Baseline Assessment - Stream Attributes

Reach S-AB16 (Timber Mat Crossing)
Intermittent
Spread G
Montgomery County, Virginia

Data	Included
Photos	✓
SWVM Form	✓
FCI Calculator and HGM Form	N/A - Headwater stream <4% slope
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	N/A – Lack of stream substrate
RiverMorph Data Sheet	N/A – Lack of stream substrate
USM Form (Virginia Only)	✓
Longitudinal Profile and Cross Sections	✓

Photo Type: DS VIEW
Location, Orientation, Photographer Initials: Downstream view of ROW looking E, JB

Photo Type: US VIEW
Location, Orientation, Photographer Initials: Upstream view of ROW looking SW, JB

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

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

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

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USACE FILE NO./ Project Name: (v2.1, Sept 2015)	Mountain Valley Pipeline	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37.231693	Lon.	-80.198778	WEATHER:	Sunny	DATE:	August 24, 2021

IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)	S-AB16	MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)		Comments:

STREAM IMPACT LENGTH:	20	FORM OF MITIGATION:	RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0.03", 8/23/2021	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: **Intermittent**	Stream Classification:	Stream Classification: **0**	Stream Classification: **0**	Stream Classification: **0**
Percent Stream Channel Slope **2.4**	Percent Stream Channel Slope	Percent Stream Channel Slope **0**	Percent Stream Channel Slope **0**	Percent Stream Channel Slope **0**

HGM Score (attach data forms):

	Average		Average		Average		Average		Average
Hydrology		Hydrology		Hydrology		Hydrology		Hydrology	
Biogeochemical Cycling	0.07333333	Biogeochemical Cycling	0	Biogeochemical Cycling	0	Biogeochemical Cycling	0	Biogeochemical Cycling	0
Habitat		Habitat		Habitat		Habitat		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		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20	0-1	0
6. Channel Alteration	0-20		2
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		20
9. Vegetative Protection (LB & RB)	0-20		8
10. Riparian Vegetative Zone Width (LB & RB)	0-20		7
Total RBP Score	Poor		37
Sub-Total			0.185

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

		Range	
Specific Conductivity — 100-199 - 85 points	0-90	0-1	
pH — 5.6-5.9 = 45 points	0-80		
DO	10-30		
Sub-Total			

Columns No. 2-5 — Specific Conductivity

	Scale	Range
Specific Conductivity	0-90	
pH	5-90	0-1
DO	10-30	
Sub-Total	0	

BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)

WV Stream Condition Index (WVSCI)

Column No. 1:

	Scale	Range	
0	0-100	0-1	
Sub-Total			0

Columns No. 2-5:

	Scale	Range	
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0.283	20	5.65833333
0	0	0
0	0	0
0	0	0
0	0	0

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)

STREAM NAME S-AB16	LOCATION Montgomery County
STATION # 12448+10 RIVERMILE_____	STREAM CLASS Intermittent
LAT 37.231693 LONG -80.198778	RIVER BASIN Upper Roanoke
STORET #	AGENCY VADEQ
INVESTIGATORS AW, JB	
FORM COMPLETED BY AW, JB	DATE 8/24/21 TIME 12:00 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** 32 ___ ⁰C
		showers (intermittent)		
	____ %	%cloud cover	☑ 30 %	**Other**_____
	☑	clear/sunny		

SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)
	Draw a map of the site and indicate the areas sampled (or attach a photograph) Railroad Rte 460 GOING AWAY Herbaceous vegetation No stream present. 100% vegetated swale/roadside ditch! Fence with silt fence ↑ herbaceous vegetation LOD LOD ↑COMING IN

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** 0.05 _____ km²

Notes: No water present. Vegetated roadside ditch which lacked stream substrate.

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 _Roadway/railroad_ ☑ 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 _Leersia oryzoides, Festuca sp., Ligustrum sinense_

INSTREAM FEATURES

Estimated Reach Length 36.2 m	**Canopy Cover** ☑ Partly open ☐ Partly shaded ☐ Shaded
Estimated Stream Width 1.5 m	
Sampling Reach Area 54.3 m^2	**High Water Mark** N/A m
Area in km^2 (m^{2}x1000) _____ km^2	**Proportion of Reach Represented by Stream Morphology Types** Riffle N/A % Run N/A % Pool N/A %
Estimated Stream Depth N/A m	
Surface Velocity N/A m/sec **(at thalweg)**	**Channelized** ☑ Yes ☑ No **Dam Present** ☐ Yes ☑ No

LARGE WOODY DEBRIS

LWD 0 m^2

Density of LWD N/A m^2/km^2 **(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 _leersiw_

Portion of the reach with aquatic vegetation 100 %

WATER QUALITY (DS, US)

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

SEDIMENT/ SUBSTRATE

Odors
☐ Normal ☐ Sewage ☐ Petroleum
☐ Chemical ☐ Anaerobic ☑ None
☐ Other_____

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

Oils
☑ Absent ☐ Slight ☐ Moderate ☐ Profuse

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			Detritus	sticks, wood, coarse plant materials (CPOM)	0
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	0
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	0
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

Notes: No water present; therefore, water quality measurements were not collected. Vegetated roadside ditch which lacked stream substrate.

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

STREAM NAME S-AB16	LOCATION Montgomery County
STATION # 12448+10 RIVERMILE_____	STREAM CLASS Intermittent
LAT 37.231693 LONG -80.198778	RIVER BASIN Upper Roanoke
STORET #	AGENCY VADEQ
INVESTIGATORS AW, JB	
FORM COMPLETED BY AW, JB	DATE 8/24/21 TIME 12:00 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 0	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 0	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. Vegetated roadside ditch which lacked stream substrate.

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 2	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 10	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10	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 4	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 6	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Parameters to be evaluated broader than sampling reach

Total Score 37

Notes: No water present. Vegetated roadside ditch which lacked stream substrate.

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME S-AB16	LOCATION Montgomery County
STATION # 12448+10_____ RIVERMILE_____	STREAM CLASS Intermittent
LAT 37.231693_____ LONG -80.198778_____	RIVER BASIN Upper Roanoke
STORET #	AGENCY VADEQ

INVESTIGATORS AW, JB		LOT NUMBER
FORM COMPLETED BY AW, JB	DATE 8/24/21 TIME 12:00 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)
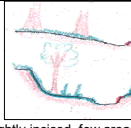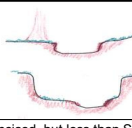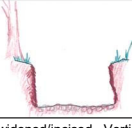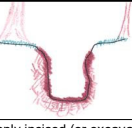
Porifera	0 1 2 3 4	Anisoptera	0 1 2 3 4	Chironomidae	0 1 2 3 4
Hydrozoa	0 1 2 3 4	Zygoptera	0 1 2 3 4	Ephemeroptera	0 1 2 3 4
Platyhelminthes	0 1 2 3 4	Hemiptera	0 1 2 3 4	Trichoptera	0 1 2 3 4
Turbellaria	0 1 2 3 4	Coleoptera	0 1 2 3 4	Other	0 1 2 3 4
Hirudinea	0 1 2 3 4	Lepidoptera	0 1 2 3 4		
Oligochaeta	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		

Stream Assessment Form (Form 1)

Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name (Applicant)	Locality	Cowardin Class.	HUC	Date	SAR #	Impact Length	Impact Factor
22865.06	Mountain Valley Pipeline (Mountain Valley Pipeline, LLC)	Montgomery County	R4	03010101	8/24/21	S-AB16	20	1

Name(s) of Evaluator(s)	Stream Name and Information	SAR Length
AW, JB	Unnamed Tributary to Roanoke River	119

1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

Conditional Category

	Optimal	Suboptimal	Marginal	Poor	Severe	
Channel Condition	Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars / bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars and transverse bars few. Transient sediment deposition covers less than 10% of bottom.	Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches, or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom.	Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% Sediment may be temporary / transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability.	Overwidened/incised. Vertically / laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary / transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent.	Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow.	CI
Scores	3	2.4	2	1.6	1	3.00

NOTES>>

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>>

	Optimal	Suboptimal		Marginal		Poor	
Riparian Buffers	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian 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% to 60% 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
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>	55%	45%				100%	
	Score >	0.5	0.6					

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

Left Bank	% Riparian Area>	100%					100%	Rt Bank CI >	0.55	CI
	Score >	0.85						Lt Bank CI >	0.85	0.70

3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

Conditional Category | NOTES>>

	Optimal	Suboptimal	Marginal	Poor	
Instream Habitat/ Available Cover	Habitat elements are typically present in greater than 50% of the reach.	Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations.	Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations.	Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach.	
					Stream Gradient	CI
Scores	1.5	1.2	0.9	0.5	High	0.50

Stream Impact Assessment Form Page 2

Project #	Project Name (Applicant)	Locality	Cowardin Class.	HUC	Date	SAR #	Impact Length	Impact Factor
22865.06	Mountain Valley Pipeline (Mountain Valley Pipeline, LLC)	Montgomery County	R4	03010101	8/24/21	S-AB16	20	1

4. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

	Conditional Category						NOTES>>
	Negligible	**Minor**		**Moderate**		**Severe**	
Channel Alteration	Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized.	Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines.	40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered.	Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement.	**Roadside vegetated ditch has completed naturalized.**

							CI
Scores	1.5	1.3	1.1	0.9	0.7	0.5	1.50

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) >>	1.14

RCI= (Sum of all CI's)/5, except if stream is ephemeral RCI = (Riparian CI/2)

COMPENSATION REQUIREMENT (CR) >>	23

$CR = RCI \times L_I \times IF$

INSERT PHOTOS:

(WSSI Photo Location "L:\22000s\22800\22865.06\Admin\05-ENVR\Field Data\Spread H\Field Forms\S-AB16\Photos\DS VIEW.jpg")

Looking downstream at S-AB16 within the ROW looking E. Assessment is limited to areas within the temporary ROW.

DESCRIBE PROPOSED IMPACT:
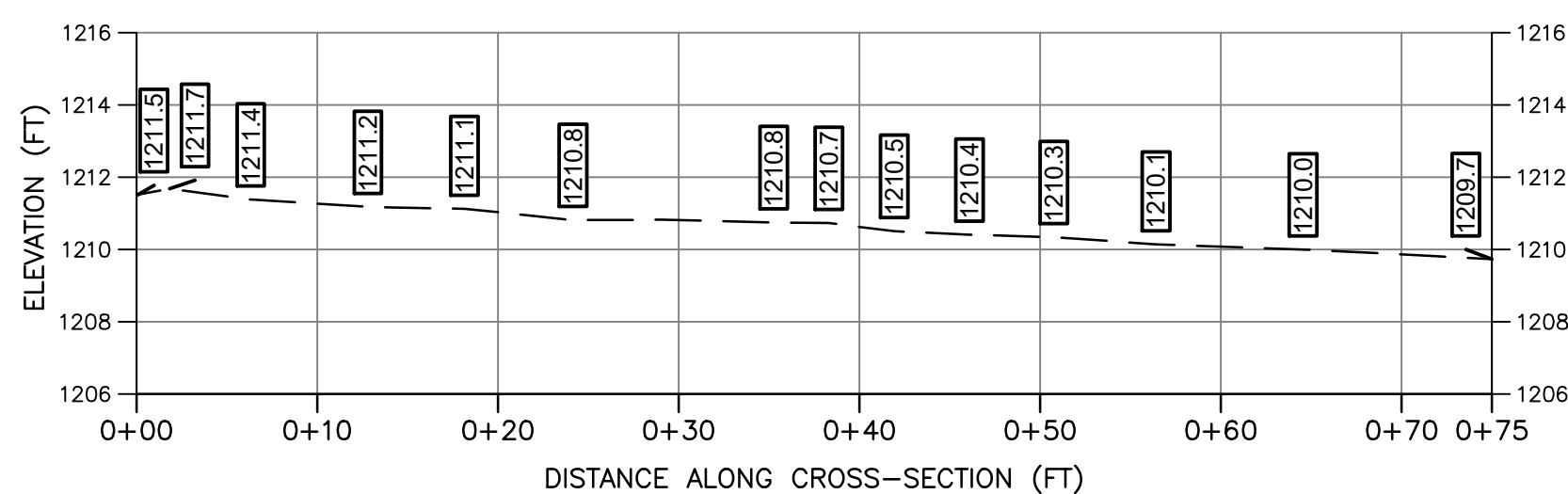
PROVIDED UNDER SEPARATE COVER

TETRA TECH, INC.
661 ANDERSEN DRIVE FOSTER PLAZA 7
PITTSBURGH, PA 15220
TEL: (412) 921-7090 FAX: (412) 921-4040
E-Mail Address: WWW.TETRATECH.COM
tetratech.com

LEGEND

— ·· — ·· — STUDY AREA (EASEMENT)

— · — · — EXISTING SURVEY—LOCATED THALWEG

—1900— EXISTING MAJOR CONTOUR

—1904— EXISTING MINOR CONTOUR

NORTH

UNNAMED TRIBUTARY
TO ROANOKE RIVER

N 13519919.39
E 1873590.39
X-SEC A

FLOW
—1214—
—1212—
—1212—
—1214—

N 13519892.60
E 1873603.89

GRAPHIC SCALE
30 10 0 20   40

S-AB16

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 REAL TIME DGPS.   FIELD LOCATIONS WERE COMPLETED ON AUGUST 24, 2021.

2. EASEMENT LINES SHOWN ON PLAN VIEW WERE PROVIDED BY MOUNTAIN VALLEY PIPELINE.

3. SURVEY POINTS FOR CROSS SECTIONS AND THALWEG PROFILES COLLECTED IN 2021 HAVE BEEN USED IN COMBINATION WITH SURVEY POINTS COLLECTED PREVIOUSLY IN 2020 IN ORDER TO GENERATE THE PRE-CROSSING SURFACE SHOWN IN PLAN. DUE TO NATURAL EROSIONAL STREAM PROCESSES THAT CAN OCCUR OVER TIME, MINOR ADJUSTMENTS TO THE PROFILE ALIGNMENTS MAY HAVE BEEN REQUIRED IN ORDER TO GENERATE A CLEAN PRE-CROSSING SURFACE.

4. ALL SECTION VIEWS SHOWN LEFT TO RIGHT FACING DOWNSTREAM.

S-AB16 BASELINE CROSS—SECTION A PIPE CL

EX. THALWEG
EL.: 1210.7

ELEVATION (FT)

DISTANCE ALONG CROSS—SECTION (FT)

PRE-CROSSING PHOTOS

PHOTO TAKEN AUGUST 24, 2021 LOOKING
DOWNSTREAM FROM UPSTREAM IMPACT LIMITS

PHOTO TAKEN AUGUST 24, 2021 LOOKING
UPSTREAM FROM DOWNSTREAM IMPACT LIMITS

POST-CROSSING PHOTOS

PENDING CROSSING

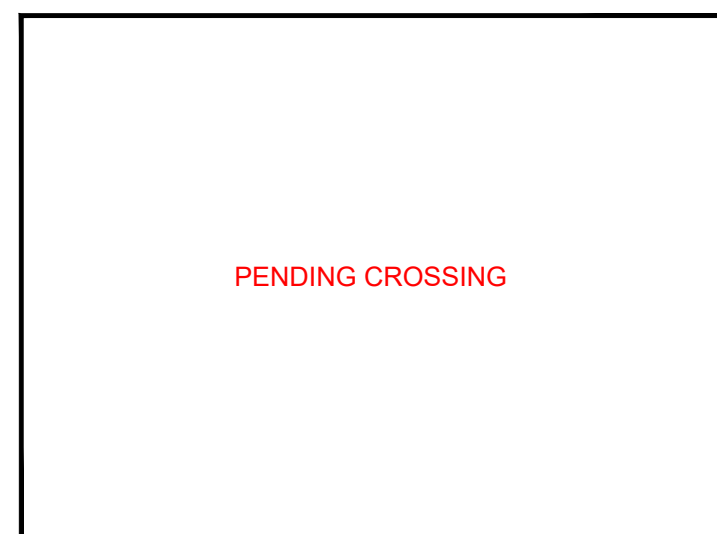PHOTO TAKEN LOOKING DOWNSTREAM
FROM UPSTREAM IMPACT LIMITS

PENDING CROSSING

PHOTO TAKEN LOOKING UPSTREAM FROM
DOWNSTREAM IMPACT LIMITS

S-AB16 BASELINE THALWEG PROFILE

ELEVATION (FT)

1211.5 | 1211.7 | 1211.4 | 1211.2 | 1211.1 | 1210.8 | 1210.8 | 1210.7 | 1210.5 | 1210.4 | 1210.3 | 1210.1 | 1210.0 | 1209.7

DISTANCE ALONG CROSS—SECTION (FT)

PROFILE LEGEND

—— EXISTING STREAM PROFILE
INVERT ALONG THALWEG

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

CROSS SECTION LEGEND

— — EXISTING GRADE

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

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)

CL STAKEOUT POINTS: S-AB16 CROSS SECTION A (PIPE CL)					
	PRE-CROSSING			POST-CROSSING	
PT. LOC.	NORTHING	EASTING	ELEV	VERT. DIFF.	HORZ. DIFF.
TS-L	13519912.0300	1873594.1100'	1213.390'		
BS-L	13519907.4400	1873597.0420'	1210.915'		
THW	13519905.9300	1873597.9940'	1210.673'		
BS-R	13519904.0500	1873599.5620'	1211.077'		
TS-R	-	-	-		

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

TETRA TECH

Client
MOUNTAIN VALLEY PIPELINE, LLC
2200 ENERGY DRIVE, 2ND FLOOR
CANONSBURG, PA 15317

Title
PROFILE AND CROSS-SECTIONS
BASELINE SURVEY
CROSSING S-AB16 – UNNAMED TRIB. TO
ROANOKE RIVER (MP 235.58)
MONTGOMERY COUNTY, VA

1
Drawing No.