Baseline Assessment - Stream Attributes

Reach S-A34 (Pipeline ROW)
Ephemeral
Spread G
Giles County, Virginia

Data	Included
Photos	✓
SWVM Form	✓
FCI Calculator and HGM Form	✓
RBP Physical Characteristics Form	✓
Water Quality Data	N/A – No water present
RBP Habitat Form	✓
RBP Benthic Form	✓
Benthic Identification Sheet	N/A – No water present
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, KD

Photo Type: US VIEW
Location, Orientation, Photographer Initials: Upstream view of ROW looking NW, KD

Photo Type: LB CL
Location, Orientation, Photographer Initials: Standing on LB looking at RB along pipe centerline looking SW, KD

Photo Type: RB CL
Location, Orientation, Photographer Initials: Standing on RB looking at LB along pipe centerline looking SE, KD

Photo Type: DS COND
Location, Orientation, Photographer Initials: Downstream conditions outside of ROW looking SE, AW

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USACE FILE NO./ Project Name: (v2.1, Sept 2015)		Mountain Valley Pipeline		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37.337763	Lon.	-80.606008		WEATHER:		Partly Sunny	DATE:	August 20, 2021
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)			S-A34			MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)							Comments:	
STREAM IMPACT LENGTH:	86	FORM OF MITIGATION:	RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.			PRECIPITATION PAST 48 HRS:	1.25", 8/19/2021		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:	Ephemeral	Stream Classification:		Stream Classification:	0	Stream Classification:	0	Stream Classification:	0
Percent Stream Channel Slope	17.63	Percent Stream Channel Slope		Percent Stream Channel Slope	0	Percent Stream Channel Slope	0	Percent Stream Channel Slope	0

HGM Score (attach data forms):

Column 1:
		Average
Hydrology	0.71	
Biogeochemical Cycling	0.47	0.56333333
Habitat	0.51	

Column 2:
		Average
Hydrology		
Biogeochemical Cycling	0	
Habitat		

Column 3:
		Average
Hydrology		
Biogeochemical Cycling	0	
Habitat		

Column 4:
		Average
Hydrology		
Biogeochemical Cycling	0	
Habitat		

Column 5:
		Average
Hydrology		
Biogeochemical Cycling	0	
Habitat		

PART I - Physical, Chemical and Biological Indicators

PHYSICAL INDICATOR (Applies to all streams classifications)

Column No. 1 — USEPA RBP (High Gradient Data Sheet)

	Points Scale	Range	Site Score
1. Epifaunal Substrate/Available Cover	0-20		0
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20	0-1	0
6. Channel Alteration	0-20		19
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		10
9. Vegetative Protection (LB & RB)	0-20		7
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		76
Sub-Total			0.63333333

Column No. 2 — USEPA RBP (Low Gradient Data Sheet)

	Points Scale	Range	Site Score
1. Epifaunal Substrate/Available Cover	0-20		
2. Pool Substrate Characterization	0-20		
3. Pool Variability	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20	0-1	
6. Channel Alteration	0-20		
7. Channel Sinuosity	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0

Column No. 3 — USEPA RBP (High Gradient Data Sheet)

	Points Scale	Range	Site Score
1. Epifaunal Substrate/Available Cover	0-20		
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20	0-1	
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0

Column No. 4 — USEPA RBP (High Gradient Data Sheet)

	Points Scale	Range	Site Score
1. Epifaunal Substrate/Available Cover	0-20		
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20	0-1	
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0

Column No. 5 — USEPA RBP (High Gradient Data Sheet)

	Points Scale	Range	Site Score
1. Epifaunal Substrate/Available Cover	0-20		
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20	0-1	
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0

CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)

WVDEP Water Quality Indicators (General)

Column No. 1:
Specific Conductivity			
100-199 - 85 points	0-90		
pH		0-1	
5.6-5.9 = 45 points	0-80		
DO	10-30		
Sub-Total			

Column No. 2:
Specific Conductivity			
	0-90		
pH		0-1	
	5-90		
DO	10-30		
Sub-Total			0

Column No. 3:
Specific Conductivity			
	0-90		
pH		0-1	
	5-90		
DO	10-30		
Sub-Total			0

Column No. 4:
Specific Conductivity			
	0-90		
pH		0-1	
	5-90		
DO	10-30		
Sub-Total			0

Column No. 5:
Specific Conductivity			
	0-90		
pH		0-1	
	5-90		
DO	10-30		
Sub-Total			0

BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)

WV Stream Condition Index (WVSCI)

Column	Value	Scale	Range	Sub-Total
No. 1	0	0-100	0-1	0
No. 2		0-100	0-1	0
No. 3		0-100	0-1	0
No. 4		0-100	0-1	0
No. 5		0-100	0-1	0

PART II - Index and Unit Score

Column	Index	Linear Feet	Unit Score
No. 1	0.640	86	55.04
No. 2	0	0	0
No. 3	0	0	0
No. 4	0	0	0
No. 5	0	0	0

FCI Calculator for the High-Gradient Headwater Streams in Appalachia

To ensure accurate calculations, the <u>UPPERMOST STRATUM</u> of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥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: Spread G, Giles County
Sampling Date: 8/20/21

Project Site   Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Shrub/Herb Strata

SAR number: S-A34

Functional Results Summary: Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.71
Biogeochemical Cycling	0.47
Habitat	0.51

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	Not Used, <20%	Not Used
V_{EMBED}	Average embeddedness of channel.	2.17	0.52
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	4.55	1.00
V_{BERO}	Total percent of eroded stream channel bank.	85.71	0.61
V_{LWD}	Number of down woody stems per 100 feet of stream.	4.29	0.54
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.	71.43	1.00
V_{SRICH}	Riparian vegetation species richness.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	71.33	0.87
V_{HERB}	Average percent cover of herbaceous vegetation.	66.67	0.89
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.85	0.89

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

Team: KD & AW	Latitude/UTM Northing: 37.337763
Project Name: Mountain Valley Pipeline	Longitude/UTM Easting: -80.606008
Location: Spread G, Giles County	Sampling Date: 8/20/21

SAR Number: S-A34   Reach Length (ft): 70   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.

2.2

Measure at least 30 points

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

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}.

4.55 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):

19.00	7.70	15.10	4.20	4.90					
11.20	3.80	0.08	0.08	0.08					
99.00	86.00	1.10	0.08	6.80					
26.00	2.40	7.90	0.08	0.08					
3.10	0.08	120.00	23.00						

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%.

86 %

Left Bank: 35 ft   Right Bank: 25 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.

4.3

Number of downed woody stems: 3

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.

71.4

Left Side: 25   Right Side: 25

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.	0.00

Group 1 = 1.0		Group 2 (-1.0)	
☑ Acer rubrum	☐ Magnolia tripetala	☑ Ailanthus altissima	☐ Lonicera japonica
☐ Acer saccharum	☐ Nyssa sylvatica	☐ Albizia julibrissin	☐ Lonicera tatarica
☐ Aesculus flava	☐ Oxydendrum arboreum	☑ Alliaria petiolata	☐ Lotus corniculatus
☐ Asimina triloba	☑ Prunus serotina	☐ Alternanthera philoxeroides	☐ Lythrum salicaria
☐ Betula alleghaniensis	☐ Quercus alba		☑ Microstegium vimineum
☐ Betula lenta	☐ Quercus coccinea	☐ Aster tataricus	☐ Paulownia tomentosa
☐ Carya alba	☐ Quercus imbricaria	☐ Cerastium fontanum	☐ Polygonum cuspidatum
☐ Carya glabra	☐ Quercus prinus	☐ Coronilla varia	☐ Pueraria montana
☐ Carya ovalis	☑ Quercus rubra	☐ Elaeagnus umbellata	☑ Rosa multiflora
☐ Carya ovata	☐ Quercus velutina	☐ Lespedeza bicolor	☐ Sorghum halepense
☐ Cornus florida	☐ Sassafras albidum	☐ Lespedeza cuneata	☐ Verbena brasiliensis
☐ Fagus grandifolia	☐ Tilia americana	☐ Ligustrum obtusifolium	
☐ Fraxinus americana	☐ Tsuga canadensis	☐ Ligustrum sinense	
☑ Liriodendron tulipifera	☐ Ulmus americana		
☐ Magnolia acuminata			

4	Species in Group 1	4	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.	71.33 %

Left Side				Right Side			
98	50			90			
80				100	10		

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.	67 %

Left Side				Right Side			
60	100			40			
30				80	90		

Sample Variable 12 within the entire catchment of the stream.

12	V$_{WLUSE}$	Weighted Average of Runoff Score for watershed:	0.85

Land Use (Choose From Drop List)		Runoff Score	% in Catchment	Running Percent (not >100)
Forest and native range (>75% ground cover)	▼	1	78	78
Open space (pasture, lawns, parks, etc.), grass cover >75%	▼	0.3	22	100
	▼			
	▼			
	▼			
	▼			
	▼			
	▼			

S-A34			Notes:

Variable	Value	VSI	
V$_{CCANOPY}$	Not Used, <20%	Not Used	Land Cover Analysis was completed using the 2019 National Land Cover Database (NLCD), from Landsat satellite imagery and other supplementary datasets.
V$_{EMBED}$	2.2	0.52	Watershed boundaries are based off of field delineated stream impacts.
V$_{SUBSTRATE}$	4.55 in	1.00	*Percentages in catchment values have been rounded to the nearest full number.
V$_{BERO}$	86 %	0.61	
V$_{LWD}$	4.3	0.54	
V$_{TDBH}$	Not Used	Not Used	
V$_{SNAG}$	0.0	0.10	
V$_{SSD}$	71.4	1.00	
V$_{SRICH}$	0.00	0.00	
V$_{DETRITUS}$	71.3 %	0.87	
V$_{HERB}$	67 %	0.89	
V$_{WLUSE}$	0.85	0.89	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)

STREAM NAME S-A34	LOCATION Giles County
STATION #_____ RIVERMILE_____	STREAM CLASS Ephemeral
LAT 37.337763 LONG -80.606008	RIVER BASIN Middle New
STORET #	AGENCY VADEQ
INVESTIGATORS KD & AW	
FORM COMPLETED BY **KD & AW** DATE 8/20/21 TIME 1:47 PM	REASON FOR SURVEY Baseline Assessment

WEATHER CONDITIONS	**Now**		**Past 24 hours**		**Has there been a heavy rain in the last 7 days?**
		storm (heavy rain)	✓		✓ Yes ☐ No
		rain (steady rain)	✓		Air Temperature 79 ⁰ C
		showers (intermittent)	✓		
	25 % ✓	%cloud cover	✓	90 %	Other_____
		clear/sunny			

SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION	**Stream Subsystem** ☐Perennial ☐Intermittent ☐Tidal	**Stream Type** ☐Coldwater ✓Warmwater
	Stream Origin ☐Glacial ☐Non-glacial montane ☐Swamp and bog ☐Spring-fed ☐Mixture of origins ✓Other precipitation	Catchment Area 0.24 _____ km²

Notes: No water present.

Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition - Form 1

A-5

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☑ Forest ☐ Commercial ☐ Field/Pasture ☐ Industrial ☐ Agricultural ☐ Other _____ ☐ Residential	**Local Watershed NPS Pollution** ☑ No evidence ☐ Some potential sources ☐ Obvious sources **Local Watershed Erosion** ☑ None ☐ Moderate ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☐ Trees ☑ Shrubs ☐ Grasses ☐ Herbaceous **Dominant species present** Rosa multiflora

INSTREAM FEATURES	**Estimated Reach Length** 21.3 m **Estimated Stream Width** 1.8 m **Sampling Reach Area** 38.3 m² **Area in km² (m²x1000)** _____ km² **Estimated Stream Depth** N/A m **Surface Velocity** N/A m/sec **(at thalweg)**	**Canopy Cover** ☑ Partly open ☐ Partly shaded ☐ Shaded **High Water Mark** 0.1 m **Proportion of Reach Represented by Stream Morphology Types** Riffle ____% Run ____% Pool ____% **Channelized** ☐ Yes ☑ No **Dam Present** ☐ Yes ☑ No

LARGE WOODY DEBRIS	**LWD** 0.25 m² **Density of LWD** _____ m²/km² **(LWD/ reach area)**

AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **Dominant species present** N/A **Portion of the reach with aquatic vegetation** 0 %

WATER QUALITY	**Temperature** N/A ⁰C **Specific Conductance** N/A **Dissolved Oxygen** N/A **pH** N/A **Turbidity** N/A **WQ Instrument Used** N/A	**Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other_____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs Flecks ☐ None ☐ Other_____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other____

SEDIMENT/ SUBSTRATE	**Odors** ☑ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other_____ **Oils** ☑ Absent ☐ Slight ☐ Moderate ☐ Profuse	**Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other_____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☑ 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		2	Detritus	sticks, wood, coarse plant materials (CPOM)	60
Boulder	> 256 mm (10")	60			
Cobble	64-256 mm (2.5"-10")	20	Muck-Mud	black, very fine organic (FPOM)	0
Gravel	2-64 mm (0.1"-2.5")	0			
Sand	0.06-2mm (gritty)	0	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	3			
Clay	< 0.004 mm (slick)	15			

Notes: No water present.

STREAM NAME S-A34	LOCATION Giles County
STATION #_____ RIVERMILE_____	STREAM CLASS Ephemeral
LAT 37.337763 LONG -80.606008	RIVER BASIN Middle New
STORET #	AGENCY VADEQ
INVESTIGATORS KD & AW	

FORM COMPLETED BY KD & AW	DATE 8/20/21 TIME 1:47 PM 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 11	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 13	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 water present.

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
6. Channel Alteration	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.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	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.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	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.
SCORE 5	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	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.
SCORE 3	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	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.
SCORE 9	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 76   Notes: No water present.

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME S-A34	LOCATION Giles County
STATION #_____ RIVERMILE_____	STREAM CLASS Ephemeral
LAT 37.337763 LONG -80.606008	RIVER BASIN Middle New
STORET #	AGENCY VADEQ

INVESTIGATORS KD & AW		LOT NUMBER
FORM COMPLETED BY **KD & AW**	DATE 8/20/21 TIME 1:47 PM	REASON FOR SURVEY Baseline Assessment

HABITAT TYPES	**Indicate the percentage of each habitat type present** ☐Cobble_____% ☐Snags_____% ☐Vegetated Banks_____% ☐Sand_____% ☐Submerged Macrophytes_____% ☐Other ( )_____%
SAMPLE COLLECTION	**Gear used** ☐D-frame ☐kick-net ☐Other _____ **How were the samples collected?** ☐wading ☐from bank ☐from boat **Indicate the number of jabs/kicks taken in each habitat type.** ☐Cobble_____ ☐Snags_____ ☐Vegetated Banks_____ ☐Sand_____ ☐Submerged Macrophytes_____ ☐Other ( )_____
GENERAL COMMENTS	No water present.

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: Giles County   Stream ID: S-A34
Stream Name: UNT to Doe Creek
HUC Code: 05050002   Basin: Middle New
Survey Date: 8/20/2021
Surveyors: KD, AW
Type: Representative

			PEBBLE COUNT				
Inches	PARTICLE	Millimeters		Particle Count	Total #	Item %	% Cum
	Silt/Clay	< .062	S/C	▲ ▼	22	22.00	22.00
	Very Fine	.062-.125	S A N D	▲ ▼	0	0.00	22.00
	Fine	.125-.25		▲ ▼	0	0.00	22.00
	Medium	.25-.5		▲ ▼	0	0.00	22.00
	Coarse	.50-1.0		▲ ▼	0	0.00	22.00
.04-.08	Very Coarse	1.0-2		▲ ▼	0	0.00	22.00
.08 -.16	Very Fine	2 -4	G R A V E L	▲ ▼	0	0.00	22.00
.16 - .22	Fine	4 -5.7		▲ ▼	1	1.00	23.00
.22 - .31	Fine	5.7 - 8		▲ ▼	2	2.00	25.00
.31 - .44	Medium	8 -11.3		▲ ▼	2	2.00	27.00
.44 - .63	Medium	11.3 - 16		▲ ▼	3	3.00	30.00
.63 - .89	Coarse	16 -22.6		▲ ▼	0	0.00	30.00
.89 - 1.26	Coarse	22.6 - 32		▲ ▼	5	5.00	35.00
1.26 - 1.77	Vry Coarse	32 - 45		▲ ▼	6	6.00	41.00
1.77 -2.5	Vry Coarse	45 - 64		▲ ▼	5	5.00	46.00
2.5 - 3.5	Small	64 - 90	C O B B L E	▲ ▼	5	5.00	51.00
3.5 - 5.0	Small	90 - 128		▲ ▼	7	7.00	58.00
5.0 - 7.1	Large	128 - 180		▲ ▼	10	10.00	68.00
7.1 - 10.1	Large	180 - 256		▲ ▼	9	9.00	77.00
10.1 - 14.3	Small	256 - 362	B O U L D E R	▲ ▼	10	10.00	87.00
14.3 - 20	Small	362 - 512		▲ ▼	4	4.00	91.00
20 - 40	Medium	512 - 1024		▲ ▼	6	6.00	97.00
40 - 80	Large	1024 -2048		▲ ▼	1	1.00	98.00
80 - 160	Vry Large	2048 -4096		▲ ▼	0	0.00	98.00
	Bedrock		BDRK	▲ ▼	2	2.00	100.00
			Totals	100			
	Total Tally:						

```
                    RIVERMORPH PARTICLE SUMMARY

---------------------------------------------------------------------

River Name:        UNT to Doe Creek
Reach Name:        S-A34
Sample Name:       Representative
Survey Date:       08/20/2021


---------------------------------------------------------------------

Size (mm)                  TOT #      ITEM %     CUM %
---------------------------------------------------------------------
0 - 0.062                  22         22.00      22.00
0.062 - 0.125              0          0.00       22.00
0.125 - 0.25               0          0.00       22.00
0.25 - 0.50                0          0.00       22.00
0.50 - 1.0                 0          0.00       22.00
1.0 - 2.0                  0          0.00       22.00
2.0 - 4.0                  0          0.00       22.00
4.0 - 5.7                  1          1.00       23.00
5.7 - 8.0                  2          2.00       25.00
8.0 - 11.3                 2          2.00       27.00
11.3 - 16.0                3          3.00       30.00
16.0 - 22.6                0          0.00       30.00
22.6 - 32.0                5          5.00       35.00
32 - 45                    6          6.00       41.00
45 - 64                    5          5.00       46.00
64 - 90                    5          5.00       51.00
90 - 128                   7          7.00       58.00
128 - 180                  10         10.00      68.00
180 - 256                  9          9.00       77.00
256 - 362                  10         10.00      87.00
362 - 512                  4          4.00       91.00
512 - 1024                 6          6.00       97.00
1024 - 2048                1          1.00       98.00
Bedrock                    2          2.00       100.00

D16 (mm)                   0.05
D35 (mm)                   32
D50 (mm)                   84.8
D84 (mm)                   330.2
D95 (mm)                   853.33
D100 (mm)                  Bedrock
Silt/Clay (%)              22
Sand (%)                   0
Gravel (%)                 24
Cobble (%)                 31
Boulder (%)                21
Bedrock (%)                2

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)	Giles County	R6	05050002	8/20/21	S-A34	86	1

Name(s) of Evaluator(s)	Stream Name and Information		SAR Length
KD & AW	UNT to Doe Creek		93.5

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

NOTES>>

	Conditional Category						
	Optimal	**Suboptimal**		**Marginal**		**Poor**	
Riparian Buffers	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.
		High	Low	High	Low	High	Low
Condition Scores	1.5	1.2	1.1	0.85	0.75	0.6	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>	50%	20%	30%			100%		
	Score >	0.85	0.6	0.5					

CI= (Sum % RA * Scores*0.01)/2

Left Bank	% Riparian Area>	80%	20%				100%	Rt Bank CI >	0.70	**CI**
	Score >	0.85	0.5					Lt Bank CI >	0.78	0.74

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) >>	0.37

RCI= (Riparian CI)/2

COMPENSATION REQUIREMENT (CR) >>	32

CR = RCI X LF X IF

INSERT PHOTOS:

(WSSI Photo Location L:\22000s\22800\22865.06\Admin\05-ENVR\Field Data\Spread G\Field Forms\S-A34\Photos)

352°N (T) 37°20'16"N, 80°36'21"W ±13ft ▲ 2210ft

US VIEW   S-A34   02 Sep 2021, 14:46:32

Upstream view of ROW looking NW. Assessment is limited to areas within the temporary ROW

DESCRIBE PROPOSED IMPACT:

PROVIDED UNDER SEPARATE COVER

SURVEY NOTES:

1. This map has been oriented to NAD 1983 UTM ZONE 17N, and vertically to The North American Vertical Datum of 1988 (NAVD 88), using a Real Time Network (RTN) GPS. Field locations were completed on May 1, 2019.

2. Monumentation, including traverse stations and fly points, shown on this drawing should be used to orient any future boundary, topographic, or location survey.

3. Easement lines shown on plan view were provided by Mountain Valley Pipeline (MVP).

4. WSSI Contour Interval = 2.0'. Contours within the channel were interpolated using stream channel breaklines (i.e. top of slopes, toe of slopes, thalweg) and cross-sectional points. Contours outside the channel were interpolated using cross-sectional spot shots.

5. All section views shown are left to right facing downstream.

6. Cross-section B shot at location of pipe centerline (based on best professional judgement).

LEGEND

	STUDY AREA (EASEMENT)
	EXISTING SURVEY-LOCATED THALWEG
EW	EXISTING SURVEY-LOCATED EDGE OF WATER (AS NECESSARY)
	EXISTING CONTOUR LINE (MAJOR)
	EXISTING CONTOUR LINE (MINOR)
2208.2 +	EXISTING SURVEYED GROUND SHOT ELEVATION
△	BENCHMARK POINT (WSSI)

NORTH

TRAV 5193
ELEV = 2210.99
N 13557756.67
E 1754984.35

N 13557778.2
E 1754962.5

N 13557755.4
E 1754958.4

N 13557740.1
E 1754965.7

2211.8
2205.6
2202.0
2208.6
2200.8
2206.1
2201.8
2203.2
2199.2
2200.0
2198.4
2204.9
2202.5
2194.7 BRIDGE
2193.5
2201.6
2198.3
2195.4
2196.6
2196.9

UNNAMED TRIBUTARY TO DOE CREEK (S-A34) FLOW

EX. BEDROCK

2209.9
2213.0
2208.2
2205.9
2205.7
2211.6
2208.9
2211.6

N 13557796.1
E 1754887.1

N 13557779.2
E 1754881.3

N 13557767.6
E 1754878.1

X-SEC A
X-SEC B
X-SEC C

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

CROSSING S-A34 CONTROL (OUTSIDE OF VIEW)

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
5195	13557719.02	1755124.373	2214.22	REBAR

S-A34 BASELINE THALWEG

2204.0
2202.6
2203.1
2200.9
2201.6
2198.8
2199.2
2197.2
2196.7
2193.4
2193.5
2187.5

EX. BEDROCK

BRIDGE

PROFILE LEGEND

EXISTING STREAM PROFILE INVERT ALONG THALWEG

PROFILE

SCALE: H: 1"=10'
V: 1"=5'

CL STAKEOUT POINTS: S-A34 CROSS SECTION B (PIPE CL)

PT. LOC.	PRE-CROSSING			POST-CROSSING	
	NORTHING	EASTING	ELEV	VERT. DIFF.	HORZ. DIFF.
TS-L	13557761.75	1754937.89	2201.81	----	----
BS-L	13557764.83	1754927.75	2198.45	----	----
THW	13557767.63	1754917.69	2198.29	----	----
BS-R	13557767.63	1754916.80	2198.35	----	----
TS-R	13557772.54	1754902.16	2205.89	----	----

TYPICAL 5-POINT CROSS-SECTION
(FACING DOWNSTREAM)

TS-L
TS-R
BS-L
BS-R
THW

TS: TOP OF SLOPE
BS: BOTTOM OF SLOPE
THW: THALWEG (INVERT)

S-A34 BASELINE CROSS SECTION A
POOL

NO WATER SURFACE AT TIME OF SURVEY (APR 2019)

EX. BEDROCK

EX. THALWEG
EL.: 2201.6'

S-A34 BASELINE CROSS SECTION B
RIFFLE

NO WATER SURFACE AT TIME OF SURVEY (APR 2019)

EX. BEDROCK

EX. THALWEG
EL.: 2198.3'

S-A34 BASELINE CROSS SECTION C
POOL

NO WATER SURFACE AT TIME OF SURVEY (APR 2019)

EX. THALWEG
EL.: 2194.7'

EX. BEDROCK

CROSS SECTION LEGEND

EXISTING GRADE

NOTE: ALL SECTION VIEWS SHOWN LEFT TO RIGHT FACING DOWNSTREAM.

CROSS SECTION

SCALE: H: 1"=10'
V: 1"=5'

Profile and Cross-Sections Baseline Survey

Prepared For: MVP

Crossing S-A34 - UNT to Doe Creek (MP 205.4)

Giles County, Virginia

PRE-CROSSING PHOTOS

169°S (T) 37°20.273', -80°36.364' ±32.8ft 2218ft
PHOTO TAKEN LOOKING DOWNSTREAM ON 05/01/2019

349°N (T) 37°20.265', -80°36.364' ±32.8ft 2233ft
PHOTO TAKEN LOOKING UPSTREAM ON 05/01/2019

POST-CROSSING PHOTOS

PENDING CROSSING
PHOTO TAKEN LOOKING

PENDING CROSSING
PHOTO TAKEN LOOKING

REVISIONS

No.	Date	Description	Rev. By	App. By

SCALE: AS NOTED

DATE: September, 2021

Horizontal Datum:	NAD 1983 UTM ZONE 17N
Vertical Datum:	NAVD 88

Boundary and Topo Source:
MVP
WSSI 2' C.I. Topo

Design	Draft	Approved
PFS	JSF	NAS

Sheet #
1 of 1

Computer File Name:
L:\Survey\22000\22000\22865\03 Spread G Work Dwgs
22865_03 S-G MP 190-207 Sheets.dwg