



2nd Stakeholder Meeting for the Development of a Clean Up Plan (Implementation Plan) for the North Fork Rivanna River Watershed

September 24th, 2024

DEQ Central Regional Office Valley Region

Madison Whitehurst

TMDL NPS Data Coordinator

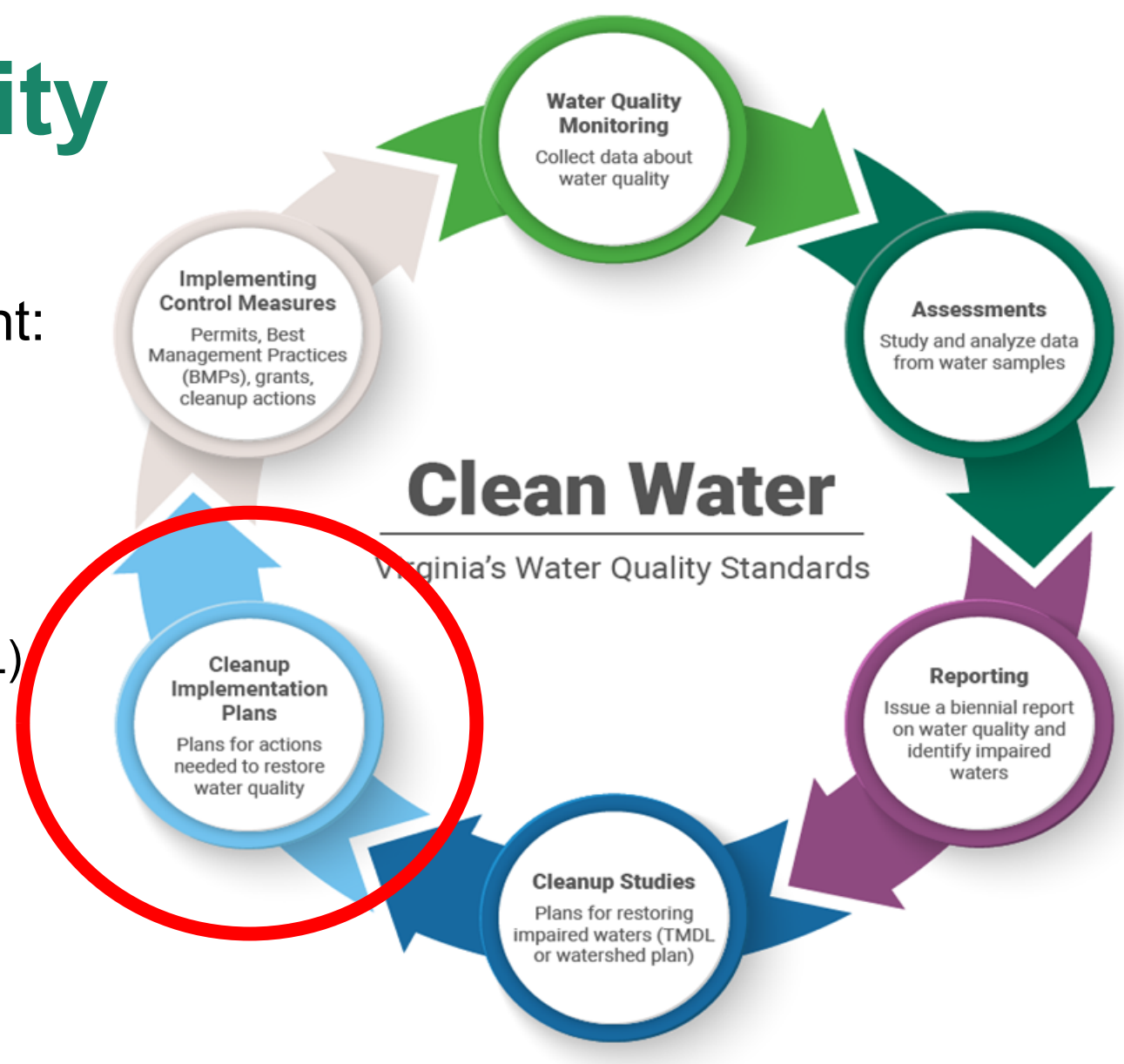
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What do we hope to accomplish today?

- Remind ourselves of Virginia's water quality process
- Review the TMDLs that guide this Implementation Plan
- Discuss how to reduce sediment, phosphorous, and bacteria in the watershed
 - Prioritizing BMPs for inclusion in the implementation plan
 - Septics/Pet Waste
 - Agricultural
 - Urban
- Next steps

Virginia's Water Quality Process

- Water Quality Monitoring & Assessment:
 - Collect and analyze data
- Reporting
 - Identify impaired waters, 303(d) list under CWA
- Cleanup Studies
 - Plans for restoring impaired waters (TMDL)
- **Cleanup Implementation Plans**
 - Plans for actions needed to restore water quality (NPS pollution)
- **Implementing Control Measures**
 - Permits (TMDLs), best management practices, cleanup actions
 - 319 Grant funding available for IP NPS BMPs



Reviewing the TMDLs

2008 Bacteria TMDL

Bacteria TMDL Development for the Rivanna River Mainstem, North Fork Rivanna River, Preddy Creek and Tributaries, Meadow Creek, Mechums River, and Beaver Creek Watersheds

Submitted by
Virginia Department of Environmental Quality

Prepared by



THE Louis Berger Group, INC.
2445 M Street, NW Washington,
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Final Report
March 2008

Virginia Department of Environmental Quality

2018 Benthic TMDL

Benthic TMDL Development for the North Fork Rivanna River Watershed and Tributaries Located in Albemarle, Greene, and Orange Counties



Prepared by:
James Madison University
and
EEE Consulting, Inc.

Prepared for:
Virginia Department of Environmental Quality

April 2019

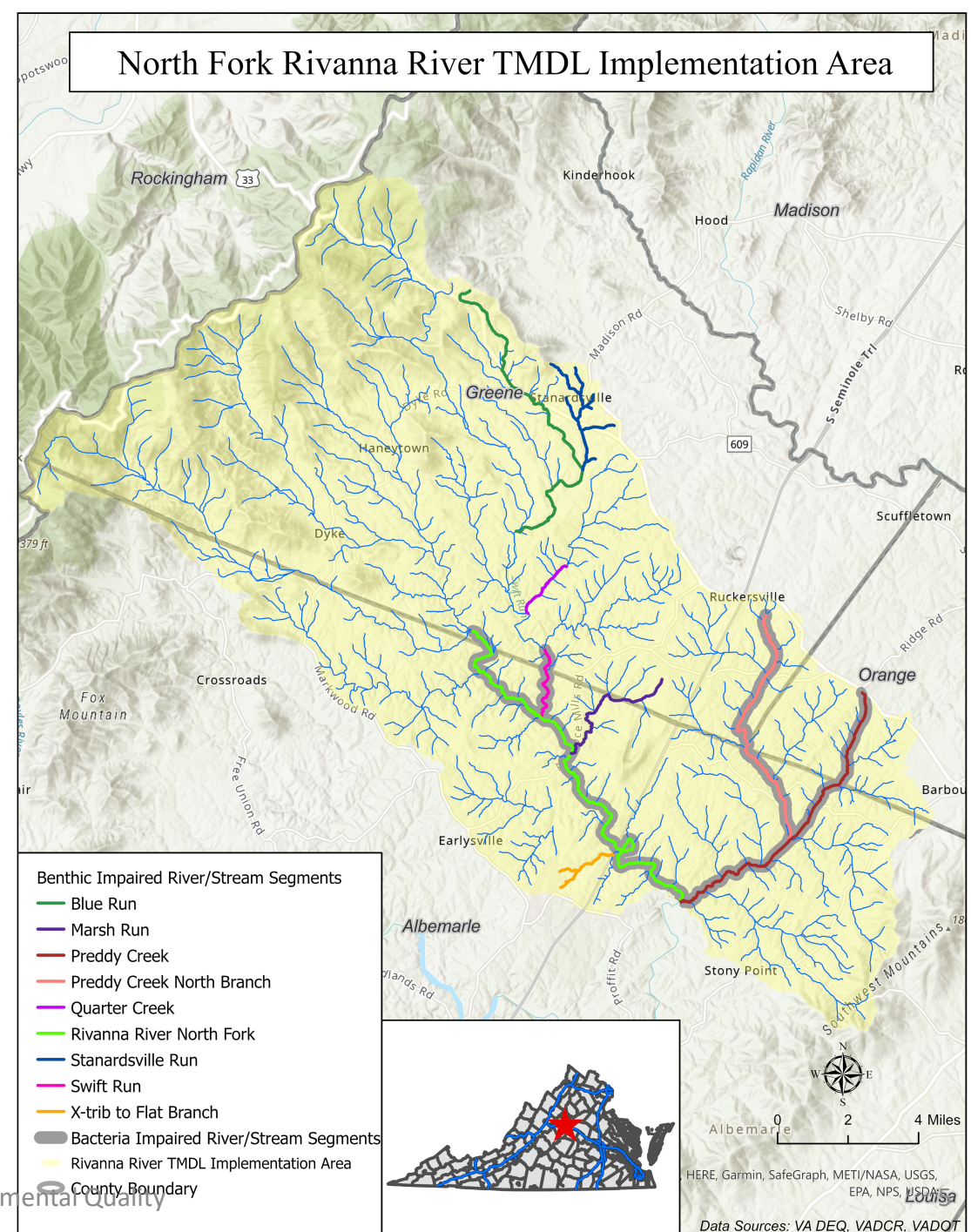


Impaired Stream Segments

Impaired Streams	Initial Listing Year (Benthic)	Initial Listing Year (Bacteria)
Blue Run*	2012	
Marsh Run	2010	
Preddy Creek	2016	2006
Preddy Creek North Branch	2010	2006
Quarter Creek	2016	
North Fork Rivanna River	2016	2006
Stanardsville Run*	2014	
Swift Run	2012	2010
X-Trib to Flat Branch	2010	

*- TMDL developed for both Sediment and Phosphorus

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From the TMDL Study: Bacteria Load Reductions

Watershed	Percent (%) Reduction in Phosphorus Loads Needed			
	Human Sources (failed septic systems and straight pipes)	Livestock (Direct Instream Loading)	Agricultural and urban nonpoint sources	Wildlife (Direct Instream Loading)
North Fork Rivanna River	100	100	95	76
Swift Run*	100	100	95	76
Preddy Creek	100	100	95	72

* Swift Run bacteria impairment listed in 2010, following competition of bacteria TMDL, reductions for NF Rivanna apply as Swift Run is within NF Rivanna watershed.

From the TMDL Study: Sediment Load Reductions

Watershed	Percent (%) Reduction in Sediment Loads Needed					
	Crop, Pasture, Hay, and Harvested Forest	Forest, Trees, Shrubs, and Wetland	Developed Pervious and Impervious Areas and Turfgrass	Streambank Erosion	Permitted Urban Areas (MS4)	Other Permitted Sources
Blue Run	71.5	0	45.0	71.5	n/a	0
Marsh Run	70.0	0	37.5	70.0	n/a	0
Preddy Creek	13.2	0	5.0	13.2	n/a	0
Preddy Creek North Branch	57.3	0	40.4	57.3	n/a	0
Quarter Creek	70.7	0	50.0	70.7	n/a	0
Stanardsville Run	76.8	0	60.0	76.8	n/a	0
Swift Run	18.7	0	5.0	18.7	n/a	0
X-Trib to Flat Branch	50.1	0	50.1	50.1	50.1	0

From the TMDL Study: Phosphorous Load Reductions

Watershed	Percent (%) Reduction in Phosphorus Loads Needed					
	Crop, Pasture, Hay, and Harvested Forest	Forest, Trees, Shrubs, Wetland	Developed Pervious and Impervious Areas and Turfgrass	Streambank Erosion	Permitted Urban Areas (MS4)	Other Permitted Sources
Blue Run	50.0	0	42.5	50.0	n/a	0
Stanardsville Run	67.8	0	67.8	67.8	n/a	0

Now, let's dive in...

Residential Septic: Overview

Is this more
realistic?

Within the North Fork Rivanna River watershed, estimated totals (TMDL, 2019):

Watershed	Total Septic Systems	Houses with Failing Septic Systems	Houses with Straight Pipes
Blue Run	409	14	0
Marsh Run	452	15	0
Preddy Creek	699	24	0
Preddy Creek North Branch	1775	60	0
Quarter Creek	905	31	0
NF Rivanna	2,341	80	0
Swift Run	700	23	0
Stanardsville Run	118	4	0
X Trib to Flat Branch	20	1	0

Residential Septic: BMPs

Around 50/50 on Replacements vs. Repairs

- ? Should there be any alternative systems implemented, if so how much (10%)?
- ? How many septic pumpouts should we call for in each watershed, 1/3 of the households?

Sub-watershed	Practice	Cost-share code	Unit	Unit Cost	Stage 1	Stage 2	Stage 3	Stage 4	Cost
Blue Run	Septic Tank Pumpout	RB-1	Pump-out	\$375	2	0	0	0	\$750
	Septic Tank Repair	RB-3	Repair	\$5,000	4	3	0	0	\$35,000
	Septic System Replacement	RB-4	Systems	\$8,000	4	3	0	0	\$56,000
Marsh Run	Septic Tank Pumpout	RB-1	Pump-out	\$375	2	0	0	0	\$750
	Septic Tank Repair	RB-3	Repair	\$5,000	4	4	0	0	\$40,000
	Septic System Replacement	RB-4	Systems	\$8,000	3	4	0	0	\$56,000
Preddy Creek	Septic Tank Pumpout	RB-1	Pump-out	\$375	7	8	0	0	\$5,625
	Septic Tank Repair	RB-3	Repair	\$5,000	6	6	0	0	\$60,000
	Septic System Replacement	RB-4	Systems	\$8,000	6	6	0	0	\$96,000
Preddy Creek North Branch	Septic Tank Pumpout	RB-1	Pump-out	\$375	7	8	0	0	\$5,625
	Septic Tank Repair	RB-3	Repair	\$5,000	15	15	0	0	\$150,000
	Septic System Replacement	RB-4	Systems	\$8,000	15	15	0	0	\$240,000
								Total Cost	\$745,750

Residential Septic: BMPs Cont.

Sub-watershed	Practice	Cost-share code	Unit	Unit Cost	Stage 1	Stage 2	Stage 3	Stage 4	Cost
Quarter Creek	Septic Tank Pumpout	RB-1	Pump-out	\$375	25	26	17	17	\$31,875
	Septic Tank Repair	RB-3	Repair	\$5,000	8	8	0	0	\$80,000
	Septic System Replacement	RB-4	Systems	\$8,000	8	7	0	0	\$120,000
North Fork Rivanna	Septic Tank Pumpout	RB-1	Pump-out	\$375	18	19	29	29	\$35,625
	Septic Tank Repair	RB-3	Repair	\$5,000	20	20	0	0	\$200,000
	Septic System Replacement	RB-4	Systems	\$8,000	20	20	0	0	\$320,000
Swift Run	Septic Tank Pumpout	RB-1	Pump-out	\$375	25	25	0	0	\$18,750
	Septic Tank Repair	RB-3	Repair	\$5,000	6	6	0	0	\$60,000
	Septic System Replacement	RB-4	Systems	\$8,000	5	6	0	0	\$88,000
Stanardsville Run	Septic Tank Pumpout	RB-1	Pump-out	\$375	6	0	0	0	\$2,250
	Septic Tank Repair	RB-3	Repair	\$5,000	2	0	0	0	\$10,000
	Septic System Replacement	RB-4	Systems	\$8,000	2	0	0	0	\$16,000
X Trib to Flat Branch	Septic Tank Pumpout	RB-1	Pump-out	\$375	2	0	0	0	\$750
	Septic Tank Repair	RB-3	Repair	\$5,000	1	0	0	0	\$5,000
								Total Cost	\$988,250

Residential Septic: Overall

Practice	Cost-share code	Unit	Unit Cost	Total	Cost
Septic Tank Pumpout	RB-1	Pump-out	\$375	272	\$102,000
Septic Tank Repair	RB-3	Repair	\$5,000	128	\$640,000
Septic System Replacement	RB-4	Systems	\$8,000	124	\$992,000
				Total Cost	\$1,734,000

Pet Waste: BMPs

Is this
reasonable?

Pet Waste Management Plan is applied throughout each stage.

? Should there be more disposal stations and composters? Or should there be less?

Sub-watershed	Practice	Unit	Unit Cost	Stage 1	Stage 2	Stage 3	Stage 4	Cost
Blue Run	Pet Waste Disposal Station	System	\$2,000	2	0	0	0	\$4,000
	Pet Waste Composter	System	\$400	3	0	0	0	\$1,200
Marsh Run	Pet Waste Disposal Station	System	\$2,000	3	0	0	0	\$6,000
	Pet Waste Composter	System	\$400	3	0	0	0	\$1,200
Preddy Creek	Pet Waste Management Plan	Program	\$4,000		1			\$16,000
	Pet Waste Disposal Station	System	\$2,000	2	0	0	0	\$4,000
	Pet Waste Composter	System	\$400	4	0	0	0	\$1,600
Preddy Creek North Branch	Pet Waste Disposal Station	System	\$2,000	4	4	0	0	\$16,000
	Pet Waste Composter	System	\$400	5	5	0	0	\$4,000
							Total Cost	\$54,000

Pet Waste: BMPs Cont.

Is this
reasonable?

Sub-watershed	Practice	Unit	Unit Cost	Stage 1	Stage 2	Stage 3	Stage 4	Cost
Quarter Creek	Pet Waste Disposal Station	System	\$2,000	2	0	0	0	\$4,000
	Pet Waste Composter	System	\$400	4	0	0	0	\$1,600
North Fork Rivanna	Pet Waste Management Plan	Program	\$4,000	1				\$16,000
	Pet Waste Disposal Station	System	\$2,000	5	5	0	0	\$20,000
	Pet Waste Composter	System	\$400	6	6	0	0	\$4,800
Swift Run	Pet Waste Disposal Station	System	\$2,000	4	0	0	0	\$8,000
	Pet Waste Composter	System	\$400	7	0	0	0	\$2,800
Stanardsville Run	Pet Waste Disposal Station	System	\$2,000	1	0	0	0	\$2,000
	Pet Waste Composter	System	\$400	2	0	0	0	\$800
X Trib to Flat Branch	Pet Waste Disposal Station	System	\$2,000	1	0	0	0	\$2,000
	Pet Waste Composter	System	\$400	2	0	0	0	\$800
							Total Cost	\$62,800

Pet Waste: Overall

Practice	Unit	Unit Cost	Total	Cost
Pet Waste Disposal Station	System	\$2,000	33	\$66,000
Pet Waste Composter		\$400	47	\$18,800
Pet Waste Management Plan	Program	\$4,000	2	\$32,000
			Total Cost	\$116,800

Agriculture: BMPs

Exclusion practices were distributed evenly over Stages 1 and 2, or 60% were in Stages 1 and 2, and 40% were in Stages 3 and 4.

Fencing needs include what has been done since the TMDL was completed in 2018.

? What percentage of the fencing should be SL-6N? 5%? 10%?

Sub-watershed	Approximate fencing installed to date (feet)	Fencing Still Needed			
		Stage 1	Stage 2	Stage 3	Stage 4
Blue Run	0	2939	2938	0	0
Marsh Run	6201	1044	1043	0	0
Preddy Creek	11117	8198	8197	0	0
Preddy Creek North Branch	0	2017	2016	0	0
Quarter Creek	0	1302	1302	0	0
North Fork Rivanna	6057	22967	22967	15312	15312
Swift Run	40214	4749	4749	0	0
Stanardsville Run	0	760	0	0	0
X Trib to Flat Branch	0	0	0	0	0

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Sub-watershed	SL-6W or CRSL-6	
	feet	systems
Blue Run	5877	2.7
Marsh Run	2087	0.95
Preddy Creek	16395	7.4
Preddy Creek North Branch	4033	1.8
Quarter Creek	2604	1.2
North Fork Rivanna	76558	34.8
Swift Run	9498	4.3
Stanardsville Run	760 ¹⁷	0.35

Agriculture: Blue Run BMPs

Is this
reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Livestock Exclusion	Stream Exclusion With Grazing Land Management	SL-6W, CRSL-6	System	\$34,000	1.4	1.3	0	0	2.7	\$91,800
Cropland	Long Term Vegetative Cover on Cropland	SL-1	Acres	\$150	2	3	0	0	5	\$750
	Cover Crop	SL-8B/8H		\$80	3	4	0	0	7	\$560
	Sediment Retention , Erosion, or Water Control Structures	WP-1	System	\$150	2	3	0	0	5	\$750
Pasture	Afforestation of erodible pasture	FR-1	Acres Treated	\$500	9	9	12	12	42	\$21,000
	Permanent vegetative cover on critical areas	SL-11		\$1,800	40	40	60	60	200	\$360,000
	Improved pasture management	SL-10		\$75	120	120	80	80	400	\$30,000
	Extensions of Watering System	SL-7		\$20,000	6	6	8	8	28	\$560,000
	Sediment Retention , Erosion, or Water Control Structures	WP-1		\$150	75	75	112.5	112.5	375	\$56,250
	Animal waste control facilities	WP-4	System	\$300,000	1	0	0	0	1	\$300,000
	Roof Runoff Management	WQ-12		\$1,450	1	0	0	0	1	\$1,450
Stream Bank	Stream Restoration	N/A	Feet	\$1,000	125	0	0	0	125	\$125,000
									Total Cost	\$1,547,560

Agriculture: Marsh Run BMPs

Is this
reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Livestock Exclusion	Stream Exclusion With Grazing Land Management	SL-6W, CRSL-6	Systems	\$34,000	0.47	0.47	0	0	0.94	\$31,960
Pasture	Afforestation of erodible pasture	FR-1	Acres Treated	\$500	6	6	8	8	28	\$14,000
	Permanent vegetative cover on critical areas	SL-11		\$1,800	13	14	20	20	67	\$120,600
	Improved pasture management	SL-10		\$75	135	135	90	90	450	\$33,750
	Extension of Watering System	SL-7		\$20,000	10	11	7	7	35	\$700,000
	Sediment Retention , Erosion, or Water Control Structures	WP-1		\$150	80	80	120	120	400	\$60,000
	Animal waste control facilities	WP-4	Systems	\$300,000	1	0	0	0	1	\$300,000
	Roof Runoff Management	WQ-12		\$1,450	1	0	0	0	1	\$1,450
Stream Bank	Stream Restoration	N/A	Feet	\$1,000	70	0	0	0	70	\$70,000
									Total Cost	\$1,331,760

Agriculture: Preddy Creek BMPs

Is this reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Livestock Exclusion	Stream Exclusion With Grazing Land Management	SL-6W, CRSL-6	Systems	\$34,000	3.7	3.7	0	0	7.4	\$251,600
Cropland	Long Term Vegetative Cover on Cropland	SL-1	Acres Treated	\$150	4	4	5	5	18	\$2,700
	Cover Crop	SL-8B/8H		\$80	5	5	7.5	7.5	25	\$2,000
	Sediment Retention, Erosion, or Water Control Structures	WP-1		\$150	6.5	6.5	10	10	33	\$4,950
	Afforestation of erodible cropland	FR-1		\$500	5.2	0	0	0	5.2	\$2,600
Pasture	Afforestation of erodible pasture	FR-1	Acres Treated	\$500	115	115	172.5	172.5	575	\$287,500
	Permanent vegetative cover on critical areas	SL-11		\$1,800	83	83	124	124	414	\$745,200
	Improved pasture management	SL-10		\$75	810	810	540	540	2700	\$202,500
	Extension of Watering System	SL-7		\$20,000	5	5	0	0	10	\$200,000
	Sediment Retention , Erosion, or Water Control Structures	WP-1	Systems	\$150	346	346	519	519	1730	\$259,500
	Animal waste control facilities	WP-4		\$300,000	1	0	0	0	1	\$300,000
	Roof Runoff Management	WQ-12		\$1,450	1	0	0	0	1	\$1,450
Harvested	Afforestation of Crop, Hay, and Pasture	FR-1	Acres	\$500	3.6	3.6	5.3	5.3	17.8	\$8,900
Barren	Farm Road or Heavy Animal Travel Lane Stabilization	SL-11B	Acres	?	0.01	0	0	0	0.01	?
Stream Bank	Stream Restoration	N/A	Feet	\$1,000	424	424	283	283	1414	\$1,414,000
Virginia Department of Environmental Quality									Total Cost	\$3,682,900

Agriculture: Preddy Creek North BMPs

Is this reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Livestock Exclusion	Stream Exclusion With Grazing Land Management	SL-6W, CRSL-6	System	\$34,000	0.91	0.91	0	0	1.82	\$61,880
Cropland	Long Term Vegetative Cover on Cropland	SL-1	Acres Treated	\$150	2	2	0	0	4	\$600
	Cover Crop	SL-8B/8H		\$80	2	2	0	0	4	\$320
	Sediment Retention, Erosion, or Water Control Structures	WP-1		\$150	3.5	0	0	0	3.5	\$525
Pasture	Afforestation of erodible pasture	FR-1	Acres Treated	\$500	59	59.5	89	89	296.5	\$148,250
	Permanent vegetative cover on critical areas	SL-11		\$1,800	21	21	32	32	106	\$190,800
	Improved pasture management	SL-10								
	Extension of Watering System	SL-7		\$75	135	135	90	90	450	\$33,750
	Sediment Retention, Erosion, or Water Control Structures	WP-1		\$20,000	5	0	0	0	5	\$100,000
				\$150	70	70	105	105	350	\$52,500
	Animal waste control facilities	WP-4	Systems	\$300,000	1	0	0	0	1	\$300,000
	Roof Runoff Management	WQ-12		\$1,450	1	0	0	0	1	\$1,450
Harvested	Afforestation of Crop, Hay, and Pasture	FR-1	Acres	\$500	31	31	46	46	154	\$77,000
Barren	Farm Road or Heavy Animal Travel Lane Stabilization	SL-11B	Acres	?	0.31	0	0	0	0.31	?
Stream Bank	Stream Restoration	N/A	Feet	\$1,000	391	392	261	261	1305	\$1,305,000
	Virginia Department of Environmental Quality								Total Cost	\$2,272,075

Agriculture: Quarter Creek BMPs Is this reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Livestock Exclusion	Stream Exclusion With Grazing Land Management	SL-6W, CRSL-6	Systems	\$34,000	0.6	0.6	0	0	1.2	\$40,800
Pasture	Afforestation of erodible pasture	FR-1	Acres Treated	\$500	7	8	12	12	39	\$19,500
	Permanent vegetative cover on critical areas	SL-11		\$1,800	16	16	24	24	80	\$144,000
	Improved pasture management	SL-10		\$75	78	78	52	52	260	\$19,500
	Extension of Watering System	SL-7		\$20,000	6	6	0	0	12	\$240,000
	Sediment Retention, Erosion, or Water Control Structures	WP-1		\$150	50	50	75	75	250	\$37,500
	Animal waste control facilities	WP-4	Systems	\$300,000	1	0	0	0	1	\$300,000
	Roof Runoff Management	WQ-12		\$1,450	1	0	0	0	1	\$1,450
Harvested	Afforestation of erodible pasture	FR-1	Acres	\$500	3.5	0	0	0	3.5	\$1,750
Stream Bank	Stream Restoration	N/A	Feet	\$1,000	285	0	0	0	285	\$285,000
									Total Cost	\$1,089,500

Agriculture: NF Rivanna BMPs

Is this reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Livestock Exclusion	Stream Exclusion With Grazing Land Management	SL-6W, CRSL-6	Systems	\$34,000	10.4	10.4	7	7	34.8	\$1,183,200
Cropland	Long Term Vegetative Cover on Cropland	SL-1	Acres Treated	\$150	5	5	7.5	7.5	25	\$3,750
	Cover Crop	SL-8B/8H		\$80	20	20	30	30	100	\$8,000
	Sediment Retention, Erosion, or Water Control Structures	WP-1		\$150	20	20	30	30	100	\$15,000
	Afforestation of erodible pasture	FR-1		\$500	3	3	4.5	4.5	15	\$7,500
Pasture	Afforestation of erodible pasture	FR-1	Acres Treated	\$500	140	140	210	210	700	\$350,000
	Permanent vegetative cover on critical areas	SL-11		\$1,800	160	160	240	240	800	\$1,440,000
	Improved pasture management	SL-10		\$75	1485	1485	990	990	4950	\$371,250
	Extension of Watering System	SL-7		\$20,000	13.5	13.5	9	9	45	\$900,000
	Sediment Retention , Erosion, or Water Control Structures	WP-1		\$150	730.5	730.5	1097	1097	3655	\$548,250
	Animal waste control facilities	WP-4	Systems	\$300,000	4	0	0	0	4	\$1,200,000
	Roof Runoff Management	WQ-12		\$1,450	3	0	0	0	3	\$4,350
									Total Cost	\$6,031,300

Agriculture: Swift Run BMPs

Is this reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Livestock Exclusion	Stream Exclusion With Grazing Land Management	SL-6W, CRSL-6	Systems	\$34,000	2.15	2.15	0	0	4.3	\$146,200
Cropland	Long Term Vegetative Cover on Cropland	SL-1	Acres Treated	\$150	7.5	7.5	0	0	15	\$2,250
	Cover Crop	SL-8B/8H		\$80	14.5	14.5	21	21	71	\$5,680
	Sediment Retention , Erosion, or Water Control Structures	WP-1		\$150	12.5	12.5	20	20	65	\$9,750
Pasture	Afforestation of erodible pasture	FR-1	Acres Treated	\$500	67	67	100.5	100.5	335	\$167,500
	Permanent vegetative cover on critical areas	SL-11		\$1,800	78	78	117	117	390	\$702,000
	Improved pasture management	SL-10		\$75	450	450	300	300	1500	\$112,500
	Extension of Watering System	SL-7		\$20,000	6	6	0	0	12	\$240,000
	Sediment Retention , Erosion, or Water Control Structures	WP-1		\$150	220	220	330	330	1100	\$165,000
	Animal waste control facilities	WP-4	Systems	\$300,000	1	0	0	0	1	\$300,000
	Roof Runoff Management	WQ-12		\$1,450	1	0	0	0	1	\$1,450
Harvested	Afforestation of erodible pasture	FR-1	Acres	\$500	1.94	0	0	0	1.94	\$970
Stream Bank	Stream Restoration	N/A	Feet	\$1,000	701	701	468	468	2338	\$2,338,000
									Total Cost	\$4,191,300

Agriculture: Stanardsville Run BMPs

Is this reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Livestock Exclusion	Stream Exclusion With Grazing Land Management	SL-6W, CRSL-6	Systems	\$34,000	0.35	0	0	0	0.35	\$11,900
Cropland	Long Term Vegetative Cover on Cropland	SL-1	Acres	\$150	0.2	0.1	0	0	0.3	\$45
	Cover Crop	SL-8B/8H		\$80	0.1	0	0	0	0.1	\$8
Pasture	Afforestation of erodible pasture	FR-1	Acres Treated	\$500	5	5	7.5	7.5	25	\$12,500
	Permanent vegetative cover on critical areas	SL-11		\$1,800	8.5	8.5	13	13	43	\$77,400
	Improved pasture management	SL-10		\$75	33	33	22	22	110	\$8,250
	Extension of Watering System	SL-7		\$20,000	7	7	4.5	4.5	23	\$460,000
	Sediment Retention , Erosion, or Water Control Structures	WP-1		\$150	26	26	39	39	130	\$19,500
	Animal waste control facilities	WP-4	Systems	\$300,000	1	0	0	0	1	\$300,000
	Roof Runoff Management	WQ-12		\$1,450	1	0	0	0	1	\$1,450
Stream Bank	Stream Restoration	N/A	Feet	\$1,000	49	0	0	0	49	\$49,000
									Total Cost	\$940,053

Agriculture: X Trib to Flat Branch BMPs

Is this reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Pasture	Afforestation of erodible pasture	FR-1	Acres Treated	\$500	0.2	0.2	0	0	0.4	\$200
	Permanent vegetative cover on critical areas	SL-11		\$1,800	0.65	0	0	0	0.65	\$1,170
	Improved pasture management	SL-10		\$75	1.7	0	0	0	1.7	\$128
	Extension of watering system	SL-7		\$20,000	0.7	0	0	0	0.7	\$14,000
	Animal waste control facilities	WP-4	Systems	\$300,000	1	0	0	0	1	\$300,000
	Roof Runoff Management	WQ-12		\$1,450	1	0	0	0	1	\$1,450
Barren	Farm Road or Heavy Animal Travel Lane Stabilization	SL-11B	Acres	?	0.01	0	0	0	0.01	?
Stream Bank	Stream Restoration	N/A	Feet	\$1,000	21	0	0	0	21	\$21,000
Total Cost									\$337,948	

Agriculture: Overall

BMP Type	Description	BMP Code	Units	Unit Cost	Total	Cost
Livestock Exclusion	Stream Exclusion With Grazing Land Management	SL-6W, CRSL-6	Systems	\$34,000	53.51	\$1,819,340
Cropland	Long Term Vegetative Cover on Cropland	SL-1	Acres Treated	\$150	67.3	\$10,095
	Cover Crop	SL-8B/8H		\$80	207.1	\$16,568
	Sediment Retention , Erosion, or Water Control Structures	WP-1		\$150	206.5	\$30,975
	Afforestation of erodible cropland	FR-1		\$500	20.2	\$10,100
Pasture	Afforestation of erodible pasture	FR-1	Acres Treated	\$500	2040.9	\$1,020,450
	Permanent vegetative cover on critical areas	SL-11		\$1,800	2100.65	\$3,781,170
	Improved pasture management	SL-10		\$75	10821.7	\$811,628
	Extension of Watering System	SL-7		\$20,000	170.7	\$3,414,000
	Sediment Retention , Erosion, or Water Control Structures	WP-1		\$150	7990	\$1,198,500
	Animal waste control facilities	WP-4	Systems	\$300,000	12	\$3,600,000
	Roof Runoff Management	WQ-12		\$1,450	11	\$15,950
Harvested	Afforestation of Crop, Hay, and Pasture Land	FR-1	Acres	\$500	177.24	\$88,620
Stream Bank	Stream Restoration	N/A	Feet	\$1,000	5607	\$5,607,000
					Total Cost	\$21,424,396

Urban: Blue Run BMPs

Is this
reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Urban	Bioretention	N/A	Acres Treated	\$10,000	14	14	21	21	70	\$700,000
	Permeable Pavement	N/A		\$240,000	4	4	7	7	22	\$5,280,000
	Grass Channels	N/A		\$18,150	3.9	3.9	2.6	2.6	13	\$235,950
	Conservation Landscaping	N/A	Acres	\$3,500	18	18	26	26	88	\$308,000
	Rainwater Harvesting	N/A	Acres Treated	\$100,000	2.8	2.9	4.2	4.2	14.1	\$1,410,000
									Total Cost	\$7,933,950

Urban: Marsh Run BMPs

Is this
reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Urban	Bioretention	N/A	Acres Treated	\$10,000	5	5	7	7	24	\$240,000
	Permeable Pavement	N/A		\$240,000	2	2	3	3	10	\$2,400,000
	Grass Channels	N/A		\$18,150	5.5	0	0	0	5.5	\$99,825
	Conservation Landscaping	N/A	Acres	\$3,500	28	29	44	44	145	\$507,500
	Rainwater Harvesting	N/A	Acres Treated	\$100,000	3	0	0	0	3	\$300,000
									Total Cost	\$3,547,325

Urban: Preddy Creek BMPs

Is this
reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Urban	Bioretention	N/A	Acres Treated	\$10,000	39.8	39.8	59.7	59.7	199	\$1,990,000
	Permeable Pavement	N/A		\$240,000	2	2	0	0	4	\$960,000
	Grass Channels	N/A		\$18,150	5	5	0	0	10	\$181,500
	Bioswale	N/A		\$42,000	5	5	0	0	10	\$420,000
	Conservation Landscaping	N/A	Acres	\$3,500	130	130	195	195	650	\$2,275,000
	Rainwater Harvesting	N/A	Acres Treated	\$100,000	1	1	0	0	2	\$200,000
									Total Cost	\$6,026,500

Urban: Preddy Creek North BMPs

Is this
reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Urban	Bioretention	N/A	Acres Treated	\$10,000	70	70	165	165	470	\$4,700,000
	Permeable Pavement	N/A		\$240,000	7	7	11	11	36	\$8,640,000
	Grass Channels	N/A		\$18,150	3.5	3.5	2	2	11	\$199,650
	Bioswale	N/A		\$42,000	5	5	0	0	10	\$420,000
	Conservation Landscaping	N/A	Acres	\$3,500	150	150	225	225	750	\$2,625,000
	Rainwater Harvesting	N/A	Acres Treated	\$100,000	4.5	4.5	6	6	21	\$2,100,000
									Total Cost	\$18,684,650

Urban: Quarter Creek BMPs

**Is this
reasonable?**

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Urban	Bioretention	N/A	Acres Treated	\$10,000	18	18	27	27	90	\$900,000
	Permeable Pavement	N/A		\$240,000	5	5	7	7	24	\$5,760,000
	Grass Channels	N/A		\$18,150	6.2	6.2	4	4	20.4	\$370,260
	Conservation Landscaping	N/A	Acres	\$3,500	40	40	60	60	200	\$700,000
	Rainwater Harvesting	N/A	Acres Treated	\$100,000	8	8	10	10	36	\$3,600,000
									Total Cost	\$11,330,260

Urban: NF Rivanna BMPs

Is this
reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Urban	Bioretention	N/A	Acres Treated	\$10,000	48	48	71	71	238	\$2,380,000
	Grass Channels	N/A		\$18,150	6	6	4	4	20	\$363,000
	Conservation Landscaping	N/A	Acres	\$3,500	180	180	270	270	900	\$3,150,000
									Total Cost	\$5,893,000

Urban: Swift Run BMPs

Is this
reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Urban	Bioretention	N/A	Acres Treated	\$10,000	27	27	41	41	136	\$1,360,000
	Permeable Pavement	N/A		\$240,000	3.2	0	0	0	3.2	\$768,000
	Grass Channels	N/A		\$18,150	1.7	0	0	0	1.7	\$30,855
	Conservation Landscaping	N/A	Acres	\$3,500	70	70	105	105	350	\$1,225,000
	Rainwater Harvesting	N/A	Acres Treated	\$100,000	1.5	0	0	0	1.5	\$150,000
									Total Cost	\$3,533,855

Urban: Stanardsville Run BMPs

Is this
reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Urban	Bioretention	N/A	Acres Treated	\$10,000	14	14	22	22	72	\$720,000
	Permeable Pavement	N/A		\$240,000	3	3	4	4	14	\$3,360,000
	Grass Channels	N/A		\$18,150	6	6	4	4	20	\$363,000
	Conservation Landscaping	N/A	Acres	\$3,500	28.5	28.5	44	44	145	\$507,500
	Rainwater Harvesting	N/A	Acres Treated	\$100,000	4	4	5	5	18	\$1,800,000
									Total Cost	\$6,750,500

Urban: X Trib to Flat Branch BMPs

Is this
reasonable?

BMP Type	Description	BMP Code	Units	Unit Cost	Extent					Cost
					Stage 1	Stage 2	Stage 3	Stage 4	Total	
Urban	Bioretention	N/A	Acres Treated	\$10,000	6	6	10	10	32	\$320,000
	Permeable Pavement	N/A		\$240,000	3	3	5	5	16	\$3,840,000
	Grass Channels	N/A		\$18,150	4	4	0	0	8	\$145,200
	Conservation Landscaping	N/A	Acres	\$3,500	12	13	19	19	63	\$220,500
	Rainwater Harvesting	N/A	Acres Treated	\$100,000	4.4	0	0	0	4.4	\$440,000
									Total Cost	\$4,965,700

Urban: Overall

BMP Type	Description	BMP Code	Units	Unit Cost	Total	Cost
Urban	Bioretention	N/A	Acres Treated	\$10,000	1331	\$13,310,000
	Permeable Pavement	N/A		\$240,000	129.2	\$31,008,000
	Grass Channels	N/A		\$18,150	109.6	\$1,989,240
	Bioswale	N/A		\$42,000	20	\$840,000
	Conservation Landscaping	N/A	Acres	\$3,500	3291	\$11,518,500
	Rainwater Harvesting	N/A	Acres Treated	\$100,000	100	\$10,000,000
					Total Cost	\$68,665,740

Overall BMP Summary

Total BMP implementation costs by stage:

BMP Application	Cost by Stage				Total
	Stage 1 (Years 1-5)	Stage 2 (Years 6-10)	Stage 3 (Years 11-15)	Stage 4 (16-20)	
Agricultural	\$9,026,310	\$4,747,825	\$3,825,130	\$3,825,130	\$21,424,396
Residential	\$16,754,070	\$14,903,390	\$19,413,540	\$19,445,540	\$70,516,540
Total Estimated Cost	\$25,780,381	\$19,651,215	\$23,238,670	\$23,270,670	\$91,940,936

Technical Assistance

1. One (1) full-time employee (FTE) for each SWCD (2 total) for Ag BMPs?
2. One (1) full-time employee (FTE) for each SWCD (2 total) for Residential Septic/Pet Waste BMPs?

Any other thoughts or questions, contact me!

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From the TMDL study: Land Use

