

Baseline Assessment – Stream Attributes

Reach S-I63 ROW (Pipeline ROW)

Perennial

Spread B

Lewis County, West Virginia

Data	Included
Photos	✓
SWVM Form	✓ Water Quality readings from benthic sampling date
FCI Calculator and HGM Form	N/A – Perennial stream (not shadeable, slope <4%)
RBP Physical Characteristics Form	✓
Water Quality Data	✓
RBP Habitat Form	✓
RBP Benthic Form	✓
Benthic Identification Sheet	✓ Sampling date 9/14/2021
Wolman Pebble Count	✓
Reference Reach Software Pebble Count Data	✓
Longitudinal Profile and Cross Sections	✓

Spread B Stream S-I63 ROW (Pipeline ROW) Lewis County



Photo Type: DS, US View

Location, Orientation, Photographer Initials: Downstream Edge of ROW, Upstream View, PL, AE
Lat: 39.969369 Long: -80.593138



Photo Type: DS, DS View

Location, Orientation, Photographer Initials: Downstream Edge of ROW, Downstream View, PL, AE
Lat: 39.969369 Long: -80.593138

Spread B Stream S-I63 ROW (Pipeline ROW) Lewis County



Photo Type: US View at Center
Location, Orientation, Photographer Initials: Center ROW, Upstream View, PL, AE
Lat: 39.969369 Long: -80.593138



Photo Type: DS View at Center
Location, Orientation, Photographer Initials: ROW Center, Downstream View, PL, AE
Lat: 39.969369 Long: -80.593138

Spread B Stream S-I63 ROW (Pipeline ROW) Lewis County

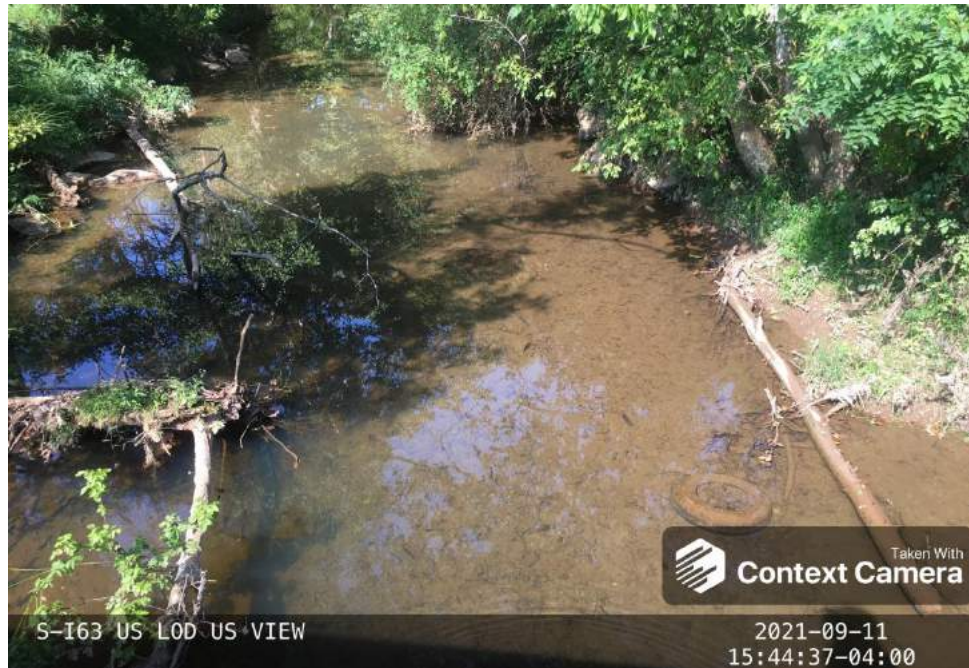


Photo Type: US, US View

Location, Orientation, Photographer Initials: Upstream Edge of ROW, Upstream View, PL, AE
Lat: 39.969369 Long: -80.593138

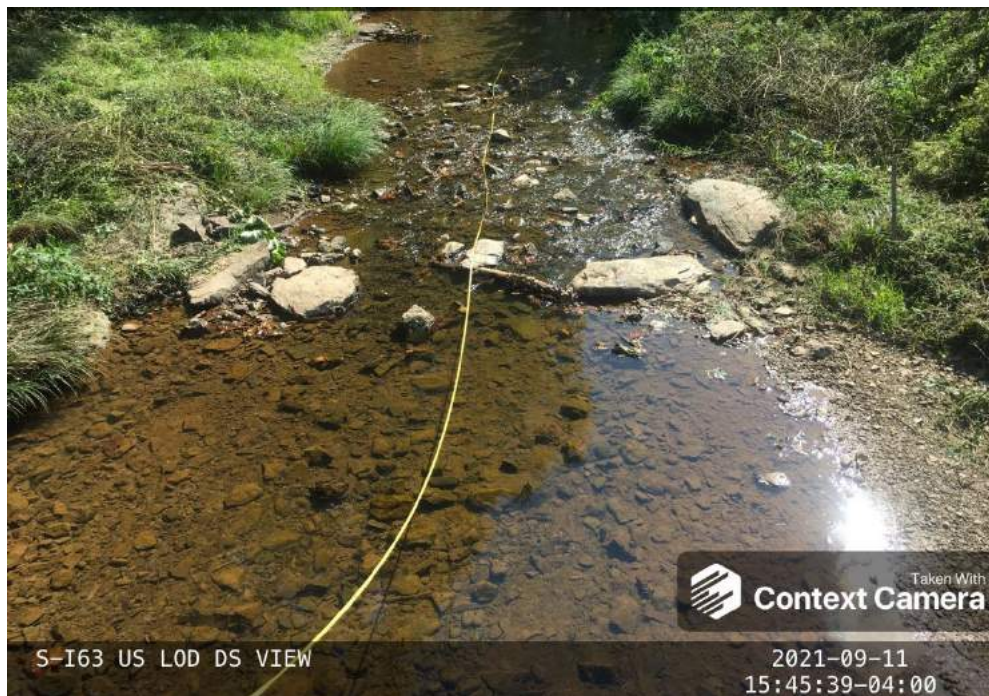


Photo Type: US, DS View

Location, Orientation, Photographer Initials: Upstream Edge of ROW, Downstream View, PL, AE
Lat: 39.969369 Long: -80.593138

Spread B Stream S-I63 ROW (Pipeline ROW) Lewis County

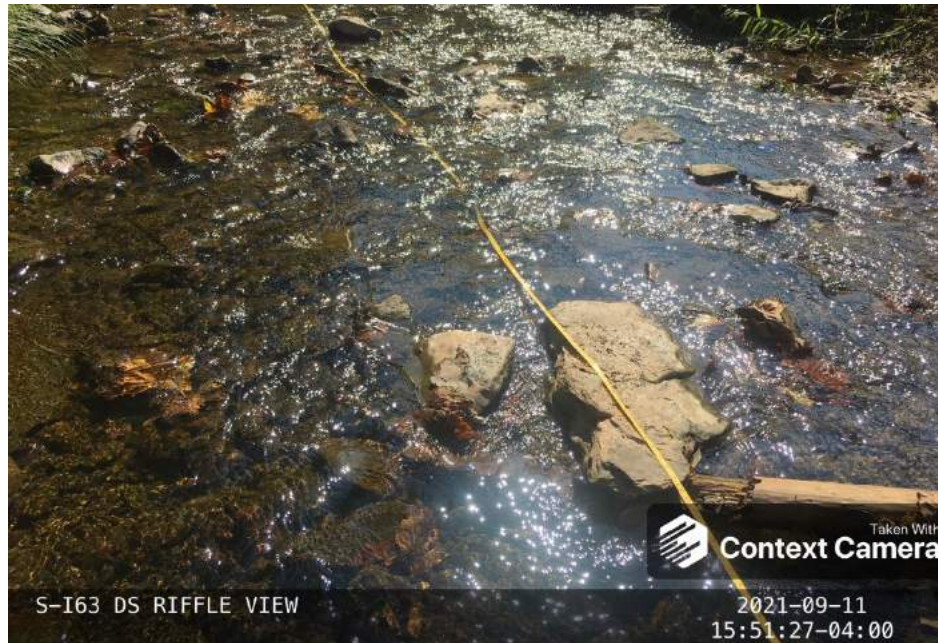


Photo Type: Riffle, DS View

Location, Orientation, Photographer Initials: Upstream of Riffle, Downstream View, PL, AE
Lat: 39.969369 Long: -80.593138



Photo Type: Riffle, US View

Location, Orientation, Photographer Initials: Downstream of Riffle, Upstream View, PL, AE
Lat: 39.969369 Long: -80.593138

Spread B Stream S-I63 ROW (Pipeline ROW) Lewis County



Photo Type: Pool, DS View
Location, Orientation, Photographer Initials: Upstream of Pool, Downstream View, PL, AE
Lat: 39.969369 Long: -80.593138



Photo Type: Pool, US View
Location, Orientation, Photographer Initials: Downstream of Pool, Upstream View, PL, AE
Lat: 39.969369 Long: -80.593138

USACE FILE NO/ Project Name: (v2.1, Sept 2015)		Mountain Valley Pipeline		IMPACT COORDINATES: (in Decimal Degrees)		Lat.	38.969369	Lon.	-80.593138	WEATHER:		Sunny	DATE:		9/14/2021		
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size (acresage), unaltered or (impairments))				S-63 ROW Pipeline ROW				MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (watershed size (acresage), unaltered or (impairments))				Comments:					
STREAM IMPACT LENGTH:		60	FORM OF MITIGATION:		RESTORATION (Levels I-III)		MIT COORDINATES: (in Decimal Degrees)		Lat.		Lon.		PRECIPITATION PAST 48 HRS:		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:			Perennial			Stream Classification:			0			Stream Classification:			0		
Percent Stream Channel Slope			0.2			Percent Stream Channel Slope			0			Percent Stream Channel Slope			0		
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					
Habitat			Habitat			Habitat			Habitat			Habitat					
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					
2. Embeddedness			2. Embeddedness			2. Embeddedness			2. Embeddedness			2. Embeddedness					
3. Velocity/ Depth Regime			3. Velocity/ Depth Regime			3. Velocity/ Depth Regime			3. Velocity/ Depth Regime			3. Velocity/ Depth Regime					
4. Sediment Deposition			4. Sediment Deposition			4. Sediment Deposition			4. Sediment Deposition			4. Sediment Deposition					
5. Channel Flow Status			5. Channel Flow Status			5. Channel Flow Status			5. Channel Flow Status			5. Channel Flow Status					
6. Channel Alteration			6. Channel Alteration			6. Channel Alteration			6. Channel Alteration			6. Channel Alteration					
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)					
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)					
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)					
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)					
Total RBP Score			Suboptimal			Total RBP Score			Poor			Total RBP Score			Poor		
Sub-Total			0.585			Sub-Total			0			Sub-Total			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					
200-299 - 80 points			0-80			200-299 - 80 points			0-80			200-299 - 80 points			0-80		
pH			0-1			pH			0-1			pH			0-1		
6.0-8.0 = 80 points			0-80			6.0-8.0 = 80 points			0-80			6.0-8.0 = 80 points			0-80		
DO						DO						DO					
>5.0 = 30 points			10-30			>5.0 = 30 points			10-30			>5.0 = 30 points			10-30		
Sub-Total			0.95			Sub-Total			0			Sub-Total			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)					
Grey Zone			0-100 0-1			Grey Zone			0-100 0-1			Grey Zone			0-100 0-1		
Sub-Total			0.652			Sub-Total			0			Sub-Total			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			Linear Feet			Index			Linear Feet			Index			Linear Feet		
Unit Score			Unit Score			Unit Score			Unit Score			Unit Score			Unit Score		
0.729			60			43.74			0			0			0		

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME _____		LOCATION _____	
STATION # _____ RIVERMILE _____		STREAM CLASS _____	
LAT _____ LONG _____		RIVER BASIN _____	
STORET # _____		AGENCY _____	
INVESTIGATORS _____			
FORM COMPLETED BY _____		DATE _____ TIME _____	REASON FOR SURVEY _____

WEATHER CONDITIONS	<table style="width: 100%;"> <tr> <td style="width: 33%; vertical-align: top;"> Now storm (heavy rain) _____ rain (steady rain) _____ showers (intermittent) _____ %cloud cover _____ clear/sunny _____ </td> <td style="width: 33%; vertical-align: top;"> Past 24 hours _____% _____% </td> <td style="width: 33%; vertical-align: top;"> Has there been a heavy rain in the last 7 days? Yes No Air Temperature _____ °C Other _____ </td> </tr> </table>			Now storm (heavy rain) _____ rain (steady rain) _____ showers (intermittent) _____ %cloud cover _____ clear/sunny _____	Past 24 hours _____% _____%	Has there been a heavy rain in the last 7 days? Yes No Air Temperature _____ °C Other _____			
Now storm (heavy rain) _____ rain (steady rain) _____ showers (intermittent) _____ %cloud cover _____ clear/sunny _____	Past 24 hours _____% _____%	Has there been a heavy rain in the last 7 days? Yes No Air Temperature _____ °C Other _____							
SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph) 								
STREAM CHARACTERIZATION	<table style="width: 100%;"> <tr> <td style="width: 33%; vertical-align: top;"> Stream Subsystem Perennial Intermittent Tidal </td> <td style="width: 33%; vertical-align: top;"> Stream Type Coldwater Warmwater </td> <td style="width: 33%; vertical-align: top;"> Catchment Area _____ km² </td> </tr> <tr> <td style="vertical-align: top;"> Stream Origin Glacial Non-glacial montane Swamp and bog </td> <td style="vertical-align: top;"> Spring-fed Mixture of origins Other _____ </td> <td></td> </tr> </table>			Stream Subsystem Perennial Intermittent Tidal	Stream Type Coldwater Warmwater	Catchment Area _____ km ²	Stream Origin Glacial Non-glacial montane Swamp and bog	Spring-fed Mixture of origins Other _____	
Stream Subsystem Perennial Intermittent Tidal	Stream Type Coldwater Warmwater	Catchment Area _____ km ²							
Stream Origin Glacial Non-glacial montane Swamp and bog	Spring-fed Mixture of origins Other _____								

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse Forest _____ Field/Pasture _____ Agricultural _____ Residential _____ Commercial _____ Industrial _____ Other _____	Local Watershed NPS Pollution No evidence <input type="checkbox"/> 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 _____	
INSTREAM FEATURES	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Estimated Reach Length _____ m Estimated Stream Width _____ m Sampling Reach Area _____ m² Area in km² (m²x1000) _____ km² Estimated Stream Depth _____ m Surface Velocity (at thalweg) _____ m/sec </div> <div style="width: 45%;"> Canopy Cover Partly open _____ Partly shaded _____ Shaded _____ High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types Riffle _____ % Run _____ % Pool _____ % Channelized Yes _____ No _____ Dam Present Yes _____ No _____ </div> </div>	
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ 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 _____ Portion of the reach with aquatic vegetation _____ %	
WATER QUALITY (DS, US)	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Temperature _____ °C Specific Conductance _____ Dissolved Oxygen _____ pH _____ Turbidity _____ WQ Instrument Used _____ </div> <div style="width: 45%;"> Water Odors Normal/None _____ Sewage _____ Petroleum _____ Chemical _____ Fishy _____ Other _____ Water Surface Oils Slick _____ Sheen _____ Globs _____ Flecks _____ None _____ Other _____ Turbidity (if not measured) Clear <input type="checkbox"/> Slightly turbid _____ Turbid _____ Opaque _____ Stained _____ Other _____ </div> </div>	
SEDIMENT/ SUBSTRATE	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Odors Normal _____ Sewage _____ Petroleum _____ Chemical _____ Anaerobic _____ None _____ Other _____ </div> <div style="width: 45%;"> 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 _____ </div> </div>	

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

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

STREAM NAME		LOCATION	
STATION # _____ RIVERMILE _____		STREAM CLASS	
LAT _____ LONG _____		RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ TIME _____ AM PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
	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	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	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	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	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	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

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

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	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	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)	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.					
Note: determine left or right side by facing downstream.																					
SCORE ____ (LB)	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
SCORE ____ (RB)	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 ____ (LB)	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
SCORE ____ (RB)	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 ____ (LB)	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
SCORE ____ (RB)	Right Bank	10	9			8	7	6			5	4	3			2	1	0			

Total Score _____

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME S-I63 ROW		LOCATION Lewis County	
STATION # _____ RIVERMILE _____		STREAM CLASS Perennial	
LAT <u>38.969369</u> LONG <u>-80.593138</u>		RIVER BASIN None	
STORET # _____		AGENCY WVDEP	
INVESTIGATORS AJE ER		LOT NUMBER _____	
FORM COMPLETED BY ER		DATE <u>9-14-21</u> TIME <u>8:36</u>	REASON FOR SURVEY Baseline Assessment

HABITAT TYPES	Indicate the percentage of each habitat type present <input checked="" type="checkbox"/> Cobble <u>75</u> % <input type="checkbox"/> Snags _____ % <input type="checkbox"/> Vegetated Banks _____ % <input checked="" type="checkbox"/> Sand <u>25</u> % <input type="checkbox"/> Submerged Macrophytes _____ % <input type="checkbox"/> Other (_____) _____ %
SAMPLE COLLECTION	Gear used <input type="checkbox"/> D-frame <input checked="" type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" 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 checked="" type="checkbox"/> Cobble <u>4</u> <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	DS: temp: 19.02 SPC: 228 DO: 7.79 pH: 7.70 US: temp: 19.03 SPC: 230 DO: 8 pH: 7.7

QUALITATIVE LISTING OF AQUATIC BIOTA

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

Periphyton	<u>0</u>	1	2	3	4	Slimes	<u>0</u>	1	2	3	4
Filamentous Algae	<u>0</u>	1	2	3	4	Macroinvertebrates	0	1	<u>2</u>	3	4
Macrophytes	<u>0</u>	1	2	3	4	Fish	0	1	<u>2</u>	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						

SITE ID: S-163 ROW

9/14/2021

Insects	Count	Tolerance	TV	Insects	Count	Tolerance	TV	Non-Insects	Count	Tolerance	TV
Ephemeroptera			46	Odonata			5	Crustacea			0
Ameletidae		2	0	Aeshnidae		3	0	Asellidae		7	0
Baetidae	6	4	24	Calopterygidae	4	6	24	Cambaridae		5	0
Beatiscidae	3	4	12	Coenagrionidae		7	0	Gammaridae		5	0
Caenidae		5	0	Cordulegastridae		3	0	Palaemonidae		5	0
Ephemerellidae		3	0	Gomphidae	1	5	5	Annellida			0
Ephemeridae		5	0	Lestidae		7	0	Hirudinea		10	0
Heptageniidae	30	3	90	Libellulidae		7	0	Nematoda		10	0
Isonychiidae	7	3	21	Coleoptera			86	Nematomorpha		10	0
Leptophlebiidae		4	0	Chrysomelidae		7	0	Oligochaeta		10	0
Potamanthidae		5	0	Dryopidae		5	0	Turbellaria			0
Siphonuridae		3	0	Dytiscidae		6	0	Turbellaria		7	0
Tricorythidae		5	0	Elmidae	69	4	276	Bivalvia			0
Plecoptera			0	Gyrinidae		5	0	Corbiculidae		6	0
Capniidae		2	0	Haliplidae		7	0	Sphaeriidae		5	0
Chloroperlidae		2	0	Hydrophilidae		7	0	Unionidae		4	0
Leuctridae		2	0	Psephenidae	17	3	51	Gastropoda			0
Nemouridae		2	0	Ptilodactylidae		5	0	Ancylidae		7	0
Peltoperlidae		1	0	Hemiptera			0	Hydrobiidae		4	0
Perlidae		1	0	Belostomatidae		8	0	Physidae		7	0
Perlodidae		1	0	Corixidae		8	0	Planorbidae		5	0
Pteronarcyidae		1	0	Gerridae		10	0	Pleuroceridae		5	0
Taeniopterygidae		2	0	Hydrometridae		8	0	Viviparidae		5	0
Trichoptera			31	Nepidae		8	0	Miscellaneous			0
Brachycentridae		2	0	Notonectidae		8	0	Collembola		6	0
Glossosomatidae		2	0	Megaloptera			4	Lepidoptera		5	0
Helicopsychidae		3	0	Corydalidae	4	3	12	Neuroptera		5	0
Hydropsychidae	27	5	135	Sialidae		6	0	Hydrachnidae		6	0
Hydroptilidae		3	0	Diptera			43	Totals	Total number	215	
Lepidostomatidae		3	0	Atheriidae		3	0		Total families	14	
Leptoceridae		3	0	Blephariceridae		2	0	Metric calculations			
Limnephilidae		4	0	Ceratopogonidae	1	8	8	WVSCI Metric Scores			
Molannidae		3	0	Chironomidae	33	9	297				
Philopotamidae	4	4	16	Culicidae		10	0	Total Taxa		14	63.6
Phryganeidae		4	0	Dixidae		6	0	EPT Taxa		6	46.2
Polycentropodidae		5	0	Empididae		7	0	% EPT Abundance		35.8	40.1
Psychomiidae		4	0	Psychodidae		8	0	% Chironomidae		15.3	86.1
Rhyacophilidae		3	0	Ptychopteridae		8	0	Hilsenhoff Biotic Index (HBI)		4.73	71.4
Uenoidae		2	0	Simuliidae		7	0	% 2 Dominant Taxa		47.4	83.8
Total Tolerance Value			1016	Stratiomyidae		10	0	WV Stream Condition Index			
West Virginia Stream Condition Index (WVSCI)				Syrphidae		10	0				
Gerritson, J., J. Burton, and M.T. Barbour. 2000. A stream condition index for West Virginia wadeable streams. Tetra Tech, Inc. Owings Mills, MD.				Tabanidae		7	0				
				Tipulidae	9	5	45				

WOLMAN PEBBLE COUNT FORM

County:	Lewis
Stream Name:	Sand Fork ROW
HUC Code:	
Survey Date:	8/30/2021
Surveyors:	PEL, AJE
Type:	Bankfull Channel

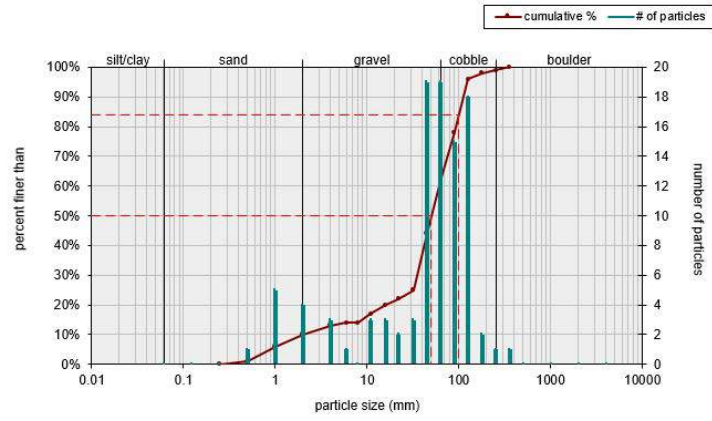
Stream ID: S-I63 ROW

Basin:

Impact Reach: 24m

PEBBLE COUNT							
Inches	PARTICLE	Millimeters		Particle Count	Total #	Item %	% Cum
	Silt/Clay	< .062	S/C	▲ ▼	0	0.00	0.00
	Very Fine	.062-.125	S A N D	▲ ▼	0	0.00	0.00
	Fine	.125-.25		▲ ▼	0	0.00	0.00
	Medium	.25-.5		▲ ▼	1	1.00	1.00
	Coarse	.50-1.0		▲ ▼	5	5.00	6.00
.04-.08	Very Coarse	1.0-2		▲ ▼	4	4.00	10.00
.08 -.16	Very Fine	2 -4		G R A V E L	▲ ▼	3	3.00
.16 - .22	Fine	4 -5.7	▲ ▼		1	1.00	14.00
.22 - .31	Fine	5.7 - 8	▲ ▼		0	0.00	14.00
.31 - .44	Medium	8 -11.3	▲ ▼		3	3.00	17.00
.44 - .63	Medium	11.3 - 16	▲ ▼		3	3.00	20.00
.63 - .89	Coarse	16 -22.6	▲ ▼		2	2.00	22.00
.89 - 1.26	Coarse	22.6 - 32	▲ ▼		3	3.00	25.00
1.26 - 1.77	Vry Coarse	32 - 45	▲ ▼		19	19.00	44.00
1.77 -2.5	Vry Coarse	45 - 64	▲ ▼		19	19.00	63.00
2.5 - 3.5	Small	64 - 90	C O B B L E		▲ ▼	15	15.00
3.5 - 5.0	Small	90 - 128		▲ ▼	18	18.00	96.00
5.0 - 7.1	Large	128 - 180		▲ ▼	2	2.00	98.00
7.1 - 10.1	Large	180 - 256		▲ ▼	1	1.00	99.00
10.1 - 14.3	Small	256 - 362	B O U L D E R	▲ ▼	1	1.00	100.00
14.3 - 20	Small	362 - 512		▲ ▼	0	0.00	100.00
20 - 40	Medium	512 - 1024		▲ ▼	0	0.00	100.00
40 - 80	Large	1024 -2048		▲ ▼	0	0.00	100.00
80 - 160	Vry Large	2048 -4096		▲ ▼	0	0.00	100.00
	Bedrock		BDRK	▲ ▼	0	0.00	100.00
				Totals:	100		
	Total Tally:						

Riffle Surface Pebble Count, S-I63 ROW



Size (mm)		Size Distribution		Type	
D16	9.9	mean	31.5	silt/clay	0%
D35	38	dispersion	3.5	sand	10%
D50	50	skewness	-0.20	gravel	53%
D65	67			cobble	36%
D84	100			boulder	1%
D95	130				



— — — — —	STUDY AREA (EASEMENT)
— . — . —	EXISTING SURVEY-LOCATED THALWEG
1176.87 +	EXISTING SURVEYED GROUND SHOT ELEVATION

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 30, 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.
5. POST-CROSSING SURVEY INFORMATION SHOWN IN RED. DATA PENDING.
6. POST-CROSSING SURVEY POINTS FOR CROSS SECTIONS AND THALWEG ARE PROJECTED ONTO PRE-CROSSING SECTION AND PROFILE VIEWS FOR COMPARISON.

CAD File No.	GR
Drawn	GH
Checked	DW
Approved	NOTED
Scale:	OCT. 2021
Date:	112IC07157
Project No.	



TETRA TECH

www.tetrattech.com

E AND CROSS-SECTIONS
BASELINE SURVEY
ING S-163 - SAND FORK
(MP 55.12)
LEWIS COUNTY, WV

1
Drawing No.



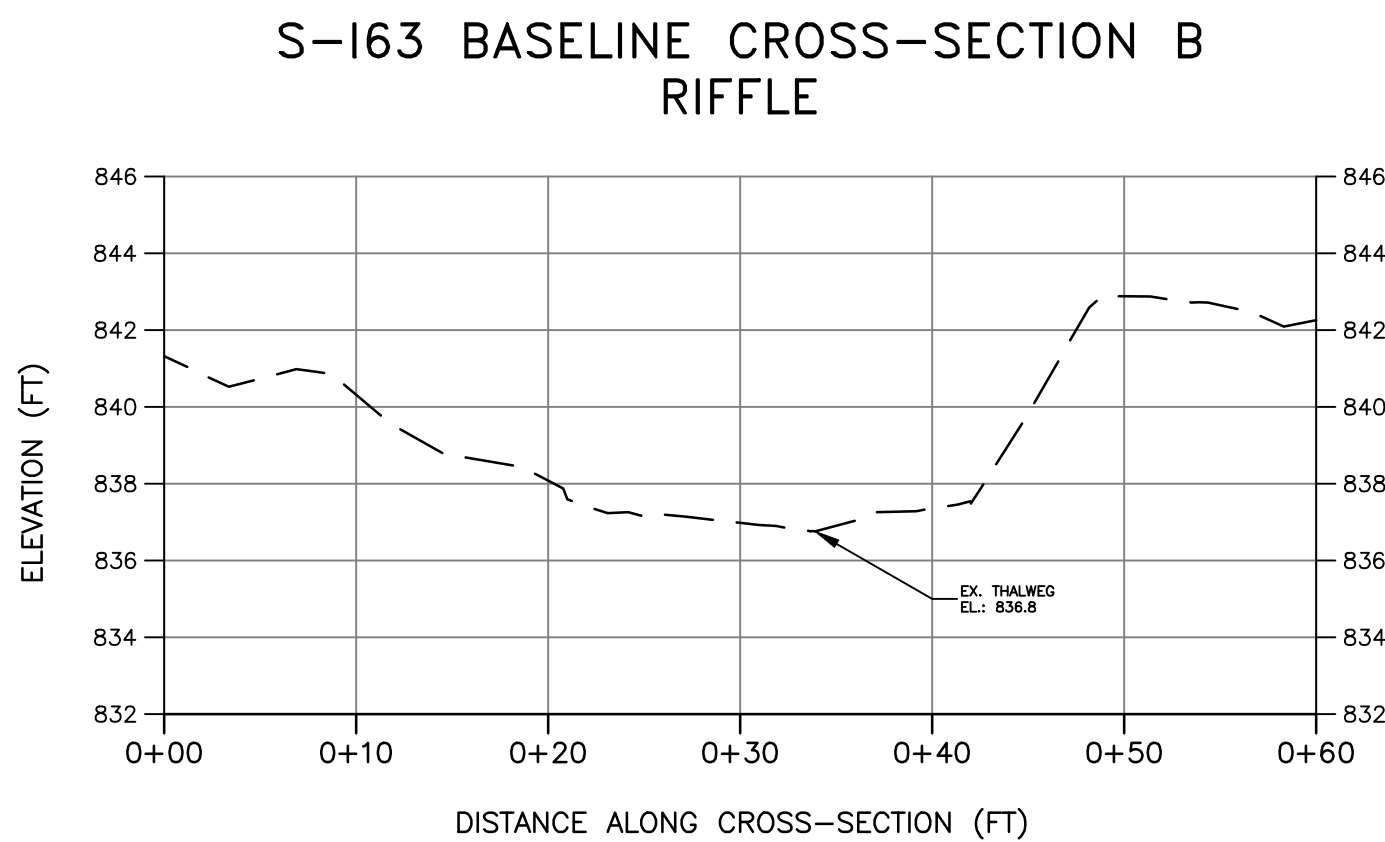
TYPICAL 5-POINT CROSS-SECTION
(FACING DOWNSTREAM)

TS-L TS-R

BS-L THW BS-R

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

AS-BUILT TABLE: 5-I63 CROSS SECTION A					
PRE-CROSSING				AS-BUILT	
PT. LOC.	NORTHING	EASTING	ELEV	VERT. DIFF.	HORZ. DIFF.
TS-L	14151702.06	1756077.10	842.63		
BS-L	14151708.86	1756066.15	837.54		
THW	14151715.66	1756055.21	836.76		
BS-R	14151720.05	1756048.14	937.88		
TS-R	14151723.36	1756042.82	840.92		



CROSS SECTION LEGEND	
— — —	EXISTING GRADE

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

PRE-CROSSING PHOTOS



PHOTO TAKEN LOOKING DOWNSTREAM
FROM UPSTREAM IMPACT LIMITS



PHOTO TAKEN 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

PRE-CROSSING

PRELIMINARY