Baseline Assessment – Stream Attributes

Reach S-C41 (Pipeline ROW)
Intermittent
Spread F
Monroe County, West Virginia

Data	Included
Photos	✓
SWVM Form	✓
FCI Calculator and HGM Form	✓
RBP Physical Characteristics Form	✓
Water Quality Data	✓
RBP Habitat Form	✓
RBP Benthic Form	✓
Benthic Identification Sheet	N/A –Low flow/Inadequate substrate
Wolman Pebble Count	✓
Reference Reach Software Pebble Count Data	✓
Longitudinal Profile and Cross Sections	✓

Spread E Stream S-C41 (Pipeline ROW) Monroe County

Photo Type: DS, US View
Location, Orientation, Photographer Initials: Downstream Edge of Right of Way, Upstream View, TF/ABK/TA/WP

Photo Type: DS Edge ROW, DS View
Location, Orientation, Photographer Initials: Downstream Edge of ROW, Downstream View, TF/ABK/TA/WP

Spread E Stream S-C41 (Pipeline ROW) Monroe County

Photo Type: C ROW, US View
Location, Orientation, Photographer Initials: Center Right of Way, Upstream View, TF/ABK/TA/WP

Photo Type: C ROW, DS View
Location, Orientation, Photographer Initials: Center of Right of Way, Downstream View, TF/ABK/TA/WP

Spread E Stream S-C41 (Pipeline ROW) Monroe County

Photo Type: US, US View
Location, Orientation, Photographer Initials: Upstream Edge of Right of Way, Upstream View, TF/ABK/TA/WP

Photo Type: US, DS View
Location, Orientation, Photographer Initials: Upstream Edge of Right of Way, Downstream View, TF/ABK/TA/WP

Spread E Stream S-C41 (Pipeline ROW) Monroe County

38.426161º N, -80.694592º W

Photo Type: View of Vegetation from TMB
Location, Orientation, Photographer Initials: View of Vegetation from Timber Mat Bridge, TF/ABK/TA/WP

"Q:\Charleston\2021 Projects\21-0244- MVP- STREAM AND WETLAND CONDITIONS ASSESSMENT AND SURVEY PLAN\002 - Pre-Crossing Monitoring\Spread F\S-C41"

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2017

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	**Mountain Valley Pipeline**	**IMPACT COORDINATES: (in Decimal Degrees)**	**Lat.**	**37.426161**	**Lon.**	**-80.694592**	**WEATHER:**	**100 % Cloud Cover 75 °F**	**DATE:**	8/17/21
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	**S-C41 UNT to Painter Run**	**MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION:** (watershed size {acreage}, unaltered or impairments)							**Comments:**	
STREAM IMPACT LENGTH:	**143**	**FORM OF MITIGATION:**	**RESTORATION (Levels I-III)**	**MIT COORDINATES: (in Decimal Degrees)**	**Lat.**		**Lon.**		**PRECIPITATION PAST 48 HRS:**		**Mitigation Length:**	

Column No. 1- Impact Existing Condition (Debit)				**Column No. 2- Mitigation Existing Condition - Baseline (Credit)**				**Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)**				**Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)**				**Column No. 5- Mitigation Projected at Maturity (Credit)**			
Stream Classification:	**Intermittent**			**Stream Classification:**				**Stream Classification:**	**0**			**Stream Classification:**	**0**			**Stream Classification:**	**0**		
Percent Stream Channel Slope	**21.8**			**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	**0.53**			**Hydrology**				**Hydrology**				**Hydrology**				**Hydrology**			
Biogeochemical Cycling	**0.45**		**0.45**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**
Habitat	**0.37**			Habitat				Habitat				Habitat				Habitat			
PART I - Physical, Chemical and Biological Indicators				**PART I - Physical, Chemical and Biological Indicators**				**PART I - Physical, Chemical and Biological Indicators**				**PART I - Physical, Chemical and Biological Indicators**				**PART I - Physical, Chemical and Biological Indicators**			
	Points Scale	**Range**	**Site Score**		**Points Scale**	**Range**	**Site Score**		**Points Scale**	**Range**	**Site Score**		**Points Scale**	**Range**	**Site Score**		**Points Scale**	**Range**	**Site Score**
PHYSICAL INDICATOR (Applies to all streams classifications)				**PHYSICAL INDICATOR** (Applies to all streams classifications)				**PHYSICAL INDICATOR** (Applies to all streams classifications)				**PHYSICAL INDICATOR** (Applies to all streams classifications)				**PHYSICAL INDICATOR** (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)				**USEPA RBP (Low Gradient Data Sheet)**				**USEPA RBP (High Gradient Data Sheet)**				**USEPA RBP (High Gradient Data Sheet)**				**USEPA RBP (High Gradient Data Sheet)**			
1. Epifaunal Substrate/Available Cover	0-20		**8**	1. Epifaunal Substrate/Available Cover	0-20			1. Epifaunal Substrate/Available Cover	0-20			1. Epifaunal Substrate/Available Cover	0-20			1. Epifaunal Substrate/Available Cover	0-20		
2. Embeddedness	0-20		**15**	2. Pool Substrate Characterization	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		**5**	3. Pool Variability	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		**13**	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		**7**	5. Channel Flow Status	0-20			5. Channel Flow Status	0-20			5. Channel Flow Status	0-20			5. Channel Flow Status	0-20		
6. Channel Alteration	0-20	0-1	**19**	6. Channel Alteration	0-20	0-1		6. Channel Alteration	0-20	0-1		6. Channel Alteration	0-20	0-1		6. Channel Alteration	0-20	0-1	
7. Frequency of Riffles (or bends)	0-20		**5**	7. Channel Sinuosity	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		**9**	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		**16**	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		**8**	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	Marginal		**105**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**
Sub-Total			**0.525**	Sub-Total			**0**	Sub-Total			**0**	Sub-Total			**0**	Sub-Total			**0**
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				**CHEMICAL INDICATOR** (Applies to Intermittent and Perennial Streams)				**CHEMICAL INDICATOR** (Applies to Intermittent and Perennial Streams)				**CHEMICAL INDICATOR** (Applies to Intermittent and Perennial Streams)				**CHEMICAL INDICATOR** (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)				**WVDEP Water Quality Indicators (General)**				**WVDEP Water Quality Indicators (General)**				**WVDEP Water Quality Indicators (General)**				**WVDEP Water Quality Indicators (General)**			
Specific Conductivity				**Specific Conductivity**				**Specific Conductivity**				**Specific Conductivity**				**Specific Conductivity**			
<=99 - 90 points	0-90		**22.2**		0-90				0-90				0-90				0-90		
pH				**pH**				**pH**				**pH**				**pH**			
6.0-8.0 = 80 points	0-80	0-1	**6.39**		5-90	0-1			5-90	0-1			5-90	0-1			5-90	0-1	
DO				**DO**				**DO**				**DO**				**DO**			
>5.0 = 30 points	10-30		**7.64**		10-30				10-30				10-30				10-30		
Sub-Total			**1**	Sub-Total			**0**	Sub-Total			**0**	Sub-Total			**0**	Sub-Total			**0**
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				**BIOLOGICAL INDICATOR** (Applies to Intermittent and Perennial Streams)				**BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)**				**BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)**				**BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)**			
WV Stream Condition Index (WVSCI)				**WV Stream Condition Index (WVSCI)**				**WV Stream Condition Index (WVSCI)**				**WV Stream Condition Index (WVSCI)**				**WV Stream Condition Index (WVSCI)**			
0	0-100	0-1			0-100	0-1			0-100	0-1			0-100	0-1			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		
Index	**Linear Feet**	**Unit Score**
0.606	**143**	**86.69375**

PART II - Index and Unit Score		
Index	**Linear Feet**	**Unit Score**
0	**0**	**0**

PART II - Index and Unit Score		
Index	**Linear Feet**	**Unit Score**
0	**0**	**0**

PART II - Index and Unit Score		
Index	**Linear Feet**	**Unit Score**
0	**0**	**0**

PART II - Index and Unit Score		
Index	**Linear Feet**	**Unit Score**
0	**0**	**0**

Ver. 10-20-17

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 $V_{CCANOPY}$ (≥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: MVP - Preliminary Assessment
Location: Monroe/F
Sampling Date: 8/18/2021

Project Site | Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Shrub/Herb Strata

SAR number: S-C41

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.53
Biogeochemical Cycling	0.45
Habitat	0.37

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	Not Used, <20%	Not Used
V_{EMBED}	Average embeddedness of channel.	3.13	0.87
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.13	0.56
V_{BERO}	Total percent of eroded stream channel bank.	64.29	0.73
V_{LWD}	Number of down woody stems per 100 feet of stream.	92.86	0.50
V_{TDBH}	Average dbh of trees.	Not Used	Not Used
V_{SNAG}	Number of snags per 100 feet of stream.	0.00	0.10
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	0.00	0.00
V_{SRICH}	Riparian vegetation species richness.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	8.75	0.11
V_{HERB}	Average percent cover of herbaceous vegetation.	91.25	1.00
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.50	0.53

Version 10-20-17

High-Gradient Headwater Streams in Appalachia
Field Data Sheet and Calculator

Team:	A. Kincaid/ T. Ferguson	Latitude/UTM Northing:	37.426161
Project Name:	MVP - Preliminary Assessment	Longitude/UTM Easting:	-80.694592
Location:	Monroe/F	Sampling Date:	8/18/2021

SAR Number: S-C41 Reach Length (ft): 70 Stream Type: Intermittent Stream

Top Strata: Shrub/Herb Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ 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:

0	0	0	0	0	0	0	0	0	0

2 V_{EMBED} 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.

3.1

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)

List the ratings at each point below:

4	5	4	3	4	4				
4	5	1	4	4	1				
1	4	4	1	1	4				
1	4	4	4	4	1				
4	1	4	4	4	1				

3 $V_{SUBSTRATE}$ 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_{EMBED}.

1.13 in

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):

9.00	0.50	1.00	8.00	1.25	8.00				
9.50	7.00	2.00	4.00	4.00	0.08				
0.08	0.08	3.50	0.08	0.08	4.00				
0.08	4.00	0.60	4.00	0.75	0.08				
1.75	0.08	0.75	0.75	2.00	0.08				

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%.

64 %

Left Bank: 25 ft Right Bank: 20 ft

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

5	V_{LWD}	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. Number of downed woody stems: 65	92.9
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.	Not Used
7	V_{SNAG}	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. Left Side: 0 Right Side: 0	0.0
8	V_{SSD}	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. Left Side: 0 Right Side: 0	0.0
9	V_{SRICH}	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

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				

Group 1 = 1.0

☐	*Acer rubrum*	☐	*Magnolia tripetala*
☐	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☐	*Fraxinus americana*	☐	*Tsuga canadensis*
☐	*Liriodendron tulipifera*	☐	*Ulmus americana*
☐	*Magnolia acuminata*		

0 Species in Group 1

Group 2 (-1.0)

☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☐	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		

0 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 $V_{DETRITUS}$ 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.

8.75 %

Left Side				Right Side			
0	0	10	15	15	0	0	30

11 V_{HERB} 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.

91 %

Left Side				Right Side			
100	100	90	85	85	100	100	70

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed:

0.50

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (<50% ground cover)	0.5	100	100

S-C41

Variable	Value	VSI
$V_{CCANOPY}$	Not Used, <20%	Not Used
V_{EMBED}	3.1	0.87
$V_{SUBSTRATE}$	1.13 in	0.56
V_{BERO}	64 %	0.73
V_{LWD}	92.9	0.50
V_{TDBH}	Not Used	Not Used
V_{SNAG}	0.0	0.10
V_{SSD}	0.0	0.00
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	8.8 %	0.11
V_{HERB}	91 %	1.00
V_{WLUSE}	0.5	0.53

Notes:

Land Cover Analysis was completed using the 2019 National Land Cover Database (NLCD), from Landat satellite imagery and other supplementary datasets. Watershed boundaries are based off field delineated stream impacts.

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME UNT to Painter Run	LOCATION S-C41 Monroe/F	
STATION # _____ RIVERMILE _____	STREAM CLASS Intermittent	
LAT 37.426161 LONG -80.694592	COUNTY Monroe	
STORET #	AGENCY Potesta	
INVESTIGATORS Tim Ferguson/Allyson Kincaid		
FORM COMPLETED BY A. Kincaid	DATE 8/18/2021 TIME 1200 PM	REASON FOR SURVEY Preliminary Assessment

WEATHER CONDITIONS

Now		Past 24 hours
	storm (heavy rain)	
	rain (steady rain)	☑
	showers (intermittent)	☑
100 %	%cloud cover	
☑	clear/sunny	%

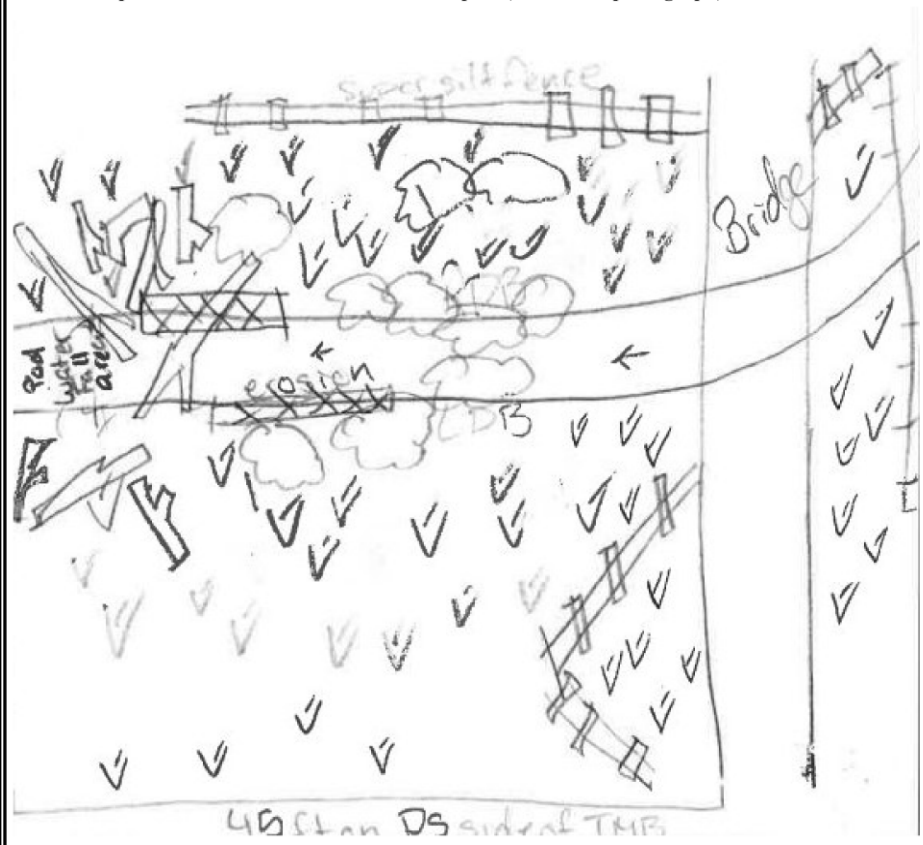
Has there been a heavy rain in the last 7 days? ☐ Yes ☐ No

Air Temperature 75 °F ° C

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☑ Intermittent ☐ Tidal

Stream Type
☐ Coldwater ☑ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☐ Spring-fed
☑ Mixture of origins
☐ Other _____

Catchment Area _____ km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
☑ Forest ☐ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☐ Other _____
☐ Residential

Local Watershed NPS Pollution
☐ No evidence ☑ Some potential sources
☐ Obvious sources

Local Watershed Erosion
☑ None ☐ Moderate ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
☐ Trees ☐ Shrubs ☑ Grasses ☑ Herbaceous

Dominant species present Herbaceous

INSTREAM FEATURES

Estimated Reach Length 70 ft m
Estimated Stream Width 1.6 ft m
Sampling Reach Area 112.8^2 m^2
Area in km^2 (m^2x1000) _____ km^2
Estimated Stream Depth 0.25 ft m
Surface Velocity (at thalweg) 0.06 ft/sec m/sec
Stream Dry ☐

Canopy Cover
☑ Partly open ☐ Partly shaded ☐ Shaded

High Water Mark _____ m

Proportion of Reach Represented by Stream Morphology Types
Riffle 0 % Run 0 %
Pool 0 %

Channelized ☐ Yes ☑ No
Dam Present ☐ Yes ☑ No

LARGE WOODY DEBRIS

LWD _____ m^2
Density of LWD _____ m^2/km^2 **(LWD/ reach area)**

AQUATIC VEGETATION N/A

Indicate the dominant type and record the dominant species present
☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating
☐ Floating Algae ☐ Attached Algae

Dominant species present _____

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature 18.0 ° C
Specific Conductance 22.2 us/cm
Dissolved Oxygen 7.64 mg/L
pH 6.39 su
Turbidity 41.1 ntu
WQ Instrument Used YSI/Turbis/dtly Meter

Water Odors
☑ Normal/None ☐ Sewage
☐ Petroleum ☐ Chemical
☐ Fishy ☐ Other _____

Water Surface Oils
☑ Slick ☐ Sheen ☐ Globs Flecks
☐ None ☐ Other _____

Turbidity (if not measured)
☐ Clear ☐ Slightly turbid ☑ Turbid
☐ Opaque ☐ Stained ☐ Other _____

SEDIMENT/ SUBSTRATE

Odors
☑ Normal ☐ Sewage ☐ Petroleum
☐ Chemical ☐ Anaerobic ☐ None
☐ Other _____

Oils
☑ Absent ☐ Slight ☐ Moderate ☐ Profuse

Deposits
☐ Sludge ☐ Sawdust ☐ Paper fiber ☑ Sand
☐ Relict shells ☐ Other _____

Looking at stones which are not deeply embedded, are the undersides black in color?
☐ Yes ☑ No

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		0	Detritus	sticks, wood, coarse plant materials (CPOM)	35
Boulder	> 256 mm (10")	0			
Cobble	64-256 mm (2.5"-10")	0	Muck-Mud	black, very fine organic (FPOM)	0
Gravel	2-64 mm (0.1"-2.5")	40			
Sand	0.06-2mm (gritty)	30	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	20			
Clay	< 0.004 mm (slick)	0			

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

STREAM NAME UNT to Painter Run	LOCATION S-C41	
STATION # _____ RIVERMILE _____	STREAM CLASS Intermittent	
LAT 37.426161 LONG -80.694592	COUNTY Monroe	
STORET #	AGENCY Potesta	
INVESTIGATORS Tim Ferguson/Allyson Kincaid		
FORM COMPLETED BY A. Kincaid	DATE 8/18/2021 TIME 1200 PM AM PM	REASON FOR SURVEY Preliminary Assessment

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover ☐ N/A	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 not new fall and not 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 8	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 15	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 ☐ N/A	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 5	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 13	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 ☐ N/A	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 7	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)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends) ☐ N/A	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**5** 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	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.
SCORE 4	Left Bank 10 9	8 7 6	5 **4** 3	2 1 0
SCORE 5	Right Bank 10 9	8 7 6	**5** 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8	Left Bank 10 9	**8** 7 6	5 4 3	2 1 0
SCORE 8	Right Bank 10 9	**8** 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 4	Left Bank 10 9	8 7 6	5 **4** 3	2 1 0
SCORE 4	Right Bank 10 9	8 7 6	5 **4** 3	2 1 0

Total Score 105

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME UNT to Painter Run	LOCATION	
STATION #_____ RIVERMILE_____	STREAM CLASS Intermittent	
LAT 37.426161 LONG -80.694592	COUNTY Monroe	
STORET #	AGENCY Potesta	
INVESTIGATORS Tim Ferguson/Allyson Kincaid		LOT NUMBER
FORM COMPLETED BY A. Kincaid	DATE 8/18/2021 TIME 1200 PM	REASON FOR SURVEY Preliminary Assessment

HABITAT TYPES	**Indicate the percentage of each habitat type present** ☐ Cobble_____% ☐ Snags _____% ☐ Vegetated Banks_____% ☐ Sand_____% ☐ Submerged Macrophytes_____% ☐ Other ( )_____%
SAMPLE COLLECTION	**Gear used** ☐ D-frame ☐ kick-net ☐ Other _____ **How were the samples collected?** ☐ wading ☐ from bank ☐ from boat **Indicate the number of jabs/kicks taken in each habitat type.** ☐ Cobble_____ ☐ Snags_____ ☐ Vegetated Banks_____ ☐ Sand_____ ☐ Submerged Macrophytes_____ ☐ Other ( )_____
GENERAL COMMENTS	Benthic data/sample not collected due to low water levels/Stream with inadequate substrate

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						

SITE ID: S-C41 UNT to Painters Run

DATE: 8/18/21

COLLECTOR(S): A. Vanscoy / T. Ferguson

Wolman Pebble Count (Reach Wide) mm

220	0.80	170	<.062	80	225	110	110	55	110
240	45	0.50	16	20	110	20	0.125	220	0.50
<.062	16	90	20	9	<.062	28	22	0.125	0.50
60	0.50	90	<.062	<.062	<.062	<.062	32	0.125	20
130	0.50	30	0.125	70	<.062	<.062	20	0.125	12
20	10	70	20	130	0.125	7	5	25	15
22	20	160	8	85	0.125	15	18	10	12
15	8	18	12	12	0.125	18	36	110	0.50
10	0.50	0.50	35	8	30	6	20	65	0.50
0.50	55	0.50	0.125	10	26	0.125	0.125	50	22

NOTES:

Could not access
All of reach
Appx 20ft was
inaccessible due
to heavy vegetation
and briers

Riffle Pebble Count

NOTES:

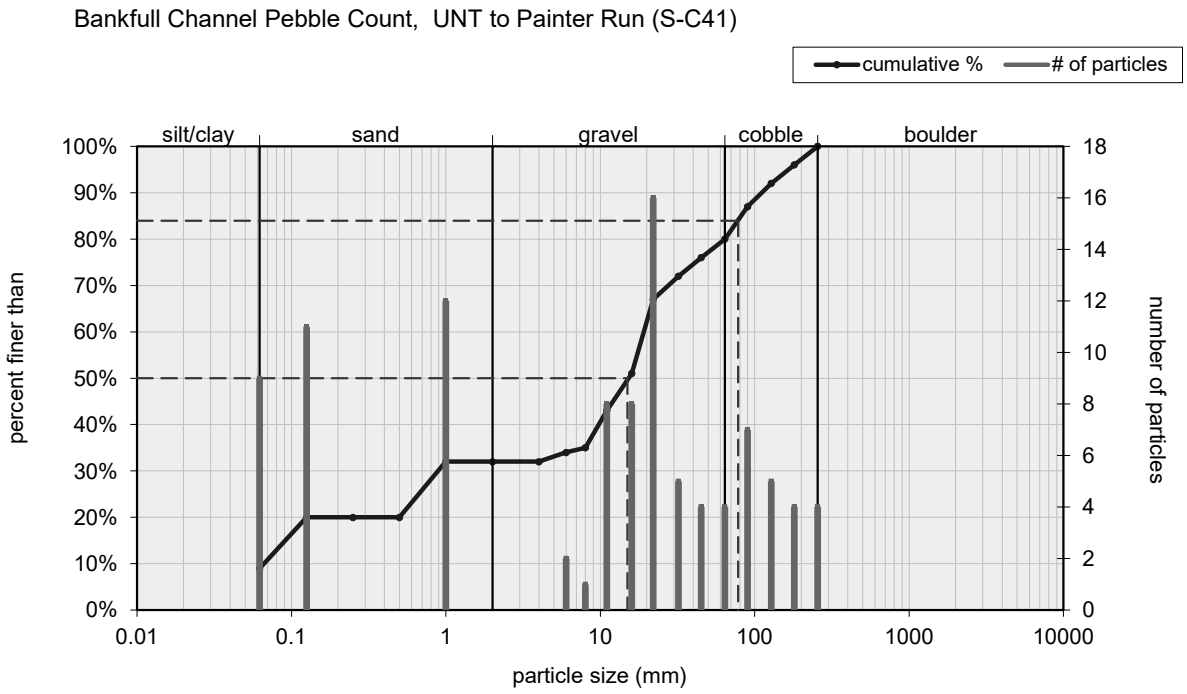
NOTES:

Inches	PARTICLE	Millimeters	
	Silt / Clay	< .062	S/C
	Very Fine	.062 - .125	SAND
	Fine	.125 - .25	SAND
	Medium	.25 - .50	SAND
	Coarse	.50 - 1.0	SAND
.04 - .08	Very Coarse	1.0 - 2	SAND
.08 - .16	Very Fine	2 - 4	GRAVEL
.16 - .22	Fine	4 - 5.7	GRAVEL
.22 - .31	Fine	5.7 - 8	GRAVEL
.31 - .44	Medium	8 - 11.3	GRAVEL
.44 - .63	Medium	11.3 - 16	GRAVEL
.63 - .89	Coarse	16 - 22.6	GRAVEL
.89 - 1.3	Coarse	22.6 - 32	GRAVEL
1.3 - 1.8	Very Coarse	32 - 45	GRAVEL
1.8 - 2.5	Very Coarse	45 - 64	GRAVEL
2.5 - 3.5	Small	64 - 90	COBBLE
3.5 - 5.0	Small	90 - 128	COBBLE
5.0 - 7.1	Large	128 - 180	COBBLE
7.1 - 10.1	Large	180 - 256	COBBLE
10.1 - 14.3	Small	256 - 362	BOULDER
14.3 - 20	Small	362 - 512	BOULDER
20 - 40	Medium	512 - 1024	BOULDER
40 - 80	Large-Vry Large	1024 - 2048	BOULDER
	Bedrock		BDRK

Bankfull Channel

Material	Size Range (mm)	Count
silt/clay	0 - 0.062	**9**
very fine sand	0.062 - 0.125	**11**
fine sand	0.125 - 0.25	
medium sand	0.25 - 0.5	
coarse sand	0.5 - 1	**12**
very coarse sand	1 - 2	
very fine gravel	2 - 4	
fine gravel	4 - 6	**2**
fine gravel	6 - 8	**1**
medium gravel	8 - 11	**8**
medium gravel	11 - 16	**8**
coarse gravel	16 - 22	**16**
coarse gravel	22 - 32	**5**
very coarse gravel	32 - 45	**4**
very coarse gravel	45 - 64	**4**
small cobble	64 - 90	**7**
medium cobble	90 - 128	**5**
large cobble	128 - 180	**4**
very large cobble	180 - 256	**4**
small boulder	256 - 362	
small boulder	362 - 512	
medium boulder	512 - 1024	
large boulder	1024 - 2048	
very large boulder	2048 - 4096	
total particle count:		100
bedrock	----------	
clay hardpan	----------	
detritus/wood	----------	
artificial	----------	
total count:		100

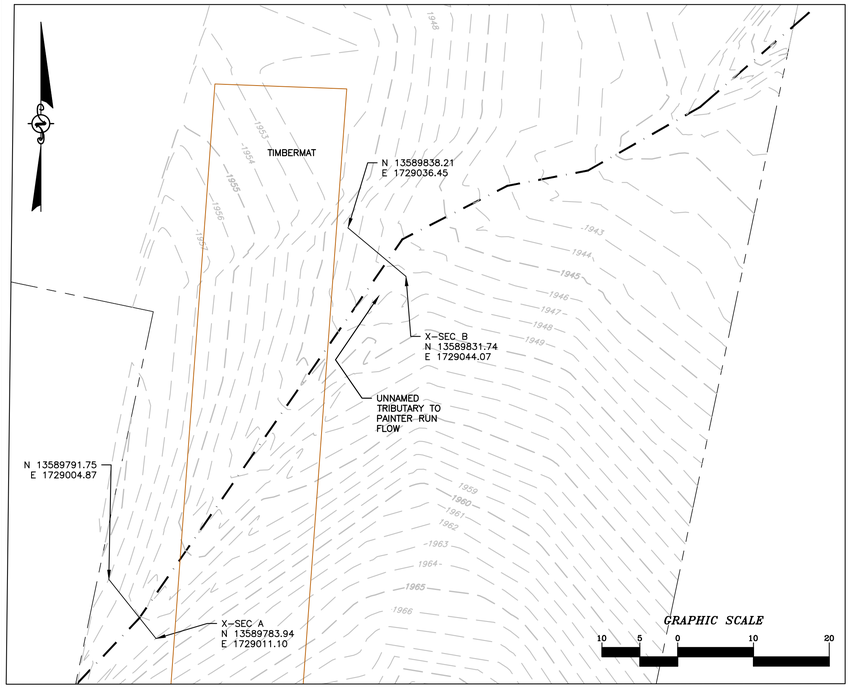
Note:



Size (mm)	
D16	0.097
D35	8
D50	15
D65	21
D84	78
D95	170

Size Distribution	
mean	2.8
dispersion	79.9
skewness	-0.43

Type	
silt/clay	9%
sand	23%
gravel	48%
cobble	20%
boulder	0%



S-C41

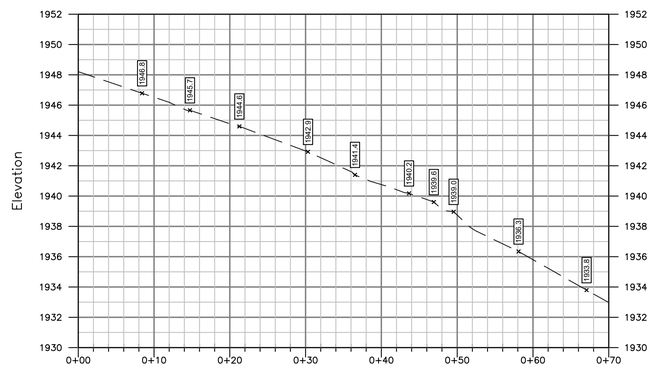
LEGEND

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

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 REAL TIME DGPS. FIELD LOCATIONS WERE COMPLETED ON 8-17-2021.
2. EASEMENT LINES SHOWN ON PLAN VIEW WERE PROVIDED BY MOUNTAIN VALLEY PIPELINE.
3. SURVEY POINTS FOR CROSS SECTIONS AND THALWEG PROFILES COLLECTED IN 2021 HAVE BEEN USED IN COMBINATION WITH SURVEY POINTS AND COLLECTED PREVIOUSLY IN 2020 IN ORDER TO GENERATE THE PRE-CROSSING SURFACE SHOWN IN PLAN. DUE TO NATURAL EROSIONAL STREAM PROCESSES THAT OCCUR OVER TIME, MINOR ADJUSTMENTS TO THE PROFILE ALIGNMENTS MAY HAVE BEEN REQUIRED IN ORDER TO GENERATE A CLEAN PRE-CROSSING SURFACE.
4. ALL SECTION VIEWS SHOWN LEFT TO RIGHT FACING DOWNSTREAM.
5. POST-CROSSING SURVEY INFORMATION SHOWN IN RED. DATA PENDING.
6. POST-CROSSING SURVEY POINTS FOR CROSS SECTIONS AND THALWEG ARE PROJECTED ONTO PRE-CROSSING SECTION AND PROFILE VIEWS FOR COMPARISON.

S-C41 BASELINE THALWEG PROFILE



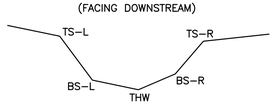
DISTANCE ALONG CROSS-SECTION (FT)

PROFILE LEGEND	
	EXISTING STREAM PROFILE INVERT ALONG THALWEG

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

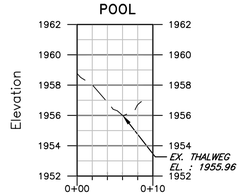
AS-BUILT TABLE: S-C41 CROSS SECTION B					
	PRE-CROSSING			AS-BUILT	
PT. LOC.	NORTHING	EASTING	ELEV.	VERT. DIFF.	HORZ. DIFF.
TS-L	13589836.46	1729038.31	1947.70		
BS-L	13589835.52	1729039.54	1946.70		
THW	13589834.45	1729040.89	1946.02		
BS-R	13589833.72	1729041.65	1946.72		
TS-R	13589832.90	1729042.68	1946.81		

TYPICAL 5-POINT CROSS-SECTION
(FACING DOWNSTREAM)



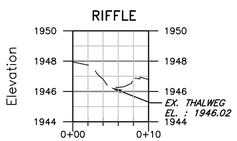
TS: TOP OF SLOPE
BS: BOTTOM OF SLOPE
THW: THALWEG (INVERT)

S-C41 BASELINE CROSS-SECTION A



DISTANCE ALONG CROSS-SECTION (FT)

S-C41 BASELINE CROSS-SECTION B



DISTANCE ALONG CROSS-SECTION (FT)

CROSS SECTION LEGEND	
— —	EXISTING GRADE

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

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

PRE-CROSSING PHOTOS

PHOTO TAKEN LOOKING DOWNSTREAM FROM UPSTREAM IMPACT LIMITS

PHOTO TAKEN LOOKING UPSTREAM FROM DOWNSTREAM IMPACT LIMITS

POST-CROSSING PHOTOS

PENDING CROSSING

PHOTO TAKEN LOOKING DOWNSTREAM UPSTREAM FROM IMPACT LIMITS

PENDING CROSSING

PHOTO TAKEN LOOKING UPSTREAM FROM UPSTREAM IMPACT LIMITS

PRE-CROSSING

DATE ISSUED 9/27/2021

POTESTA & ASSOCIATES, INC.
ENGINEERS AND ENVIRONMENTAL CONSULTANTS
7012 MacCorkle Avenue SE, Charleston, WV 25304
TEL: (304) 342-1400 FAX: (304) 343-9031
E-Mail Address: potesta@potesta.com

POTESTA

Client: MOUNTAIN VALLEY PIPELINE, LLC
2200 ENERGY DRIVE, 2ND FLOOR
CANONSBURG, PA 15317

Title: PROFILE AND CROSS-SECTIONS
BASELINE SURVEY
CROSSING S-C41 - UNNAMED TRIB. OF PAINTER RUN. (MP 194.6)
MONROE COUNTY, WV

1 Drawing No.

S-C41 CAD File No.
MBS Drawn
CHH Checked
BB/JLY Approved
NOTED Scale:
SEPT. 2021 Date:
21-0244-005 Project No.

File: S:\C3D-Proj-WV\2021\21-0244-WV\21-0244-S-C41.dwg
Layout: Layout1 Jul 28, 2021 - 4:31pm
Plotted By: MBSonkolf