

Baseline Assessment - Stream Attributes

Reach S-MM14 (Pipeline ROW) Ephemeral Spread H Montgomery County, Virginia

Data	Included
Photos	✓
SWVM Form	✓
FCI Calculator and HGM Form	✓
RBP Physical Characteristics Form	✓
Water Quality Data	N/A – No flow
RBP Habitat Form	✓
RBP Benthic Form	✓
Benthic Identification Sheet	N/A – No flow
Wolman Pebble Count	✓
RiverMorph Data Sheet	✓
USM Form (Virginia Only)	✓
Longitudinal Profile and Cross Sections	✓



Photo Type: DS VIEW

Location, Orientation, Photographer Initials: Downstream view of ROW looking SE, AO



Photo Type: US VIEW

Location, Orientation, Photographer Initials: Upstream view of ROW looking NW, AO



Photo Type: LB CL

Location, Orientation, Photographer Initials: Standing on LB looking at RB along pipe centerline looking SW, AO



Photo Type: RB CL

Location, Orientation, Photographer Initials: Standing on RB looking at LB along pipe centerline looking E, AO



Photo Type: DS COND

Location, Orientation, Photographer Initials: Downstream conditions outside of ROW looking S, AO

L:\22000s\22800\22865.06\Admin\05-ENVR\Field Data\Spread H\Field Forms\S-MM14\Photos

USACE FILE NO/ Project Name: <small>(V2.1, Sept 2019)</small>		Mountain Valley Pipeline		IMPACT COORDINATES: (in Decimal Degrees)		Lat.	37.258717	Lon.	-80.29321	WEATHER:		Sunny		DATE:		August 25, 2021			
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: <small>(watershed size (acreage), unaltered or impairments)</small>				S-MM14				MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: <small>(watershed size (acreage), unaltered or impairments)</small>				Comments:							
STREAM IMPACT LENGTH:		105		FORM OF MITIGATION:		RESTORATION (Levels I-III)		MIT COORDINATES: (in Decimal Degrees)		Lat.		Lon.		PRECIPITATION PAST 48 HRS:		None		Mitigation Length:	
Column No. 1- Impact Existing Condition (Debit)				Column No. 2- Mitigation Existing Condition - Baseline (Credit)				Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				Column No. 5- Mitigation Projected at Maturity (Credit)			
Stream Classification:				Stream Classification:				Stream Classification:				Stream Classification:				Stream Classification:			
Ephemeral								0				0				0			
Percent Stream Channel Slope				Percent Stream Channel Slope				Percent Stream Channel Slope				Percent Stream Channel Slope				Percent Stream Channel Slope			
12.29								0				0				0			
HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):			
Average				Average				Average				Average				Average			
Hydrology				Hydrology				Hydrology				Hydrology				Hydrology			
Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling			
0.55				0				0				0				0			
0.47				0				0				0				0			
Habitat				Habitat				Habitat				Habitat				Habitat			
0.27				0				0				0				0			
PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators			
PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)				USEPA RBP (Low Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover				1. Epifaunal Substrate/Available Cover				1. Epifaunal Substrate/Available Cover				1. Epifaunal Substrate/Available Cover				1. Epifaunal Substrate/Available Cover			
0.20				0.20				0.20				0.20				0.20			
2. Embeddedness				2. Embeddedness				2. Embeddedness				2. Embeddedness				2. Embeddedness			
0.20				0.20				0.20				0.20				0.20			
3. Velocity/ Depth Regime				3. Velocity/ Depth Regime				3. Velocity/ Depth Regime				3. Velocity/ Depth Regime				3. Velocity/ Depth Regime			
0.20				0.20				0.20				0.20				0.20			
4. Sediment Deposition				4. Sediment Deposition				4. Sediment Deposition				4. Sediment Deposition				4. Sediment Deposition			
0.20				0.20				0.20				0.20				0.20			
5. Channel Flow Status				5. Channel Flow Status				5. Channel Flow Status				5. Channel Flow Status				5. Channel Flow Status			
0.20				0.20				0.20				0.20				0.20			
6. Channel Alteration				6. Channel Alteration				6. Channel Alteration				6. Channel Alteration				6. Channel Alteration			
0.20				0.20				0.20				0.20				0.20			
7. Frequency of Riffles (or bends)				7. Frequency of Riffles (or bends)				7. Frequency of Riffles (or bends)				7. Frequency of Riffles (or bends)				7. Frequency of Riffles (or bends)			
0.20				0.20				0.20				0.20				0.20			
8. Bank Stability (LB & RB)				8. Bank Stability (LB & RB)				8. Bank Stability (LB & RB)				8. Bank Stability (LB & RB)				8. Bank Stability (LB & RB)			
0.20				0.20				0.20				0.20				0.20			
9. Vegetative Protection (LB & RB)				9. Vegetative Protection (LB & RB)				9. Vegetative Protection (LB & RB)				9. Vegetative Protection (LB & RB)				9. Vegetative Protection (LB & RB)			
0.20				0.20				0.20				0.20				0.20			
10. Riparian Vegetative Zone Width (LB & RB)				10. Riparian Vegetative Zone Width (LB & RB)				10. Riparian Vegetative Zone Width (LB & RB)				10. Riparian Vegetative Zone Width (LB & RB)				10. Riparian Vegetative Zone Width (LB & RB)			
0.20				0.20				0.20				0.20				0.20			
Total RBP Score				Total RBP Score				Total RBP Score				Total RBP Score				Total RBP Score			
Suboptimal				Poor				Poor				Poor				Poor			
71				0				0				0				0			
Sub-Total				Sub-Total				Sub-Total				Sub-Total				Sub-Total			
0.5916667				0				0				0				0			
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)			
Specific Conductivity				Specific Conductivity				Specific Conductivity				Specific Conductivity				Specific Conductivity			
100-199 = 85 points				100-199 = 85 points				100-199 = 85 points				100-199 = 85 points				100-199 = 85 points			
0.80				0.80				0.80				0.80				0.80			
pH				pH				pH				pH				pH			
5.6-5.9 = 45 points				5.6-5.9 = 45 points				5.6-5.9 = 45 points				5.6-5.9 = 45 points				5.6-5.9 = 45 points			
0.80				0.80				0.80				0.80				0.80			
DO				DO				DO				DO				DO			
10-30				10-30				10-30				10-30				10-30			
0.80				0.80				0.80				0.80				0.80			
Sub-Total				Sub-Total				Sub-Total				Sub-Total				Sub-Total			
0				0				0				0				0			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)			
0				0				0				0				0			
Sub-Total				Sub-Total				Sub-Total				Sub-Total				Sub-Total			
0				0				0				0				0			
PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score			
Index				Index				Index				Index				Index			
Linear Feet				Linear Feet				Linear Feet				Linear Feet				Linear Feet			
Unit Score				Unit Score				Unit Score				Unit Score				Unit Score			
0.563				0				0				0				0			
105				0				0				0				0			
59.10625				0				0				0				0			

FCI Calculator for the High-Gradient Headwater Streams in Appalachia

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for V_{CCANOPY} ($\geq 20\%$ cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-Gradient Headwater Streams and Low-Gradient Perennial Streams in Appalachia (Environmental Laboratory U.S. Army Corps of Engineers 2017).

Project Name: Mountain Valley Pipeline

Location: Montgomery County; Spread H

Sampling Date: 8/25/2021

Project Site Before Project

Subclass for this SAR:

Ephemeral Stream

Uppermost stratum present at this SAR:

Shrub/Herb Strata

SAR number: S-MM14

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.55
Biogeochemical Cycling	0.47
Habitat	0.27

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
V_{CCANOPY}	Percent canopy over channel.	Not Used, <20%	Not Used
V_{EMBED}	Average embeddedness of channel.	2.33	0.58
$V_{\text{SUBSTRATE}}$	Median stream channel substrate particle size.	0.55	0.28
V_{BERO}	Total percent of eroded stream channel bank.	124.36	0.41
V_{LWD}	Number of down woody stems per 100 feet of stream.	0.00	0.00
V_{TDBH}	Average dbh of trees.	Not Used	Not Used
V_{SNAG}	Number of snags per 100 feet of stream.	0.00	0.10
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	147.44	1.00
V_{SRICH}	Riparian vegetation species richness.	5.59	1.00
V_{DETRITUS}	Average percent cover of leaves, sticks, etc.	27.50	0.34
V_{HERB}	Average percent cover of herbaceous vegetation.	68.33	0.91
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.92	0.97

High-Gradient Headwater Streams in Appalachia Field Data Sheet and Calculator

Team: **AO, MM** Latitude/UTM Northing: **37.258717**
 Project Name: **Mountain Valley Pipeline** Longitude/UTM Easting: **-80.29321**
 Location: **Montgomery County; Spread H** Sampling Date: **8/25/2021**
 SAR Number: **S-MM14** Reach Length (ft): **78** Stream Type: **Ephemeral Stream**

Top Strata: **Shrub/Herb Strata** (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: **Project Site** Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0										
---	--	--	--	--	--	--	--	--	--	--

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.3

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

1	3	4	1	3	2					
1	1	3	3	1	1					
4	1	2	4	1	3					
1	3	1	4	5	3					

Measure at least 30 points

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED} . 0.55 in

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.08	1.10	1.70	0.08	0.70	5.60					
0.08	0.08	3.20	0.90	0.08	0.08					
1.40	0.08	3.10	0.08	0.08	2.40					
0.08	0.40	0.08	3.40	5.40	4.10					

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 124 %

Left Bank: **58 ft** Right Bank: **39 ft**

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5 V_{LWD} Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. 0.0

Number of downed woody stems: **0**

6 V_{TDBH} Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. Not Used

List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:

Left Side					Right Side				

7 V_{SNAG} Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. 0.0

Left Side: **0** Right Side: **0**

8 V_{SSD} Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. 147.4

Left Side: **50** Right Side: **65**

9	V _{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	5.59
Group 1 = 1.0		Group 2 (-1.0)	
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>
<input type="checkbox"/>	<i>Acer saccharum</i>	<input type="checkbox"/>	<i>Nyssa sylvatica</i>
<input type="checkbox"/>	<i>Aesculus flava</i>	<input type="checkbox"/>	<i>Oxydendrum arboreum</i>
<input type="checkbox"/>	<i>Asimina triloba</i>	<input checked="" type="checkbox"/>	<i>Prunus serotina</i>
<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input type="checkbox"/>	<i>Quercus alba</i>
<input type="checkbox"/>	<i>Betula lenta</i>	<input type="checkbox"/>	<i>Quercus coccinea</i>
<input type="checkbox"/>	<i>Carya alba</i>	<input type="checkbox"/>	<i>Quercus imbricaria</i>
<input type="checkbox"/>	<i>Carya glabra</i>	<input checked="" type="checkbox"/>	<i>Quercus prinus</i>
<input type="checkbox"/>	<i>Carya ovalis</i>	<input checked="" type="checkbox"/>	<i>Quercus rubra</i>
<input type="checkbox"/>	<i>Carya ovata</i>	<input checked="" type="checkbox"/>	<i>Quercus velutina</i>
<input checked="" type="checkbox"/>	<i>Cornus florida</i>	<input type="checkbox"/>	<i>Sassafras albidum</i>
<input type="checkbox"/>	<i>Fagus grandifolia</i>	<input type="checkbox"/>	<i>Tilia americana</i>
<input type="checkbox"/>	<i>Fraxinus americana</i>	<input type="checkbox"/>	<i>Tsuga canadensis</i>
<input checked="" type="checkbox"/>	<i>Liriodendron tulipifera</i>	<input type="checkbox"/>	<i>Ulmus americana</i>
<input type="checkbox"/>	<i>Magnolia acuminata</i>		
6 Species in Group 1		1 Species in Group 2	

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10	V _{DETRITUS}	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	27.50 %																								
		<table border="1"> <thead> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>45</td> <td>40</td> <td></td> <td>5</td> <td>5</td> <td>50</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Left Side				Right Side				20	45	40		5	5	50										
Left Side				Right Side																							
20	45	40		5	5	50																					
11	V _{HERB}	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	68 %																								
		<table border="1"> <thead> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>50</td> <td>55</td> <td></td> <td>95</td> <td>90</td> <td>40</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Left Side				Right Side				80	50	55		95	90	40										
Left Side				Right Side																							
80	50	55		95	90	40																					

Sample Variable 12 within the entire catchment of the stream.

12	V _{WLUSE}	Weighted Average of Runoff Score for watershed:	0.92																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not >100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (<50% ground cover)</td> <td>0.5</td> <td>17</td> <td>17</td> </tr> <tr> <td>Forest and native range (>75% ground cover)</td> <td>1</td> <td>83</td> <td>100</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (<50% ground cover)	0.5	17	17	Forest and native range (>75% ground cover)	1	83	100																									
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
Forest and native range (<50% ground cover)	0.5	17	17																																				
Forest and native range (>75% ground cover)	1	83	100																																				

S-MM14			Notes:
Variable	Value	VSI	
V _{CCANOPY}	Not Used, <20%	Not Used	
V _{EMBED}	2.3	0.58	
V _{SUBSTRATE}	0.55 in	0.28	
V _{BERO}	124 %	0.41	
V _{LWD}	0.0	0.00	
V _{TDBH}	Not Used	Not Used	
V _{SNAG}	0.0	0.10	
V _{SSD}	147.4	1.00	
V _{SRICH}	5.59	1.00	
V _{DETRITUS}	27.5 %	0.34	
V _{HERB}	68 %	0.91	
V _{WLUSE}	0.92	0.97	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME S-MM14	LOCATION Montgomery County	
STATION # <u>12086+56</u> RIVERMILE _____	STREAM CLASS Ephemeral	
LAT <u>37.258717</u> LONG <u>-80.29321</u>	RIVER BASIN Upper Roanoke	
STORET # _____	AGENCY VADEQ	
INVESTIGATORS AO,MM		
FORM COMPLETED BY AO, MM	DATE <u>8/25/2021</u> TIME <u>10:44am</u>	REASON FOR SURVEY Baseline Assessment

WEATHER CONDITIONS	<p>Now</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <input type="checkbox"/> storm (heavy rain) rain (steady rain) showers (intermittent) ____% <input checked="" type="checkbox"/> %cloud cover clear/sunny </div> <div style="width: 45%;"> <p>Past 24 hours</p> <input type="checkbox"/> storm (heavy rain) rain (steady rain) showers (intermittent) ____% <input type="checkbox"/> clear/sunny </div> </div> <p>Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air Temperature <u>28</u> °C Other _____</p>	
SITE LOCATION/MAP	<p>Draw a map of the site and indicate the areas sampled (or attach a photograph)</p>	
STREAM CHARACTERIZATION	<p>Stream Subsystem <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal</p> <p>Stream Origin <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input checked="" type="checkbox"/> Other: Precipitation</p> <p>Stream Type <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater</p> <p>Catchment Area <u>0.10</u> km²</p>	

Notes: No flow; stream bed was dry at the time of field work.

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	Local Watershed NPS Pollution <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input checked="" type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous Dominant species present <i>Rhus allegheniensis</i>	
INSTREAM FEATURES	Estimated Reach Length <u>27.77</u> m Estimated Stream Width <u>.76</u> m Sampling Reach Area _____ m ² Area in km² (m²x1000) _____ km ² Estimated Stream Depth <u>N/A</u> m Surface Velocity (at thalweg) <u>N/A</u> m/sec	Canopy Cover <input checked="" type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark <u>.10</u> m Proportion of Reach Represented by Stream Morphology Types Riffle <u>N/A</u> % Run <u>N/A</u> % Pool <u>N/A</u> % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
LARGE WOODY DEBRIS	LWD <u>0</u> m ² Density of LWD <u>0</u> m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae Dominant species present <u>None</u> Portion of the reach with aquatic vegetation <u>0</u> %	
WATER QUALITY (DS, US)	Temperature <u>N/A</u> °C Specific Conductance <u>N/A</u> Dissolved Oxygen <u>N/A</u> pH <u>N/A</u> Turbidity <u>N/A</u> WQ Instrument Used <u>N/A</u>	Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other <u>N/A</u> Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs Flecks <input type="checkbox"/> None <input type="checkbox"/> Other <u>N/A</u> Turbidity (if not measured) <input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other <u>N/A</u>
SEDIMENT/SUBSTRATE	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input checked="" type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		5	Detritus	sticks, wood, coarse plant materials (CPOM)	80
Boulder	> 256 mm (10")	0			
Cobble	64-256 mm (2.5"-10")	5	Muck-Mud	black, very fine organic (FPOM)	0
Gravel	2-64 mm (0.1"-2.5")	35			
Sand	0.06-2mm (gritty)	5	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	30			
Clay	< 0.004 mm (slick)	20			

Notes: No flow, thus no water quality data collected

HABITAT ASSESSMENT FIELD DATA SHEET - HG - USE ON ALL STREAMS (FRONT)

STREAM NAME S-MM14		LOCATION Montgomery County	
STATION # <u>12086+56</u> RIVERMILE _____		STREAM CLASS Ephemeral	
LAT <u>37.258717</u> LONG <u>-80.29321</u>		RIVER BASIN Upper Roanoke	
STORET # _____		AGENCY VADEQ	
INVESTIGATORS AO,MM			
FORM COMPLETED BY AO, MM		DATE <u>8/25/2021</u> TIME <u>10:44am</u> AM PM	REASON FOR SURVEY Baseline Assessment

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

Notes: No flow; stream bed was dry at the time of field work.

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category																			
	Optimal					Suboptimal					Marginal					Poor				
6. Channel Alteration SCORE <u>20</u>	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.				
	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
7. Frequency of Riffles (or bends) SCORE <u>0</u>	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.					Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.					Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.					Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.				
	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream. SCORE <u>2</u> SCORE <u>4</u>	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.				
	Left Bank	10	9			8	7	6			5	4	3			2	1	0		
	Right Bank	10	9			8	7	6			5	4	3			2	1	0		
9. Vegetative Protection (score each bank) SCORE <u>6</u> SCORE <u>7</u>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.				
	Left Bank	10	9			8	7	6			5	4	3			2	1	0		
	Right Bank	10	9			8	7	6			5	4	3			2	1	0		
10. Riparian Vegetative Zone Width (score each bank riparian zone) SCORE <u>7</u> SCORE <u>9</u>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.				
	Left Bank	10	9			8	7	6			5	4	3			2	1	0		
	Right Bank	10	9			8	7	6			5	4	3			2	1	0		

Total Score 71

Notes: No flow; stream bed was dry at the time of field work.

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME S-MM14		LOCATION Montgomery County	
STATION # ¹²⁰⁸⁶⁺⁵⁶ RIVERMILE _____		STREAM CLASS Ephemeral	
LAT ^{37.258717} LONG ^{-80.29321}		RIVER BASIN Upper Roanoke	
STORET # _____		AGENCY VADEQ	
INVESTIGATORS AO,MM			LOT NUMBER _____
FORM COMPLETED BY AO, MM		DATE ^{8/25/2021} TIME ^{10:44am}	REASON FOR SURVEY Baseline Assessment

HABITAT TYPES	Indicate the percentage of each habitat type present <input checked="" type="checkbox"/> Cobble ¹⁰ % <input checked="" type="checkbox"/> Snags ⁵ % <input checked="" type="checkbox"/> Vegetated Banks ⁶⁰ % <input checked="" type="checkbox"/> Sand ⁵ % <input type="checkbox"/> Submerged Macrophytes _____ % <input type="checkbox"/> Other (_____) _____ %
SAMPLE COLLECTION	Gear used <input type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of jabs/kicks taken in each habitat type. <input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	Aquatic biota were not sampled due to no flow and dry stream bed. No aquatic biota visually observed.

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

WOLMAN PEBBLE COUNT FORM

County: Montgomery County Stream ID: S-MM14
 Stream Name: UNT to Flatwoods Branch
 HUC Code: 03010101 Basin: Upper Roanoke
 Survey Date: 8/25/2021
 Surveyors: AO, MM
 Type: Representative

PEBBLE COUNT							
Inches	PARTICLE	Millimeters		Particle Count	Total #	Item %	% Cum
	Silt/Clay	<.062	S/C	▲ ▼	32	32.00	32.00
	Very Fine	.062-.125	S A N D	▲ ▼	2	2.00	34.00
	Fine	.125-.25		▲ ▼	0	0.00	34.00
	Medium	.25-.5		▲ ▼	0	0.00	34.00
	Coarse	.50-1.0		▲ ▼	0	0.00	34.00
.04-.08	Very Coarse	1.0-2		▲ ▼	0	0.00	34.00
.08-.16	Very Fine	2-4		G R A V E L	▲ ▼	4	4.00
.16-.22	Fine	4-5.7	▲ ▼		4	4.00	42.00
.22-.31	Fine	5.7-8	▲ ▼		5	5.00	47.00
.31-.44	Medium	8-11.3	▲ ▼		6	6.00	53.00
.44-.63	Medium	11.3-16	▲ ▼		2	2.00	55.00
.63-.89	Coarse	16-22.6	▲ ▼		7	7.00	62.00
.89-1.26	Coarse	22.6-32	▲ ▼		9	9.00	71.00
1.26-1.77	Vry Coarse	32-45	▲ ▼		10	10.00	81.00
1.77-2.5	Vry Coarse	45-64	▲ ▼		8	8.00	89.00
2.5-3.5	Small	64-90	C O B B L E		▲ ▼	4	4.00
3.5-5.0	Small	90-128		▲ ▼	2	2.00	95.00
5.0-7.1	Large	128-180		▲ ▼	1	1.00	96.00
7.1-10.1	Large	180-256		▲ ▼	0	0.00	96.00
10.1-14.3	Small	256-362	B O U L D E R	▲ ▼	0	0.00	96.00
14.3-20	Small	362-512		▲ ▼	0	0.00	96.00
20-40	Medium	512-1024		▲ ▼	0	0.00	96.00
40-80	Large	1024-2048		▲ ▼	0	0.00	96.00
80-160	Vry Large	2048-4096		▲ ▼	0	0.00	96.00
	Bedrock		BDRK	▲ ▼	4	4.00	100.00
				Totals	100		
	Total Tally:						

RIVERMORPH PARTICLE SUMMARY

 River Name: UNT to Flatwoods Branch
 Reach Name: S-MM14
 Sample Name: Representative
 Survey Date: 08/25/2021

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	32	32.00	32.00
0.062 - 0.125	2	2.00	34.00
0.125 - 0.25	0	0.00	34.00
0.25 - 0.50	0	0.00	34.00
0.50 - 1.0	0	0.00	34.00
1.0 - 2.0	0	0.00	34.00
2.0 - 4.0	4	4.00	38.00
4.0 - 5.7	4	4.00	42.00
5.7 - 8.0	5	5.00	47.00
8.0 - 11.3	6	6.00	53.00
11.3 - 16.0	2	2.00	55.00
16.0 - 22.6	7	7.00	62.00
22.6 - 32.0	9	9.00	71.00
32 - 45	10	10.00	81.00
45 - 64	8	8.00	89.00
64 - 90	4	4.00	93.00
90 - 128	2	2.00	95.00
128 - 180	1	1.00	96.00
180 - 256	0	0.00	96.00
256 - 362	0	0.00	96.00
362 - 512	0	0.00	96.00
512 - 1024	0	0.00	96.00
1024 - 2048	0	0.00	96.00
Bedrock	4	4.00	100.00

D16 (mm)	0.03
D35 (mm)	2.5
D50 (mm)	9.65
D84 (mm)	52.13
D95 (mm)	128
D100 (mm)	Bedrock
Silt/Clay (%)	32
Sand (%)	2
Gravel (%)	55
Cobble (%)	7
Boulder (%)	0
Bedrock (%)	4

Total Particles = 100.

Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact Length	Impact Factor
22865.06	Mountain Valley Pipeline (Mountain Valley Pipeline, LLC)	Montgomery County	R6	03010101	8/25/2021	S-MM14	105	1
Name(s) of Evaluator(s)		Stream Name and Information					SAR Length	
AO, MM		Unnamed Tributary to Flatwoods Branch					91	

2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

Conditional Category								NOTES>>	
Riparian Buffers	Optimal	Suboptimal		Marginal		Poor			
	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover and an non-maintained understory. Wetlands areas.	High Suboptimal: Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	Low Suboptimal: Riparian areas with tree stratum (dbh > 3 inches) present, with >30% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	High Marginal: Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	Low Marginal: Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory.	High Poor: Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	Low Poor: Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.		
Condition Scores	1.5	High 1.2	Low 1.1	High 0.85	Low 0.75	High 0.6	Low 0.5		

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

Right Bank	% Riparian Area>	75%	25%				100%	Cl= (Sum % RA * Scores*0.01)/2		
	Score >	0.85	0.6							
Left Bank	% Riparian Area>	75%	20%	5%			100%	Rt Bank Cl >	0.79	Cl
	Score >	0.6	0.75	0.85				Lt Bank Cl >	0.64	0.72

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

THE REACH CONDITION INDEX (RCI) >>	0.36
RCI= (Riparian Cl)/2	
COMPENSATION REQUIREMENT (CR) >>	38
CR = RCI X LF X IF	

INSERT PHOTOS:

(WSSI Photo Location L:\22000s\22800\22865.06\Admin\05-ENVRI\Field Data\Spread H\Field Forms\S-MM14\Photos



Downstream view of ROW looking SE. Assessment is limited to areas within the temporary ROW.

DESCRIBE PROPOSED IMPACT:

