

## Baseline Assessment – Stream Attributes

**Reach S-F9b (Pipeline ROW)**

**Perennial**

**Spread I**

**Franklin County, Virginia**

<b>Data</b>	<b>Included</b>
Photos	✓
SWVM Form	✓
FCI Calculator and HGM Form	Perennial stream (not shadeable, slope less than 4%)
RBP Physical Characteristics Form	✓
Water Quality Data	✓
RBP Habitat Form	✓
RBP Benthic Form	✓
Benthic Identification Sheet	No Riffles
Wolman Pebble Count	✓
RiverMorph Data Sheet	✓
USM Form (Virginia Only)	✓
Longitudinal Profile and Cross Sections	✓



Photo Type: US VIEW

Location, Orientation, Photographer Initials: Downstream at ROW/LOD looking S upstream, RAH



Photo Type: DS COND

Location, Orientation, Photographer Initials: Downstream at ROW/LOD looking N downstream, RAH





Photo Type: LB CL

Location, Orientation, Photographer Initials: On thalweg at pipe centerline looking NE at right streambank, RAH

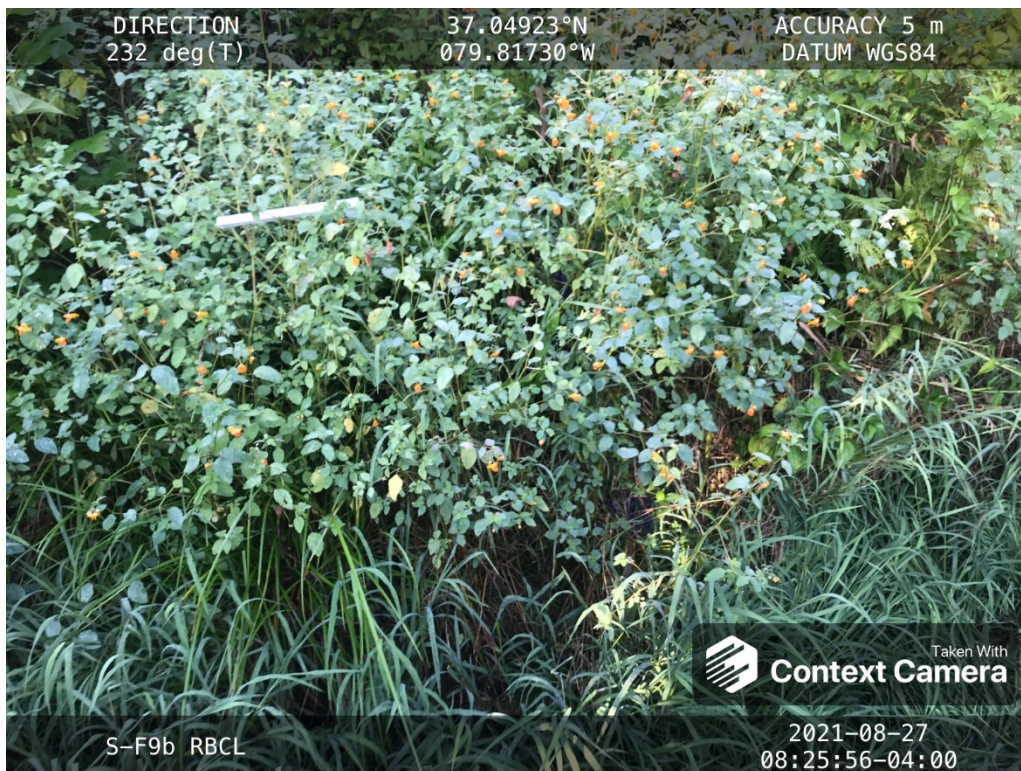


Photo Type: RB CL

Location, Orientation, Photographer Initials: On thalweg at pipe centerline looking SW at left streambank, RAH



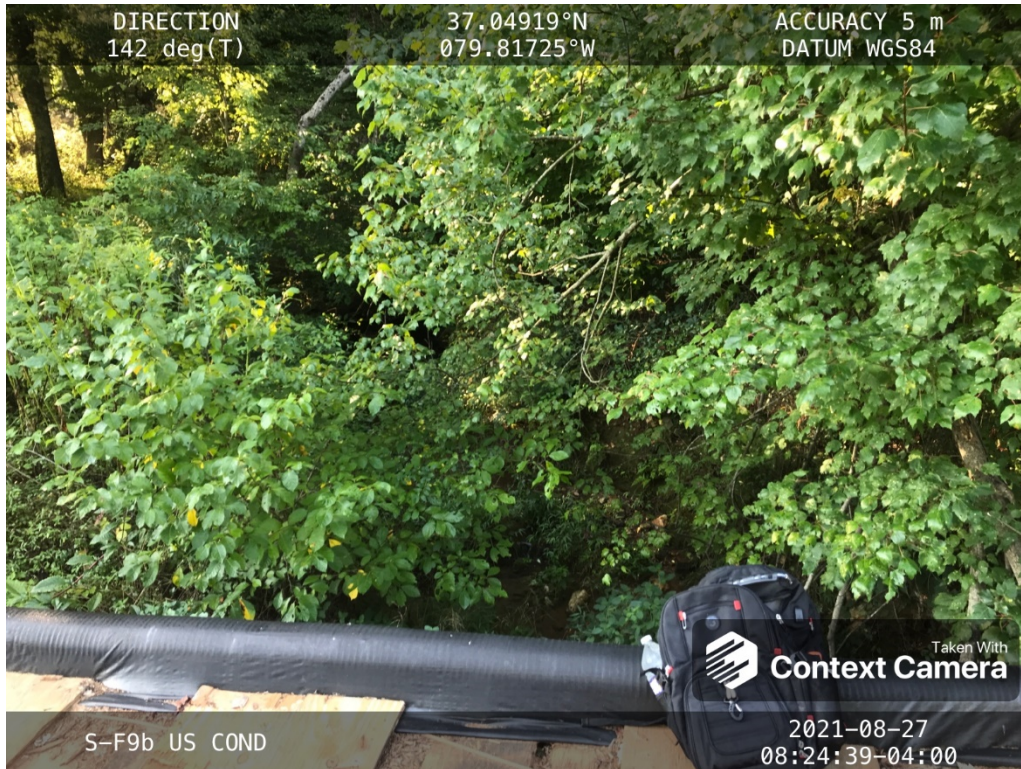


Photo Type: US COND

Location, Orientation, Photographer Initials: Upstream at ROW looking SE upstream, RAH

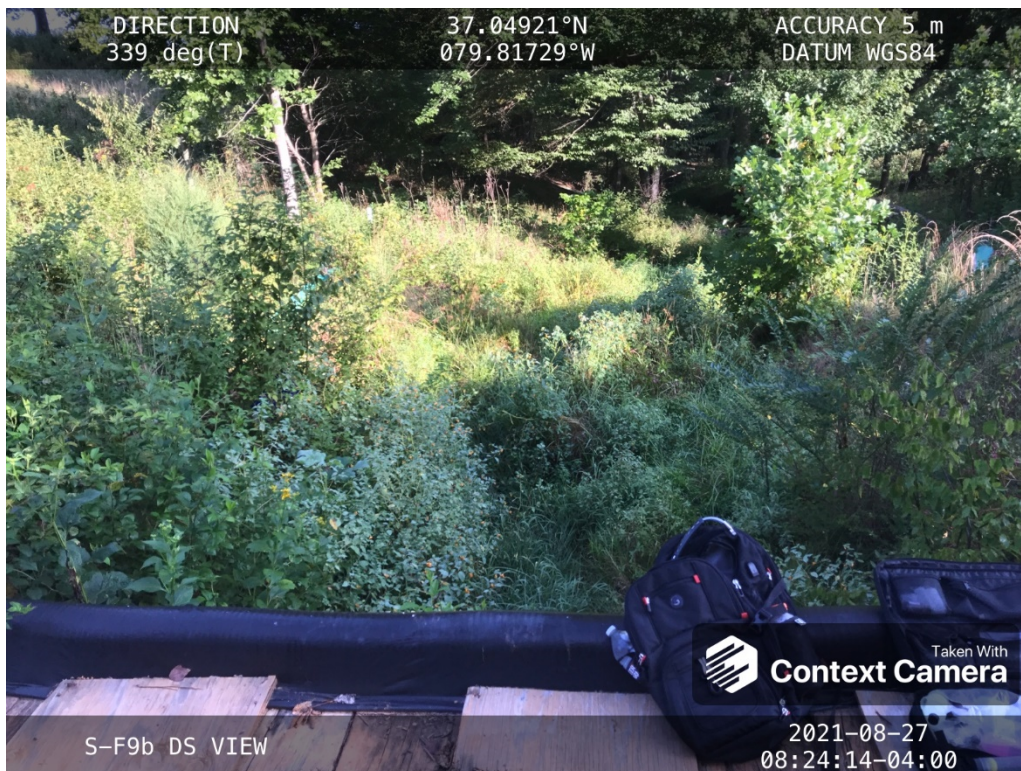


Photo Type: DS VIEW

Location, Orientation, Photographer Initials: Upstream at ROW/LOD looking NW downstream, RAH

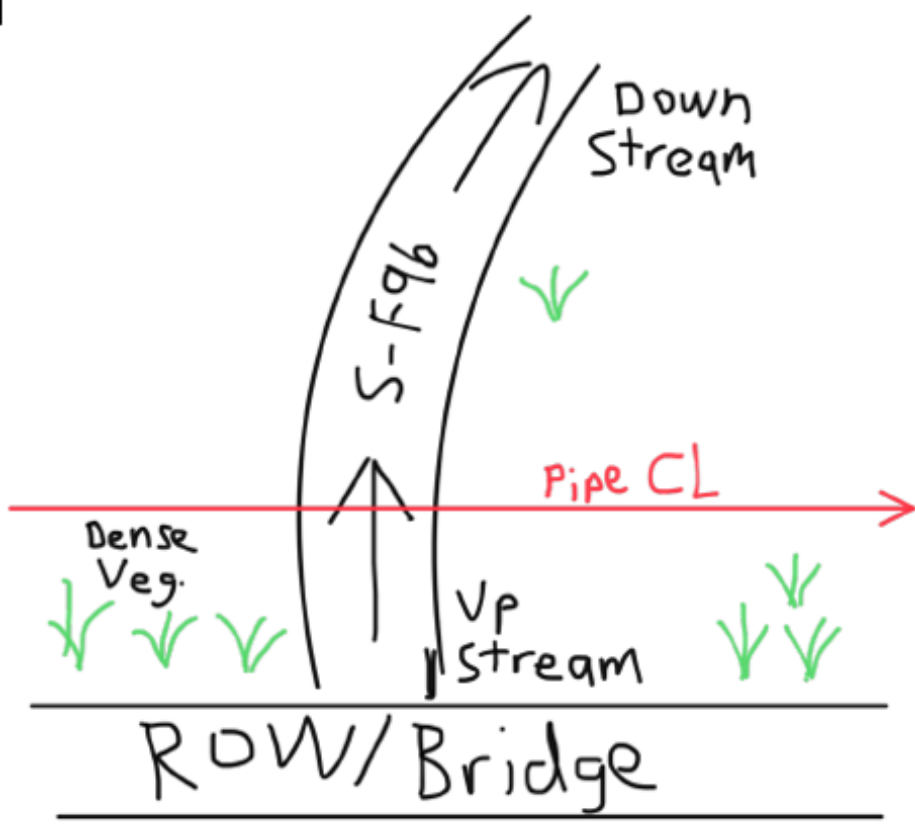


USACE FILE NO./ Project Name: <small>(v2.1, Sept 2015)</small>				Mountain Valley Pipeline				IMPACT COORDINATES: (in Decimal Degrees)				Lat.	37.049238		Lon.	-79.817223		WEATHER:		Sunny		DATE:		8/27/2021															
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: <small>(watershed size (acreage), unaltered or impairments)</small>						S-F9b; 59.92 Acres						MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: <small>(watershed size (acreage), unaltered or impairments)</small>												Comments:															
STREAM IMPACT LENGTH:				76		FORM OF MITIGATION:		RESTORATION (Levels I-III)		MIT COORDINATES: (in Decimal Degrees)		Lat.			Lon.			PRECIPITATION PAST 48 HRS:		No		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				0.55		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				0		Biogeochemical Cycling				0		Biogeochemical Cycling				0		Biogeochemical Cycling				0											
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											
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		0-1		18		1. Epifaunal Substrate/Available Cover		0-20		0-1				1. Epifaunal Substrate/Available Cover		0-20		0-1				1. Epifaunal Substrate/Available Cover		0-20		0-1											
2. Embeddedness		0-20				9		2. Embeddedness		0-20						2. Embeddedness		0-20						2. Embeddedness		0-20						2. Embeddedness		0-20					
3. Velocity/ Depth Regime		0-20				15		3. Velocity/ Depth Regime		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				17		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				10		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				19		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				18		7. Frequency of Riffles (or bends)		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				18		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				18		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		160		Total RBP Score				Poor		0		Total RBP Score				Poor		0		Total RBP Score				Poor		0									
Sub-Total						0.8		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				0-1				Specific Conductivity				0-1				Specific Conductivity				0-1				Specific Conductivity				0-1											
<=99 - 90 points		0-90				37.1		pH		0-90						pH		0-90						pH		0-90						pH		0-90					
6.0-8.0 = 80 points		0-80				7.17		DO		5-90						DO		5-90						DO		5-90						DO		5-90					
>5.0 = 30 points		10-30				8.63				10-30								10-30								10-30								10-30					
Sub-Total								1		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			
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		Index				Linear Feet		Unit Score	
0.900				76		68.4		0				0		0		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>	<table style="width: 100%;"> <tr> <td style="width: 33%;"> <b>Now</b>             storm (heavy rain) _____            rain (steady rain) _____            showers (intermittent) _____            %cloud cover _____            clear/sunny _____         </td> <td style="width: 33%;"> <b>Past 24 hours</b>             _____%            _____%         </td> <td style="width: 33%;"> <b>Has there been a heavy rain in the last 7 days?</b>            Yes _____ No _____  <b>Air Temperature</b> _____ °C  <b>Other</b> _____         </td> </tr> </table>			<b>Now</b>  storm (heavy rain) _____ rain (steady rain) _____ showers (intermittent) _____ %cloud cover _____ clear/sunny _____	<b>Past 24 hours</b>  _____% _____%	<b>Has there been a heavy rain in the last 7 days?</b> Yes _____ No _____ <b>Air Temperature</b> _____ °C <b>Other</b> _____
<b>Now</b>  storm (heavy rain) _____ rain (steady rain) _____ showers (intermittent) _____ %cloud cover _____ clear/sunny _____	<b>Past 24 hours</b>  _____% _____%	<b>Has there been a heavy rain in the last 7 days?</b> Yes _____ No _____ <b>Air Temperature</b> _____ °C <b>Other</b> _____				
<b>SITE LOCATION/MAP</b>	<p>Draw a map of the site and indicate the areas sampled (or attach a photograph)</p> 					
<b>STREAM CHARACTERIZATION</b>	<table style="width: 100%;"> <tr> <td style="width: 50%;"> <b>Stream Subsystem</b>            Perennial _____ Intermittent _____ Tidal _____  <b>Stream Origin</b>            Glacial _____            Non-glacial montane _____            Swamp and bog _____         </td> <td style="width: 50%;"> <b>Stream Type</b>            Coldwater _____ Warmwater _____  <b>Catchment Area</b> _____ km<sup>2</sup>            Spring-fed _____            Mixture of origins _____            Other _____         </td> </tr> </table>			<b>Stream Subsystem</b> Perennial _____ Intermittent _____ Tidal _____ <b>Stream Origin</b> Glacial _____ Non-glacial montane _____ Swamp and bog _____	<b>Stream Type</b> Coldwater _____ Warmwater _____ <b>Catchment Area</b> _____ km <sup>2</sup> Spring-fed _____ Mixture of origins _____ Other _____	
<b>Stream Subsystem</b> Perennial _____ Intermittent _____ Tidal _____ <b>Stream Origin</b> Glacial _____ Non-glacial montane _____ Swamp and bog _____	<b>Stream Type</b> Coldwater _____ Warmwater _____ <b>Catchment Area</b> _____ km <sup>2</sup> Spring-fed _____ Mixture of origins _____ Other _____					



# 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>	<table style="width: 100%;"> <tr> <td style="width: 50%;"> <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               </td><td style="width: 50%;"> <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 _____               </td></tr> </table>		<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	<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 _____
<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	<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 _____			
<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</b>	<table style="width: 100%;"> <tr> <td style="width: 50%;"> <b>Temperature</b> _____ °C  <b>Specific Conductance</b> _____  <b>Dissolved Oxygen</b> _____  <b>pH</b> _____  <b>Turbidity</b> _____  <b>WQ Instrument Used</b> _____               </td><td style="width: 50%;"> <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 _____               </td></tr> </table>		<b>Temperature</b> _____ °C <b>Specific Conductance</b> _____ <b>Dissolved Oxygen</b> _____ <b>pH</b> _____ <b>Turbidity</b> _____ <b>WQ Instrument Used</b> _____	<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 _____
<b>Temperature</b> _____ °C <b>Specific Conductance</b> _____ <b>Dissolved Oxygen</b> _____ <b>pH</b> _____ <b>Turbidity</b> _____ <b>WQ Instrument Used</b> _____	<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 _____			
<b>SEDIMENT/ SUBSTRATE</b>	<table style="width: 100%;"> <tr> <td style="width: 50%;"> <b>Odors</b>                  Normal _____ Sewage _____ Petroleum _____                  Chemical _____ Anaerobic _____ None _____                  Other _____               </td><td style="width: 50%;"> <b>Deposits</b>                  Sludge _____ Sawdust _____ Paper fiber _____ Sand _____                  Relict shells _____ Other _____               </td></tr> </table> <b>Oils</b> Absent _____ Slight _____ Moderate _____ Profuse _____ <b>Looking at stones which are not deeply embedded, are the undersides black in color?</b> Yes _____ No _____		<b>Odors</b> Normal _____ Sewage _____ Petroleum _____ Chemical _____ Anaerobic _____ None _____ Other _____	<b>Deposits</b> Sludge _____ Sawdust _____ Paper fiber _____ Sand _____ Relict shells _____ Other _____
<b>Odors</b> Normal _____ Sewage _____ Petroleum _____ Chemical _____ Anaerobic _____ None _____ Other _____	<b>Deposits</b> Sludge _____ Sawdust _____ Paper fiber _____ Sand _____ Relict shells _____ Other _____			

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:   
Stream Name: UNT to Blackwater River  
HUC Code: 03010101  
Survey Date: 8/27/2021  
Surveyors: RH, CL  
Type: Representative

Stream ID: S-F9b

Basin: Upper Roanoke

PEBBLE COUNT							
Inches	PARTICLE	Millimeters		Particle Count	Total #	Item %	% Cum
	Silt/Clay	< .062	S/C		36	36.00	36.00
	Very Fine	.062-.125	S A N D		5	5.00	41.00
	Fine	.125-.25			12	12.00	53.00
	Medium	.25-.5			4	4.00	57.00
	Coarse	.50-1.0			8	8.00	65.00
.04-.08	Very Coarse	1.0-2			11	11.00	76.00
.08 -.16	Very Fine	2 -4	G R A V E L		3	3.00	79.00
.16 - .22	Fine	4 -5.7			3	3.00	82.00
.22 - .31	Fine	5.7 - 8			1	1.00	83.00
.31 - .44	Medium	8 -11.3			2	2.00	85.00
.44 - .63	Medium	11.3 - 16			5	5.00	90.00
.63 - .89	Coarse	16 -22.6				0.00	90.00
.89 - 1.26	Coarse	22.6 - 32			4	4.00	94.00
1.26 - 1.77	Vry Coarse	32 - 45				0.00	94.00
1.77 -2.5	Vry Coarse	45 - 64				0.00	94.00
2.5 - 3.5	Small	64 - 90	C O B B L E		2	2.00	96.00
3.5 - 5.0	Small	90 - 128			2	2.00	98.00
5.0 - 7.1	Large	128 - 180				0.00	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			0.00	99.00
14.3 - 20	Small	362 - 512				0.00	99.00
20 - 40	Medium	512 - 1024				0.00	99.00
40 - 80	Large	1024 -2048				0.00	99.00
80 - 160	Vry Large	2048 -4096				0.00	99.00
	Bedrock		BDRK		1	1.00	100.00
				Totals:	100		
	Total Tally:						

## RIVERMORPH PARTICLE SUMMARY

-----  
River Name: UNT to Blackwater River  
Reach Name: S-F9b  
Sample Name: Representative  
Survey Date: 08/27/2021  
-----

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	36	36.00	36.00
0.062 - 0.125	5	5.00	41.00
0.125 - 0.25	12	12.00	53.00
0.25 - 0.50	4	4.00	57.00
0.50 - 1.0	8	8.00	65.00
1.0 - 2.0	11	11.00	76.00
2.0 - 4.0	3	3.00	79.00
4.0 - 5.7	3	3.00	82.00
5.7 - 8.0	1	1.00	83.00
8.0 - 11.3	2	2.00	85.00
11.3 - 16.0	5	5.00	90.00
16.0 - 22.6	0	0.00	90.00
22.6 - 32.0	4	4.00	94.00
32 - 45	0	0.00	94.00
45 - 64	0	0.00	94.00
64 - 90	2	2.00	96.00
90 - 128	2	2.00	98.00
128 - 180	0	0.00	98.00
180 - 256	1	1.00	99.00
256 - 362	0	0.00	99.00
362 - 512	0	0.00	99.00
512 - 1024	0	0.00	99.00
1024 - 2048	0	0.00	99.00
Bedrock	1	1.00	100.00

D16 (mm)	0.03
D35 (mm)	0.06
D50 (mm)	0.22
D84 (mm)	9.65
D95 (mm)	77
D100 (mm)	Bedrock
Silt/Clay (%)	36
Sand (%)	40
Gravel (%)	18
Cobble (%)	5
Boulder (%)	0
Bedrock (%)	1

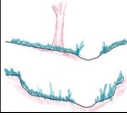
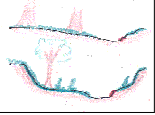
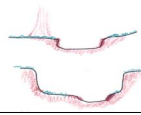
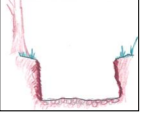

Total Particles = 100.



# 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)	Franklin County	R3	03010101	8/27/2021	S-F9b	76	1
Name(s) of Evaluator(s)		Stream Name and Information					SAR Length	
RH, CL		UNT to Blackwater River					76	
<b>1. Channel Condition:</b> Assess the cross-section of the stream and prevailing condition (erosion, aggradation)								
Conditional Category								
Channel Condition	Optimal	Suboptimal	Marginal	Poor	Severe			
								
	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 to 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.			
Scores	3	2.4	2	1.6	1	CI		
NOTES>>								
<b>2. RIPARIAN BUFFERS:</b> Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)								
Conditional Category								
Riparian Buffers	Optimal	Suboptimal	Marginal	Poor	NOTES>>			
	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.				
Scores	1.5	High 1.2 Low 1.1	High 0.85 Low 0.75	High 0.6 Low 0.5				
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.					Ensure the sums			
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.					of % Riparian			
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.					Blocks equal 100			
Right Bank	% Riparian Area>	20%	80%				100%	
	Score >	0.6	0.85					
Left Bank	% Riparian Area>	20%	80%				100%	
	Score >	0.6	0.85					
							CI= (Sum % RA * Scores*0.01)/2	
							Rt Bank CI >	0.80
							Lt Bank CI >	0.80
<b>3. INSTREAM HABITAT:</b> 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								
Instream Habitat/ Available Cover	Optimal	Suboptimal	Marginal	Poor	NOTES>>			
	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.				
Scores	1.5	1.2	0.9	0.5	Stream Gradient High / Low CI 1.50			

## 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)	Franklin County	R3	03010101	8/27/2021	S-F9b	76	1

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

Channel Alteration	Conditional Category					NOTES>>	CI
	Negligible	Minor	Moderate		Severe		
	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.	
<b>Scores</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>	<b>0.9</b>	<b>0.7</b>	<b>0.5</b>	<b>1.50</b>

### 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.

<b>THE REACH CONDITION INDEX (RCI) &gt;&gt;</b>	<b>1.36</b>
RCI = (Sum of all CI's)/5, except if stream is ephemeral RCI = (Riparian CI/2)	
<b>COMPENSATION REQUIREMENT (CR) &gt;&gt;</b>	<b>103</b>
CR = RCI X L <sub>i</sub> X IF	

### INSERT PHOTOS:

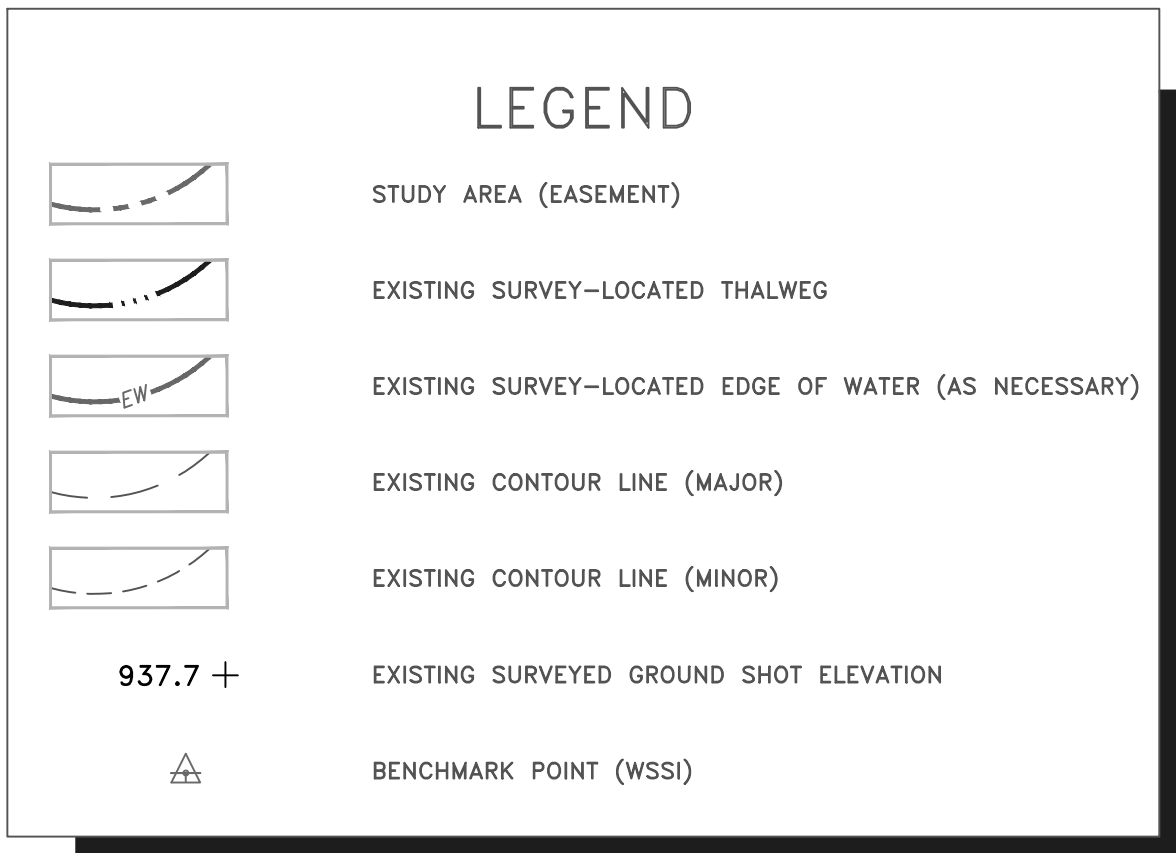


**CAPTION.** Assessment is limited to areas within the temporary ROW.

### DESCRIBE PROPOSED IMPACT:

PROVIDED UNDER SEPARATE COVER





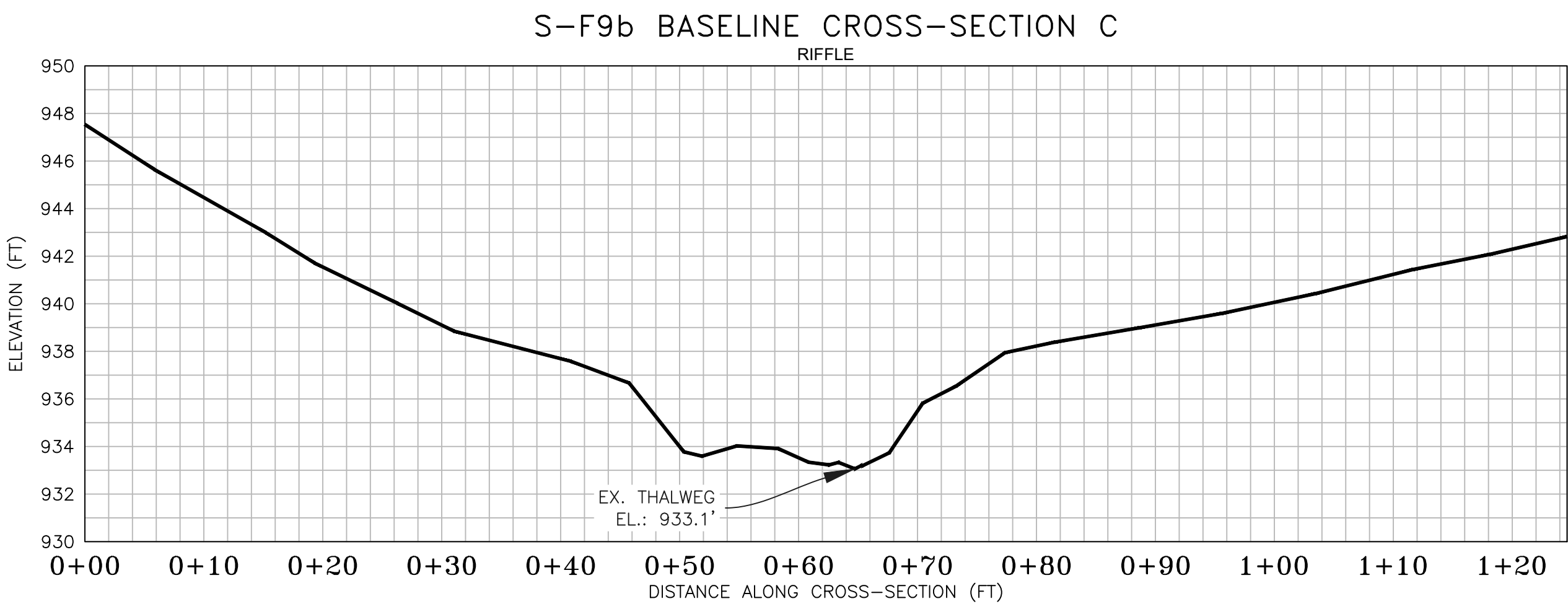
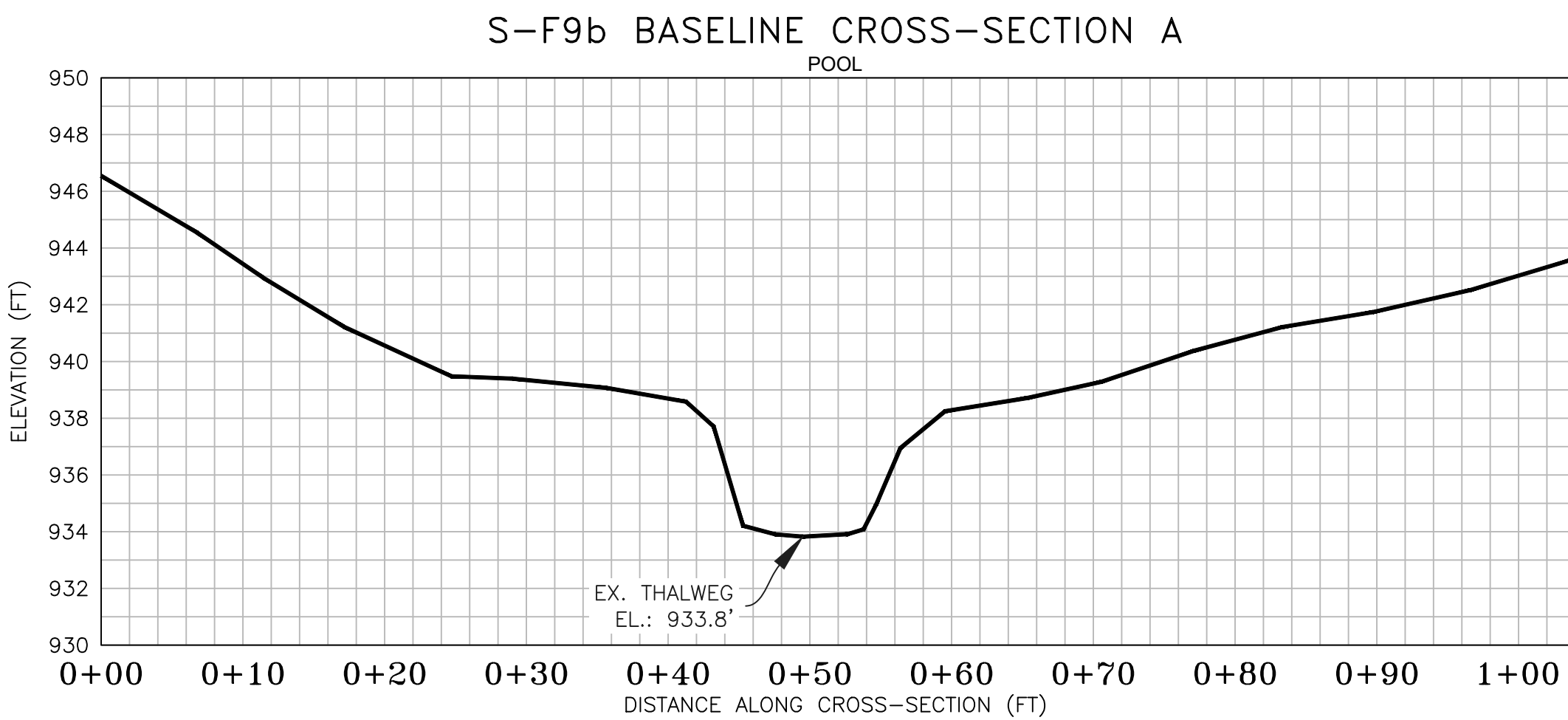
- PRE-CROSSING PHOTOS**

**PHOTO TAKEN LOOKING DOWNSTREAM  
ALONG LEFT BANK ON 03/28/2018**

**PHOTO TAKEN LOOKING UPSTREAM  
ALONG LEFT BANK ON 03/28/2018**

**PHOTO TAKEN LOOKING DOWNSTREAM  
ALONG RIGHT BANK ON 03/28/2018**

**PHOTO TAKEN LOOKING UPSTREAM  
ALONG RIGHT BANK ON 03/28/2018**

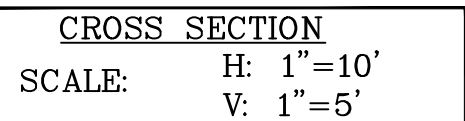


TYPICAL 5-POINT CROSS-SECTION  
(FACING DOWNSTREAM)

TS-L TS-R

BS-L THW BS-R

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



Crossing S-F9b UNT to Blackwater River (MP 269.9)

No.	Date	Description	Rev. By	App. By
DATE: September, 2021			SCALE: AS NOTED	

**Horizontal Datum:** NAD 1983 UTM ZONE 17N

**Vertical Datum:** NAVD 88

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

Design	Draft	Approved
EJC	MGE	NAS

Sheet #  
**1 of 1**

**Computer File Name:**  
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