

## Baseline Assessment – Stream Attributes

### Reach S-H160 (Timber Mat Crossing) Perennial Spread B Lewis County, West Virginia

Data	Included
Photos	✓
SWVM Form	✓
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	N/A – No Habitat
Wolman Pebble Count	✓
Reference Reach Software Pebble Count Data	✓
Longitudinal Profile and Cross Sections	✓

**Spread B      Stream S-H160 (Timber Mat Crossing)      Lewis County**



Photo Type: DS, US View

Location, Orientation, Photographer Initials: Downstream Edge of ROW, Upstream View, PEL/AJE

Lat: 38.933179 Long: -80.584562



Photo Type: DS, DS View

Location, Orientation, Photographer Initials: Downstream Edge of ROW, Downstream View, PEL/AJE

Lat: 38.933179 Long: -80.584562

**Spread B      Stream S-H160 (Timber Mat Crossing)      Lewis County**



Photo Type: US View at Center  
Location, Orientation, Photographer Initials: Center ROW, Upstream View, PEL/AJE  
Lat: 38.933179 Long: -80.584562



Photo Type: DS View at Center  
Location, Orientation, Photographer Initials: ROW Center, Downstream View, PEL/AJE  
Lat: 38.933179 Long: -80.584562

**Spread B      Stream S-H160 (Timber Mat Crossing)      Lewis County**



Photo Type: US, US View  
Location, Orientation, Photographer Initials: Upstream Edge of ROW, Upstream View, PEL/AJE  
Lat: 38.933179 Long: -80.584562



Photo Type: US, DS View  
Location, Orientation, Photographer Initials: Upstream Edge of ROW, Downstream View, PEL/AJE  
Lat: 38.933179 Long: -80.584562

**Spread B      Stream S-H160 (Timber Mat Crossing)      Lewis County**



Photo Type: Riffle, DS View  
Location, Orientation, Photographer Initials: Upstream of Riffle, Downstream View, PEL/AJE  
Lat: 38.933179 Long: -80.584562



Photo Type: Riffle, US View  
Location, Orientation, Photographer Initials: Downstream of Riffle, Upstream View, PEL/AJE  
Lat: 38.933179 Long: -80.584562

**Spread B      Stream S-H160 (Timber Mat Crossing)      Lewis County**



Photo Type: Pool, DS View

Location, Orientation, Photographer Initials: Upstream of Pool, Downstream View, PEL/AJE  
Lat: 38.933179 Long: -80.584562



Photo Type: Pool, US View

Location, Orientation, Photographer Initials: Downstream of Pool, Upstream View, PEL/AJE  
Lat: 38.933179 Long: -80.584562

USACE FILE NO./ Project Name: (v2.1, Sept 2015)				Mountain Valley Pipeline				IMPACT COORDINATES: (in Decimal Degrees)		Lat.	38.933179		Lon.	-80.584562		WEATHER:		Sunny		DATE:		8/30/2021									
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)						S-H160						MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)						Comments:													
STREAM IMPACT LENGTH:				23		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:						Stream Classification:				0		Stream Classification:				0		Stream Classification:				0			
Percent Stream Channel Slope				0.1		Percent Stream Channel Slope						Percent Stream Channel Slope				0		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):						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							
Points Scale Range Site Score						Points Scale Range Site Score						Points Scale Range Site Score						Points Scale Range Site Score						Points Scale Range Site Score							
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 0-20 12						1. Epifaunal Substrate/Available Cover 0-20						1. Epifaunal Substrate/Available Cover 0-20						1. Epifaunal Substrate/Available Cover 0-20						1. Epifaunal Substrate/Available Cover 0-20							
2. Embeddedness 0-20 11						2. Embeddedness 0-20						2. Embeddedness 0-20						2. Embeddedness 0-20						2. Embeddedness 0-20							
3. Velocity/ Depth Regime 0-20 14						3. Pool Substrate Characterization 0-20						3. Velocity/ Depth Regime 0-20						3. Velocity/ Depth Regime 0-20						3. Velocity/ Depth Regime 0-20							
4. Sediment Deposition 0-20 11						4. Sediment Deposition 0-20						4. Sediment Deposition 0-20						4. Sediment Deposition 0-20						4. Sediment Deposition 0-20							
5. Channel Flow Status 0-20 15						5. Channel Flow Status 0-20						5. Channel Flow Status 0-20						5. Channel Flow Status 0-20						5. Channel Flow Status 0-20							
6. Channel Alteration 0-20 0						6. Channel Alteration 0-20						6. Channel Alteration 0-20						6. Channel Alteration 0-20						6. Channel Alteration 0-20							
7. Frequency of Riffles (or bends) 0-20 16						7. Channel Sinuosity 0-20						7. Frequency of Riffles (or bends) 0-20						7. Frequency of Riffles (or bends) 0-20						7. Frequency of Riffles (or bends) 0-20							
8. Bank Stability (LB & RB) 0-20 19						8. Bank Stability (LB & RB) 0-20						8. Bank Stability (LB & RB) 0-20						8. Bank Stability (LB & RB) 0-20						8. Bank Stability (LB & RB) 0-20							
9. Vegetative Protection (LB & RB) 0-20 18						9. Vegetative Protection (LB & RB) 0-20						9. Vegetative Protection (LB & RB) 0-20						9. Vegetative Protection (LB & RB) 0-20						9. Vegetative Protection (LB & RB) 0-20							
10. Riparian Vegetative Zone Width (LB & RB) 0-20 2						10. Riparian Vegetative Zone Width (LB & RB) 0-20						10. Riparian Vegetative Zone Width (LB & RB) 0-20						10. Riparian Vegetative Zone Width (LB & RB) 0-20						10. Riparian Vegetative Zone Width (LB & RB) 0-20							
Total RBP Score Suboptimal 118						Total RBP Score Poor 0						Total RBP Score Poor 0						Total RBP Score Poor 0						Total RBP Score Poor 0							
Sub-Total 0.59						Sub-Total 0						Sub-Total 0						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 0-90 229						Specific Conductivity 0-90						Specific Conductivity 0-90						Specific Conductivity 0-90						Specific Conductivity 0-90							
pH						pH						pH						pH						pH							
6.0-8.0 = 80 points 0-80 8						pH 5-90						pH 5-90						pH 5-90						pH 5-90							
DO						DO						DO						DO						DO							
>5.0 = 30 points 10-30 9.1						DO 10-30						DO 10-30						DO 10-30						DO 10-30							
Sub-Total 0.95						Sub-Total 0						Sub-Total 0						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)							
0 0-100 0-1						0 0-100 0-1						0 0-100 0-1						0 0-100 0-1						0 0-100 0-1							
Sub-Total 0						Sub-Total 0						Sub-Total 0						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		Unit Score		Index				Linear Feet		Unit Score		Index				Linear Feet		Unit Score		Index				Linear Feet		Unit Score	
0.770				23		17.71		0				0		0		0				0		0		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 _____

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

# PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> Forest _____ Field/Pasture _____ Agricultural _____ Residential _____ Commercial _____ Industrial _____ Other _____	<b>Local Watershed NPS Pollution</b> No evidence <input type="checkbox"/> Some potential sources Obvious sources _____ <b>Local Watershed Erosion</b> None _____ Moderate _____ Heavy _____
<b>RIPARIAN VEGETATION (18 meter buffer)</b>	<b>Indicate the dominant type and record the dominant species present</b> Trees _____ Shrubs _____ Grasses _____ Herbaceous _____ <b>Dominant species present</b> _____	
<b>INSTREAM FEATURES</b>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <b>Estimated Reach Length</b> _____ m  <b>Estimated Stream Width</b> _____ m  <b>Sampling Reach Area</b> _____ m<sup>2</sup>  <b>Area in km<sup>2</sup> (m<sup>2</sup>x1000)</b> _____ km<sup>2</sup>  <b>Estimated Stream Depth</b> _____ m  <b>Surface Velocity (at thalweg)</b> _____ m/sec           </div> <div style="width: 45%;"> <b>Canopy Cover</b>            Partly open _____ Partly shaded _____ Shaded _____  <b>High Water Mark</b> _____ m  <b>Proportion of Reach Represented by Stream Morphology Types</b>            Riffle _____ % Run _____ %            Pool _____ %  <b>Channelized</b> Yes _____ No _____  <b>Dam Present</b> Yes _____ No _____           </div> </div>	
<b>LARGE WOODY DEBRIS</b>	<b>LWD</b> _____ m <sup>2</sup> <b>Density of LWD</b> _____ m <sup>2</sup> /km <sup>2</sup> (LWD/ reach area)	
<b>AQUATIC VEGETATION</b>	<b>Indicate the dominant type and record the dominant species present</b> Rooted emergent _____ Rooted submergent _____ Rooted floating _____ Free floating _____ Floating Algae _____ Attached Algae _____ <b>Dominant species present</b> _____ <b>Portion of the reach with aquatic vegetation</b> _____ %	
<b>WATER QUALITY (DS, US)</b>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <b>Temperature</b> _____ °C  <b>Specific Conductance</b> _____  <b>Dissolved Oxygen</b> _____  <b>pH</b> _____  <b>Turbidity</b> _____  <b>WQ Instrument Used</b> _____           </div> <div style="width: 45%;"> <b>Water Odors</b>            Normal/None _____ Sewage _____            Petroleum _____ Chemical _____            Fishy _____ Other _____  <b>Water Surface Oils</b>            Slick _____ Sheen _____ Globs _____ Flecks _____            None _____ Other _____  <b>Turbidity (if not measured)</b>            Clear <input type="checkbox"/> Slightly turbid _____ Turbid _____            Opaque _____ Stained _____ Other _____           </div> </div>	
<b>SEDIMENT/ SUBSTRATE</b>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <b>Odors</b>            Normal _____ Sewage _____ Petroleum _____            Chemical _____ Anaerobic _____ None _____            Other _____           </div> <div style="width: 45%;"> <b>Deposits</b>            Sludge _____ Sawdust _____ Paper fiber _____ Sand _____            Relict shells _____ Other _____  <b>Looking at stones which are not deeply embedded, are the undersides black in color?</b>            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
	<b>1. Epifaunal Substrate/ Available Cover</b>	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.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>2. Embeddedness</b>	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.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>3. Velocity/Depth Regime</b>	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).
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>4. Sediment Deposition</b>	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.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>5. Channel Flow Status</b>	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.
	<b>SCORE</b>	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					
<b>6. Channel Alteration</b>	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.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>7. Frequency of Riffles (or bends)</b>	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.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>8. Bank Stability (score each bank)</b>	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		
<b>9. Vegetative Protection (score each bank)</b>	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		
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	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 _____	LOCATION _____	
STATION # _____ RIVERMILE _____	STREAM CLASS _____	
LAT _____ LONG _____	RIVER BASIN _____	
STORET # _____	AGENCY _____	
INVESTIGATORS _____		LOT NUMBER _____
FORM COMPLETED BY _____	DATE _____ TIME _____	REASON FOR SURVEY _____

<b>HABITAT TYPES</b>	<b>Indicate the percentage of each habitat type present</b> Cobble _____% Snags _____% Vegetated Banks _____% Sand _____% Submerged Macrophytes _____% Other ( _____ ) _____%
<b>SAMPLE COLLECTION</b>	<b>Gear used</b> D-frame    kick-net    Other _____  <b>How were the samples collected?</b> wading    from bank    from boat  <b>Indicate the number of jabs/kicks taken in each habitat type.</b> Cobble _____ Snags _____ Vegetated Banks _____ Sand _____ Submerged Macrophytes _____ Other ( _____ ) _____
<b>GENERAL COMMENTS</b>	

### 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: Lewis

Stream ID: S-H160

Stream Name: Indian Fork

HUC Code:

Basin:

Survey Date: 8/30/2021

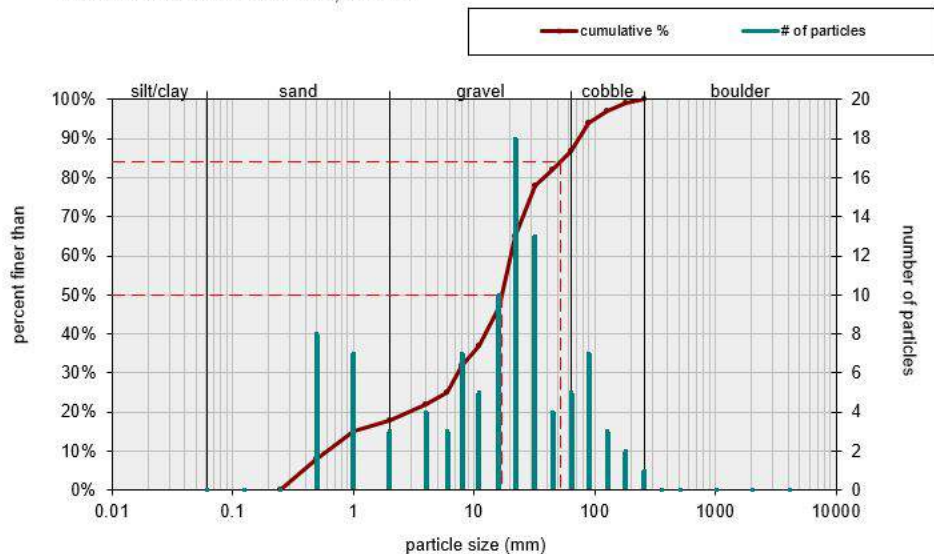
Surveyors: PEL, AJE

Impact Reach: 7.3 m

Type: Bankfull Channel

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		▲ ▼	8	8.00	8.00
	Coarse	.50-1.0		▲ ▼	7	7.00	15.00
.04-.08	Very Coarse	1.0-2		▲ ▼	3	3.00	18.00
.08 -.16	Very Fine	2 -4	G R A V E L	▲ ▼	4	4.00	22.00
.16 - .22	Fine	4 -5.7		▲ ▼	3	3.00	25.00
.22 - .31	Fine	5.7 - 8		▲ ▼	7	7.00	32.00
.31 - .44	Medium	8 -11.3		▲ ▼	5	5.00	37.00
.44 - .63	Medium	11.3 - 16		▲ ▼	10	10.00	47.00
.63 - .89	Coarse	16 -22.6		▲ ▼	18	18.00	65.00
.89 - 1.26	Coarse	22.6 - 32		▲ ▼	13	13.00	78.00
1.26 - 1.77	Vry Coarse	32 - 45		▲ ▼	4	4.00	82.00
1.77 -2.5	Vry Coarse	45 - 64		▲ ▼	5	5.00	87.00
2.5 - 3.5	Small	64 - 90	C O B B L E	▲ ▼	7	7.00	94.00
3.5 - 5.0	Small	90 - 128		▲ ▼	3	3.00	97.00
5.0 - 7.1	Large	128 - 180		▲ ▼	2	2.00	99.00
7.1 - 10.1	Large	180 - 256		▲ ▼	1	1.00	100.00
10.1 - 14.3	Small	256 - 362	B O U L D E R	▲ ▼	0	0.00	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:						

# Bankfull Channel Pebble Count, S-H160



Size (mm)	
D16	1.3
D35	9.7
D50	17
D65	22
D84	52
D95	100

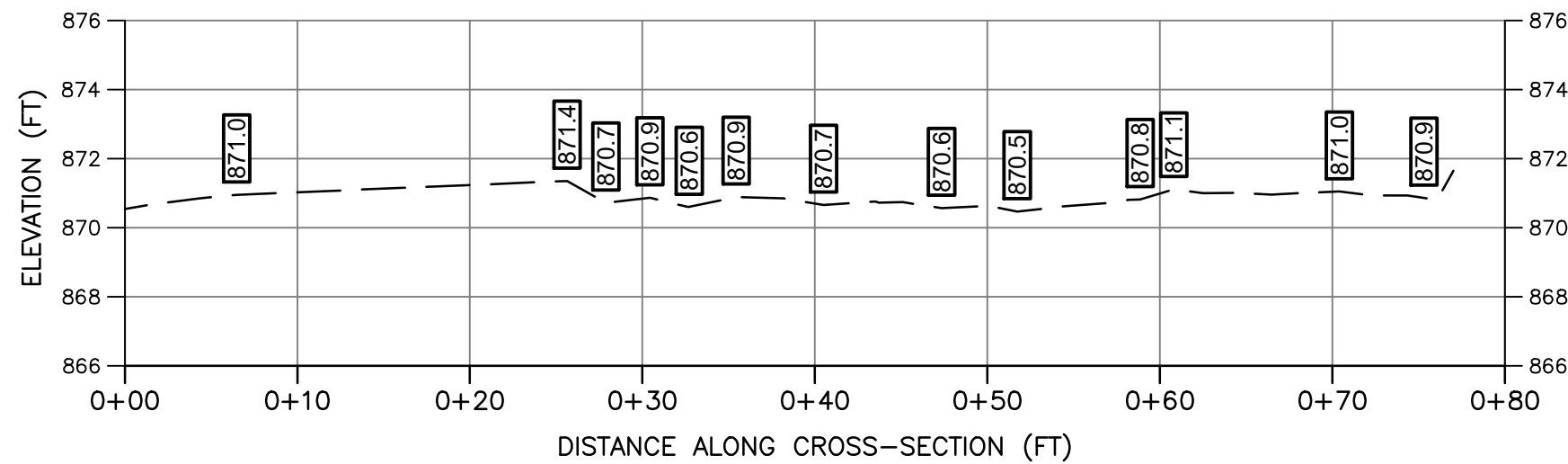
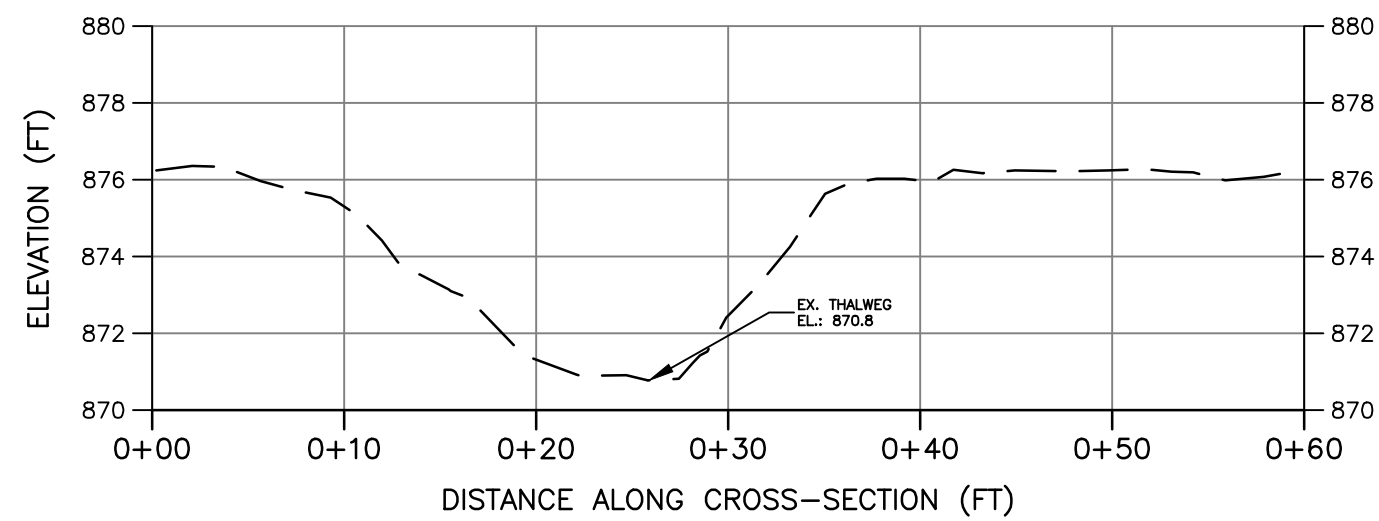
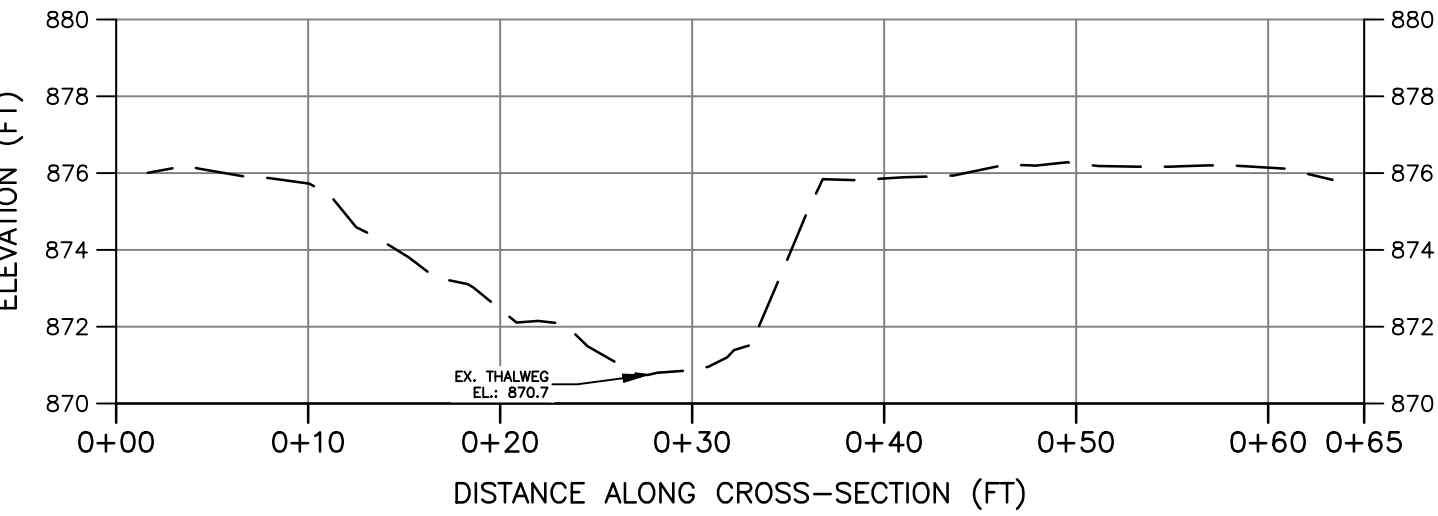
Size Distribution	
mean	8.2
dispersion	8.1
skewness	-0.25

Type	
silt/clay	0%
sand	18%
gravel	69%
cobble	13%
boulder	0%



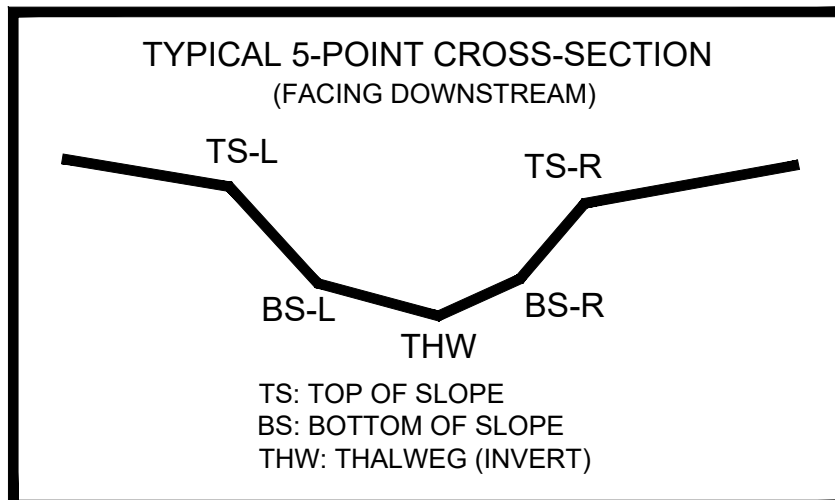
— — — — —	STUDY AREA (EASEMENT)
— . — . —	EXISTING SURVEY—LOCATED THALWEG
<b>1176.87 +</b>	EXISTING SURVEYED GROUND SHOT ELEVATION

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 SEPTEMBER 2, 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.



PROFILE LEGEND	
	EXISTING STREAM PROFILE
	INVERT ALONG THALWEG

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



AS-BUILT TABLE: S-H160 CROSS SECTION A				
PRE-CROSSING			AS-BUILT	
PT. LOC.	NORTHING	EASTING	ELEV	VERT. DIFF.
TS - L	14138574.1520	1758554.2680	875.389'	
BS - L	14138563.4320	1758560.4870	871.720'	
THW	14138560.60	1758562.2470	870.723'	
BS - R	14138555.4460	1758563.6270	871.521'	
TS - R	14138552.2380	1758567.3550	875.855'	

**CROSS SECTION LEGEND**

— — — EXISTING GRADE

**CROSS SECTION**

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

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

PHOTO TAKEN LOOKING DOWNSTREAM  
FROM UPSTREAM IMPACT LIMITS

PENDING CROSSING

PENDING CROSSING


PHOTO TAKEN LOOKING DOWNSTREAM  
FROM UPSTREAM IMPACT LIMITS

PHOTO TAKEN LOOKING UPSTREAM FROM  
DOWNSTREAM IMPACT LIMITS

PRE-CROSSING

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

**TETRA TECH, INC.**  
661 ANDERSEN DRIVE FOSTER PLAZA 7  
PITTSBURGH, PA 15220  
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**TETRA TECH**  
www.tetratech.com

UNTAIN VALLEY PIPELINE, LLC  
0 ENERGY DRIVE, 2ND FLOOR  
CANONSBURG, PA 15317

PROFILE AND CROSS-SECTIONS BASELINE SURVEY CROSSING S-H160 - INDIAN FORK (MP 58.54) LEWIS COUNTY, WV	Client MCM 222
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Title	1
Drawing No.	