Final Report
Mill Creek (Opequon) Clean Water Act Section 319(h) Incremental Grant
Canaan Valley Institute in Cooperation with WVDEP
April 1, 2013 thru September 30, 2013

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In 2008 the Watershed Based Plan for Mill Creek was accepted by EPA and identified fecal coliform bacteria and sediment as impairments to Mill Creek of the Opequon Creek watershed, Berkeley County, WV (Figure 1). Nonpoint sources of fecal coliform addressed in the Potomac Direct Drains TMDL and the Watershed Based Plan for Mill Creek include failing septic systems, pasture, cropland, and residential/urban land. The largest reductions prescribed by the TMDL are from failing septic systems. Nonpoint sources of sediment in this watershed include streambank erosion and upland sources such as cropland, pasture, and residential/urban/roads areas.

The Mill Creek 319(h) project was developed to reduce a portion of the fecal coliform loads primarily through septic system upgrades and incentives for pumping septic systems as well as agricultural and urban BMPs. During the grant period, 31 septic systems were pumped and 13 failing systems were replaced or repaired, accounting for a reduction in fecal coliform of 7.67E+13 counts/year. An additional 4.49E+11 counts/year were reduced through agricultural and urban practices such as buffer plantings, livestock fencing and stormwater management (Table 1).

Reductions in sediment loads were achieved primarily through a single natural stream design project near the headwaters of Mill Creek. Residential practices were also employed to achieve reductions of both pollutants. Two workshops were held regarding septic systems to educate residents and professionals about proper function and maintenance of septic systems. Rain barrel workshops and stormwater demonstration projects were performed to educate residents about stormwater management.

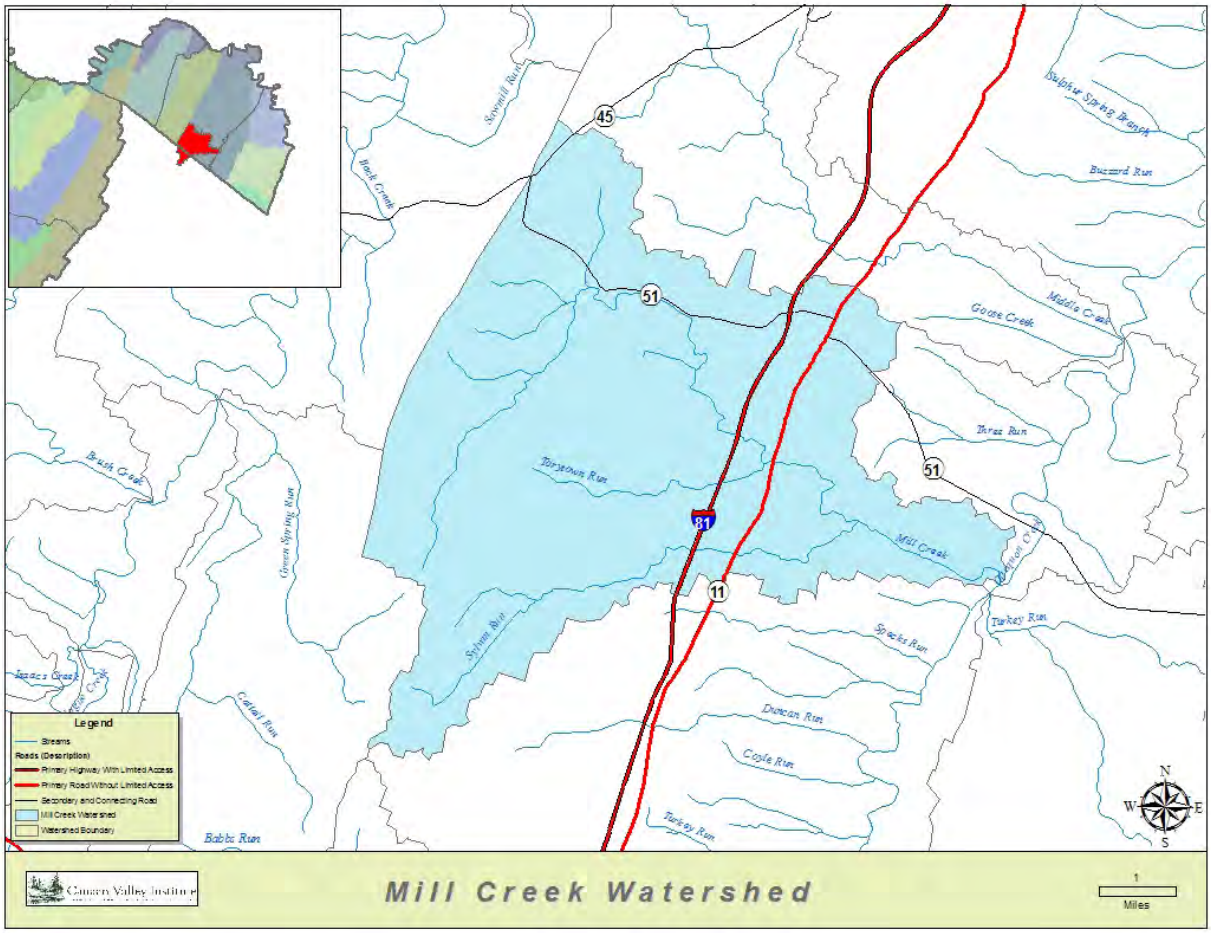


Figure 1: The Mill Creek (of Opequon) Watershed, located in Berkeley County, WV

Practice	Units	Installed units	Baseline load per unit	% efficiency for fecal	Fecal load reduced (counts/yr)
Septic Systems					
Upgrade/fix failing systems	systems	13	5.90E+12	100.00%	7.67E+13
Cropland/Pasture					
Forest buffer establishment	acres	3	1.68E+10	57.00%	2.86E+10
Fencing	acres	16	1.68E+10	70.00%	1.88E+11
Alternative water system	animal units	50	1.68E+10	22.00%	1.84E+11
Urban/Residential					
Stream Buffers	acres	3	1.09E+10	57.00%	1.86E+10
Raingardens	acres	3	1.09E+10	90.00%	2.94E+10
Total					**7.71E+13**

Table 1: Fecal coliform reductions achieved as part of this project

Septic Systems

Fecal coliform from septic systems was addressed through two programs: a septic system pumping coupon program and a septic system repair/replacement program. Although the septic system pumping program was quite successful, the septic system upgrade program had a much slower response from homeowners. This was despite many outreach efforts on behalf of the Opequon Creek Project Team, CVI and WVDEP. Outreach efforts included articles in the local newspaper, the Journal; the creation and distribution of a pamphlet; targeted mailings of the pamphlet to watershed residents; an item on the local radio station, and door-to-door distribution of grant applications and information. CVI also met with all licensed Berkeley County septic installers to promote the program through word of mouth.

Despite these efforts, participation in the program remained inactive. When local residents were asked the reason for the lack of interest, they reported that the 50% homeowner match requirement made voluntary participation undesirable. A similar program in the Sleepy Creek Watershed in Morgan County, WV required a relatively small monetary contribution from homeowners and participation was abundant. Although the Mill Creek program was presented in conjunction with the Onsite System Loan Program, residents were not willing to incur a new expense.

The Berkeley County Health Department also explained that much of their knowledge of failing septic systems in the Mill Creek Watershed came from inspections the Health Department performs as part of a property transfer. Since the decline of the housing market, the number of inspections dropped dramatically. In addition there are many empty homes and septic inspections cannot be performed until a house has been occupied for 30 days. However banks have been reluctant to hold down-payments in escrow for 30 days to wait for the inspection, further slowing the sale of homes and the number of inspections. The Berkeley County Health Department also reported that the few septic repairs that have been permitted in the county in recent months have required Elgin drains, drip irrigation or some alternative to traditional technology as the soil conditions in this area are inadequate for traditional treatment. When we focused efforts on addressing projects of this type, and increased the grant cost-share to 80% enrollment increased and we were able to fund the replacement of 13 failing septic systems on lots draining to Mill Creek.

Cropland/Pasture

The reduction of 7.20E+10 counts/year from agricultural practices was exceeded through the installation of 35,455 feet of fencing, the construction of one stream crossing and the installation of one alternative watering system.

Urban/Residential

Although the original proposal did not include a reduction of bacteria from urban sources, addressing this load by installing stormwater projects at Musselman High School and the South Berkeley County Recycling Center provided the added benefit of educating the local community on alternative stormwater management options. CVI collaborated with the Cacapon Institute to assist students in the installation of a raingarden in a swale which receives storwater runoff from a parking lot of approximately 10 acres.

The Berkeley County Solid Waste Authority identified the South Berkeley County Recycling Center as high priority for addressing stormwater runoff. Standing water in the driveway area of the site (Figure 2) impeded the transportation of shipping trailers provided no treatment of the stormwater from an upland driveway area of approximately 3 acres.

Figure 2: Standing water at the shipping container loading area of the South Berkeley County Recycling Center

This area was excavated to a depth of 5 feet and a drainage trench was dug to allow flow to a downhill treatment area (Figure 3). The excavated area was then filled with a layer of gravel, amended soil and mulch to allow for infiltration at the site (Figure 4, Appendix A). A final inspection of the site was performed the day following a 5 inch rainfall event (Appendix B) and the site was completely drained.

Figure 3: Drainage trench to downhill treatment area at the South Berkeley County Recycling Center

Figure 4: Excavation of the area of standing water at the South Berkeley County Recycling Center

The stormwater project at the South Berkeley County Recycling Center will serve as an educational outreach opportunity for the estimated 200 customers who access the center daily. The recycling center is located within the commercial area along route 51 in Inwood which could benefit from some stormwater management practices. This area consists of a large percentage of impervious surface, including major intersection at routes 51 and 11. It is recognized as a problem area because even small amounts of rain cause the intersection to flood and it regularly becomes a traffic problem. An educational display will be designed and installed with the purpose of demonstrating alternative stormwater management options and may have the added benefit of bringing landowners together to talk about a larger stormwater projects in the region with additional benefits.

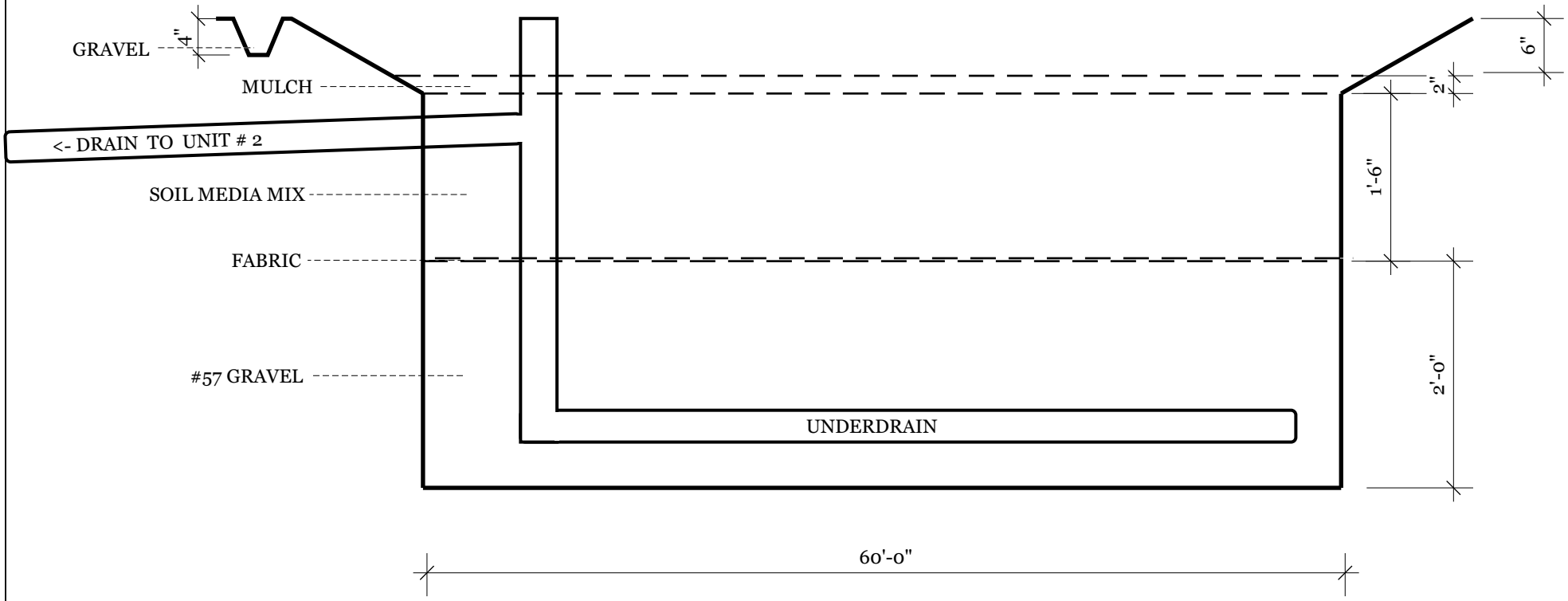
Sediment

The sediment reduction of 85 lbs/year was achieved through a single natural stream restoration project near the headwaters of Mill Creek. Steep eroding banks along roughly 830 linear feet of Mill Creek were stabilized by cutting back the banks to a less erosive angle, and protecting them with bioengineering. A floodplain and riparian corridor were reestablished with a variety of native tree and shrub species. An as-built report was prepared for the site (Appendix C) and a final inspection was performed (Appendix D).

Project Costs

This table summarizes total project costs including 319 Program funds and non-federal match.

	Total 319 Funds	**Total Match**	**Total Project Costs**
Salaries	$35,078	$24,690	$59,768
Fringe	$9,656		$9,656
Supplies	$17,887	$690	$18,577
Contractual	$147,925	$37,183	$185,108
Travel	$7,451		$7,451
Other	$2,842		$2,842
Total Direct	$220,840	$62,563	$283,402
Indirect	$23,153		$23,153
Total	**$243,993**	**$62,563**	**$306,555**



BIORETENTION UNIT # 1

Inwood Recycling Center

REVISIONS

	MM/DD/YY	REMARKS
1	__/__/__	...
2	__/__/__	...
3	__/__/__	...
4	__/__/__	...
5	__/__/__	...

A 002

WV Dept. of Environmental Protection's
Nonpoint Program Final Inspection Form

Project name South Berkeley Recycling Center Fiscal year 2009
Watershed name Mill Creek of Opequon HUC12 020700040905
Sub-grantee Canaan Valley Institute Contractor(s) Palmer Construction
Funding source(s) 319, local and state match
Location 39-22-3 Latitude 76-2-18 Longitude Other location info Tigram St. behind Food Lion

Inspection Results

	Yes	No
1. Was the project completed on-time?	X	
2. Were all structures installed according the work plan? (If "no" explain)		

Recycling property is 10 ac total
3.4 ft deep

3. Are erosion and sediment control practices in place and functioning?	X	
• Vegetation growing		
• Silt fences		
• Settling ponds		
• Other (describe)		

NA Josh Arnold is local contact @ Recycling Center
304-406-6205

4. Was pre-project monitoring conducted?	X	X
5. Has post-project monitoring been conducted? If "no" when is it planned?		X

More funds are needed for monitoring

6. Have all invoices been submitted?		X
7. Have all progress (semi-annual) reports been submitted?		X

Additional comments (problems, deficiencies, recommended actions, etc.) Finals will be submitted soon. Sebastian participated in this project, provided oversight and design drawings

Basin Coordinator/Project Manager Timothy Craddock (PRINT) [signature] (SIGNATURE)

Date 10-14-13

Complete this form, scan and submit it by Email to: timothy.d.craddock@wv.gov; or mail a copy to the address below:

dep
WVDEP's Nonpoint Source Program
601 57th Street, SE
Charleston, WV 25304

Attn: Timothy Craddock

Note: This form is part of a final report required to close-out NPS projects. It can be submitted with the final or before the final is due. Go to: http://www.dep.wv.gov/WWE/Programs/nonptsource/Pages/Reports.aspx to learn more about NPS reporting requirements.

Mill Creek
Webber Stream Bank and Riparian Stabilization
As-built Report

Tributary to the Opequon Creek
Gerrardstown, West Virginia
Berkley County

Project Completed by:
CANAAN VALLEY INSTITUTE

Funding Provided by:
WEST VIRGINIA DEPARTMENT OF ENVIRONMENT
NONPOINT SOURCE PROGRAM - 319 GRANT

CANAAN VALLEY INSTITUTE

Ensuring our region has healthy streams — a critical economic engine for rural communities.

Description

This project is intended to reduce sediment loads in Mill Creek a tributary of Opequon Creek watershed, Berkeley County, WV. The site was impacted by debris blockages and vertical stream banks that prevented the stream to access the floodplain and allow for erosion preventing vegetation to become established. The restoration type was a priority 4 which is defined as stabilize in place. This type of restoration allowed us to limit impacts and the land needed for the restoration, reduce the volume of excavated material, and reduce the cost of the overall restoration. Overly high banks were cut back to a less erosive bank angle and were protected with bio-engineering. The bio-engineering was comprised of brush mattress, live fascines, and live stakes. The riparian corridor was planted with a wide variety of trees and shrubs to provide a wider range to the current species which was made up of a large number of green ash which has become a species of concern due to the emerald ash borer persistence.

There were 6 types of restoration done at this restoration location and is broken out as stated below:

- V 320.5 linear feet of banks were laid back to a more appropriate bank angle and protected with brush mattress, live fascines, and live stakes
- V 104.6 linear feet of banks were stabilized with brush mattress and live fascines, equipment was not used limiting impacts to the site.
- V 198.7 linear feet of live fascines and live stakes were installed, equipment was not used to limit impacts to the site.
- V 327.5 linear feet of heavy live stakes, no equipment was used to limit impacts. The entire site was sporadically live staked below the bankfull elevation to help provide bank stability throughout the reach length an estimated 830 linear feet.
- V An inner bench or berm feature was constructed at an area of scour with an area of 246.6 sq. ft.
- V 9835.1 sq. ft. of riparian area was replanted with trees and shrubs, tubed, and staked.

Materials were purchased from reportable suppliers, these materials included:

- V 3,500 sq. ft. of Brush Mattress
- V 650 Live Stakes (Buttonbush, Silky Willow, Pussy Willow, Elderberry, Silk Dogwod)
- V 155 Live Fascines or Wattles (4”-5” diameter – 6 ft. length)
- V 835 Dead Stakes
- V 150 Potted Plants #1 (Red Chokeberry, Redosier Dogwood, Winterberry
- V 200 Tree Tubes 4 ft. (tubes, ties, oak stake, bird net)
- V 150 Bare Root Seedlings (Black Chokeberry, Redosier Dog wood, Winterberry)
- V 75 Shagbark Hickory (Bare Root)
- V 25 Boxelder (1 gallon)
- V 50 Red Maple (band pot)
- V 50 American Sycamore (Bare Root)

Priority 4 restoration was chosen because of multiple factors:

1) Land owner requested that we limit our impacts.
2) The cost and available funds prevented realignment.
3) The stream had a stable longitudinal profile with a proper riffle pool sequence.

Mill Creek - Webber Stream Bank and Riparian Stabilization
As-built Photo Point Locations
Tributary to the Opequon Creek
Berkeley County, West Virginia

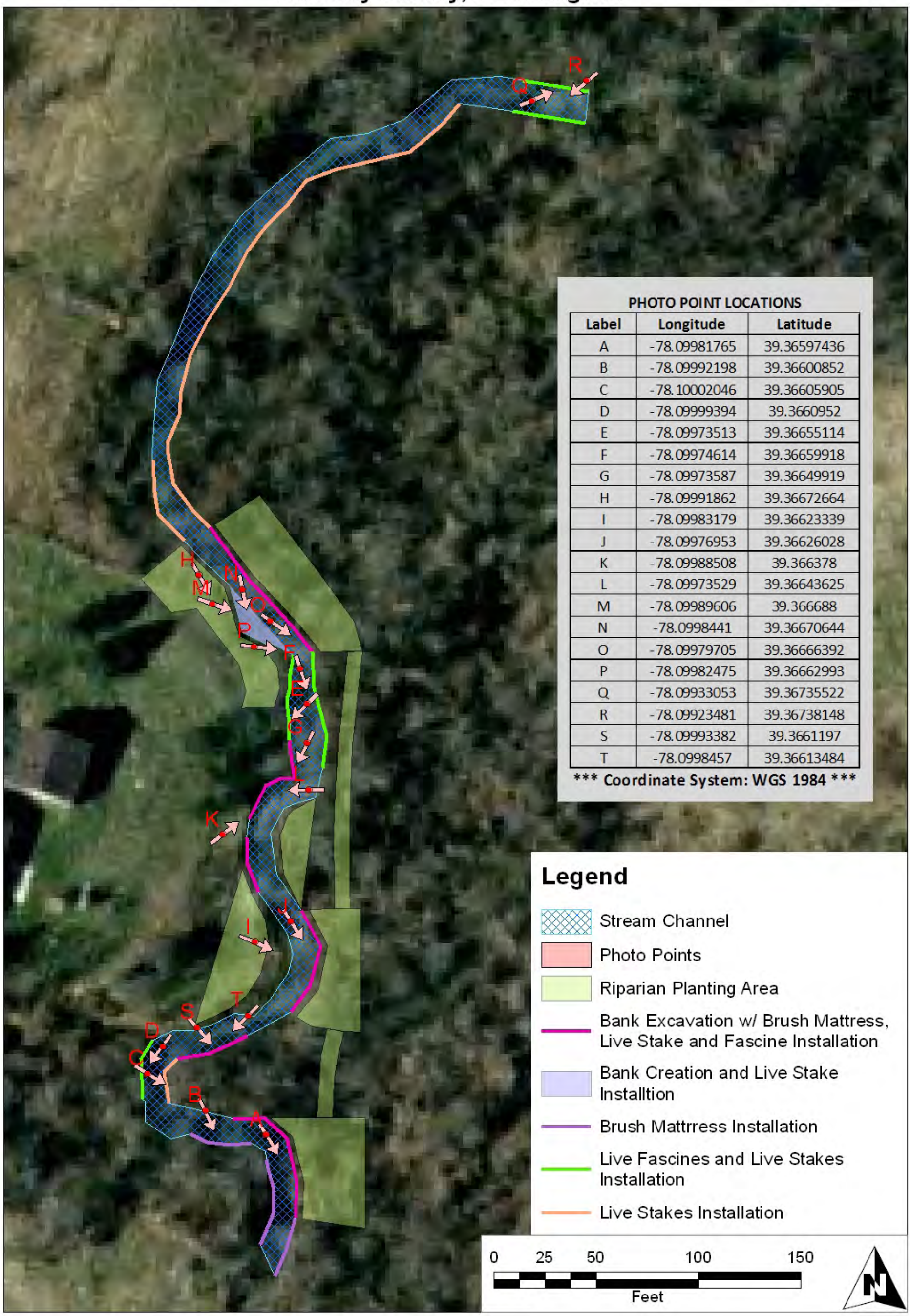


PHOTO POINT LOCATIONS

Label	Longitude	Latitude
A	-78.09981765	39.36597436
B	-78.09992198	39.36600852
C	-78.10002046	39.36605905
D	-78.09999394	39.3660952
E	-78.09973513	39.36655114
F	-78.09974614	39.36659918
G	-78.09973587	39.36649919
H	-78.09991862	39.36672664
I	-78.09983179	39.36623339
J	-78.09976953	39.36626028
K	-78.09988508	39.366378
L	-78.09973529	39.36643625
M	-78.09989606	39.366688
N	-78.0998441	39.36670644
O	-78.09979705	39.36666392
P	-78.09982475	39.36662993
Q	-78.09933053	39.36735522
R	-78.09923481	39.36738148
S	-78.09993382	39.3661197
T	-78.0998457	39.36613484

*** Coordinate System: WGS 1984 ***

Above: *(Photo A) Area was graded to a less steep bank angle and protected with brush mattress, live fascines, and live stakes.*

Below: *(Photo B) Area was stabilized with live fascines and live stakes. No excavation was done due to limited access. Impacts by mobilization were avoided.*

Above: *(Photo G) Area was graded to a less steep bank angle and protected with brush mattress, live fascines, and live stakes.*

Below: *(Photo H) Area was planted with additional bare root seedlings to add to the riparian corridor. Each seedling was protected by a tree tube and hardwood stake.*

Above: *(Photo) Area was graded to a less steep bank angle and protected with brush mattress, live fascines, and live stakes. Upland area was replanted with bare root seedlings and protected with tree tubes and hardwood stakes. Photo taken after construction completion.*

Below: *(Photo) Same area shown in photo (above), this photo was taken 6 weeks after construction was completed.*

Above: *(Photo K) Area was graded to a less steep bank angle and protected with brush mattress, live fascines, and live stakes. Upland area was replanted with bare root seedlings and protected with tree tubes and hardwood stakes. Inner berm was constructed at the toe of the excavated slope. Photo K taken after construction completion.*

Below: *(Photo L) Same area shown in photo K (above), this photo was taken 6 weeks after construction was completed.*

Above: *(Photo O) Area was graded to a less steep bank angle and protected with brush mattress, live fascines, and live stakes. Upland area was replanted with bare root seedlings and protected with tree tubes and hardwood stakes. Photo taken after construction completion.*

Below: *(Photo P) Same area shown in photo (above), this photo was taken 6 weeks after construction was completed.*

Above: *(Photo 5) Area was graded to a less steep bank angle and protected with brush mattress, live fascines, and live stakes. Upland area was replanted with bare root seedlings and protected with tree tubes and hardwood stakes. Photo 5 taken after construction completion.*

Below: *(Photo 7) Same area shown in photo 5 (above), this photo was taken 6 weeks after construction was completed.*

WV Dept. of Environmental Protection's
Nonpoint Program Final Inspection Form

Project name Webber NSD Fiscal year 2009
Watershed name Mill Creek of Opequon HUC12 020700040905
Sub-grantee Canaan Valley Institute Contractor(s) CVI
Funding source(s) 319, local and state match
Location 39-21-58 Latitude 78-5-60 Longitude Other location info Reach is behind home (Webber residence)

Inspection Results

	Yes	No
1. Was the project completed on-time?	X	
2. Were all structures installed according the work plan? (If "no" explain)	X	

Initial proposed planted work was adjusted somewhat, instead banks were pulled back and planting were increased

3. Are erosion and sediment control practices in place and functioning?	X	
• Vegetation growing		
• Silt fences		
• Settling ponds		
• Other (describe)		

Brush mattresses are installed some are growing. All planting completed. Use spray to manage invasives have been completed. Landowner had some concerns about that feels it kills other plants.

4. Was pre-project monitoring conducted?	X	(BEHI)
5. Has post-project monitoring been conducted? If "no" when is it planned? Need additional funding		X
6. Have all invoices been submitted?		X
7. Have all progress (semi-annual) reports been submitted?		Y

Nov. 1st

Additional comments (problems, deficiencies, recommended actions, etc.)

Urge to extend reach to 100-ft and apply for additional FY2010 funds for monitoring

Basin Coordinator/Project Manager Timothy Craddock (PRINT) (SIGNATURE)

Date 10-14-2013

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