Lost River and Mill Creek watershed based plans, which are based upon the Chesapeake Bay Model.

Table 7: Practice efficiency rates as determined by the EPA approved watershed based plans for Lost River and Mill Creek in West Virginia, which are based upon the Chesapeake Bay Model.

1	Filter Strip	70%
2	Single Stage Waste Stabilization Lagoon	85%
3	Sediment Pond/Swale in Combination with Filter Strip	85%
4	Fencing (complete removal of livestock from waterway)	90%
5	Buffer	80%
6	Off Watering System Without fencing	50%
7	Off Site Watering System With Flash Rotational Grazing In the Riparian Zone	90%

Table 8 shows the amount of required load reductions for each stream for the non-point sources regarding agriculture. To reach these goals BMP's will be selected from the USDA NRCS Field Office Technical Guide, and will comply with guidance documents and a point system found in Section III of this guide (see Appendix).

Table 8. Required load reductions from agriculture for the Second Creek Watershed.

	Baseline counts/yr	Allocated counts/year	Reduction Counts/year	% Reduction
Kitchen Creek	7.89E+13	1.93E+13	5.96E+13	75.54%
Back Creek	6.25E+13	1.68E+13	4.57E+13	73.52%
Second Creek Total	4.49E+14	1.49E+14	3.00E+14	66.82%

Table 9. Baseline Loads for individual species on individual animal species add a reduction column to this table. Number of cattle to get out of the creek or efficiency % of Au per species

Livestock Species	Pastureland Baseline Load	Total Animal Units (AU)	Animal Units Per Species	% of AU Per Species	Total Baseline Load per Species
Beef	4.49E+14	10173	9122.1	89.7%	4.03E+14
Dairy	4.49E+14	10173	484.5	4.8%	2.14E+13
Swine	4.49E+14	10173	45.9	0.5%	2.03E+12
Sheep	4.49E+14	10173	179	1.8%	7.90E+12
Equine	4.49E+14	10173	332.5	3.3%	1.47E+13
Total					4.49E+14

Source tracking conducted by the West Virginia Conservation Agency found 4 large dairy farms, 3 poultry farms, and numerous beef, horse, sheep, and goat farms. Virtually all of these farms except the poultry operations allow livestock access to the stream for water and near open sink holes while on pasture. It has also been noticed that approximately two thirds of the livestock within this watershed are located in the Kitchen Creek and Back Creek sub watersheds.

Farms in this area are typically managed in three systems, grazing, confinement, and crops. It is determined by WVCA source tracking that contamination from these operation may come in equal thirds from the different management systems. By restricting livestock from streams, developing water

to prevent loafing near streams, and implement practices to reduce stormwater from pastreland, 1/3 of bacteria should be reduced from grazing systems. By developing waste storage facilities, nutrient management plans, and nutrient relocation practices, another 1/3 of bacteria can be reduced from confinement systems. Also another 1/3 can be reduced from crop systems by developing cover crops, conservation tillage, nutrient management, and other stormwater infiltration practices. It is known that all fecal coliforms originates from animals in the watershed regardless of the management system used.

To estimate fecal coliform loading the calculated total baseline load is divided by the total number of animal units as in Table 9. The total baseline load 4.49E+14/10,173 animal units will give an estimated load of 4.41E+10 cfu/animal unit. The practices explained in Section C are used in various combinations based on the recommended conservation plan for each farm. The goal is to incorporate all animal units into the conservation practices listed in Table 7.Using the efficiencies listed in Table 7, Table 10 calculates the total load reductions for all anticipated practices listed in Section D.

Table 10: Anticipated Load Reductions for Agriculture Practices

Practice	Load Reduction/AU	# of AUs	Total Reductions
Filter Strip	3.09E+10	10,173	3.14E+14
Single Stage Waste Stabilization Lagoon	3.75E+10	10,173	3.82E+14
Sediment Pond/Swale in Combination with Filter Strip	3.75E+10	10,173	3.82E+14
Fencing (complete removal of livestock from waterway)	3.97E+10	10,173	4.04E+14
Buffer	3.53E+10	10,173	3.59E+14
Off Site Watering System Without fencing	2.21E+10	10,173	2.25E+14
Off Site Watering System With Flash Rotational Grazing	3.97E+10	10,173	4.04E+14
Totals	2.43E+11		2.47E+15

According to the TMDL the required reduction is 3.00E+14. Installing all the practices listed in the financial section (D) would exceed the reductions called for in the TMDL.

b. Failing Onsite Septic Systems

The TMDL calls for a fecal coliform load reduction from failing septics of 8.17E+12 (also on the bottom of Table 5). This is substantially less than the required reductions from agriculture so our primary focus will be on agricultural BMP's. However, working with the local health department and watershed associations, we plan to do on the ground assessment of the current conditions of the wastewater needs in Second Creek. We will identify the hot spots that need upgrades and promote the Onsite Loan Program (OSLP) to the landowners. The TMDL model calls for 100% load reductions from failing septic systems however this is often found to be unrealistic due to the economic status of individual system owners. We also hope to provide 319 funding as a match for the OSLP to reduce the cost for low income homes. While addressing the septic system issues will be a focus of this plan, the load reductions will be achieved by exceeding the reductions called for from agriculture.

Table 11. Percentage of required reductions for fecal coliform in Second Creek (TMDL 2008)

Land Use Requiring Reduction	Overall Required Reduction	% of Overall Reduction
Pasture/Cropland	3.00062E+14	97.35
Failing Septics	8.17303E+12	2.65
Total	3.08235E+14	100

C. Description of Non-Point Management Measures

Fecal Coliform

a. Agriculture

To address load reductions as a result of agricultural activity streams, fencing will be utilized to keep livestock out of creeks. Other options that will be utilized in addition will be, manure storage facilities, alternative water systems, buffers, and rehabilitation of riparian areas. These practices will be designed to increase ground cover by a minimum of 20%, with an ultimate goal of 80% minimum ground cover. Increased ground cover decreases soil erodibility and motility of nutrients and fecal born bacteria. Utilizing two spreadsheets, BMP Efficiency Calculator and Region 5 Model, and the USDA NRCS Field Office Technical Guide section 3; these management measures will be planed to assure they meet the overall load reduction required by the TMDL. These BMPs will be implemented through sound conservation planning and funded by various State programs, Federal Farm Bill Programs, and landowner contributions. The most critical areas for implementation of these practices will be along Kitchen Creek near Gap Mills, WV.

Conservation Plans: A record of landowners' decisions combined with a combination of agronomic, management and engineered practices that protect and improve soil productivity and water quality; the plan must meet agency technical standards. These plans include technical advice prepared by a certified conservation planner. All practices included in the USDA Natural Resources Conservation Service Field Office Technical Guide are eligible to be included in a conservation plan.

CREP: The Conservation Reserve Enhancement Program (CREP) is a federal-state land retirement conservation program targeted to address state and nationally significant agriculture-related environmental problems. The West Virginia CREP involves additional financial incentives to encourage the restoration of riparian and other natural habitats to protect the vitally important soil, water and wildlife resources of the Potomac, New, Greenbrier, and Little Kanawha Rivers. The goal of the West Virginia CREP program is to help reduce the occurrence of runoff, sediment, and nutrients from agricultural enterprises into the designated watersheds.

EQIP: The Environmental Quality Incentive Program (EQIP) is a federal farm bill program, advised by a local work group, which provides cost-share funds to landowners with conservation plans to develop practices that address resource concerns on their farm.

Fecal Coliform contamination in the Second Creek Watershed as a resource concern falls under the categories of Water Quality – Harmful levels of pathogens in surface water. The following BMP's are practices recommended by USDA NRCS that will address this resources concern or are support practices necessary to achieve the goals of the primary practices.

- **Alternative watering sources, with fencing**: To reduce occurrences of livestock coming into direct contact with a stream or other waterway, a narrow strip of land along the stream bank can be fenced off. Alternative watering sources, such as spring development and wells with pipelines and troughs, must then be provided for the livestock. This will prevent livestock form defecating in or close to the stream, and reduce stream bank erosion. NRCS conservation practices that can accomplish this are: 378 Pond, 382 Fence, 516 Pipeline, 533 Pumping Plant for Water Control, 574 Spring Development,

587 Structure for Water Control, 614 Watering Facility, 636Water Harvesting Catchment, 642 Well, 472 Access Control. These practices correspond to load reductions in table 7 for: off site watering systems and fencing.

- **Erosion and sediment control**: Practices that protect water resources from sediment pollution and increases in runoff associated with land development activities. By retaining soil on-site, sediment and attached nutrients are prevented from leaving disturbed areas and polluting streams. *Examples:* Silt fence, slope drain, permanent vegetation. NRCS conservation practices that can accomplish this are: 342 Critical Area Planting, 362 Diversion, and 561 Heavy Use Area Protection. Other practices are available and located in the WV Erosion and Sediment Control Handbook. These practices correspond to load reductions in table 7 for: sediment ponds/swale in combination with filter strip.

- **Riparian Buffer practices**: Areas of vegetation (herbaceous or woody) that are tolerant of intermittent flooding or saturated soils and that are established or managed in the transitional zone between terrestrial and aquatic habitats. NRCS conservation practices that can accomplish this are: 314 Brush Management, 390 Riparian Herbaceous Cover, 412 Waterways, 468 Lined Waterways, 490 Tree/Shrub Site Prep, 612 Tree/Shrub Establishment, 391 Riparian Forest Buffer. These practices correspond to load reductions in table 7 for: Buffer and fencing.

- **Filter Strip**: A strip or area of herbaceous vegetation situated between cropland, grazingland, or disturbed land (including forestland) and environmentally sensitive areas. NRCS conservation practices that can accomplish this are: 393 Filter Strip. These practices correspond to load reductions in table 7 for: Filter Strip and fencing.

- **Heavy Use Area Protection**
  Practices that restore or put into proper use, areas that are or have been used by large numbers of areas for feeding, walking, loafing. NRCS conservation practices that can accomplish this are: 313 Waste Storage Facility, 342 Critical Area Planting, 484 Mulching, 512 Pasture & Hayland Planting, 528 Prescribed Grazing, Access Road, 561 Heavy Use Area Protection, 575 Animal Trails and Walkways, 561 Heavy Use Area Protection., as well as various erosion and sediment control measures according to the WV Erosion and Sediment Control Handbook. These practices correspond to load reductions in table 7 for: Sediment Pond/Swale in combination with filter strip and fencing.

- **Nutrient Management Plans**: Farm operators develop a comprehensive plan that describes the optimum use of nutrients to minimize nutrient loss while maintaining yield and appropriate ground cover. NRCS conservation practices that can accomplish this are: 100 CNMP Development, 313 Waste Storage Facility, 316 Animal Mortality Composter, 328 Conservation Crop Rotation, 329 Residue Management, 340 Cover Crop, 590 Nutrient Management, 634 Manure Transfer. These practices correspond to load reductions in table 7 for: Waste Stabilization Lagoon and fencing.

- **Nutrient Relocation.** Farm operators who manage waste storage facilities will retain the right to retain all the manure necessary for their own fertilization purposes, but will be willing to give excess manure other farmers to spread on hay, pasture, or cropland as an alternative source. NRCS conservation practices that can accomplish this are: 590 Nutrient Management, 634 Manure Transfer. These practices correspond to load reductions in table 7 for: Waste Stabilization lagoon and fencing.

- **Animal Waste Management Systems** - livestock and Poultry operators design practices for proper storage, handling, and use of wastes generated from confined animal operations. This includes a means of collecting, scraping, or washing wastes and contaminated runoff from confinement areas into appropriate waste storage structures. For poultry operations, litter sheds are typically used. Livestock feedlots and dairies commonly utilize waste lagoons or move animal feeding areas away from the streamside. NRCS conservation practices that can accomplish this are: 313 Waste Storage Facility, 359 Waste Treatment Lagoon. These practices correspond to load reductions in table 7 for: waste stabilization lagoon and fencing.

- **Storm Water Management**
  Practices that prevent stormwater form coming into contact with fecal material and washing it into streams. NRCS conservation practices that can accomplish this are: 362 Diversions, 412 Waterway, 468 Lined Waterway, 558 Roof Runoff Management, 606 subsurface Drain, and 620 Underground Outlet. These practices correspond to load reductions in table 7 for: Sediment Pond/Swale in combination with filter Strip.

- **Sediment Ponds & Wetlands** – These structures intercept surface runoff and treat it through settling, then discharge it at a controlled rate to minimize the environmental and physical impacts on receiving waters. Less expensive runoff filtration practices such as vegetated swales may also be used. NRCS conservation practices that can accomplish this are: 350 Sediment Basin, 658 Wetland Creation, and 657 Wetland Restoration. These practices correspond to load reductions in table 7 for: Sediment Ponds/Swale in combination with filter Strip.

***See Appendix for standards and specifications of all the above mentioned NRCS conservation practices.*

b. Failing Septic Systems

The health department and the watershed association will work together to compile the health department permit data into a map to show the areas of need for upgraded wastewater systems. Once these areas are located and documented residents will be approached to participate in the OSLP where onsite systems have been prescribed. If an area is prescribed for a cluster system wastewater treatment system we will work with the residents to implement this system.

A cluster system uses the same technology for treatment and dispersal as onsite systems, but is sized to handle more than one house. They require easements and maintenance. Legal easements are required for houses served by cluster systems to insure that the treatment system remains functional through time and ownership changes. These easements insure that treatment is always available to the lot. Maintenance agreements, usually a contract with a qualified third party, are also required to insure the sustainability of the treatment system.

D. Estimate Cost for Financial and Technical Assistance

While there are many conservation practices that can be applied to reduce the overall load of fecal coliform to the Second Creek watershed, the following practices outlined in this budged will be the most critical. Since the majority of the watershed is karst geology, these practices will be applied in the areas where livestock are in an extremely close proximity to impaired streams (Kitchen Creek and Back Creek). The

waste storage facilities will allow for proper storage and relocation of nutrients generated from dairy and feedlot operations, and the watering systems will prevent un-necessary loafing of livestock near the streams. Fencing and riparian development will restrict livestock from direct contact with the waterways. Failing septic systems will be re-developed to allow for proper percolation. In order to implement the practices mentioned in section B these are the project and estimated cost required to reach the desired load reductions

Best Management Practice	**Planned Units**	**Cost/Unit**	**Total**
Waste Storage Facilities	6	$60, 000	$360,000
Stream Crossings	22	$125	$2,750
Spring Developments	32	$340	$10,880
Ponds	16	$10,000	$160,000
Water Troughs	48	$1,000	$48,000
Pumping Plant	24	$1,000	$24,000
Pipeline	14400 Feet	$1.35	$19,440
Wetland Restoration	1	$10,000	$10,000
Wetland Development	1	$10,000	$10,000
Nutrient Management Application	1550 Acres	$106	$164,300
Nutrient Management Planning	31	$288	$8,928
Grazing Plans	31	$144	$4,464
Forested Buffers	56.46 Acres	$500	$28,230
Herbaceous Buffers	112.93 Acres	$210	$23,715
Buffer Rental	169.39	$72	$12,196
Critical Area Planting	100.75 Acres	$718	$72,338
Fence	194719 Feet	$1.50	$292,078
Upgrade/fix failing/ Individual Sewer Systems	365 systems	$7,500	$2,737,500
Educational Component			**$5,000**
Monitoring			**$20,000**
Total			$4,013,819

See Appendix for full cost list

The NPS Program in WVDEP will administer the Section 319 grants and assist in plan and project development. The West Virginia Conservation Agency (WVCA) will be the state agency coordinating the implementation of BMP's. The Greenbrier Valley Conservation District will be the fiscal manager of 319 and other funds. These organizations will work together to oversee project installation as well as work with the partnering organizations to ensure success of the project. WVCA will organize a fecal coliform monitoring program to be conducted by the partners. WVCA will perform fecal testing in the

focus sub-watershed prior to and following the implementation of each project. The TMDL section of the DEP will monitor water quality in five years, including 2009, and 2014. Outreach will be coordinated by the watershed associations, The Greenbrier River Watershed Association, and Friends of the Second Creek. The efforts of these two organizations will introduce the public to the goals and plans of the project. The USDA-Natural Resource Conservation Service will provide technical assistance in designing the agricultural best management practices. All cooperating agencies and organizations will promote the program within the watershed.

The Greenbrier River Watershed Association and the Friends of The Second Creek are vital to the success of this project. The watershed associations are active in education of best management practices to landowners and residents in the watershed. The Greenbrier River Watershed Association and the Friends of The Second Creek have pledged their support to this project. The Greenbrier Sporting Club has offered assistance with the monitoring aspects of the project, and the West Virginia Farm Bureau may also be involved with outreach aspects of the project.

Sources of funding to achieve the goals of this plan:

- **Environmental Quality Incentive Program**, (EQIP) Offered by the USDA NRCS, EQIP can provide 50% cost share for agriculture practices that improve water quality, depending on ranking criteria and funding available.
- **Conservation Reserve Enhancement Program**, (CREP) Offered by USDA FSA, CREP provides 90% cost share to develop riparian areas and alternative watering systems for livestock.
- **319 Grants** through WVDEP NPS program for systems incorporating various water quality improvement practices
- **The WV Onsite State Revolving Fund Program. This program can be used to promote loan funding for individual onsite systems as well as homeowner-owned components of decentralized systems**
- **West Virginia Conservation Agency** will provide 15% matching funds to implement agriculture practices
- **Local businesses**, often when providing service to those businesses and surrounding homes.
- **Health Department**
- **Landowners** will provide 25% matching funds for practices developed on their property. Much of these funds will be in kind for labor, equipment use, and materials

E. Educational Component

Education will be a key component to implementing the watershed based plan. Partnering with the Greenbrier River Watershed Association (GRWA) and Friends of Second Creek Watershed Association will allow educational opportunities to reach the watershed association membership as well as members of the community. The GRWA has committed to partnering in educational efforts to improve water quality within the watershed. As mentioned in the mission statement of the GRWA, education and outreach play a vital role in their mission and sustainability. They have a history of outreach and education in the local community and make use of a variety of media. In order to achieve the non-point source management measures, GRWA and other local and state organizations have and will conduct a number of activities to educate watershed residents and users about the problems and potentials of the watershed. These activities will also be used to communicate the goals and progress of the WBP:

- *Farm Field Days*

    - *Events held on farms for farmers to demonstrate new technology and the use of BMP's*
- *Mailings*
    - *Newsletters and postcards sent to residents of that area informing them of opportunities and developments of the watershed based plan.*
- *Envirothon*
    - *An educational environmental contest for high school students. Teams participating may be trained for many aspects of the contest along Second Creek.*
- *Watershed School (Adult Education)*
    - *A weekly class providing training on all aspects of watershed management geared toward volunteers associated with watershed organizations*
- *Stream Monitoring Workshop*
    - *Provided by the WV DEP through the SOS program, teach volunteers how to properly monitor streams.*
- *Water Resource Program*
    - *Provided by the U.S. National Parks Service, teaches students about natural stream systems*
- *Stream Clean ups*
    - *With the help of 4-H, FFA and other organizations, pick up trash along the stream banks*

F, G, H. Schedule for Implementation

Milestone Schedule: include in schedule the septic evaluations Assessment and approach for implementation

Action	Time line
Begin Project Proposal Stage 1 South of Hollywood & Project Proposal	May 2008
Submit Project Proposal Stage 1 to WV DEP to address Agriculture activities south of Hollywood	June 2008
Submit Watershed Based Plan to West Virginia Department of Environmental Protection and U.S. Environmental Protection Agency	December 2008
Public Outreach and announcement of 319 Incremental Funding	Upon approval by EPA, 2009
Hold 1 educational workshop to gain additional public interest	June 2009
Accept applications for project participants	June 2009

Implement project to address fecal coliform from agricultural sources Stage 1	June 2009 - 2011
Develop 15 grazing and nutrient management plans Develop monitoring plan for wastewater study	June 2009
Hold 1 educational workshop	August 2009
Develop stream buffers (84 acres), exclusion fences (15,000 Feet), and other non-structural practices to prevent livestock from accessing streams	August 2009
Conduct inventory of existing treatment systems including review of records and field survey.	9/30/2009
Submit Project Proposal Stage 2 to WV DEP to address Agriculture activities north of Hollywood Compile data from wastewater treatment survey for reporting	November 2009
A target fecal coliform reduction for Kitchen Creek and Back Creek Fecal Coliform 4.115E+13 counts/yr, Kitchen Creek (approximately ½ baseline) 3.37E+13 counts/yr, Back Creek Host workshop with watershed associations regarding findings Of wastewater survey and develop a report showing the next Steps to addressing the wastewater needs in the watershed	December 2009
Public Outreach and announcement of 319 Incremental Funding EPA, 2009 - 2010	Upon approval by
Accept applications for project participants Submit proposal to 319 to match the OSLP for areas identified in the plan for needed upgraded wastewater needs	January- April 2010
Implement project to address fecal coliform from agricultural sources Stage 2	May 2010 - 2012
Hold 2 educational workshops	May 2010
Implement structural practices such as waste storage facilities For stage 1 (3 waste storage facilities, 24 alternative water systems)	July 2010
Develop 16 grazing and nutrient management plans (stage 2)	June 2010
Develop 84 acres in stream buffers, 100,000 feet of exclusion fences, and other non-structural practices to prevent livestock from accessing streams (stage 2)	August 2010

Implement structural practices such as waste storage facilities For stage 2 (3 waste storage facilities, 24 alternative water systems)	August 2010
A target fecal coliform reduction for Second Creek Fecal coliform 1.93E+14 counts/year (approximately ½ baseline)	December 2010
Hold 2 educational workshops	May 2011
Complete Stage 1	November 2011
A target fecal coliform reduction Fecal Coliform 2.22E+13 counts/year, Kitchen Creek 1.88E+13 counts/year Back Creek	December 2011
Hold 2 educational workshops	May 2012
Complete Stage 2	November 2012
A target fecal coliform reduction Fecal Coliform at or below 2.22E+13 counts/year, Kitchen Creek 1.88E+13 counts/year, Back Creek 1.93E+14 counts/year, Second Creek	December 2012

Prioritization Rationale
The goal in this WBP is to achieve water quality standards in the watershed. The sub-watershed was prioritized through the information given by the WBP working group. The local knowledge and concerns within the watershed is a considering factor in project determination.

Criteria for Project Prioritization:
It is critical to incorporate the local community to decide ranking and prioritization for projects.
These standards should be used to determine ranking for projects:

- Community Willingness- Eagerness and willing to share the cost of the projects by the landowners and community members
- Project Cost and Funding Leverage - Feasibility and cost of a project
- Water Quality- Identified “hot spots” for sources of fecal coliform from the TMDL and water monitoring
- Overall potential to decrease fecal coliform loads
- Proximity to Headwaters

The criteria may be altered as deemed necessary by the cooperating agencies and organizations.

I. Monitoring Protocol

The watershed associations will work together along with WVDEP Nonpoint Source Program and WVCA as a monitoring team that will be responsible for pre- and post- project implementation. The monitoring team

will develop a specific monitoring plan and submit it to EPA for review prior to project implantation. A generic project plan will include site locations upstream and downstream of the project site, sampling regime and responsible parties. All water sampling procedures will be done in accordance with the DEP Division of Water and Waste Watershed Assessment Branch's established assurance project plan (QAPP). This will assure not only that our installed projects are functioning properly, but will give up measureable reductions in fecal contamination associated with these streams as it pertains to the streams 303 (d) listing. Save Our Streams (SOS) protocols will also be used to assess the habitat and benthic macro-invertebrate communities before and after a project is implemented. . Fecal coliform samples will continue to be collected by the watershed groups during 3 flow regimes following the project completion for two years.

WVCA and GRWA will conduct plan development monitoring for fecal coliform bacteria utilizing a private laboratory for analysis. The purpose of monitoring is to gather additional data that is necessary to identify "hot spots" and possible sources of fecal pollution entering the main stem of Second Creek. Better data will lead to more informed decisions and a stronger watershed based plan. A QAPP for the monitoring of this plan will be developed and submitted to EPA for approval.

The monitoring and sampling project will be used as a mapping exercise to identify the areas with the largest need for assistance and improve the accuracy of the watershed based plan. Eight (8) sites will be identified for twice monthly monitoring for six months and episodic higher flow sampling during runoff events if possible (not to exceed 2 additional sampling days). Monitoring points will be revaluated after six months based on monitoring results and a monthly sampling regiment established to be continued as necessary until TMDL requirements are met. Samples will be collected at sites with public access or landowner permission.

During times of normal flow, guides from the Greenbrier Sporting Club will provide visual assessments as to the overall health of the habitat and water quality seen within the stream. These assessments will be compared to scientific data to demonstrate common stream dynamics that may improve with the use of BMP's