

## Baseline Assessment – Stream Attributes

**Reach S-E29 (Pipeline ROW)**

**Perennial**

**Spread I**

**Franklin County, Virginia**

<b>Data</b>	<b>Included</b>
Photos	✓
SWVM Form	✓
FCI Calculator and HGM Form	N/A – Perennial stream (not shadeable, slope less than 4%)
RBP Physical Characteristics Form	✓
Water Quality Data	✓
RBP Habitat Form	✓
RBP Benthic Form	✓
Benthic Identification Sheet	✓
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 NE upstream, RAH



Photo Type: DS COND

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



## Spread I

## Stream S-E29 (Pipeline ROW) Franklin County



Photo Type: LB CL

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



Photo Type: RB CL

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





Photo Type: US COND

Location, Orientation, Photographer Initials: Upstream at ROW/LOD looking NE upstream, RAH



Photo Type: DS VIEW

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

USACE FILE NO./ Project Name: (v2.1, Sept 2018)		Mountain Valley Pipeline		IMPACT COORDINATES: (in Decimal Degrees)		Lat.	37.089178	Lon.	-79.95011	WEATHER:		Sunny	DATE:		August 30, 2021		
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size (acres), unaffiliated or impairments)				S-E29; 234.85 ac				MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size (acres), unaffiliated or impairments)				Comments:					
STREAM IMPACT LENGTH:		80	FORM OF MITIGATION:		RESTORATION (Levels I-III)		MIT COORDINATES: (in Decimal Degrees)		Lat.		Lon.		PRECIPITATION PAST 48 HRS:		Yes	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			1.39			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					
Hydrology						Hydrology						Hydrology					
Biogeochemical Cycling			0			Biogeochemical Cycling			0			Biogeochemical Cycling			0		
Habitat						Habitat						Habitat					
PART I - Physical, Chemical and Biological Indicators						PART I - Physical, Chemical and Biological Indicators						PART I - Physical, Chemical and Biological Indicators					
Points Scale			Range			Points Scale			Range			Points Scale			Range		
Site Score						Site Score						Site Score					
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 (High Gradient Data Sheet)						USEPA RBP (High Gradient Data Sheet)					
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			2. Embeddedness			0-20			2. Embeddedness			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			4. Sediment Deposition			0-20			4. Sediment Deposition			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			6. Channel Alteration			0-20			6. Channel Alteration			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			8. Bank Stability (LB & RB)			0-20			8. Bank Stability (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			10. Riparian Vegetative Zone Width (LB & RB)			0-20			10. Riparian Vegetative Zone Width (LB & RB)			0-20		
Total RBP Score			Suboptimal			Total RBP Score			Poor			Total RBP Score			Poor		
Sub-Total			0.905			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)					
WVDEP Water Quality Indicators (General)						WVDEP Water Quality Indicators (General)						WVDEP Water Quality Indicators (General)					
Specific Conductivity			0-90			Specific Conductivity			0-90			Specific Conductivity			0-90		
pH			0-1			pH			0-1			pH			0-1		
DO			10-30			DO			10-30			DO			10-30		
Sub-Total			1			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)					
WV Stream Condition Index (WVSCI)			0-100			WV Stream Condition Index (WVSCI)			0-100			WV Stream Condition Index (WVSCI)			0-100		
Sub-Total			0.711			Sub-Total			0			Sub-Total			0		
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					
0.839			80			0			0			0			0		



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

STREAM NAME S-E29		LOCATION Franklin
STATION # _____ RIVERMILE _____	STREAM CLASS Perennial	
LAT 37.089178 LONG -79.95011	RIVER BASIN Upper Roanoke	
STORET # _____	AGENCY VADEQ	
INVESTIGATORS RH, DW, RC		
FORM COMPLETED BY <b>RH</b>	DATE 8/30/2021 TIME 1336	REASON FOR SURVEY Baseline Assessment

<b>WEATHER CONDITIONS</b>	<div style="display: flex; justify-content: space-between;"> <div> <p><b>Now</b></p> <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> </div> <div> <p>storm (heavy rain)</p> <p>rain (steady rain)</p> <p>showers (intermittent)</p> <p>%cloud cover _____</p> <p>clear/sunny</p> </div> </div> </div> <div> <p><b>Past 24 hours</b></p> <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;"> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div> <p>storm (heavy rain)</p> <p>rain (steady rain)</p> <p>showers (intermittent)</p> <p>%cloud cover _____</p> <p>clear/sunny</p> </div> </div> </div> <div> <p><b>Has there been a heavy rain in the last 7 days?</b></p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><b>Air Temperature</b> 28.3 °C</p> <p><b>Other</b> _____</p> </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> <div style="text-align: center;"> <p><b>LOD</b></p> <p><b>ROW / Bridge</b></p> <p><b>LOD</b></p> </div>
<b>STREAM CHARACTERIZATION</b>	<div style="display: flex; justify-content: space-between;"> <div> <p><b>Stream Subsystem</b></p> <p><input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal</p> <p><b>Stream Origin</b></p> <p><input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed</p> <p><input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins</p> <p><input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____</p> </div> <div> <p><b>Stream Type</b></p> <p><input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater</p> <p><b>Catchment Area</b> _____ km<sup>2</sup></p> </div> </div>

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

<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources <b>Local Watershed Erosion</b> <input checked="" type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
<b>RIPARIAN VEGETATION (18 meter buffer)</b>	<b>Indicate the dominant type and record the dominant species present</b> <input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous <b>Dominant species present</b> <u>Kudzu</u>	
<b>INSTREAM FEATURES</b>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <b>Estimated Reach Length</b> <u>13.4</u> m  <b>Estimated Stream Width</b> <u>1.2</u> m  <b>Sampling Reach Area</b> <u>16.4</u> 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> <u>0.03</u> m  <b>Surface Velocity (at thalweg)</b> <u>0.3</u> m/sec           </div> <div style="width: 45%;"> <b>Canopy Cover</b>  <input checked="" type="checkbox"/> Partly open      <input type="checkbox"/> Partly shaded      <input type="checkbox"/> Shaded  <b>High Water Mark</b> <u>0.3</u> m  <b>Proportion of Reach Represented by Stream Morphology Types</b>              Riffle <u>70</u> %      Run <u>15</u> %              Pool <u>15</u> %  <b>Channelized</b>      <input type="checkbox"/> Yes      <input checked="" type="checkbox"/> No  <b>Dam Present</b>      <input type="checkbox"/> Yes      <input checked="" type="checkbox"/> No           </div> </div>	
<b>LARGE WOODY DEBRIS</b>	<b>LWD</b> <u>0</u> 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> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input checked="" type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae <b>Dominant species present</b> <u>Common duck weed</u> <b>Portion of the reach with aquatic vegetation</b> <u>3</u> %	
<b>WATER QUALITY</b>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <b>Temperature</b> <u>22.5 D; 22.5 U</u> °C  <b>Specific Conductance</b> <u>80.5 D; 79.9 U</u> ms/cm  <b>Dissolved Oxygen</b> <u>9.14 D; 7.46 U</u> mg/l  <b>pH</b> <u>7.48 D; 7.48 U</u> SU  <b>Turbidity</b> <u>N/A</u>  <b>WQ Instrument Used</b> <u>YSI</u> </div> <div style="width: 45%;"> <b>Water Odors</b>  <input checked="" type="checkbox"/> Normal/None      <input type="checkbox"/> Sewage  <input type="checkbox"/> Petroleum      <input type="checkbox"/> Chemical  <input type="checkbox"/> Fishy      <input type="checkbox"/> Other _____  <b>Water Surface Oils</b>  <input type="checkbox"/> Slick      <input type="checkbox"/> Sheen      <input type="checkbox"/> Globs      <input type="checkbox"/> Flecks  <input checked="" type="checkbox"/> None      <input type="checkbox"/> Other _____  <b>Turbidity (if not measured)</b>  <input checked="" type="checkbox"/> Clear      <input type="checkbox"/> Slightly turbid      <input type="checkbox"/> Turbid  <input type="checkbox"/> Opaque      <input type="checkbox"/> Stained      <input type="checkbox"/> Other _____           </div> </div>	
<b>SEDIMENT/SUBSTRATE</b>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <b>Odors</b>  <input checked="" type="checkbox"/> Normal      <input type="checkbox"/> Sewage      <input type="checkbox"/> Petroleum  <input type="checkbox"/> Chemical      <input type="checkbox"/> Anaerobic      <input type="checkbox"/> None  <input type="checkbox"/> Other _____  <b>Oils</b>  <input checked="" type="checkbox"/> Absent      <input type="checkbox"/> Slight      <input type="checkbox"/> Moderate      <input type="checkbox"/> Profuse           </div> <div style="width: 45%;"> <b>Deposits</b>  <input type="checkbox"/> Sludge      <input type="checkbox"/> Sawdust      <input type="checkbox"/> Paper fiber      <input type="checkbox"/> Sand  <input type="checkbox"/> Relict shells      <input checked="" type="checkbox"/> Other <u>None</u>  <b>Looking at stones which are not deeply embedded, are the undersides black in color?</b>  <input type="checkbox"/> Yes      <input checked="" type="checkbox"/> 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)	3
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")	40	Muck-Mud	black, very fine organic (FPOM)	0
Gravel	2-64 mm (0.1"-2.5")	35			
Sand	0.06-2mm (gritty)	15	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	10			
Clay	< 0.004 mm (slick)				

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

STREAM NAME S-E29		LOCATION Franklin	
STATION # _____ RIVERMILE _____		STREAM CLASS Perennial	
LAT 37.089178 LONG -79.95011		RIVER BASIN Upper Roanoke	
STORET # _____		AGENCY VADEQ	
INVESTIGATORS RH, DW, RC			
FORM COMPLETED BY RH		DATE 8/30/2021 TIME 1336 AM PM	REASON FOR SURVEY Baseline Assessment

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 16	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 13	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 13	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 17	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 12	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>  SCORE <b>19</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.					
	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>  SCORE <b>17</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.					
	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>  Note: determine left or right side by facing downstream. SCORE <b>9</b> SCORE <b>9</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.					
	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
	Right Bank	10	9			8	7	6			5	4	3			2	1	0			
<b>9. Vegetative Protection (score each bank)</b>  SCORE <b>9</b> SCORE <b>9</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.					
	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
	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>  SCORE <b>9</b> SCORE <b>9</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.					
	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
	Right Bank	10	9			8	7	6			5	4	3			2	1	0			

Total Score **161**

## BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME S-E29		LOCATION Giles County	
STATION # _____ RIVERMILE _____		STREAM CLASS Perennial	
LAT <u>37.089178</u> LONG <u>-79.95011</u>		RIVER BASIN None	
STORET # _____		AGENCY VADEQ	
INVESTIGATORS KD AW		LOT NUMBER _____	
FORM COMPLETED BY <b>KD</b>		DATE <u>8/31/21</u> TIME <u>1:00 PM</u>	REASON FOR SURVEY Baseline Assessment

<b>HABITAT TYPES</b>	<b>Indicate the percentage of each habitat type present</b> <input checked="" type="checkbox"/> Cobble <u>100</u> % <input type="checkbox"/> Snags _____ % <input type="checkbox"/> Vegetated Banks _____ % <input type="checkbox"/> Sand _____ % <input type="checkbox"/> Submerged Macrophytes _____ % <input type="checkbox"/> Other ( _____ ) _____ %
<b>SAMPLE COLLECTION</b>	<b>Gear used</b> <input type="checkbox"/> D-frame <input checked="" type="checkbox"/> kick-net <input type="checkbox"/> Other _____  <b>How were the samples collected?</b> <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat  <b>Indicate the number of jabs/kicks taken in each habitat type.</b> <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 ( _____ ) _____
<b>GENERAL COMMENTS</b>	4 kicks in riffle habitat. Discarded crayfish and fish.

### 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						



Sample ID Collection Date		S-E29 08-31-2021
ORDER	GENUS/SPECIES	COUNT
	<b>Ephemeroptera</b> Baetis sp.	4
	<b>Ephemeroptera</b> Caenis sp.	2
	<b>Ephemeroptera</b> Ephemera sp.	2
	<b>Ephemeroptera</b> Ephemerellidae	1
	<b>Ephemeroptera</b> Isonymia sp.	1
	<b>Ephemeroptera</b> Leptophlebiidae	5
	<b>Ephemeroptera</b> Maccaffertium sp.	16
	<b>Ephemeroptera</b> Plauditus sp.	1
	<b>Ephemeroptera</b> Teloganopsis deficiens	2
	<b>Plecoptera</b> Eccoptura xanthenes	2
	<b>Plecoptera</b> Leuctra sp.	4
	<b>Trichoptera</b> Cheumatopsyche sp.	10
	<b>Trichoptera</b> Hydroptila sp.	1
	<b>Trichoptera</b> Lepidostoma sp.	1
	<b>Trichoptera</b> Lype diversa	1
	<b>Trichoptera</b> Neophylax sp.	4
	<b>Odonata</b> Calopteryx sp.	10
	<b>Odonata</b> Cordulegaster sp.	1
	<b>Coleoptera</b> Anchytarsus bicolor	3
	<b>Coleoptera</b> Helichus sp.	1
	<b>Coleoptera</b> Optioservus sp.	20
	<b>Coleoptera</b> Oulimnius sp.	11
	<b>Megaloptera</b> Sialis sp.	1
	<b>Diptera-Chironomidae</b> Briliia sp.	1
	<b>Diptera-Chironomidae</b> Corynoneura sp.	5
	<b>Diptera-Chironomidae</b> Cricotopus sp.	7
	<b>Diptera-Chironomidae</b> Cryptochironomus sp.	1
	<b>Diptera-Chironomidae</b> Dicrotendipes sp.	1
	<b>Diptera-Chironomidae</b> Krenosmittia sp.	1
	<b>Diptera-Chironomidae</b> Microtendipes sp.	7
	<b>Diptera-Chironomidae</b> Neozavrelia sp.	1
	<b>Diptera-Chironomidae</b> Nilotanytus sp.	1
	<b>Diptera-Chironomidae</b> Paracricotopus sp.	1
	<b>Diptera-Chironomidae</b> Parakiefferiella sp.	5
	<b>Diptera-Chironomidae</b> Parametrioctenus sp.	6
	<b>Diptera-Chironomidae</b> Paraphaenocladus sp.	2
	<b>Diptera-Chironomidae</b> Paratanytarsus sp.	1
	<b>Diptera-Chironomidae</b> Polypedilum sp.	31
	<b>Diptera-Chironomidae</b> Rheotanytarsus sp.	1
	<b>Diptera-Chironomidae</b> Stempellinella sp.	6
	<b>Diptera-Chironomidae</b> Sublettea sp.	1
	<b>Diptera-Chironomidae</b> Tanytarsus sp.	13
	<b>Diptera-Chironomidae</b> Thienemannimyia gr. sp.	6
	<b>Diptera</b> Ceratopogoninae	2
	<b>Diptera</b> Empididae	2
	<b>Diptera</b> Hexatoma sp.	3
	<b>Diptera</b> Limonia sp.	5
	<b>Diptera</b> Simulium sp.	1
	<b>Diptera</b> Tabanidae	1
	<b>Diptera</b> Tipula sp.	1
	<b>Annelida</b> Naididae	10
	<b>Annelida</b> tubificoid Naididae w/o cap setae	1
	<b>Bivalvia</b> Sphaeriidae	1
	<b>Gastropoda</b> Ferrissia sp.	9
	<b>Gastropoda</b> Lymnaeidae	1
	<b>Gastropoda</b> Physa sp.	2
<b>TOTAL</b>		<b>241</b>

Sample ID Collection Date		S-E29 08-31-2021
<b>WVSCI Metric Values</b>		
Total taxa		31
EPT taxa		14
% EPT		23.7
% Chironomidae		40.7
% 2 Dominant		53.5
HBI		5.14
<b>WVSCI Metric Scores</b>		
Total taxa		147.6
EPT taxa		107.7
% EPT		25.7
% Chironomidae		59.9
% 2 Dominant		72.6
HBI		68.4
<b>WVSCI Metric Scores</b>		
Total taxa		100.0
EPT taxa		100.0
% EPT		25.7
% Chironomidae		59.9
% 2 Dominant		72.6
HBI		68.4
<b>WVSCI Total Score</b>		<b>71.1</b>

**WVSCI Thresholds**

Unimpaired = > 68.00

Gray Zone = 60.61 to 68.00

Impaired = <60.61

# WOLMAN PEBBLE COUNT FORM

County: Franklin County  
Stream Name: UNT to Teels Creek  
HUC Code: 03010101  
Survey Date: 8/30/2021`  
Surveyors: RH, DW, RC  
Type: Representative

Stream ID: S-E29

Basin: Upper Roanoke

PEBBLE COUNT							
Inches	PARTICLE	Millimeters		Particle Count	Total #	Item %	% Cum
	Silt/Clay	< .062	S/C	<div><div></div><div></div></div>	16	16.00	16.00
	Very Fine	.062-.125	S A N D	<div><div></div><div></div></div>	4	4.00	20.00
	Fine	.125-.25		<div><div></div><div></div></div>	5	5.00	25.00
	Medium	.25-.5		<div><div></div><div></div></div>	4	4.00	29.00
	Coarse	.50-1.0		<div><div></div><div></div></div>	6	6.00	35.00
.04-.08	Very Coarse	1.0-2		<div><div></div><div></div></div>	7	7.00	42.00
.08 -.16	Very Fine	2 -4		G R A V E L	<div><div></div><div></div></div>	3	3.00
.16 -.22	Fine	4 -5.7	<div><div></div><div></div></div>		8	8.00	53.00
.22 - .31	Fine	5.7 - 8	<div><div></div><div></div></div>		14	14.00	67.00
.31 - .44	Medium	8 -11.3	<div><div></div><div></div></div>		4	4.00	71.00
.44 - .63	Medium	11.3 - 16	<div><div></div><div></div></div>		5	5.00	76.00
.63 - .89	Coarse	16 -22.6	<div><div></div><div></div></div>		3	3.00	79.00
.89 - 1.26	Coarse	22.6 - 32	<div><div></div><div></div></div>		3	3.00	82.00
1.26 - 1.77	Vry Coarse	32 - 45	<div><div></div><div></div></div>		9	9.00	91.00
1.77 -2.5	Vry Coarse	45 - 64	<div><div></div><div></div></div>		5	5.00	96.00
2.5 - 3.5	Small	64 - 90	C O B B L E		<div><div></div><div></div></div>	2	2.00
3.5 - 5.0	Small	90 - 128		<div><div></div><div></div></div>	2	2.00	100.00
5.0 - 7.1	Large	128 - 180		<div><div></div><div></div></div>	0	0.00	100.00
7.1 - 10.1	Large	180 - 256		<div><div></div><div></div></div>	0	0.00	100.00
10.1 - 14.3	Small	256 - 362	B O U L D E R	<div><div></div><div></div></div>	0	0.00	100.00
14.3 - 20	Small	362 - 512		<div><div></div><div></div></div>	0	0.00	100.00
20 - 40	Medium	512 - 1024		<div><div></div><div></div></div>	0	0.00	100.00
40 - 80	Large	1024 -2048		<div><div></div><div></div></div>	0	0.00	100.00
80 - 160	Vry Large	2048 -4096		<div><div></div><div></div></div>	0	0.00	100.00
	Bedrock		BDRK	<div><div></div><div></div></div>	0	0.00	100.00
				Totals:	100		
	Total Tally:						



## RIVERMORPH PARTICLE SUMMARY

River Name: UNT to Teels Creek  
 Reach Name: S-E29  
 Sample Name: Representative  
 Survey Date: 08/30/2021

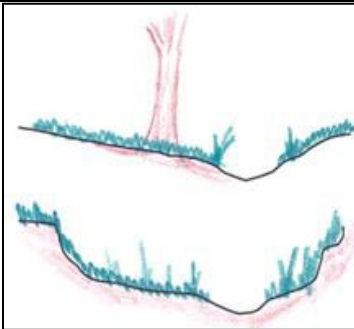
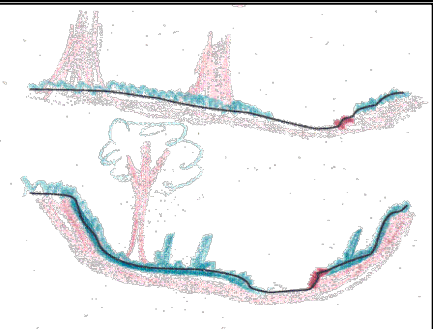
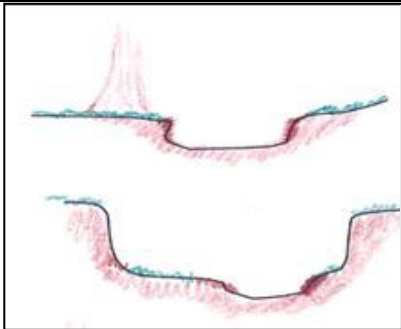
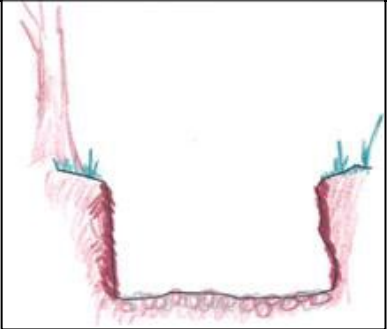
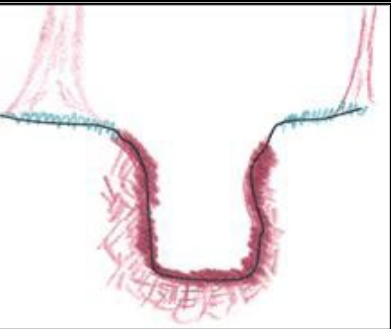
Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	16	16.00	16.00
0.062 - 0.125	4	4.00	20.00
0.125 - 0.25	5	5.00	25.00
0.25 - 0.50	4	4.00	29.00
0.50 - 1.0	6	6.00	35.00
1.0 - 2.0	7	7.00	42.00
2.0 - 4.0	3	3.00	45.00
4.0 - 5.7	8	8.00	53.00
5.7 - 8.0	14	14.00	67.00
8.0 - 11.3	4	4.00	71.00
11.3 - 16.0	5	5.00	76.00
16.0 - 22.6	3	3.00	79.00
22.6 - 32.0	3	3.00	82.00
32 - 45	9	9.00	91.00
45 - 64	5	5.00	96.00
64 - 90	2	2.00	98.00
90 - 128	2	2.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.06		
D35 (mm)	1		
D50 (mm)	5.06		
D84 (mm)	34.89		
D95 (mm)	60.2		
D100 (mm)	128		
Silt/Clay (%)	16		
Sand (%)	26		
Gravel (%)	54		
Cobble (%)	4		
Boulder (%)	0		
Bedrock (%)	0		

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	8/30/2021	S-E29	80	1		
Name(s) of Evaluator(s)		Stream Name and Information					SAR Length			
RH, DW, RC		UNT to Teels Creek					76			
1. Channel Condition: Assess the cross-section of the stream and prevailing condition (erosion, aggradation)										
Conditional Category										
Channel Condition	Optimal	Suboptimal		Marginal		Poor		Severe		
	 <p>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.</p>	 <p>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.</p>		 <p>Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% Sediment may be temporary / transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on &gt; 40% of the banks and depositional features which contribute to stability.</p>		 <p>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 &gt; 40% of the banks and stable sediment deposition is absent.</p>		 <p>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.</p>		
Scores	3	2.4		2		1.6		1		CI
NOTES>>										
2. RIPARIAN BUFFERS: Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)										
Conditional Category								NOTES>>		
Riparian Buffers	Optimal	Suboptimal		Marginal		Poor				
	Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas.	<b>High Suboptimal:</b> 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.	<b>Low Suboptimal:</b> Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation).	<b>High Marginal:</b> Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover.	<b>Low Marginal:</b> 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.	<b>High Poor:</b> 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.	<b>Low Poor:</b> Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions.			
Scores	1.5	1.2	1.1	0.85	0.75	0.6	0.5			
1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.						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%	70%				90%			
	Score >	0.5	0.85							
								CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	20%	70%				90%	Rt Bank CI >	0.70	
	Score >	0.5	0.85					Lt Bank CI >	0.70	
3. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embeddedness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.										
Instream Habitat/ Available Cover	Conditional Category						NOTES>>			
	Optimal	Suboptimal		Marginal		Poor				
	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	8/30/2021	S-E29	80	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>>	
	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.		
Scores	1.5	1.3	1.1	0.9	0.7	0.5		CI 1.10

REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH

NOTE: The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.

THE REACH CONDITION INDEX (RCI) >>

1.26

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

COMPENSATION REQUIREMENT (CR) >>

101

CR = RCI X L<sub>i</sub> X IF


INSERT PHOTOS:

(WSSI Photo Location )

DIRECTION  
172 deg(T)

37.08842°N  
079.95033°W

ACCURACY 5 m  
DATUM WGS84



S-E29 DS COND

2021-08-30  
14:14:19-04:00

Taken With  
Context Camera

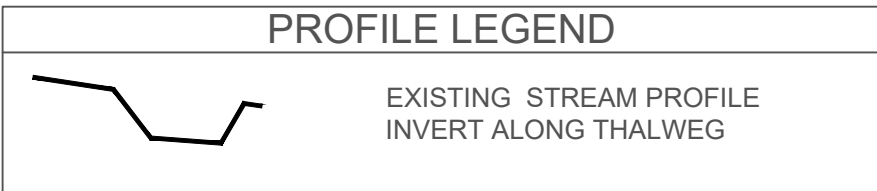
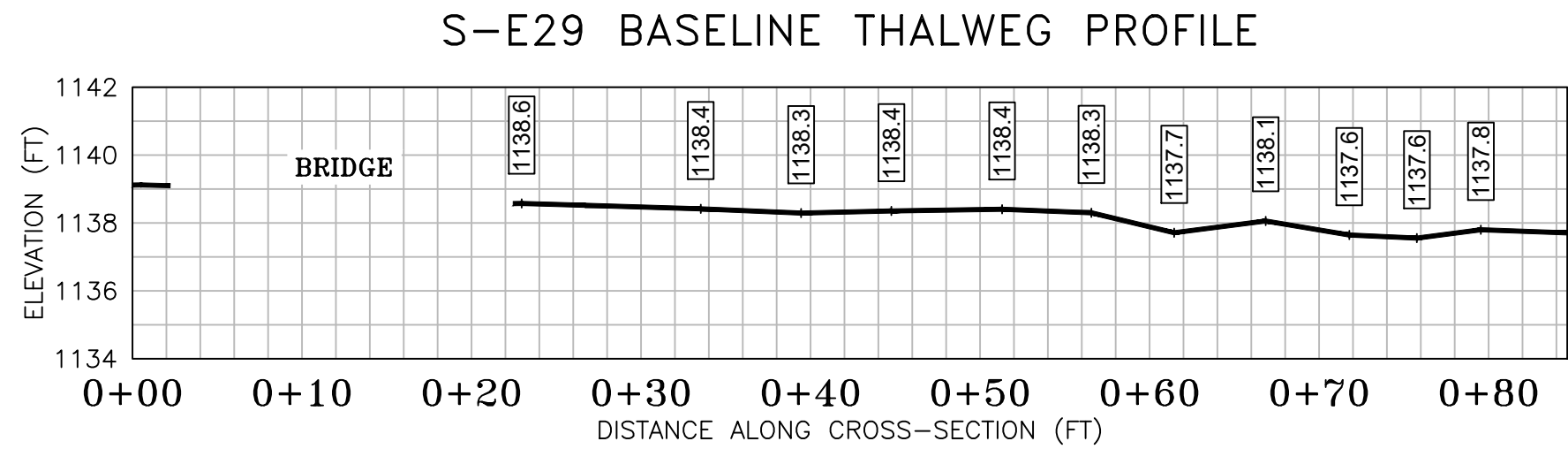
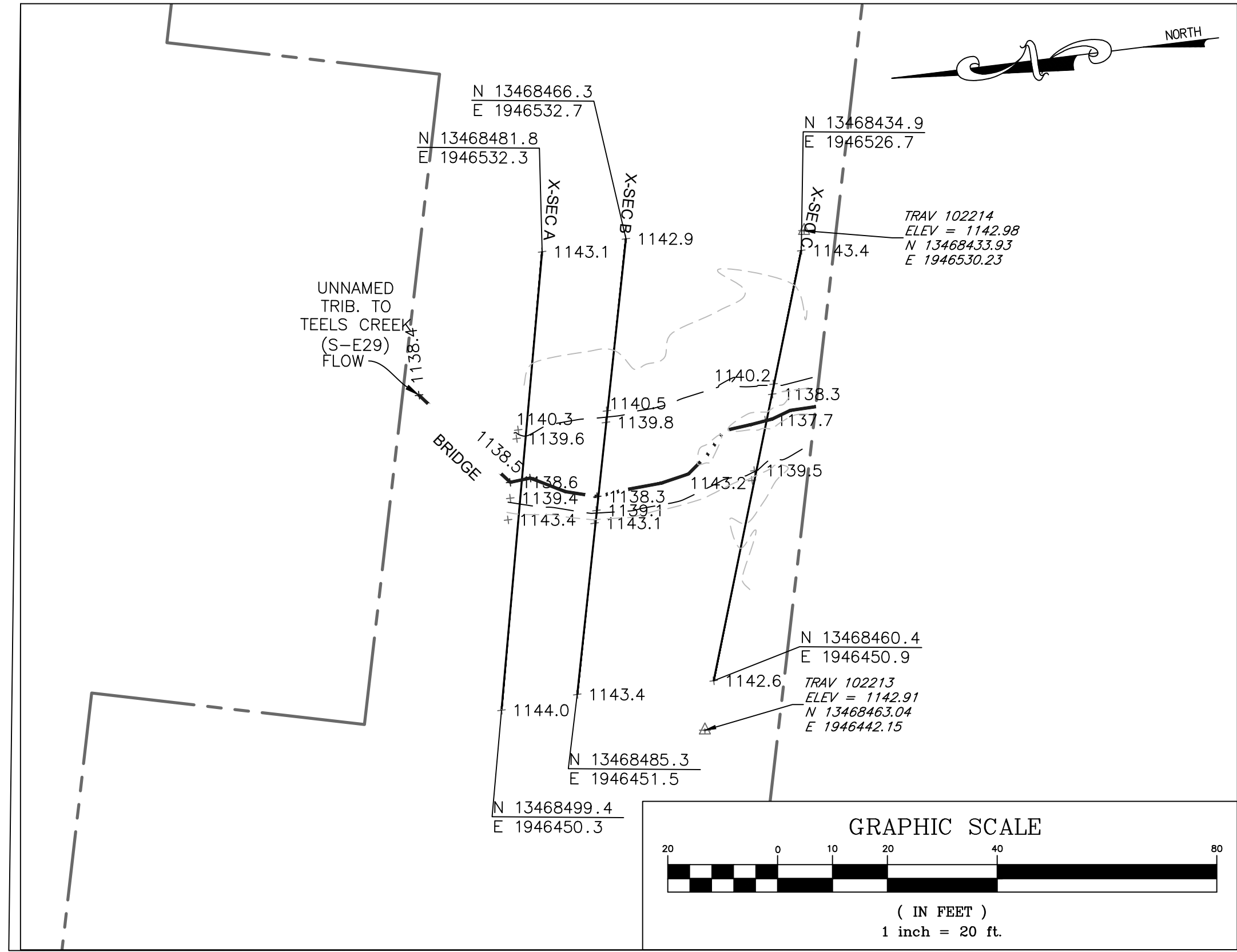
CAPTION. Assessment is limited to areas within the temporary ROW.

DESCRIBE PROPOSED IMPACT:

PROVIDED UNDER SEPARATE COVER

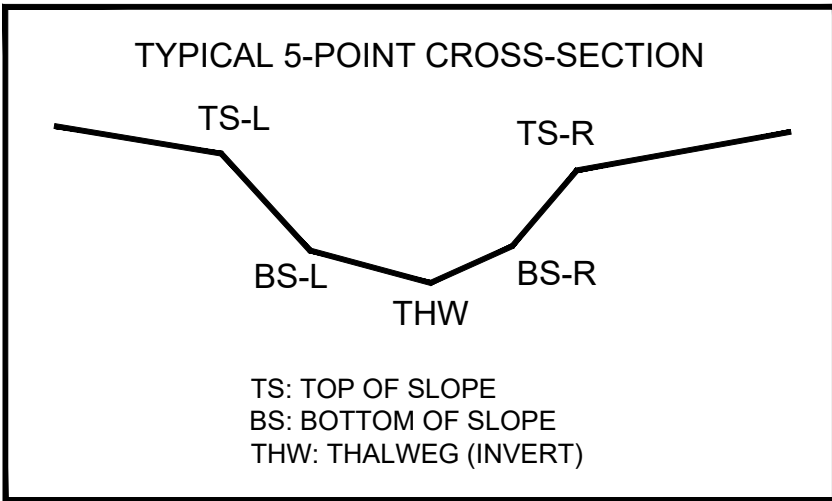
Reach R3-R4  
File: C:\Users\KATELYN.HOISINGTON\Downloads\OneDrive\_2\_10-11-2021\S-E29\_20211008KW\10. S-E29\_USM\_MVP\_20211008KW.xlsx





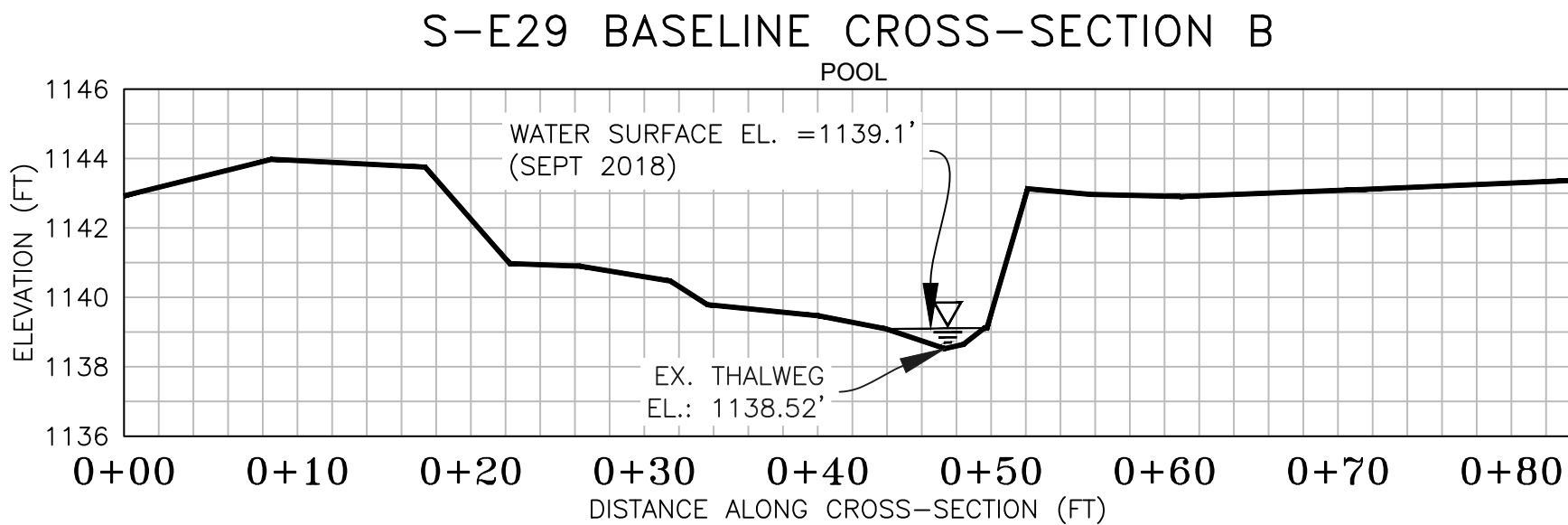
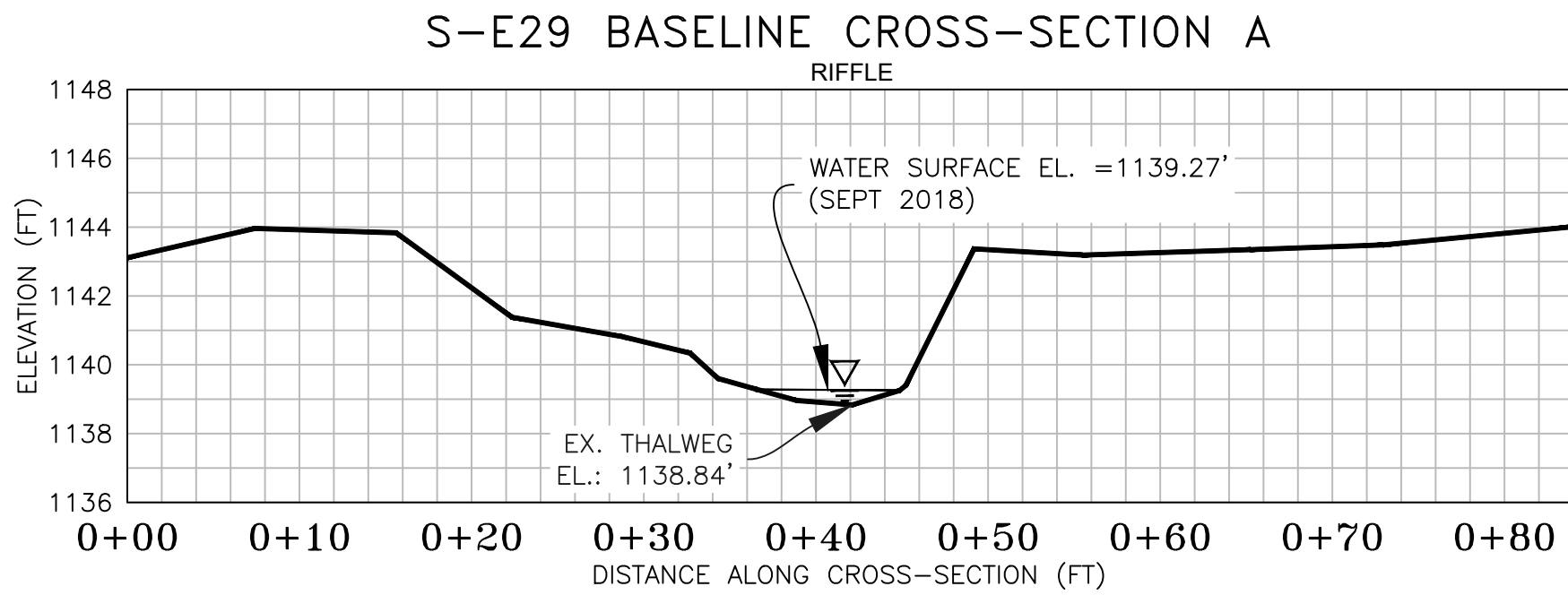
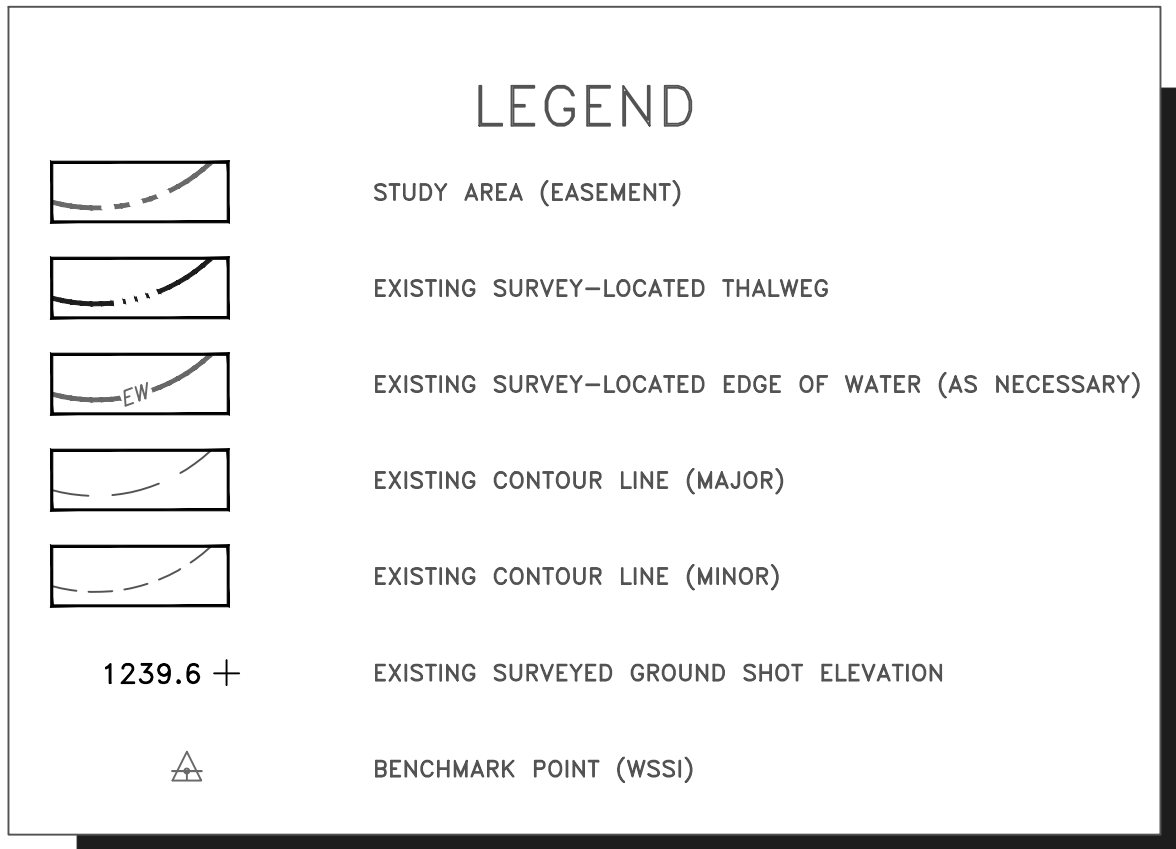
PROFILE  
SCALE: H: 1"=10'  
V: 1"=5'

CL STAKEOUT POINTS: S-E29 CROSS SECTION B (PIPE CL)					
PT. LOC.	PRE-CROSSING			POST-CROSSING	
	NORTHING	EASTING	ELEV	VERT. DIFF.	HORZ. DIFF.
TS-L	13468478.34	1946482.04	1143.13	----	----
BS-L	13468477.73	1946484.31	1139.12	----	----
THW	13468477.24	1946486.70	1138.52	----	----
BS-R	13468474.05	1946500.02	1139.79	----	----
TS-R	13468473.62	1946502.09	1140.47	----	----



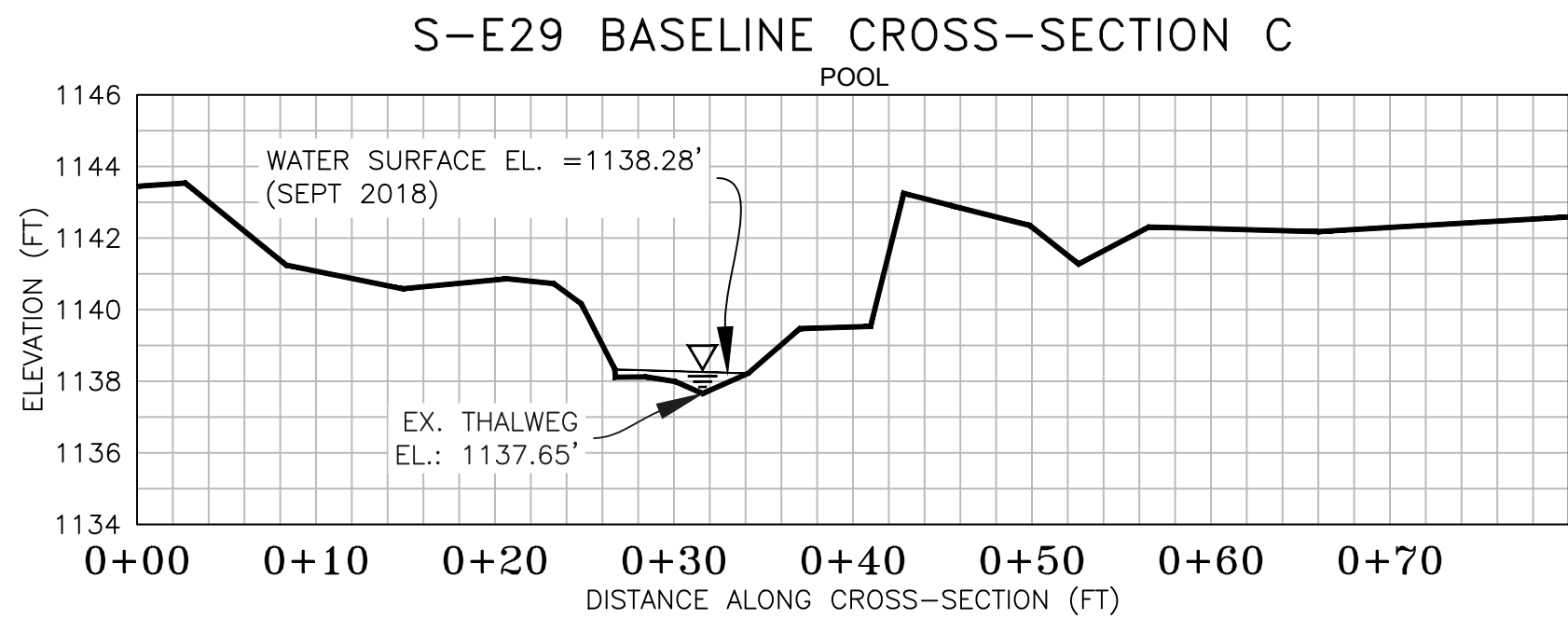
#### SURVEY NOTES:

1. This map has been oriented to NAD 1983 UTM ZONE 17N, and vertically to The North American Vertical Datum of 1988 (NAVD 88), using a Real Time Network (RTN) GPS. Field locations were completed on March 27, 2018.
2. Monumentation, including traverse stations and fly points, shown on this drawing should be used to orient any future boundary, topographic, or location survey.
3. Easement lines shown on plan view were provided by Mountain Valley Pipeline (MVP).
4. WSSI Contour Interval = 2.0'. Contours within the channel were interpolated using stream channel breaklines (i.e. top of slopes, toe of slopes, thalweg) and cross-sectional points. Contours outside the channel were interpolated using cross-sectional spot shots.
5. All section views shown are left to right facing downstream.
6. Cross-section B shot at location of pipe centerline (based on best professional judgement).

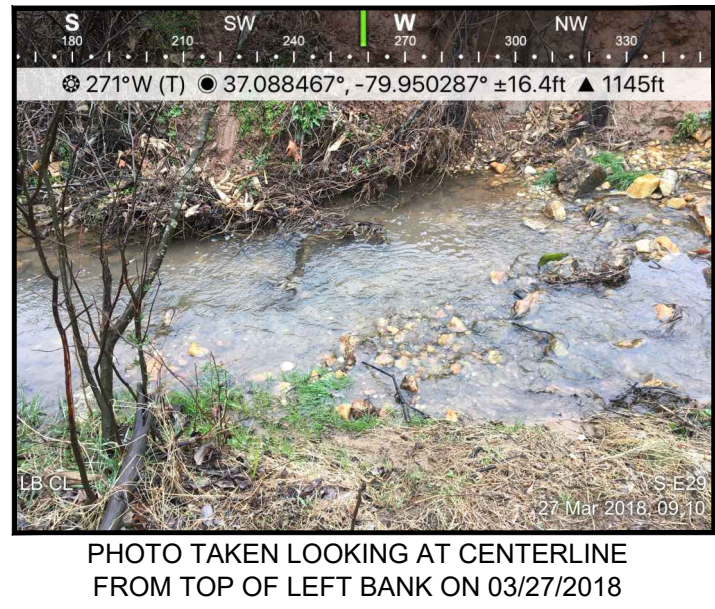
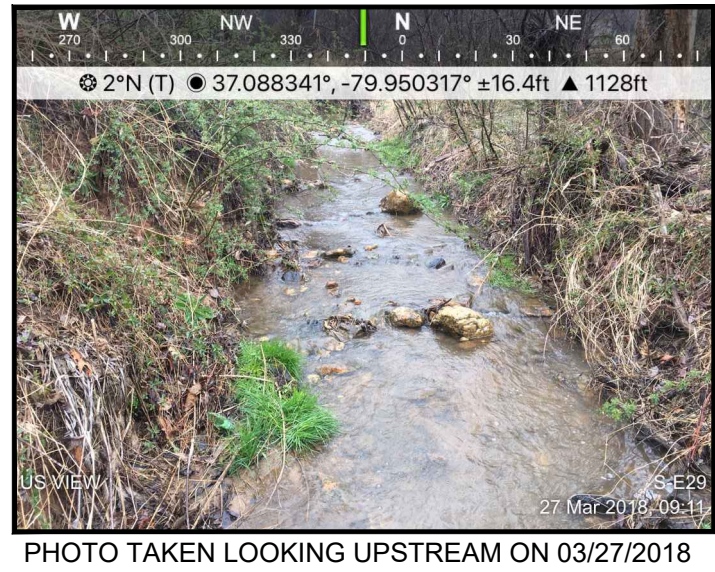
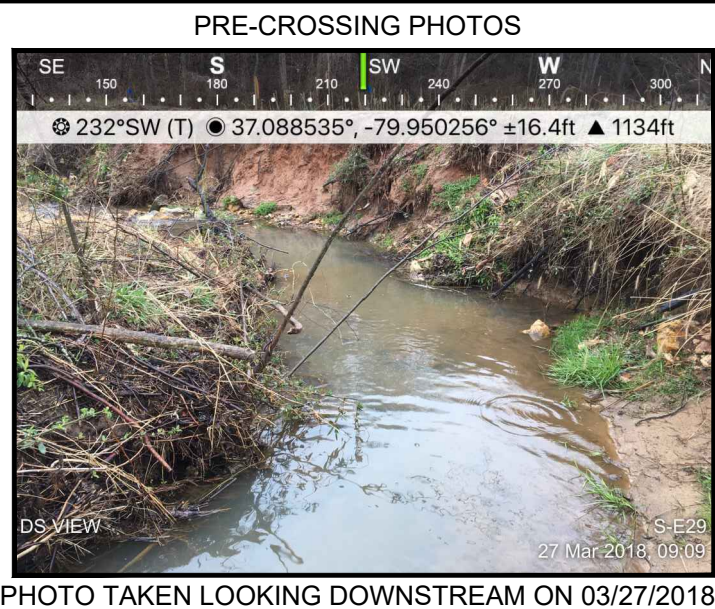


CROSS SECTION  
SCALE: H: 1"=10'  
V: 1"=5'

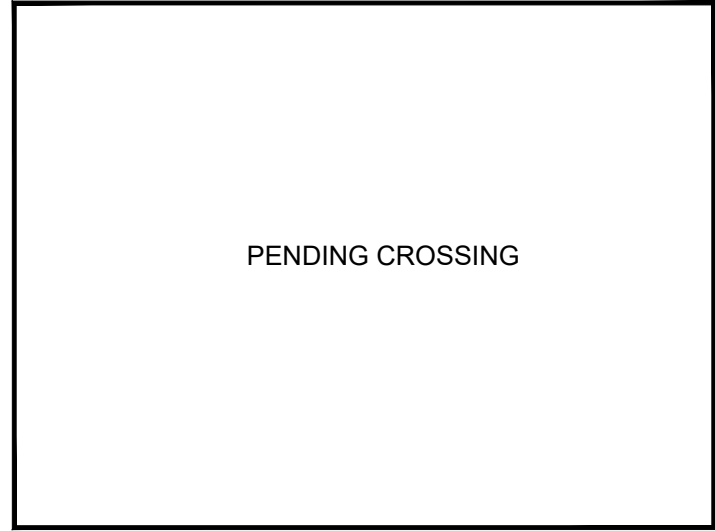
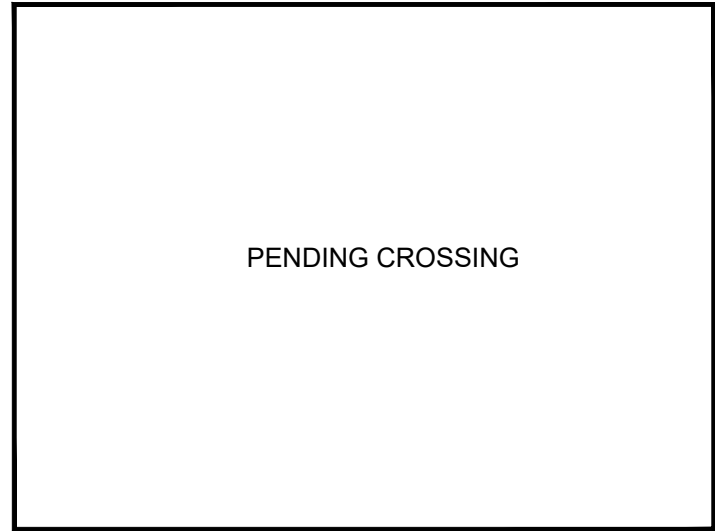
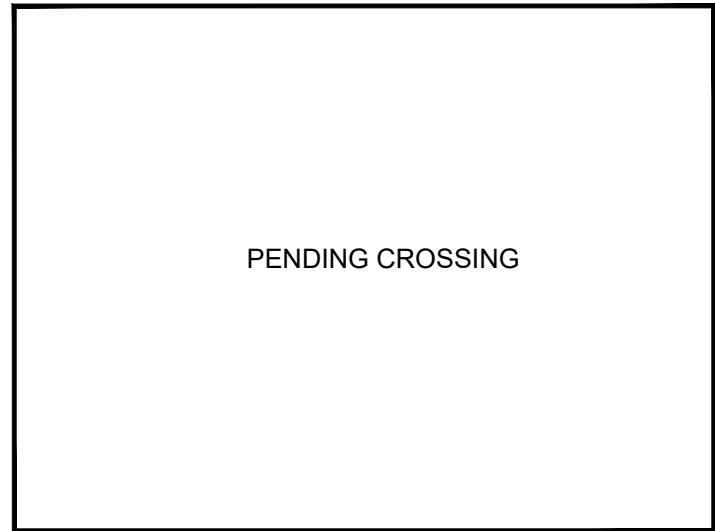
CROSS SECTION LEGEND  
— EXISTING GRADE



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



#### POST-CROSSING PHOTOS



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

Horizontal Datum: NAD 1983 UTM ZONE 17N		
Vertical Datum: NAVD 88		
Boundary and Topo Source: MVP		
WSSI 2' C.I. Topo		
Design	Draft	Approved
EJC	SIH	PFS
Sheet #		
1 of 1		
Computer File Name: C:\WSSI\2021\08\09\WSSI 2' C.I. Topo.dwg		
2021-08-04 10:24:30		