

## Baseline Assessment – Stream Attributes

### Reach S-EF7-ATWS (ATWS) Ephemeral Spread I Franklin County, Virginia

Data	Included
Photos	✓
SWVM Form	✓
FCI Calculator and HGM Form	✓
RBP Physical Characteristics Form	✓
Water Quality Data	N/A - No flow
RBP Habitat Form	✓
RBP Benthic Form	✓
Benthic Identification Sheet	N/A - No flow
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 N upstream, DW



Photo Type: DS COND

Location, Orientation, Photographer Initials: Downstream at ROW/LOD looking S downstream, DW





Photo Type: US COND

Location, Orientation, Photographer Initials: Upstream at ROW/LOD looking N upstream, DW



Photo Type: DS VIEW

Location, Orientation, Photographer Initials: Upstream at ROW/LOD looking S downstream, DW



SASCE FILE NO./ Project Name: (v2.1, Sept 2015)	Mountain Valley Pipeline			IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37.074636	Lon.	-79.941336	WEATHER:	Sunny	DATE:	8/28/2021			
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)			S-EF7-ATWS; 7.49 Acres			MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)						Comments:			
STREAM IMPACT LENGTH:	22	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:		Ephemeral	Stream Classification:			Stream Classification:		0	Stream Classification:		0	Stream Classification:		0	
Percent Stream Channel Slope		12.6	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	0.39	0.36666667	Hydrology		0	Hydrology		0	Hydrology		0	Hydrology		0	
Biogeochemical Cycling	0.36		Biogeochemical Cycling			Biogeochemical Cycling			Biogeochemical Cycling			Biogeochemical Cycling			
Habitat	0.35		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
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	0	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		3	2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		0	3. Pool Variability	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		2	4. Sediment Deposition	0-20			4. Sediment Deposition	0-20			4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20			5. Channel Flow Status	0-20			5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		18	6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		0	7. Channel Sinuosity	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		16	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		15	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		13	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	Marginal		67	Total RBP Score	Poor		0	Total RBP Score	Poor	</					



## High-Gradient Headwater Streams in Appalachia

### Field Data Sheet and Calculator

Team:	DW, JM	Latitude/UTM Northing:	37.074636
Project Name:	Mountain Valley Pipeline	Longitude/UTM Easting:	-79.941336
Location:	Franklin County	Sampling Date:	8/28/21
SAR Number:	S-EF7-ATW:	Reach Length (ft):	22
		Stream Type:	Ephemeral Stream
Top Strata:	Shrub/Herb Strata	(determined from percent calculated in V <sub>CCANOPY</sub> )	
Site and Timing:	Project Site	▼	Before Project

**Sample Variables 1-4 in stream channel**

1	V <sub>CCANOPY</sub>	Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.)
---	----------------------	---

Not Used,  
<20%

List the percent cover measurements at each point below:

[illegible]

2	V <sub>EMBED</sub>	Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5.
---	--------------------	--

2.0

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983 )

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

Measure  
at least  
30 points

List the ratings at each point below:

[illegible]

3	$V_{\text{SUBSTRATE}}$	Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in $V_{\text{EMBED}}$ .
---	------------------------	---

2.85 i

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

[illegible]

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%.

95 %

Left Bank: 3 ft

Right Bank: 18 ft

**Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).**

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.
---	------------------	---

00

Number of downed woody stems: 0

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.
---	-------------------	---

Not Used

List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:

Left Side					Right Side				

7 V<sub>SNAG</sub> Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.

9.1

Left Side: 0

Right Side: 2

8 V<sub>SSD</sub> Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.

340.9

Left Side: 35

Right Side: 40



9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	0.00
Group 1 = 1.0		Group 2 (-1.0)	
<input type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>
<input type="checkbox"/>	<i>Acer saccharum</i>	<input type="checkbox"/>	<i>Nyssa sylvatica</i>
<input type="checkbox"/>	<i>Aesculus flava</i>	<input type="checkbox"/>	<i>Oxydendrum arboreum</i>
<input type="checkbox"/>	<i>Asimina triloba</i>	<input type="checkbox"/>	<i>Prunus serotina</i>
<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input type="checkbox"/>	<i>Quercus alba</i>
<input type="checkbox"/>	<i>Betula lenta</i>	<input type="checkbox"/>	<i>Quercus coccinea</i>
<input type="checkbox"/>	<i>Carya alba</i>	<input type="checkbox"/>	<i>Quercus imbricaria</i>
<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>
<input type="checkbox"/>	<i>Carya ovalis</i>	<input type="checkbox"/>	<i>Quercus rubra</i>
<input type="checkbox"/>	<i>Carya ovata</i>	<input type="checkbox"/>	<i>Quercus velutina</i>
<input type="checkbox"/>	<i>Cornus florida</i>	<input type="checkbox"/>	<i>Sassafras albidum</i>
<input type="checkbox"/>	<i>Fagus grandifolia</i>	<input type="checkbox"/>	<i>Tilia americana</i>
<input type="checkbox"/>	<i>Fraxinus americana</i>	<input type="checkbox"/>	<i>Tsuga canadensis</i>
<input checked="" type="checkbox"/>	<i>Liriodendron tulipifera</i>	<input type="checkbox"/>	<i>Ulmus americana</i>
<input type="checkbox"/>	<i>Magnolia acuminata</i>		
1 Species in Group 1		1 Species in Group 2	

**Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.**

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td><td></td><td></td><td>20</td> <td>80</td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side							20	80												
Left Side				Right Side																							
			20	80																							
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td><td></td><td></td><td>80</td> <td>20</td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side							80	20												
Left Side				Right Side																							
			80	20																							

**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.53																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&lt;50% ground cover)</td> <td>0.5</td> <td>55</td> <td>55</td> </tr> <tr> <td>Forest and native range (&gt;75% ground cover)</td> <td>1</td> <td>21</td> <td>76</td> </tr> <tr> <td>Impervious areas (parking lots, roofs, driveways, etc)</td> <td>0</td> <td>10</td> <td>86</td> </tr> <tr> <td>Newly graded areas (bare soil, no vegetation or pavement)</td> <td>0</td> <td>0</td> <td>86</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &lt;50%</td> <td>0.1</td> <td>0</td> <td>86</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75%</td> <td>0.3</td> <td>14</td> <td>100</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (<50% ground cover)	0.5	55	55	Forest and native range (>75% ground cover)	1	21	76	Impervious areas (parking lots, roofs, driveways, etc)	0	10	86	Newly graded areas (bare soil, no vegetation or pavement)	0	0	86	Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	0	86	Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	14	100									
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
Forest and native range (<50% ground cover)	0.5	55	55																																				
Forest and native range (>75% ground cover)	1	21	76																																				
Impervious areas (parking lots, roofs, driveways, etc)	0	10	86																																				
Newly graded areas (bare soil, no vegetation or pavement)	0	0	86																																				
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	0	86																																				
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	14	100																																				

S-EF7-ATWS			Notes:
Variable	Value	VSI	Land Cover Analysis was completed using the 2019 National Land Cover Database (NLCD), from Landsat satellite imagery and other supplementary datasets. Watershed boundaries are based off of field delineated stream impacts. *Percentages in catchment values have been rounded to the nearest full number
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	2.0	0.46	
V <sub>SUBSTRATE</sub>	2.85 in	1.00	
V <sub>BERO</sub>	95 %	0.56	
V <sub>LWD</sub>	0.0	0.00	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	9.1	0.50	
V <sub>SSD</sub>	340.9	1.00	
V <sub>SRICH</sub>	0.00	0.00	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.53	0.56	



## FCI Calculator for the High-Gradient Headwater Streams in Appalachia

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-Gradient Headwater Streams and Low-Gradient Perennial Streams in Appalachia (Environmental Laboratory U.S. Army Corps of Engineers 2017).

**Project Name:** Mountain Valley Pipeline

**Location:** Franklin County

**Sampling Date:** 8/28/21

Project Site      Before Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**

Shrub/Herb Strata

**SAR number:** S-EF7-ATWS

### Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.39
Biogeochemical Cycling	0.36
Habitat	0.35

### Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	2.00	0.46
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	2.85	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	95.45	0.56
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	0.00	0.00
$V_{TDBH}$	Average dbh of trees.	Not Used	Not Used
$V_{SNAG}$	Number of snags per 100 feet of stream.	9.09	0.50
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	340.91	1.00
$V_{SRICH}$	Riparian vegetation species richness.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.53	0.56



# 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>Draw a map of the site and indicate the areas sampled (or attach a photograph)</p> <p>The map shows a stream flowing from the top left towards the bottom right. A red arrow labeled 'P: 5L' points to the stream. An 'Access ROAD' is shown on the right with a red arrow pointing right. A green area labeled 'forest' is at the bottom. A blue line labeled 'S-E-F-T-A-T-W-S' runs vertically. A green line labeled '22 ft' is near the stream. The letters 'ATWS' are written on the left side of the stream.</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> _____ km<sup>2</sup>            Spring-fed            Mixture of origins            Other _____         </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: 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 _____           </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</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: 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 _____           </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: 50%;"> <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: Franklin County  
Stream Name: UNT to Teels Creek  
HUC Code: 03010101  
Survey Date: 8/28/2021  
Surveyors: JM, DW, CB  
Type: Representative

Stream ID: S-EF7-ATWS

Basin: Upper Roanoke

PEBBLE COUNT							
Inches	PARTICLE	Millimeters		Particle Count	Total #	Item %	% Cum
	Silt/Clay	< .062	S/C	<div><div></div><div></div><div></div></div>	15	15.00	15.00
	Very Fine	.062-.125	S A N D	<div><div></div><div></div><div></div></div>	10	10.00	25.00
	Fine	.125-.25		<div><div></div><div></div><div></div></div>	0	0.00	25.00
	Medium	.25-.5		<div><div></div><div></div><div></div></div>	0	0.00	25.00
	Coarse	.50-1.0		<div><div></div><div></div><div></div></div>	0	0.00	25.00
.04-.08	Very Coarse	1.0-2		<div><div></div><div></div><div></div></div>	0	0.00	25.00
.08 -.16	Very Fine	2 -4		G R A V E L	<div><div></div><div></div><div></div></div>	0	0.00
.16 - .22	Fine	4 -5.7	<div><div></div><div></div><div></div></div>		0	0.00	25.00
.22 - .31	Fine	5.7 - 8	<div><div></div><div></div><div></div></div>		0	0.00	25.00
.31 - .44	Medium	8 -11.3	<div><div></div><div></div><div></div></div>		0	0.00	25.00
.44 - .63	Medium	11.3 - 16	<div><div></div><div></div><div></div></div>		0	0.00	25.00
.63 - .89	Coarse	16 -22.6	<div><div></div><div></div><div></div></div>		4	4.00	29.00
.89 - 1.26	Coarse	22.6 - 32	<div><div></div><div></div><div></div></div>		8	8.00	37.00
1.26 - 1.77	Vry Coarse	32 - 45	<div><div></div><div></div><div></div></div>		10	10.00	47.00
1.77 -2.5	Vry Coarse	45 - 64	<div><div></div><div></div><div></div></div>		12	12.00	59.00
2.5 - 3.5	Small	64 - 90	C O B B L E		<div><div></div><div></div><div></div></div>	16	16.00
3.5 - 5.0	Small	90 - 128		<div><div></div><div></div><div></div></div>	17	17.00	92.00
5.0 - 7.1	Large	128 - 180		<div><div></div><div></div><div></div></div>	7	7.00	99.00
7.1 - 10.1	Large	180 - 256		<div><div></div><div></div><div></div></div>	1	1.00	100.00
10.1 - 14.3	Small	256 - 362	B O U L D E R	<div><div></div><div></div><div></div></div>	0	0.00	100.00
14.3 - 20	Small	362 - 512		<div><div></div><div></div><div></div></div>	0	0.00	100.00
20 - 40	Medium	512 - 1024		<div><div></div><div></div><div></div></div>	0	0.00	100.00
40 - 80	Large	1024 -2048		<div><div></div><div></div><div></div></div>	0	0.00	100.00
80 - 160	Vry Large	2048 -4096		<div><div></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-EF7-ATWS  
Sample Name: Representative  
Survey Date: 08/28/2021  
-----

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	15	15.00	15.00
0.062 - 0.125	10	10.00	25.00
0.125 - 0.25	0	0.00	25.00
0.25 - 0.50	0	0.00	25.00
0.50 - 1.0	0	0.00	25.00
1.0 - 2.0	0	0.00	25.00
2.0 - 4.0	0	0.00	25.00
4.0 - 5.7	0	0.00	25.00
5.7 - 8.0	0	0.00	25.00
8.0 - 11.3	0	0.00	25.00
11.3 - 16.0	0	0.00	25.00
16.0 - 22.6	4	4.00	29.00
22.6 - 32.0	8	8.00	37.00
32 - 45	10	10.00	47.00
45 - 64	12	12.00	59.00
64 - 90	16	16.00	75.00
90 - 128	17	17.00	92.00
128 - 180	7	7.00	99.00
180 - 256	1	1.00	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)	0.07		
D35 (mm)	29.65		
D50 (mm)	49.75		
D84 (mm)	110.12		
D95 (mm)	150.29		
D100 (mm)	255.99		
Silt/Clay (%)	15		
Sand (%)	10		
Gravel (%)	34		
Cobble (%)	41		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

# Ephemeral Stream Assessment Form (Form 1a)

Unified Stream Methodology for use in Virginia

For use in ephemeral streams

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact Length	Impact Factor
22865.06	Mountain Valley Pipeline (Mountain Valley Pipeline, LLC)	Franklin County	R6	03010101	8/28/21	S-EF7 ATWS	22	1
Name(s) of Evaluator(s)		Stream Name and Information					SAR Length	
DW, JM		UNT to Teels Creek					22	

**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 and an non-maintained understory. Wetlands 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% 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.		
			High	Low	High	Low	High		Low
Condition 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>	30%	70%				100%		
	Score >	0.85	1.5						
						CI= (Sum % RA * Scores*0.01)/2			
Left Bank	% Riparian Area>	5%	95%				100%		
	Score >	0.6	0.5						
						Rt Bank CI >	1.31	CI	
						Lt Bank CI >	0.51	0.91	
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) >>			0.46	

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) >> 0.46

RCI= (Riparian CI)/2

COMPENSATION REQUIREMENT (CR) >> 10

CR = RCI X LF X IF

INSERT PHOTOS:



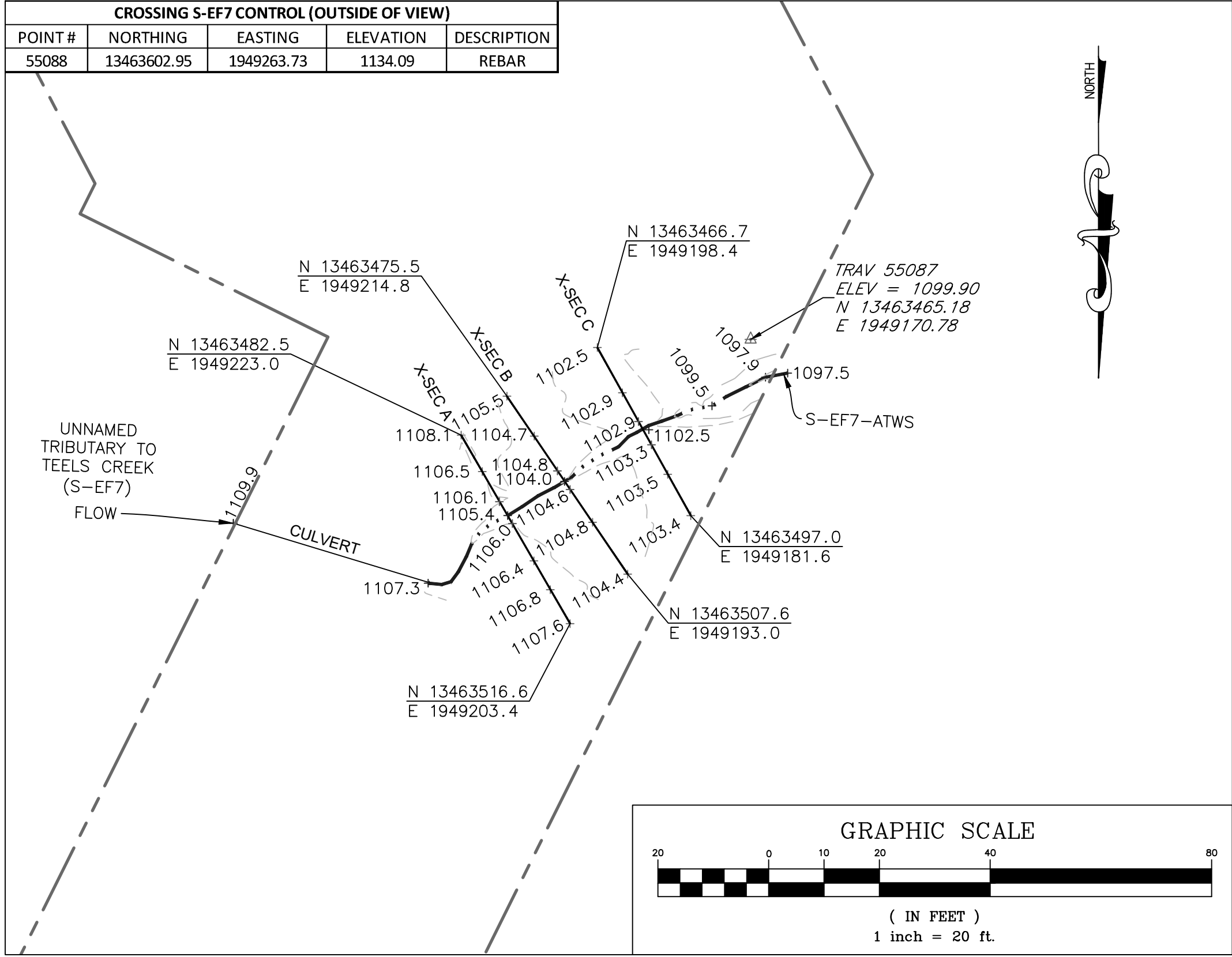
**CAPTION.** Assessment is limited to areas within the temporary ROW.

DESCRIBE PROPOSED IMPACT:

PROVIDED UNDER SEPARATE COVER

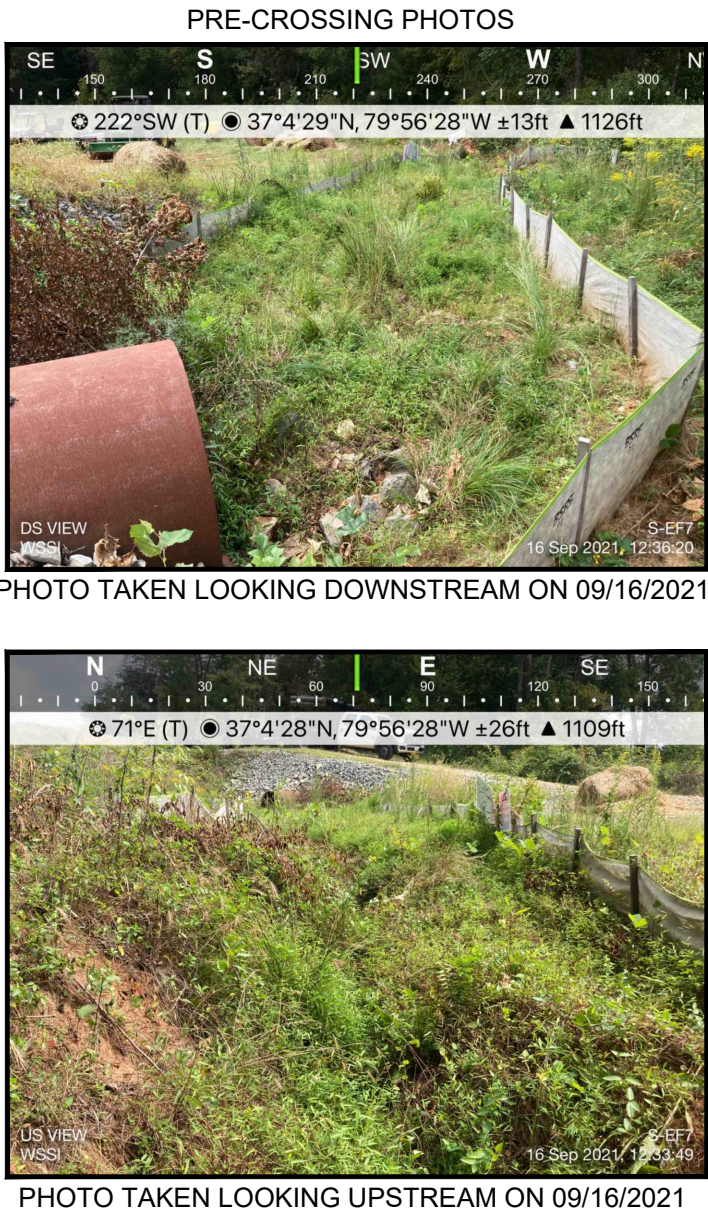
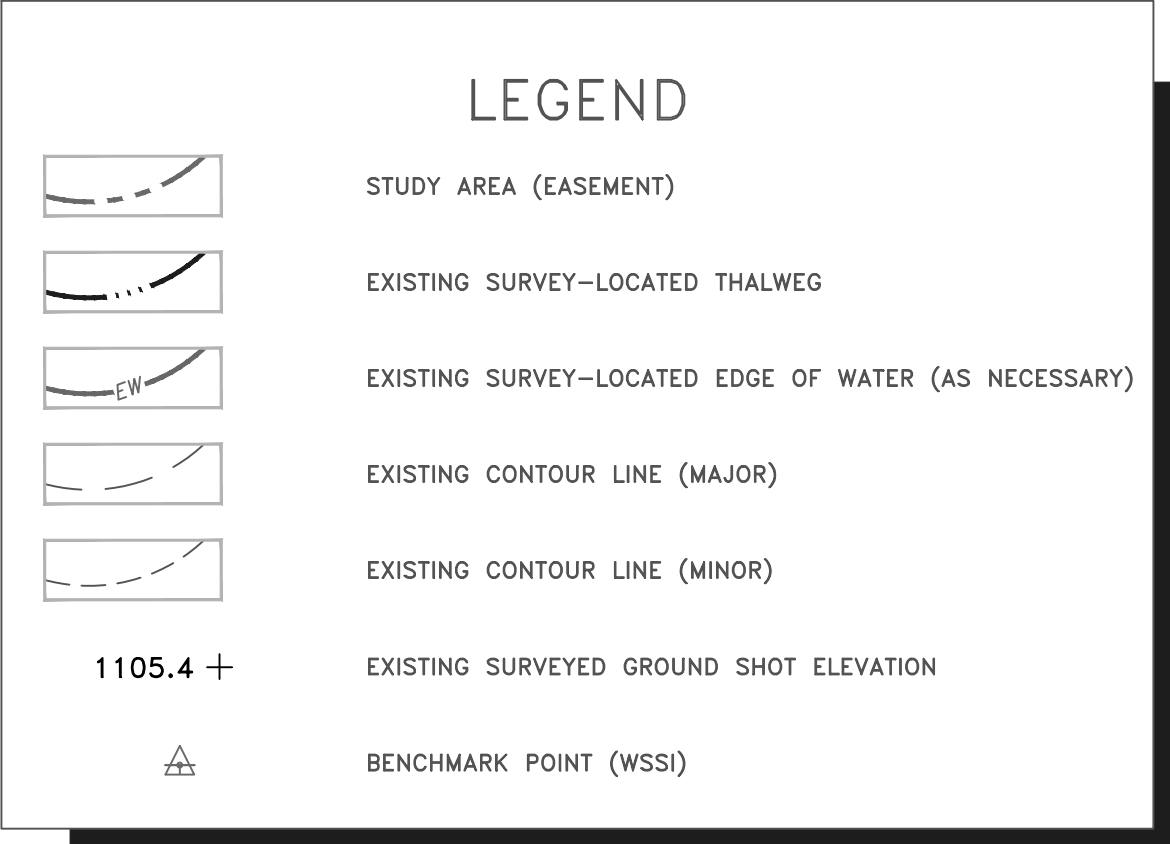
PROVIDED UNDER SEPARATE COVER





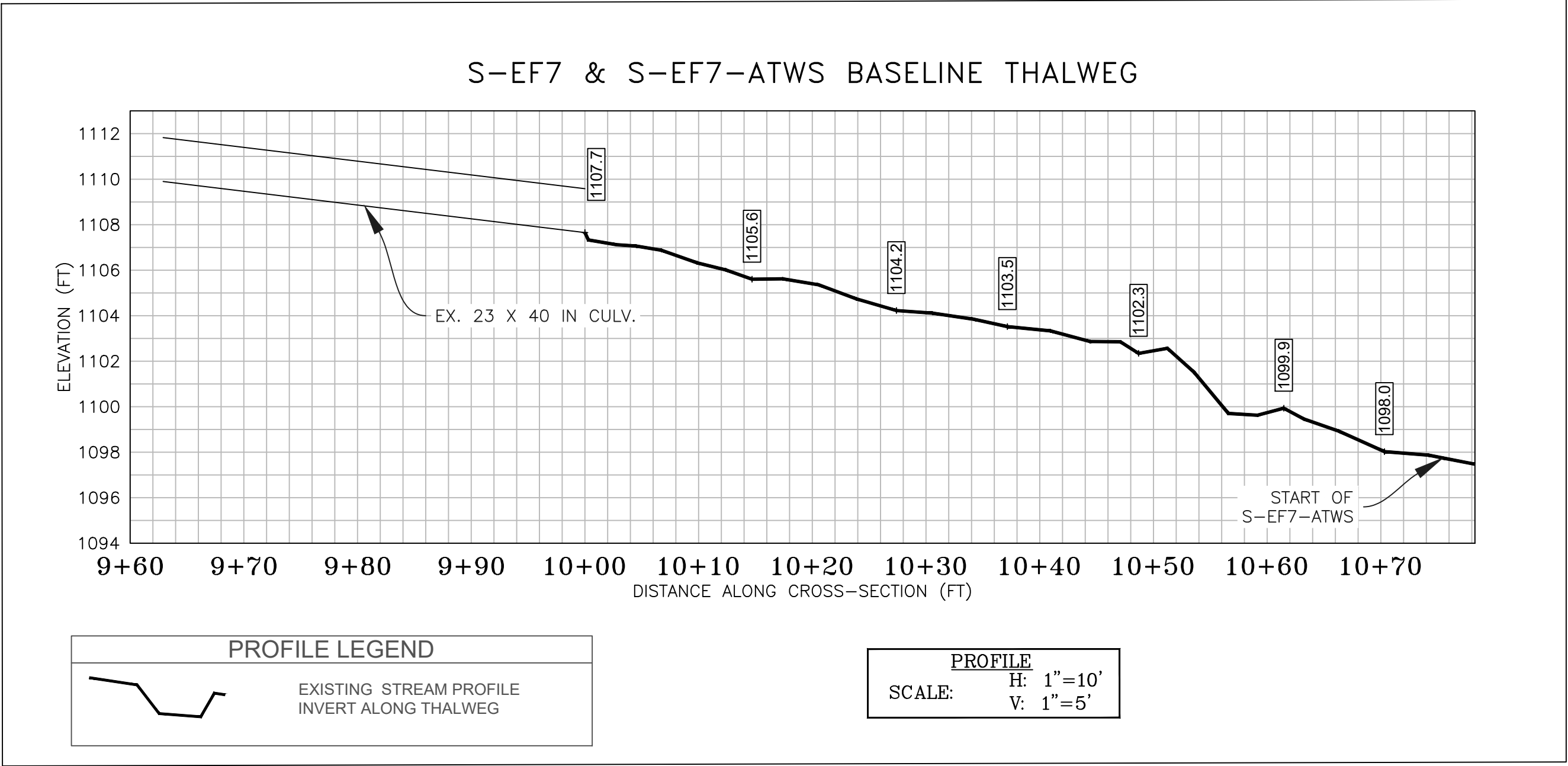
SURVEY NOTES:

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 September 10, 2018 and September 16, 2021.
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).
7. Pipe installed prior to survey.

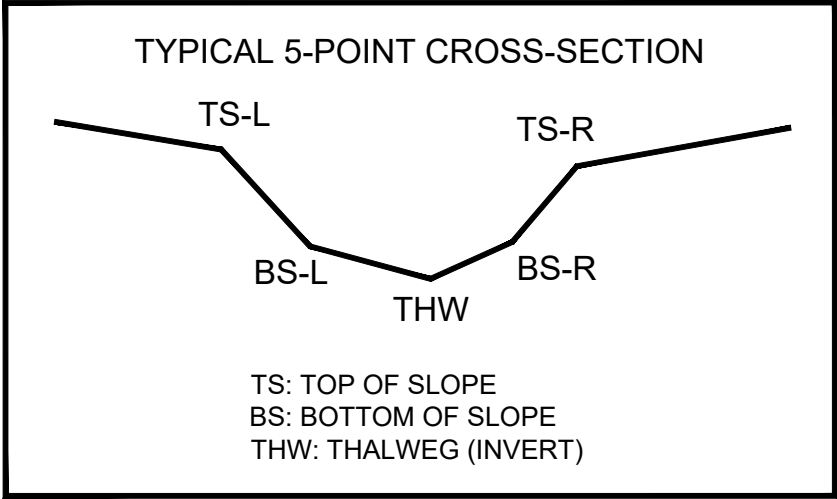


Wetland Studies and Solutions, Inc. a DAWEY company

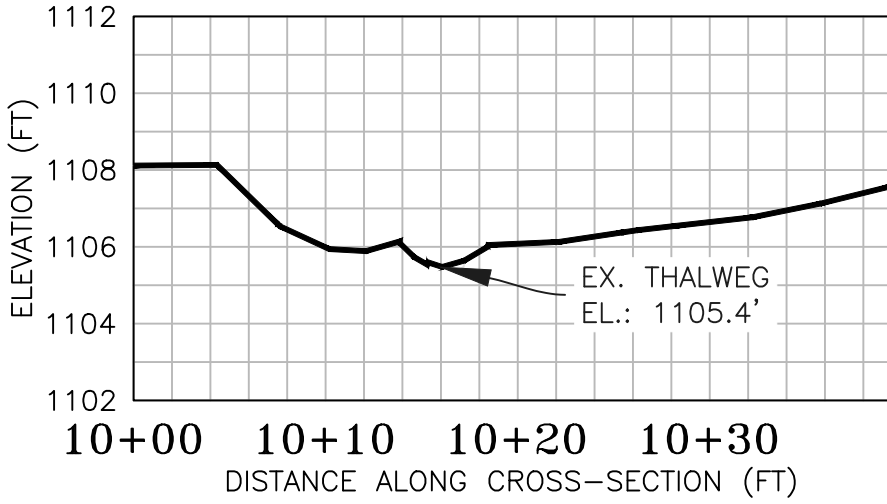
5500 Wellington Branch Drive • Suite 100  
Gainesville, Virginia 20155  
Phone: 703-679-5600 • Fax: 703-679-5601  
www.wetlands.com



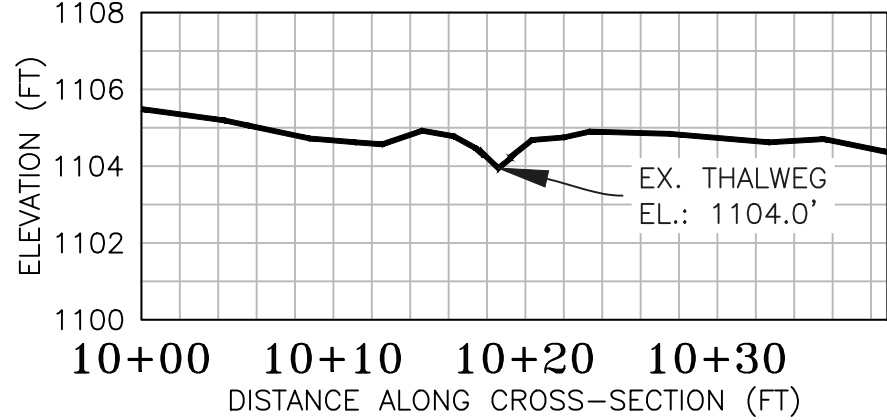
CL STAKEOUT POINTS: S-EF7 CROSS SECTION B (PIPE CL)					
PRE-CROSSING			POST-CROSSING		
PT. LOC.	NORTHING	EASTING	ELEV	VERT. DIFF.	HORZ. DIFF.
TS-L	13463488.94	1949205.67	1104.78	----	----
BS-L	13463490.11	1949204.84	1104.36	----	----
THW	13463490.86	1949204.39	1103.97	----	----
BS-R	13463491.39	1949204.04	1104.25	----	----
TS-R	13463492.33	1949203.38	1104.56	----	----



S-EF7 BASELINE CROSS-SECTION A



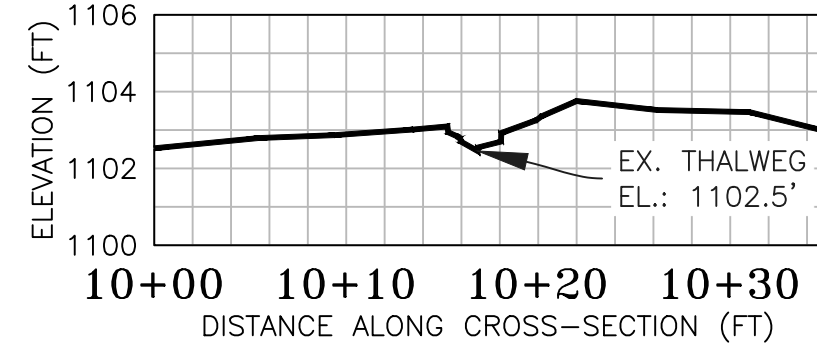
S-EF7 BASELINE CROSS-SECTION B



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

CROSS SECTION LEGEND EXISTING GRADE

S-EF7 BASELINE CROSS-SECTION C



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

POST-CROSSING PHOTOS

PENDING CROSSING

PHOTO TAKEN LOOKING

PENDING CROSSING

PHOTO TAKEN LOOKING

PENDING CROSSING

PHOTO TAKEN LOOKING

Profile and Cross-Sections Baseline Survey

Prepared For: MVP

Crossing S-EF7 & S-EF7-ATWS- Teels Creek (MP 260.2)

Franklin County, Virginia

Copyright © 2021 Wetland Studies and Solutions, Inc.

REVISIONS					SCALE: AS NOTED
No.	Date	Description	Rev. By	App. By	
Horizontal Datum: NAD 1983 UTM ZONE 17N					DATE: October 2021
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: L:\Survey\22065\22065\22065\01\Sheet1 Work.Dwg 22065_01 S3 MP 224-267 Sheet.dwg					