S-A120

Stream Photograph Page

Stream ID S-A120 Date: 06/03/2015

Photograph Direction West

Comments:

STREAM ID S-A120	**STREAM NAME** Stout Run
LAT 39.489692 **LONG** -80.520845	**DATE** 06/03/2015
CLIENT MVP	**PROJECT NAME** MVP
INVESTIGATORS SY, KL, RS, WS	
FLOW REGIME Perennial ___ Intermittent ✔ Ephemeral ___	**WATER TYPE** TNW ___ RPW ✔ NRPW ___

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 6.0 ft
Top of Bank Height:
LB 18.0 in RB 16.0 in
Water Depth: 3.00 in
Water Width: 27.0 in
High Water Mark: 13.0 in
Flow Direction: West

Stream Erosion
___ None ✔ Moderate ___ Heavy

Artificial, Modified or Channelized
___ Yes ✔ No

Dam Present ___ Yes ✔ No

Sinuosity ✔ Low ___ Medium ___ High

Gradient
___ Flat (0.5/100 ft) ✔ Moderate (2 ft/100 ft) ___ Severe (10 ft/100 ft)

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
___ Standing water
✔ Flowing water

Velocity
___ Fast ___ Moderate
✔ Slow

Proportion of Reach Represented by Stream Morphology Types
Riffle 20 % Run 30 %
Pool 50 %

Turbidity
___ Clear ✔ Slightly turbid ___ Turbid
___ Opaque ___ Stained
___ Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		10
Boulder	> 256 mm (10")	10
Cobble	64-256 mm (2.5"-10")	25
Gravel	2-64 mm (0.1"-2.5")	0
Sand	0.06-2mm (gritty)	40
Silt	0.004-0.06 mm	10
Clay	< 0.004 mm (slick)	5

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	10
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___ Industrial
___ Agricultural ___ Residential
___ Other:

Canopy Cover
___ Partly open ✔ Partly shaded
___ Shaded ___ Open

Indicate the dominant type (Check one)
✔ Trees ___ Shrubs
___ Grasses ___ Herbaceous

Floodplain Width
___ Wide > 30ft ___ Moderate 15-30ft
✔ Narrow <16ft

Wetland Present ✔ Yes ___ No
Wetland ID W-A34

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
___ Rooted emergent ___ Rooted submergent ___ Rooted floating ___ Free floating
___ Floating algae ___ Attached algae

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES	

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	**Mountain Valley Pipeline Project SWVM v2.1**	**IMPACT COORDINATES: (in Decimal Degrees)**	**Lat.**	**39.489890**	**Lon.**	**-80.522083**	**WEATHER:**	**Sunny, 55°**	**DATE:**	**November 10, 2016**
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	**S-A120; Stout Run; 57.60 ac watershed** **Form of Mitigation: Mitigation Bank**	**MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION:** (watershed size {acreage}, unaltered or impairments)							**Comments:**	
STREAM IMPACT LENGTH:	**26**	**FORM OF MITIGATION:**	**PRESERVATION**	**MIT COORDINATES: (in Decimal Degrees)**	**Lat.**		**Lon.**		**PRECIPITATION PAST 48 HRS:**	**0.40"**	**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:**	**Intermittent**			**Stream Classification:**	**Intermittent**			**Stream Classification:**	**Intermittent**			**Stream Classification:**	**Intermittent**		
Percent Stream Channel Slope	**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	**0.62**			**Hydrology**				**Hydrology**				**Hydrology**				**Hydrology**			
Biogeochemical Cycling	**0.58**		**0.44**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**
Habitat	**0.12**			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 (High 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	**11**	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		1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		**12**	2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		**4**	3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		**16**	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		**6**	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		**14**	6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		**3**	7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		**12**	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		**12**	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		**98**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**
Sub-Total			**0.49**	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	0-1	**0.135**		0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1	
pH				**pH**				**pH**				**pH**				**pH**			
6.0-8.0 = 80 points	0-80		**8.04**		5-90				5-90				5-90				5-90		
DO				**DO**				**DO**				**DO**				**DO**			
>5.0 = 30 points	10-30		**38**		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)**			
Poor	0-100	0-1	**39.4**		0-100	0-1			0-100	0-1			0-100	0-1			0-100	0-1	
Sub-Total			**0.294**	Sub-Total			**0**	Sub-Total			**0**	Sub-Total			**0**	Sub-Total			**0**

PART II - Index and Unit Score		
Index	**Linear Feet**	**Unit Score**
0.517	**26**	**13.45066667**

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**

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.517333333	26	13.45066667	$10,760.53

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	13.45066667	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

***Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project**
***Note2: Place an "X" in the appropriate category (only select one).**

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-A120	13.45066667	#VALUE!

Extended Upland Buffer Zone

***Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)**
***Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)**
***Note[3]: Select the appropriate mitigation type**

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

	Straight Preservation Ratio (v2.1, Sept 2015)
Final Mitigation Unit Yield	
#VALUE!	

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

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 Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: MVP
Location: S-A120
Sampling Date: Enter dates on Data Form

Project Site Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Shrub/Herb Strata

SAR number:

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.62
Biogeochemical Cycling	0.58
Habitat	0.12

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.	3.20	0.89
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.08	0.04
V_{BERO}	Total percent of eroded stream channel bank.	0.00	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	4.00	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.	31.00	0.48
V_{SRICH}	Riparian vegetation species richness.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	19.38	0.24
V_{HERB}	Average percent cover of herbaceous vegetation.	115.00	1.00
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.93	0.98

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	C. Vileno, C. Stoliker	Latitude/UTM Northing:	39.489890
Project Name:	MVP	Longitude/UTM Easting:	-80.522083
Location:	S-A120	Sampling Date:	

SAR Number: | Reach Length (ft): 100 | 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:

15									

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.

3.2

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:

3	3	3	4	4	3	3	3	3	3
3	3	3	3	3	3	4	3	3	3
3	4	3	3	3	3	3	3	4	4

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}.

0.08 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):

4.00	4.00	1.00	0.08	1.00	0.08	0.08	0.08	3.00	3.00
0.08	0.08	0.08	0.08	0.08	0.08	2.00	0.08	0.08	0.08
0.08	1.00	0.08	0.08	0.08	0.08	0.08	2.00	1.00	1.00

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%.

0 %

Left Bank: 0 ft Right Bank: 0 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. **4.0**

Number of downed woody stems: 4

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**

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_{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. **0.0**

Left Side: 0 Right Side: 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. **31.0**

Left Side: 11 Right Side: 20

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**

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☑	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☐	*Liriodendron tulipifera*	☐	*Ulmus americana*				
☐	*Magnolia acuminata*						
0	Species in Group 1			2	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.

19.38 %

Left Side				Right Side			
20	15	20	20	20	20	20	20

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.

115 %

Left Side				Right Side			
120	100	115	115	120	120	115	115

Sample Variable 12 within the entire catchment of the stream.

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

0.93

Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	90	90
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	10	100

Summary

Variable	Value	VSI
$V_{CCANOPY}$	Not Used, <20%	Not Used
V_{EMBED}	3.2	0.89
$V_{SUBSTRATE}$	0.08 in	0.04
V_{BERO}	0 %	1.00
V_{LWD}	4.0	0.50
V_{TDBH}	Not Used	Not Used
V_{SNAG}	0.0	0.10
V_{SSD}	31.0	0.48
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	19.4 %	0.24
V_{HERB}	115 %	1.00
V_{WLUSE}	0.93	0.98

Notes:

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME S-A120	LOCATION Wetzel, County	
STATION #_____ RIVERMILE_____	STREAM CLASS Intermittent	
LAT 39.489890 LONG -80.522083	RIVER BASIN Headwaters South Fork Fishing Creek	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS C. Vileno, C. Stoliker		
FORM COMPLETED BY C. Vileno	DATE 11/10/2016 TIME 3:00pm	REASON FOR SURVEY SWVM

	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 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 11	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 12	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 4	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 16	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 6	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**
Parameters to be evaluated broader than sampling reach	**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 14	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)	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 3	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 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 6 (RB)	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 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 6 (RB)	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 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 98

Insects	Count	Tolerance	TV
Ephemeroptera			0
Ameletidae		2	0
Baetidae		4	0
Beatiscidae		4	0
Caenidae		5	0
Ephemerellidae		3	0
Ephemeridae		5	0
Heptageniidae		3	0
Isonychiidae		3	0
Leptophlebiidae		4	0
Potamanthidae		5	0
Siphlonuridae		3	0
Tricorythidae		5	0
Plecoptera			3
Capniidae		2	0
Chloroperlidae	1	2	2
Leuctridae		2	0
Nemouridae		2	0
Peltoperlidae		1	0
Perlidae	2	1	2
Perlodidae		1	0
Pteronarcyidae		1	0
Taeniopterygidae		2	0
Trichoptera			0
Brachycentridae		2	0
Glossosomatidae		2	0
Helicopsychidae		3	0
Hydropsychidae		5	0
Hydroptilidae		3	0
Lepidostomatidae		3	0
Leptoceridae		3	0
Limnephilidae		4	0
Molannidae		3	0
Philopotamidae		4	0
Phryganeidae		4	0
Polycentropodidae		5	0
Psychomiidae		3	0
Rhyacophilidae		3	0
Uenoidae		2	0
Total Tolerance Value			64

Insects	Count	Tolerance	TV
Odonata			0
Aeshnidae		3	0
Calopterygidae		6	0
Coenagrionidae		7	0
Cordulegastridae		3	0
Gomphidae		5	0
Lestidae		7	0
Libellulidae		7	0
Coleoptera			0
Chrysomelidae		7	0
Dryopidae		5	0
Dytiscidae		6	0
Elmidae		4	0
Gyrinidae		5	0
Haliplidae		7	0
Hydrophilidae		7	0
Psephenidae		3	0
Ptilodactylidae		5	0
Hemiptera			0
Belostomatidae		8	0
Corixidae		8	0
Gerridae		10	0
Hydrometridae		8	0
Nepidae		8	0
Notonectidae		8	0
Megaloptera			0
Corydalidae		3	0
Sialidae		6	0
Diptera			1
Athericidae		3	0
Blephariceridae		2	0
Ceratopogonidae		8	0
Chironomidae		9	0
Culicidae		10	0
Dixidae		6	0
Empididae		7	0
Psychodidae		8	0
Ptychopteridae		8	0
Simuliidae		6	0
Stratiomyidae		10	0
Syrphidae		10	0
Tabanidae		7	0
Tipulidae	1	5	5

Non-Insects	Count	Tolerance	TV
Crustacea			1
Asellidae		7	0
Cambaridae	1	5	5
Gammaridae		5	0
Palaemonidae		5	0
Annelida			5
Hirudinea		10	0
Nematoda		10	0
Nematomorpha		10	0
Oligochaeta	5	10	50
Turbellaria			0
Turbellaria		7	0
Bivalvia			0
Corbiculidae		6	0
Sphaeriidae		5	0
Unionidae		4	0
Gastropoda			0
Ancylidae		7	0
Hydrobiidae		4	0
Physidae		7	0
Planorbidae		5	0
Pleuroceridae		5	0
Viviparidae		5	0
Miscellaneous			0
Collembola		6	0
Lepidoptera		5	0
Neuroptera		5	0
Hydrachnidae		6	0
Totals	**Total number**		**10**
	Total families		**5**

Metric calculations				
Richness			**Additional metrics**	
Total Taxa	5	22.7	Ephemeroptera Taxa	0
EPT Taxa	2	15.4	Plecoptera Taxa	2
Tolerance			Trichoptera Taxa	0
Biotic Index	6.40	51.4	Long-lived Taxa	5
% Tolerant	50.0	51.0	Odonata Taxa	0
Composition			Diptera Taxa	1
% EPT Abundance	30.0	33.3	COET Taxa	0
% Dominance	50.0	62.5	% Sensitive	30.0
% Net-spinners	0.0	NA	% Chironomidae	0.0
Stream Condition Index		**39.4**	% Clingers	30.0
Integrity Rating	**Poor**		More diversity measures	

West Virginia Save Our Streams
601 57th Street, SE, Charleston WV 25304
http://www.dep.wv.gov/sos

Note: There may be instances when families are collected that are not listed above. In those cases choose a similar family/tolerance value if known, to calculate the metrics. You should contact the WV Save Our Streams Coordinator to confirm your choice. Provide as much detail as possible so that family-level identification can be determined.

S-QR34

Stream Photograph Page

Stream ID S-QR34 Date: 04/26/2016

Photograph Direction West

Comments:

STREAM ID S-QR34		**STREAM NAME** UNT to Stout Run	
CLIENT EQT		**PROJECT NAME** MVP	
LAT 39.489149	**LONG** -80.520697	**DATE** 04/26/2016	**COUNTY** Wetzel
INVESTIGATORS D Hadersbeck, J McGuirk, C Sapusek			
WATER TYPE TNW ☐ RPW ☐ NRPW ☑		**FLOW REGIME** Perennial ☐ Intermittent ☐ Ephemeral ☑	

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 2.5 ft
Top of Bank Height:
LB 0.5 ft RB 0.5 ft
Water Depth: 1.00 in
Water Width: 1.0 ft
Ordinary High Water Mark (Width): 2.0 ft
Ordinary High Water Mark (Height): 3.0 in
Flow Direction: North

Sinuosity ___ Low ✔ Medium ___ High

Gradient ___ Flat (0.5/100 ft) ___ Moderate (2 ft/100 ft) ✔ Severe (10 ft/100 ft)

Stream Erosion
___ None ✔ Moderate ___ Heavy

Artificial, Modified or Channelized
✔ Yes ___ No

Within Roadside Ditch
✔ Yes ___ No

Culvert Present ___ Yes ✔ No
Culvert Material:_____
Culvert Size: _____in

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
___ Standing water
✔ Flowing water

Velocity
___ Fast ___ Moderate
✔ Slow

Proportion of Reach Represented by Stream Morphology Types (Only enter if water present)
Riffle % Run 100 %
Pool %

Turbidity
___ Clear ✔ Slightly turbid ___ Turbid
___ Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%) 100

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		
Boulder	> 256 mm (10")	5
Cobble	64-256 mm (2.5"-10")	15
Gravel	2-64 mm (0.1"-2.5")	25
Sand	0.06-2mm (gritty)	30
Silt	0.004-0.06 mm	25
Clay	< 0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	40
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___ Industrial
___ Agricultural ___ Residential
___ ROW ✔ Other: Road

Canopy Cover
___ Open ✔ Partly shaded
___ Shaded

Floodplain Width
___ Wide > 30ft ___ Moderate 15-30ft
✔ Narrow <15ft

MACROINVERTEBRATES/OTHER WILDLIFE OBSERVED OR OTHER NOTES AND OBSERVATIONS

Starts as ephemeral and turns into roadside stream that joins into S-A121.

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2015

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	**Mountain Valley Pipeline Project SWVM v2.1**	**IMPACT COORDINATES: (in Decimal Degrees)**	**Lat.**	**39.489083**	**Lon.**	**-80.520519**	**WEATHER:**	**Sunny, 55°**	**DATE:**	**November 10, 2016**
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	**S-QR34; UNT to Stout Run; 1.42ac watershed**	**MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION:** (watershed size {acreage}, unaltered or impairments)							**Comments:**	**No / low water flow at time of survey. Unable to sample water quality or WVSCI.**
STREAM IMPACT LENGTH:	**125**	**FORM OF MITIGATION:**	**RESTORATION (Levels I-III)**	**MIT COORDINATES: (in Decimal Degrees)**	**Lat.**		**Lon.**		**PRECIPITATION PAST 48 HRS:**	**0.40"**	**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:**	**Ephemeral**			**Stream Classification:**	**Ephemeral**			**Stream Classification:**	**Ephemeral**			**Stream Classification:**	**Ephemeral**		
Percent Stream Channel Slope		**15**		**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	0.5			**Hydrology**				**Hydrology**				**Hydrology**				**Hydrology**			
Biogeochemical Cycling	0.54		0.413333333	**Biogeochemical Cycling**			0	**Biogeochemical Cycling**			0	**Biogeochemical Cycling**			0	**Biogeochemical Cycling**			0
Habitat	0.2			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 (High 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		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			2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		12	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		0	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		5	6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		12	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		11	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		11	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		54	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0
Sub-Total			0.45	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**			
100-199 - 85 points	0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1	
pH				**pH**				**pH**				**pH**				**pH**			
5.6-5.9 = 45 points	0-80				5-90				5-90		5.6		5-90				5-90		
DO				**DO**				**DO**				**DO**				**DO**			
	10-30				10-30				10-30				10-30				10-30		
Sub-Total				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			**PART II - Index and Unit Score**			**PART II - Index and Unit Score**			**PART II - Index and Unit Score**			**PART II - Index and Unit Score**		
Index	**Linear Feet**	**Unit Score**	**Index**	**Linear Feet**	**Unit Score**	**Index**	**Linear Feet**	**Unit Score**	**Index**	**Linear Feet**	**Unit Score**	**Index**	**Linear Feet**	**Unit Score**
0.519	**125**	**64.89583333**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.519166667	125	64.89583333	$51,916.67

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	64.89583333	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

***Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project**
***Note2: Place an "X" in the appropriate category (only select one).**

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-QR34	64.89583333	#DIV/0!

Extended Upland Buffer Zone

***Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)**
***Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)**
***Note[3]: Select the appropriate mitigation type**

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

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 Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: MVP
Location: S-QR34
Sampling Date: 11/10/2016

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number:

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.50
Biogeochemical Cycling	0.54
Habitat	0.20

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	23.00	0.14
V_{EMBED}	Average embeddedness of channel.	2.00	0.46
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.08	0.04
V_{BERO}	Total percent of eroded stream channel bank.	0.00	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	0.00	0.00
V_{TDBH}	Average dbh of trees.	7.11	0.70
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.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	3.60	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	19.38	0.24
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.93	0.98

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	C. Vileno, C. Stoliker	Latitude/UTM Northing:	39.489083
Project Name:	MVP	Longitude/UTM Easting:	-80.520519
Location:	S-QR34	Sampling Date:	11/10/2016

SAR Number: | Reach Length (ft): 100 | Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling 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.)

23.0 %

List the percent cover measurements at each point below:

50	40	30	20	15	15	15	15	15	15

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.

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)

List the ratings at each point below:

2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2

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}.

0.08 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):

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	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%.

0 %

Left Bank: 0 ft | Right Bank: 0 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. **0.0**

Number of downed woody stems: 0

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. **7.1**

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	4	8	8	4	12	5			
10	6								

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. **0.0**

Left Side: 0 Right Side: 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. **Not Used**

Left Side: Right Side:

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. **3.60**

Group 1 = 1.0		Group 2 (-1.0)	
☑ *Acer rubrum*	☐ *Magnolia tripetala*	☐ *Ailanthus altissima*	☐ *Lonicera japonica*
☐ *Acer saccharum*	☐ *Nyssa sylvatica*	☐ *Albizia julibrissin*	☐ *Lonicera tatarica*
☐ *Aesculus flava*	☐ *Oxydendrum arboreum*	☐ *Alliaria petiolata*	☐ *Lotus corniculatus*
☐ *Asimina triloba*	☐ *Prunus serotina*	☐ *Alternanthera philoxeroides*	☐ *Lythrum salicaria*
☐ *Betula alleghaniensis*	☑ *Quercus alba*		☐ *Microstegium vimineum*
☐ *Betula lenta*	☐ *Quercus coccinea*	☐ *Aster tataricus*	☐ *Paulownia tomentosa*
☐ *Carya alba*	☐ *Quercus imbricaria*	☐ *Cerastium fontanum*	☐ *Polygonum cuspidatum*
☐ *Carya glabra*	☐ *Quercus prinus*	☐ *Coronilla varia*	☐ *Pueraria montana*
☐ *Carya ovalis*	☐ *Quercus rubra*	☐ *Elaeagnus umbellata*	☑ *Rosa multiflora*
☐ *Carya ovata*	☐ *Quercus velutina*	☐ *Lespedeza bicolor*	☐ *Sorghum halepense*
☐ *Cornus florida*	☐ *Sassafras albidum*	☐ *Lespedeza cuneata*	☐ *Verbena brasiliensis*
☑ *Fagus grandifolia*	☐ *Tilia americana*	☐ *Ligustrum obtusifolium*	
☐ *Fraxinus americana*	☐ *Tsuga canadensis*	☐ *Ligustrum sinense*	
☑ *Liriodendron tulipifera*	☐ *Ulmus americana*		
☐ *Magnolia acuminata*			
5 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 $V_{DETRITUS}$ 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.

19.38 %

Left Side				Right Side			
20	30	40	30	20	15	0	0

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.

Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: 0.93

Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	90	90
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	10	100

Summary

Variable	Value	VSI
$V_{CCANOPY}$	23 %	0.14
V_{EMBED}	2.0	0.46
$V_{SUBSTRATE}$	0.08 in	0.04
V_{BERO}	0 %	1.00
V_{LWD}	0.0	0.00
V_{TDBH}	7.1	0.70
V_{SNAG}	0.0	0.10
V_{SSD}	Not Used	Not Used
V_{SRICH}	3.60	1.00
$V_{DETRITUS}$	19.4 %	0.24
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.93	0.98

Notes:

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME S-QR34	LOCATION Wetzel, County	
STATION #_____ RIVERMILE_____	STREAM CLASS Ephemeral	
LAT 39.489083 LONG -80.520519	RIVER BASIN Headwaters South Fork Fishing Creek	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS C. Vileno, C. Stoliker		
FORM COMPLETED BY C. Vileno	DATE 11/10/2016 TIME 3:30pm	REASON FOR SURVEY SWVM

	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 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 0	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 3	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 0	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 12	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 0	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 5	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)	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 0	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 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 6 (RB)	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 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 3 (RB)	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 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

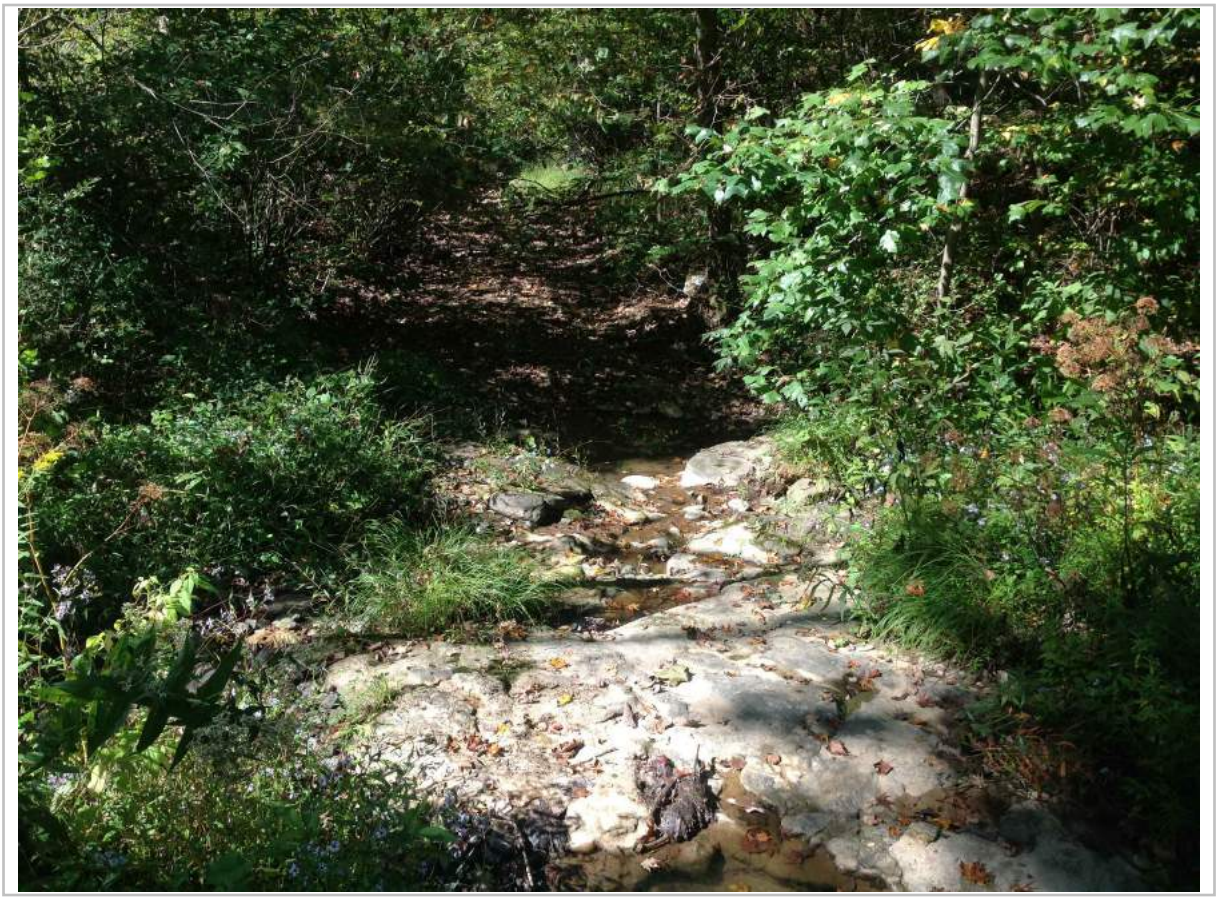
Total Score 54

No / low flow at time of survey. Unable to sample water quality or WVSCI.

S-J56

Stream Photograph Page

Stream ID S-J56 Date: 05/31/2015



Photograph Direction SW

Comments:

STREAM ID S-J56	**STREAM NAME** Manion Run
LAT 39.464274 **LONG** -80.502218	**DATE** 05/31/2015
PROJECT NAME MVP	**CLIENT** MVP
INVESTIGATORS Pete Johnson, Chris Weber, Nate K	
FLOW REGIME Perennial ✔ Intermittent ___ Ephemeral ___	**WATER TYPE** TNW ___ RPW ✔ NRPW ___

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 10.0 ft
Top of Bank Height:
LB 4.0 ft RB 6.0 ft
Water Depth: 2.00 in
Water Width: 5.0 ft
High Water Mark: 3.0 ft
Flow Direction: SE

Stream Erosion
___None ✔ Moderate ___Heavy

Artificial, Modified or Channelized
___ Yes ✔ No

Dam Present ___Yes ✔ No

Sinuosity ___ Low ✔ Medium ___ High

Gradient
___ Flat (0.5/100 ft) ✔ Moderate (2 ft/100 ft) ___Severe (10 ft/100 ft)

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
___ Standing water
✔ Flowing water

Velocity
___ Fast ✔ Moderate
___ Slow

Proportion of Reach Represented by Stream Morphology Types
Riffle 70 % Run 15 %
Pool 15 %

Turbidity
✔ Clear ___Slightly turbid ___Turbid
___ Opaque ___Stained
___Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		15
Boulder	> 256 mm (10")	20
Cobble	64-256 mm (2.5"-10")	35
Gravel	2-64 mm (0.1"-2.5")	10
Sand	0.06-2mm (gritty)	15
Silt	0.004-0.06 mm	5
Clay	< 0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	20
Muck-Mud	black, very fine organic (FPOM)	10
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___Industrial
___ Agricultural ___ Residential
___ Other:

Canopy Cover
✔ Partly open ___Partly shaded
___ Shaded ___ Open

Indicate the dominant type (Check one)
✔ Trees ___ Shrubs
___ Grasses ___Herbaceous

Floodplain Width
___ Wide > 30ft ✔ Moderate 15-30ft
___ Narrow <16ft

Wetland Present ___Yes ✔ No
Wetland ID

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
___ Rooted emergent ___Rooted submergent ___Rooted floating ___Free floating
___ Floating algae ___Attached algae

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	Mountain Valley Pipeline Project SWVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	39.463899	Lon.	-80.502594	WEATHER:	Sunny, 70	DATE:	September 1, 2016
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	S-J56; Manion Run; 318ac Form of Mitigation: Mitigation Bank	MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)							Comments:	
STREAM IMPACT LENGTH:	41	FORM OF MITIGATION:	RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:		Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				Column No. 2- Mitigation Existing Condition - Baseline (Credit)				Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				Column No. 5- Mitigation Projected at Maturity (Credit)			
Stream Classification:	Perennial			Stream Classification:	Perennial			Stream Classification:	Perennial			Stream Classification:	Perennial			Stream Classification:	Perennial		
Percent Stream Channel Slope	2			Percent Stream Channel Slope				Percent Stream Channel Slope	0			Percent Stream Channel Slope	0			Percent Stream Channel Slope	0		
HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):			
			Average				Average				Average				Average				Average
Hydrology				Hydrology				Hydrology				Hydrology				Hydrology			
Biogeochemical Cycling			0	Biogeochemical Cycling			0	Biogeochemical Cycling			0	Biogeochemical Cycling			0	Biogeochemical Cycling			0
Habitat				Habitat				Habitat				Habitat				Habitat			
PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score		Points Scale	Range	Site Score		Points Scale	Range	Site Score		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 (High 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	16	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		1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		13	2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		12	3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		10	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		6	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		18	6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		18	7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		11	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		14	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		12	10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Suboptimal		130	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0
Sub-Total			0.65	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	0-1	0.164		0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1	
pH				pH				pH				pH				pH			
6.0-8.0 = 80 points	0-80		7.42		5-90				5-90				5-90				5-90		
DO				DO				DO				DO				DO			
>5.0 = 30 points	10-30		76.8		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)			
Good	0-100	0-1	70.5		0-100	0-1			0-100	0-1			0-100	0-1			0-100	0-1	
Sub-Total			0.705	Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.785	41	32.185

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

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2015

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.785	41	32.185	$25,748.00

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	32.185	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

***Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project**
***Note2: Place an "X" in the appropriate category (only select one).**

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-J56	32.185	#DIV/0!

Extended Upland Buffer Zone

***Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)**
***Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)**
***Note[3]: Select the appropriate mitigation type**

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME S-J56	LOCATION Wetzel County, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Perennial	
LAT 39.463899 LONG -80.502594	RIVER BASIN Headwaters South Fork Fishing Creek	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS C. Vileno, J. McGuirk, J. Bittner		
FORM COMPLETED BY J. McGuirk	DATE 09/01/2016 TIME 1:00	REASON FOR SURVEY Proposed pipeline

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 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 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 12	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 10	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 6	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 18	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)	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 18	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 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 6 (RB)	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 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 7 (RB)	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 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 130

Insects	Count	Tolerance	TV
Ephemeroptera			11
Ameletidae		2	0
Baetidae	1	4	4
Beatiscidae		4	0
Caenidae		5	0
Ephemerellidae		3	0
Ephemeridae		5	0
Heptageniidae	6	3	18
Isonychiidae		3	0
Leptophlebiidae	4	4	16
Potamanthidae		5	0
Siphlonuridae		3	0
Tricorythidae		5	0
Plecoptera			3
Capniidae		2	0
Chloroperlidae		2	0
Leuctridae	2	2	4
Nemouridae		2	0
Peltoperlidae		1	0
Perlidae	1	1	1
Perlodidae		1	0
Pteronarcyidae		1	0
Taeniopterygidae		2	0
Trichoptera			0
Brachycentridae		2	0
Glossosomatidae		2	0
Helicopsychidae		3	0
Hydropsychidae		5	0
Hydroptilidae		3	0
Lepidostomatidae		3	0
Leptoceridae		3	0
Limnephilidae		4	0
Molannidae		3	0
Philopotamidae		4	0
Phryganeidae		4	0
Polycentropodidae		5	0
Psychomiidae		3	0
Rhyacophilidae		3	0
Uenoidae		2	0
Total Tolerance Value			101

Insects	Count	Tolerance	TV
Odonata			6
Aeshnidae		3	0
Calopterygidae		6	0
Coenagrionidae		7	0
Cordulegastridae		3	0
Gomphidae	6	5	30
Lestidae		7	0
Libellulidae		7	0
Coleoptera			1
Chrysomelidae		7	0
Dryopidae		5	0
Dytiscidae		6	0
Elmidae		4	0
Gyrinidae		5	0
Haliplidae		7	0
Hydrophilidae		7	0
Psephenidae	1	3	3
Ptilodactylidae		5	0
Hemiptera			0
Belostomatidae		8	0
Corixidae		8	0
Gerridae		10	0
Hydrometridae		8	0
Nepidae		8	0
Notonectidae		8	0
Megaloptera			0
Corydalidae		3	0
Sialidae		6	0
Diptera			2
Athericidae		3	0
Blephariceridae		2	0
Ceratopogonidae		8	0
Chironomidae		9	0
Culicidae		10	0
Dixidae		6	0
Empididae		7	0
Psychodidae		8	0
Ptychopteridae		8	0
Simuliidae		6	0
Stratiomyidae		10	0
Syrphidae		10	0
Tabanidae		7	0
Tipulidae	2	5	10

Non-Insects	Count	Tolerance	TV
Crustacea			3
Asellidae		7	0
Cambaridae	3	5	15
Gammaridae		5	0
Palaemonidae		5	0
Annelida			0
Hirudinea		10	0
Nematoda		10	0
Nematomorpha		10	0
Oligochaeta		10	0
Turbellaria			0
Turbellaria		7	0
Bivalvia			0
Corbiculidae		6	0
Sphaeriidae		5	0
Unionidae		4	0
Gastropoda			0
Ancylidae		7	0
Hydrobiidae		4	0
Physidae		7	0
Planorbidae		5	0
Pleuroceridae		5	0
Viviparidae		5	0
Miscellaneous			0
Collembola		6	0
Lepidoptera		5	0
Neuroptera		5	0
Hydrachnidae		6	0
Totals	**Total number**		**26**
	Total families		**9**

Metric calculations				
Richness			**Additional metrics**	
Total Taxa	9	40.9	Ephemeroptera Taxa	3
EPT Taxa	5	38.5	Plecoptera Taxa	2
Tolerance			Trichoptera Taxa	0
Biotic Index	3.88	87.4	Long-lived Taxa	5
% Tolerant	0.0	100.0	Odonata Taxa	1
Composition			Diptera Taxa	1
% EPT Abundance	53.8	59.8	COET Taxa	5
% Dominance	23.1	96.2	% Sensitive	38.5
% Net-spinners	0.0	NA	% Chironomidae	0.0
Stream Condition Index		**70.5**	% Clingers	53.8
Integrity Rating	**Suboptimal**		More diversity measures	

West Virginia Save Our Streams
601 57th Street, SE, Charleston WV 25304
http://www.dep.wv.gov/sos

Note: There may be instances when families are collected that are not listed above. In those cases choose a similar family/tolerance value if known, to calculate the metrics. You should contact the WV Save Our Streams Coordinator to confirm your choice. Provide as much detail as possible so that family-level identification can be determined.

No FCI form included. Not a high-gradient ephemeral or intermittent headwater stream.

S-J59

Stream Photograph Page

Stream ID S-J59 Date: 05/31/2015

Photograph Direction South

Comments:

STREAM ID S-J59	**STREAM NAME** UNT to Manion Run
LAT 39.462645 **LONG** -80.504754	**DATE** 05/31/2015
PROJECT NAME MVP	**CLIENT** MVP
INVESTIGATORS Pete Johnson, Chris Weber, Nate K	
FLOW REGIME Perennial ___ Intermittent ✔ Ephemeral ___	**WATER TYPE** TNW ___ RPW ✔ NRPW ___

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 3.0 ft
Top of Bank Height:
LB 1.0 ft RB 1.0 ft
Water Depth: 1.00 in
Water Width: 6.0 in
High Water Mark: 6.0 in
Flow Direction: S

Stream Erosion
___None ✔ Moderate ___Heavy

Artificial, Modified or Channelized
___ Yes ✔ No

Dam Present ___Yes ✔ No

Sinuosity ___ Low ✔ Medium ___ High

Gradient
___ Flat (0.5/100 ft) ___Moderate (2 ft/100 ft) ✔ Severe (10 ft/100 ft)

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
✔ Standing water
✔ Flowing water

Velocity
___ Fast ✔ Moderate
___ Slow

Proportion of Reach Represented by Stream Morphology Types
Riffle 15 % Run 40 %
Pool 45 %

Turbidity
✔ Clear ___Slightly turbid ___Turbid
___ Opaque ___Stained
___Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		5
Boulder	> 256 mm (10")	40
Cobble	64-256 mm (2.5"-10")	30
Gravel	2-64 mm (0.1"-2.5")	10
Sand	0.06-2mm (gritty)	10
Silt	0.004-0.06 mm	5
Clay	< 0.004 mm (slick)	0

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	40
Muck-Mud	black, very fine organic (FPOM)	0
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___Industrial
___ Agricultural ___ Residential
___ Other:

Canopy Cover
___Partly open ___Partly shaded
✔ Shaded ___ Open

Indicate the dominant type (Check one)
✔ Trees ✔ Shrubs
___ Grasses ___Herbaceous

Floodplain Width
___ Wide > 30ft ✔ Moderate 15-30ft
___ Narrow <16ft

Wetland Present ___Yes ✔ No
Wetland ID

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
___Rooted emergent ___Rooted submergent ___Rooted floating ___Free floating
___Floating algae ___Attached algae

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2015

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	**Mountain Valley Pipeline Project SWVM v2.1**	**IMPACT COORDINATES: (in Decimal Degrees)**	**Lat.**	**39.462705**	**Lon.**	**-80.504726**	**WEATHER:**	**Rain, 75°**	**DATE:**	**September 1, 2016**
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	**S-J59; UNT to Manion Run; 7.16** **Form of Mitigation: Mitigation Bank**	**MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION:** (watershed size {acreage}, unaltered or impairments)							**Comments:**	**Low water flow at time of survey. Unable to sample water quality**
STREAM IMPACT LENGTH: **7** **FORM OF MITIGATION:**	**RESTORATION (Levels I-III)**	**MIT COORDINATES: (in Decimal Degrees)**	**Lat.**		**Lon.**		**PRECIPITATION PAST 48 HRS:**	**0.50"**	**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:**	**Intermittent**			**Stream Classification:**	**Intermittent**			**Stream Classification:**	**Intermittent**			**Stream Classification:**	**Intermittent**		
Percent Stream Channel Slope	**4**			**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	**0.63**			**Hydrology**				**Hydrology**				**Hydrology**				**Hydrology**			
Biogeochemical Cycling	**0.77**		**0.603333333**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**
Habitat	**0.41**			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 (High 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	**12**	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		1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		**10**	2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		**0**	3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		**17**	4. Sediment Deposition	0-20			4. Sediment Deposition	0-20			4. Sediment Deposition	0-20			4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		**1**	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		**16**	6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		**0**	7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		**12**	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		**15**	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		**12**	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		**95**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**
Sub-Total			**0.475**	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**			
100-199 - 85 points	0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1	
pH				**pH**				**pH**				**pH**				**pH**			
5.6-5.9 = 45 points	0-80				5-90				5-90		5.6		5-90				5-90		
DO				**DO**				**DO**				**DO**				**DO**			
	10-30				10-30				10-30				10-30				10-30		
Sub-Total				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)**			
Good	0-100	0-1	**73.9**		0-100	0-1			0-100	0-1			0-100	0-1			0-100	0-1	
Sub-Total			**0.739**	Sub-Total			**0**	Sub-Total			**0**	Sub-Total			**0**	Sub-Total			**0**

PART II - Index and Unit Score		
Index	**Linear Feet**	**Unit Score**
0.637	**7**	**4.461333333**

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**

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.637333333	7	4.461333333	$3,569.07

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	4.461333333	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

***Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project**
***Note2: Place an "X" in the appropriate category (only select one).**

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-J59	4.461333333	#DIV/0!

Extended Upland Buffer Zone

***Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)**
***Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)**
***Note[3]: Select the appropriate mitigation type**

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

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 Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: MVP
Location: Wetzel County
Sampling Date: 09/01/2016

Project Site Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number:

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.63
Biogeochemical Cycling	0.77
Habitat	0.41

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	43.00	0.40
V_{EMBED}	Average embeddedness of channel.	2.97	0.81
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.40	0.20
V_{BERO}	Total percent of eroded stream channel bank.	20.00	0.97
V_{LWD}	Number of down woody stems per 100 feet of stream.	6.00	0.75
V_{TDBH}	Average dbh of trees.	22.00	1.00
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.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	25.00	0.30
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.75	0.79

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	C. Vileno, J. McGuirk, J. Bittner	Latitude/UTM Northing:	39.462705
Project Name:	MVP	Longitude/UTM Easting:	-80.504726
Location:	Wetzel County	Sampling Date:	09/01/2016

SAR Number: | Reach Length (ft): 100 | Stream Type: Intermittent Stream

Top Strata: Tree/Sapling 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.)

43.0 %

List the percent cover measurements at each point below:

85	80	70	0	10	50	85	20	20	10

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.

3.0

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)

List the ratings at each point below:

3	2	4	3	3	3	4	2	3	2
3	3	3	3	3	2	3	3	3	4
4	3	2	3	4	4	3	2	2	3

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}.

0.40 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):

8.00	4.00	0.50	0.10	0.20	5.00	11.00	10.00	5.00	0.30
0.25	0.50	6.00	0.25	0.08	10.00	15.00	0.08	4.00	0.25
3.00	3.00	0.25	0.08	0.08	0.08	7.00	0.25	0.08	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%.

20 %

Left Bank: 5 ft Right Bank: 15 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. **6.0**

Number of downed woody stems: 6

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. **22.0**

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				
40	6				20				

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. **0.0**

Left Side: 0 Right Side: 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. **Not Used**

Left Side: Right Side:

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**

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☑	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☑	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☑	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*				
☐	*Magnolia acuminata*						
2 Species in Group 1				3 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. **25.00 %**

Left Side				Right Side			
30	10	15	50	10	15	30	40

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. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.75**

Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)
Gravel	0	10	10
Forest and native range (>75% ground cover)	1	60	70
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	10	80
Forest and native range (50% to 75% ground cover)	0.7	20	100

Summary

Variable	Value	VSI
$V_{CCANOPY}$	43 %	0.40
V_{EMBED}	3.0	0.81
$V_{SUBSTRATE}$	0.40 in	0.20
V_{BERO}	20 %	0.97
V_{LWD}	6.0	0.75
V_{TDBH}	22.0	1.00
V_{SNAG}	0.0	0.10
V_{SSD}	Not Used	Not Used
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	25.0 %	0.30
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.75	0.79

Notes:

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME S-J59	LOCATION Wetzel County, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Intermittent	
LAT 39.462705 LONG -80.504726	RIVER BASIN Headwaters South Fork Fishing Creek	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS C. Vileno, J. McGuirk, J. Bittner		
FORM COMPLETED BY J. Bittner	DATE 09/01/2016 TIME 12:45	REASON FOR SURVEY Proposed pipeline

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 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 12	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 10	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 0	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 1	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**
Parameters to be evaluated broader than sampling reach	**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 16	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)	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 0	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 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 6 (RB)	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 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 8 (RB)	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 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 95

Insects	Count	Tolerance	TV
Ephemeroptera			7
Ameletidae		2	0
Baetidae		4	0
Beatiscidae		4	0
Caenidae		5	0
Ephemerellidae		3	0
Ephemeridae		5	0
Heptageniidae	1	3	3
Isonychiidae		3	0
Leptophlebiidae	6	4	24
Potamanthidae		5	0
Siphlonuridae		3	0
Tricorythidae		5	0
Plecoptera			13
Capniidae		2	0
Chloroperlidae		2	0
Leuctridae		2	0
Nemouridae		2	0
Peltoperlidae	4	1	4
Perlidae	8	1	8
Perlodidae	1	1	1
Pteronarcyidae		1	0
Taeniopterygidae		2	0
Trichoptera			0
Brachycentridae		2	0
Glossosomatidae		2	0
Helicopsychidae		3	0
Hydropsychidae		5	0
Hydroptilidae		3	0
Lepidostomatidae		3	0
Leptoceridae		3	0
Limnephilidae		4	0
Molannidae		3	0
Philopotamidae		4	0
Phryganeidae		4	0
Polycentropodidae		5	0
Psychomiidae		3	0
Rhyacophilidae		3	0
Uenoidae		2	0
Total Tolerance Value			46

Insects	Count	Tolerance	TV
Odonata			0
Aeshnidae		3	0
Calopterygidae		6	0
Coenagrionidae		7	0
Cordulegastridae		3	0
Gomphidae		5	0
Lestidae		7	0
Libellulidae		7	0
Coleoptera			0
Chrysomelidae		7	0
Dryopidae		5	0
Dytiscidae		6	0
Elmidae		4	0
Gyrinidae		5	0
Haliplidae		7	0
Hydrophilidae		7	0
Psephenidae		3	0
Ptilodactylidae		5	0
Hemiptera			0
Belostomatidae		8	0
Corixidae		8	0
Gerridae		10	0
Hydrometridae		8	0
Nepidae		8	0
Notonectidae		8	0
Megaloptera			1
Corydalidae		3	0
Sialidae	1	6	6
Diptera			0
Athericidae		3	0
Blephariceridae		2	0
Ceratopogonidae		8	0
Chironomidae		9	0
Culicidae		10	0
Dixidae		6	0
Empididae		7	0
Psychodidae		8	0
Ptychopteridae		8	0
Simuliidae		6	0
Stratiomyidae		10	0
Syrphidae		10	0
Tabanidae		7	0
Tipulidae		5	0

Non-Insects	Count	Tolerance	TV
Crustacea			0
Asellidae		7	0
Cambaridae		5	0
Gammaridae		5	0
Palaemonidae		5	0
Annelida			0
Hirudinea		10	0
Nematoda		10	0
Nematomorpha		10	0
Oligochaeta		10	0
Turbellaria			0
Turbellaria		7	0
Bivalvia			0
Corbiculidae		6	0
Sphaeriidae		5	0
Unionidae		4	0
Gastropoda			0
Ancylidae		7	0
Hydrobiidae		4	0
Physidae		7	0
Planorbidae		5	0
Pleuroceridae		5	0
Viviparidae		5	0
Miscellaneous			0
Collembola		6	0
Lepidoptera		5	0
Neuroptera		5	0
Hydrachnidae		6	0
Totals	**Total number**		**21**
	Total families		**6**

Metric calculations			
Richness			**Additional metrics**	
Total Taxa	6	27.3	Ephemeroptera Taxa	2
EPT Taxa	5	38.5	Plecoptera Taxa	3
Tolerance			Trichoptera Taxa	0
Biotic Index	2.19	100.0	Long-lived Taxa	3
% Tolerant	0.0	100.0	Odonata Taxa	0
Composition			Diptera Taxa	0
% EPT Abundance	95.2	100.0	COET Taxa	2
% Dominance	38.1	77.4	% Sensitive	66.7
% Net-spinners	0.0	NA	% Chironomidae	0.0
Stream Condition Index		**73.9**	% Clingers	95.2
Integrity Rating	**Suboptimal**		More diversity measures	

West Virginia Save Our Streams
601 57th Street, SE, Charleston WV 25304
http://www.dep.wv.gov/sos

Note: There may be instances when families are collected that are not listed above. In those cases choose a similar family/tolerance value if known, to calculate the metrics. You should contact the WV Save Our Streams Coordinator to confirm your choice. Provide as much detail as possible so that family-level identification can be determined.

No / low flow at time of survey. Unable to sample water quality.

S-A110/S-K62

Stream Photograph Page

Stream ID S-A110 / K6 2 (upstı Date: 05/30/2015

Photograph Direction North

Comments:

STREAM ID S-A110 / K6 2 (upstream)	**STREAM NAME** UNT to Laural Run
LAT 39.201933 **LONG** -80.553215	**DATE** 05/30/2015
CLIENT MVP	**PROJECT NAME** MVP
INVESTIGATORS J. Hart, D. Santillo, J. Potrikus	
FLOW REGIME Perennial ___ Intermittent ✔ Ephemeral ___	**WATER TYPE** TNW ___ RPW ✔ NRPW ___

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 7.0 ft
Top of Bank Height:
LB 1.5 ft RB 1.5 ft
Water Depth: 0.50 in
Water Width: 1.5 ft
High Water Mark: 4.5 ft
Flow Direction: South

Stream Erosion
___ None ✔ Moderate ___ Heavy

Artificial, Modified or Channelized
___ Yes ✔ No

Dam Present ___ Yes ✔ No

Sinuosity ✔ Low ___ Medium ___ High

Gradient
___ Flat (0.5/100 ft) ___ Moderate (2 ft/100 ft) ✔ Severe (10 ft/100 ft)

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
✔ Standing water
✔ Flowing water

Velocity
___ Fast ___ Moderate
✔ Slow

Proportion of Reach Represented by Stream Morphology Types
Riffle 20 % Run 55 %
Pool 25 %

Turbidity
✔ Clear ___ Slightly turbid ___ Turbid
___ Opaque ___ Stained
___ Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		20
Boulder	> 256 mm (10")	10
Cobble	64-256 mm (2.5"-10")	20
Gravel	2-64 mm (0.1"-2.5")	10
Sand	0.06-2mm (gritty)	15
Silt	0.004-0.06 mm	15
Clay	< 0.004 mm (slick)	10

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	20
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___ Industrial
___ Agricultural ___ Residential
___ Other:

Canopy Cover
___ Partly open ___ Partly shaded
✔ Shaded ___ Open

Indicate the dominant type (Check one)
✔ Trees ___ Shrubs
___ Grasses ___ Herbaceous

Floodplain Width
___ Wide > 30ft ___ Moderate 15-30ft
✔ Narrow <16ft

Wetland Present ✔ Yes ___ No
Wetland ID W-A23

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
___ Rooted emergent ___ Rooted submergent ___ Rooted floating ___ Free floating
___ Floating algae ___ Attached algae

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES

Steep Intermittent stream has groundwater contributions. Drains to culvert, under road and disperses in pasture

original S-K62

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2015

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	**Mountain Valley Pipeline Project SWVM v2.1**	**IMPACT COORDINATES: (in Decimal Degrees)**	**Lat.**	**39.201316**	**Lon.**	**-80.553306**	**WEATHER:**	**Sunny, 70°**	**DATE:**	**June 1, 2016**
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	**S-A110/K62; UNT to Laurel Run; 3.1ac watershed** **Form of Mitigation: Mitigation Bank**	**MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION:** (watershed size {acreage}, unaltered or impairments)							**Comments:**	**Low water flow at time of survey. Unable to sample water quality or WVSCI.**
STREAM IMPACT LENGTH:	**25**	**FORM OF MITIGATION:**	**RESTORATION (Levels I-III)**	**MIT COORDINATES: (in Decimal Degrees)**	**Lat.**		**Lon.**		**PRECIPITATION PAST 48 HRS:**	**0**	**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:**	**Intermittent**			**Stream Classification:**	**Intermittent**			**Stream Classification:**	**Intermittent**			**Stream Classification:**	**Intermittent**		
Percent Stream Channel Slope	**4**			**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	**0.49**			**Hydrology**				**Hydrology**				**Hydrology**				**Hydrology**			
Biogeochemical Cycling	**0.36**		**0.31**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**
Habitat	**0.08**			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 (High 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	**6**	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		1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		**5**	2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		**1**	3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		**3**	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		**1**	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		**2**	6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		**1**	7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		**2**	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		**0**	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		**12**	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	Poor		**33**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**
Sub-Total			**0.165**	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**			
100-199 - 85 points	0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1	
pH				**pH**				**pH**				**pH**				**pH**			
5.6-5.9 = 45 points	0-80				5-90				5-90		5.6		5-90				5-90		
DO				**DO**				**DO**				**DO**				**DO**			
	10-30				10-30				10-30				10-30				10-30		
Sub-Total				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			**PART II - Index and Unit Score**			**PART II - Index and Unit Score**			**PART II - Index and Unit Score**			**PART II - Index and Unit Score**		
Index	**Linear Feet**	**Unit Score**	**Index**	**Linear Feet**	**Unit Score**	**Index**	**Linear Feet**	**Unit Score**	**Index**	**Linear Feet**	**Unit Score**	**Index**	**Linear Feet**	**Unit Score**
0.396	**25**	**9.90625**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.39625	25	9.90625	$7,925.00

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	9.90625	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

***Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project**
***Note2: Place an "X" in the appropriate category (only select one).**

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-K62/ S-A110	9.90625	#DIV/0!

Extended Upland Buffer Zone

***Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)**
***Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)**
***Note[3]: Select the appropriate mitigation type**

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

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 Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: MVP
Location: S-A110/K62 (Doddridge County, WV)
Sampling Date: 06/01/2016

Project Site Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Shrub/Herb Strata

SAR number:

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.49
Biogeochemical Cycling	0.36
Habitat	0.08

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.	1.93	0.44
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.08	0.04
V_{BERO}	Total percent of eroded stream channel bank.	160.00	0.22
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.	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.	0.00	0.00
V_{HERB}	Average percent cover of herbaceous vegetation.	98.75	1.00
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.91	0.96

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team: C. Vileno, J. McGuirk, A. Mengel
Latitude/UTM Northing: 39.201316
Project Name: MVP
Longitude/UTM Easting: -80.553306
Location: S-A110/K62 (Doddridge County, WV)
Sampling Date: 06/01/2016
SAR Number:
Reach Length (ft): 100
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.

1.9

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:

2	2	2	1	2	2	2	3	2	2
2	3	2	2	1	2	2	2	1	2
2	2	2	2	2	2	2	2	1	2

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}.

0.08 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):

0.08	0.08	0.08	0.08	0.08	0.08	3.10	2.40	0.08	0.08
1.90	0.08	0.08	4.30	0.08	3.70	0.08	0.08	0.08	0.08
2.40	4.70	0.08	3.90	0.08	0.08	0.08	2.90	0.08	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%.

160 %

Left Bank: 100 ft Right Bank: 60 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. **0.0**

Number of downed woody stems: 0

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**

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				
0					0				

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. **0.0**

Left Side: 0 Right Side: 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. **0.0**

Left Side: 0 Right Side: 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**

Group 1 = 1.0		Group 2 (-1.0)	
☐ *Acer rubrum*	☐ *Magnolia tripetala*	☐ *Ailanthus altissima*	☐ *Lonicera japonica*
☐ *Acer saccharum*	☐ *Nyssa sylvatica*	☐ *Albizia julibrissin*	☐ *Lonicera tatarica*
☐ *Aesculus flava*	☐ *Oxydendrum arboreum*	☐ *Alliaria petiolata*	☐ *Lotus corniculatus*
☐ *Asimina triloba*	☐ *Prunus serotina*	☐ *Alternanthera philoxeroides*	☐ *Lythrum salicaria*
☐ *Betula alleghaniensis*	☐ *Quercus alba*		☐ *Microstegium vimineum*
☐ *Betula lenta*	☐ *Quercus coccinea*	☐ *Aster tataricus*	☐ *Paulownia tomentosa*
☐ *Carya alba*	☐ *Quercus imbricaria*	☐ *Cerastium fontanum*	☐ *Polygonum cuspidatum*
☐ *Carya glabra*	☐ *Quercus prinus*	☐ *Coronilla varia*	☐ *Pueraria montana*
☐ *Carya ovalis*	☐ *Quercus rubra*	☐ *Elaeagnus umbellata*	☐ *Rosa multiflora*
☐ *Carya ovata*	☐ *Quercus velutina*	☐ *Lespedeza bicolor*	☐ *Sorghum halepense*
☐ *Cornus florida*	☐ *Sassafras albidum*	☐ *Lespedeza cuneata*	☐ *Verbena brasiliensis*
☐ *Fagus grandifolia*	☐ *Tilia americana*	☐ *Ligustrum obtusifolium*	
☐ *Fraxinus americana*	☐ *Tsuga canadensis*	☐ *Ligustrum sinense*	
☐ *Liriodendron tulipifera*	☐ *Ulmus americana*		
☐ *Magnolia acuminata*			
0 Species in Group 1		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.

0.00 %

Left Side				Right Side			
0				0			

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.

99 %

Left Side				Right Side			
90	100	100	100	100	100	100	100

Sample Variable 12 within the entire catchment of the stream.

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

0.91

Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	90	90
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	10	100

Summary

Variable	Value	VSI
$V_{CCANOPY}$	Not Used, <20%	Not Used
V_{EMBED}	1.9	0.44
$V_{SUBSTRATE}$	0.08 in	0.04
V_{BERO}	160 %	0.22
V_{LWD}	0.0	0.00
V_{TDBH}	Not Used	Not Used
V_{SNAG}	0.0	0.10
V_{SSD}	0.0	0.00
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	0.0 %	0.00
V_{HERB}	99 %	1.00
V_{WLUSE}	0.91	0.96

Notes:

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME S-A110/K62	LOCATION Doddridge County, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Intermittent	
LAT 39.201316 LONG -80.553306	RIVER BASIN Little Muskingum-Middle Island	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS J. McGuirk, C. Vileno, A. Mengel		
FORM COMPLETED BY A. Mengel	DATE 06/01/2016 TIME 13:00	REASON FOR SURVEY SWVM

	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 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 6	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 5	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 1	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 3	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 1	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 2	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)	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 1	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 1 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 (RB)	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 0 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 0 (RB)	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 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 33

No / low flow at time of survey. Unable to sample water quality or WVSCI.

S-K43

Stream Photograph Page

Stream ID S-K43 Date: 05/19/2015

Photograph Direction NE

Comments:

STREAM ID S-K43	**STREAM NAME** Cove Lick
LAT 39.002050 **LONG** -80.596017	**DATE** 05/19/2015
CLIENT MVP	**PROJECT NAME** MVP
INVESTIGATORS A.Bensted, V. Prilepin, J. Bittner	
FLOW REGIME Perennial ✔ Intermittent ___ Ephemeral ___	**WATER TYPE** TNW ___ RPW ✔ NRPW ___

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 7.0 ft
Top of Bank Height:
LB 4.0 ft RB 4.0 ft
Water Depth: 1.00 ft
Water Width: 4.0 ft
High Water Mark: 7.0 ft
Flow Direction: West

Stream Erosion
___ None ✔ Moderate ___ Heavy

Artificial, Modified or Channelized
___ Yes ✔ No

Dam Present ___ Yes ✔ No

Sinuosity ___ Low ___ Medium ✔ High

Gradient
___ Flat (0.5/100 ft) ✔ Moderate (2 ft/100 ft) ___ Severe (10 ft/100 ft)

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
___ Standing water
✔ Flowing water

Velocity
___ Fast ___ Moderate
✔ Slow

Proportion of Reach Represented by Stream Morphology Types
Riffle 70 % Run 10 %
Pool 20 %

Turbidity
___ Clear ✔ Slightly turbid ___ Turbid
___ Opaque ___ Stained
___ Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		
Boulder	> 256 mm (10")	
Cobble	64-256 mm (2.5"-10")	40
Gravel	2-64 mm (0.1"-2.5")	25
Sand	0.06-2mm (gritty)	15
Silt	0.004-0.06 mm	5
Clay	< 0.004 mm (slick)	15

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	10
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___ Industrial
___ Agricultural ___ Residential
___ Other:

Canopy Cover
✔ Partly open ___ Partly shaded
___ Shaded ___ Open

Indicate the dominant type (Check one)
✔ Trees ___ Shrubs
___ Grasses ___ Herbaceous

Floodplain Width
✔ Wide > 30ft ___ Moderate 15-30ft
___ Narrow <16ft

Wetland Present ___ Yes ✔ No
Wetland ID

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
___ Rooted emergent ___ Rooted submergent ___ Rooted floating ___ Free floating
___ Floating algae ___ Attached algae

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES

Stream meanders within wide floodplain on valley floor.

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	Mountain Valley Pipeline Project SWVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	39.002097°	Lon.	-80.595753°	WEATHER:		DATE:	8/10/2015
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)	S-K43; Cove Lick Form of Mitigation: Mitigation Bank	MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)							Comments:	
STREAM IMPACT LENGTH:	27	FORM OF MITIGATION:	RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:		Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				Column No. 2- Mitigation Existing Condition - Baseline (Credit)				Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				Column No. 5- Mitigation Projected at Maturity (Credit)			
Stream Classification:	Perennial			Stream Classification:	Intermittent			Stream Classification:	Intermittent			Stream Classification:	Intermittent			Stream Classification:	Intermittent		
Percent Stream Channel Slope	3			Percent Stream Channel Slope				Percent Stream Channel Slope	0			Percent Stream Channel Slope	0			Percent Stream Channel Slope	0		
HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):			
			Average				Average				Average				Average				Average
Hydrology				Hydrology	1			Hydrology	1			Hydrology	1			Hydrology	1		
Biogeochemical Cycling			0	Biogeochemical Cycling	1		0	Biogeochemical Cycling	1		0	Biogeochemical Cycling	1		0	Biogeochemical Cycling	1		0
Habitat				Habitat	1			Habitat	1			Habitat	1			Habitat	1		
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 (High 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	14	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		11	2. Embeddedness	0-20		0	2. Embeddedness	0-20		0	2. Embeddedness	0-20		0	2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		9	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		9	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		6	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		11	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		15	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		14	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		14	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Suboptimal		114	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0
Sub-Total			0.57	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	0-1	0.165		0-90	0-1	0		0-90	0-1	0		0-90	0-1	0		0-90	0-1	
pH				pH				pH				pH				pH			
6.0-8.0 = 80 points	0-80		7.88		5-90		0		5-90		0		5-90		0		5-90		
DO				DO				DO				DO				DO			
>5.0 = 30 points	10-30		8.71		10-30		0		10-30		0		10-30		0		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)			
Fair	0-100	0-1	54.5		0-100	0-1	0		0-100	0-1	0		0-100	0-1	0		0-100	0-1	
Sub-Total			0.445	Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.672	27	18.135

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

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.671666667	27	18.135	$14,508.00

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	18.135	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

**Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project*
**Note2: Place an "X" in the appropriate category (only select one).*

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-K43	18.135	#DIV/0!

Extended Upland Buffer Zone

**Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)*
**Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)*
**Note[3]: Select the appropriate mitigation type*

Buffer Width	Left Bank
0-50	None
51-150	None
Buffer Width	**Right Bank**
0-50	None
51-150	None
Average Buffer Width/Side	0

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

Insects	Count	Tolerance	TV
Ephemeroptera			4
Ameletidae		2	0
Baetidae		4	0
Beatiscidae		4	0
Caenidae		5	0
Ephemerellidae		3	0
Ephemeridae		5	0
Heptageniidae	2	3	6
Isonychiidae		3	0
Leptophlebiidae	2	4	8
Potamanthidae		5	0
Siphlonuridae		3	0
Tricorythidae		5	0
Plecoptera			0
Capniidae		2	0
Chloroperlidae		2	0
Leuctridae		2	0
Nemouridae		2	0
Peltoperlidae		1	0
Perlidae		1	0
Perlodidae		1	0
Pteronarcyidae		1	0
Taeniopterygidae		2	0
Trichoptera			4
Brachycentridae		2	0
Glossosomatidae		2	0
Helicopsychidae		3	0
Hydropsychidae	4	5	20
Hydroptilidae		3	0
Lepidostomatidae		3	0
Leptoceridae		3	0
Limnephilidae		4	0
Molannidae		3	0
Philopotamidae		4	0
Phryganeidae		4	0
Polycentropodidae		5	0
Psychomiidae		3	0
Rhyacophilidae		3	0
Uenoidae		2	0
Total Tolerance Value			134

Insects	Count	Tolerance	TV
Odonata			3
Aeshnidae		3	0
Calopterygidae		6	0
Coenagrionidae		7	0
Cordulegastridae		3	0
Gomphidae	3	5	15
Lestidae		7	0
Libellulidae		7	0
Coleoptera			3
Chrysomelidae		7	0
Dryopidae		5	0
Dytiscidae		6	0
Elmidae	3	4	12
Gyrinidae		5	0
Haliplidae		7	0
Hydrophilidae		7	0
Psephenidae		3	0
Ptilodactylidae		5	0
Hemiptera			0
Belostomatidae		8	0
Corixidae		8	0
Gerridae		10	0
Hydrometridae		8	0
Nepidae		8	0
Notonectidae		8	0
Megaloptera			1
Corydalidae	1	3	3
Sialidae		6	0
Diptera			14
Athericidae		3	0
Blephariceridae		2	0
Ceratopogonidae		8	0
Chironomidae		9	0
Culicidae		10	0
Dixidae		6	0
Empididae		7	0
Psychodidae		8	0
Ptychopteridae		8	0
Simuliidae		6	0
Stratiomyidae		10	0
Syrphidae		10	0
Tabanidae		7	0
Tipulidae	14	5	70

Non-Insects	Count	Tolerance	TV
Crustacea			0
Asellidae		7	0
Cambaridae		5	0
Gammaridae		5	0
Palaemonidae		5	0
Annelida			0
Hirudinea		10	0
Nematoda		10	0
Nematomorpha		10	0
Oligochaeta		10	0
Turbellaria			0
Turbellaria		7	0
Bivalvia			0
Corbiculidae		6	0
Sphaeriidae		5	0
Unionidae		4	0
Gastropoda			0
Ancylidae		7	0
Hydrobiidae		4	0
Physidae		7	0
Planorbidae		5	0
Pleuroceridae		5	0
Viviparidae		5	0
Miscellaneous			0
Collembola		6	0
Lepidoptera		5	0
Neuroptera		5	0
Hydrachnidae		6	0

Totals		
	Total number	**29**
	Total families	**7**

Metric calculations			
Richness			**Additional metrics**	
Total Taxa	7	31.8	Ephemeroptera Taxa	2
EPT Taxa	3	23.1	Plecoptera Taxa	0
Tolerance			Trichoptera Taxa	1
Biotic Index	4.62	76.8	Long-lived Taxa	5
% Tolerant	0.0	100.0	Odonata Taxa	1
Composition			Diptera Taxa	1
% EPT Abundance	27.6	30.7	COET Taxa	5
% Dominance	48.3	64.7	% Sensitive	10.3
% Net-spinners	13.8	NA	% Chironomidae	0.0
Stream Condition Index		**54.5**	% Clingers	24.1
Integrity Rating	**Marginal**		More diversity measures	

West Virginia Save Our Streams
601 57th Street, SE, Charleston WV 25304
http://www.dep.wv.gov/sos

Note: There may be instances when families are collected that are not listed above. In those cases choose a similar family/tolerance value if known, to calculate the metrics. You should contact the WV Save Our Streams Coordinator to confirm your choice. Provide as much detail as possible so that family-level identification can be determined.

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME S-K43	LOCATION Lewis County, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Perennial	
LAT 39.002097° LONG -80.595753°	RIVER BASIN Headwaters Sand Fork	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS J.McGuirk, C.Stoliker		
FORM COMPLETED BY J.McGuirk	DATE 09/07/2016 TIME 2:00PM	REASON FOR SURVEY

	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 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 14	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 11	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 9	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 9	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 6	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 11	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)	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 15	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 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	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 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	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 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 114

No FCI form included. Not a high-gradient ephemeral or intermittent headwater stream.

S-I63

Stream Photograph Page

Stream ID S-I63 Date: 05/16/2015

Photograph Direction SW

Comments:

STREAM ID S-I63	**STREAM NAME** Sand Fork
LAT 38.969345 **LONG** -80.593157	**DATE** 05/16/2015
CLIENT MVP	**CLIENT** MVP
INVESTIGATORS SET SJC GS	
FLOW REGIME Perennial ✔ Intermittent ___ Ephemeral ___	**WATER TYPE** TNW ___ RPW ✔ NRPW ___

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 20.0 ft
Top of Bank Height:
LB 3.0 ft RB 4.0 ft
Water Depth: 18.00 in
Water Width: 12.0 ft
High Water Mark: 2.0 ft
Flow Direction: W

Stream Erosion
___None ✔ Moderate ___Heavy

Artificial, Modified or Channelized
✔ Yes ___ No

Dam Present ___Yes ✔ No

Sinuosity ✔ Low ___ Medium ___ High

Gradient
✔ Flat (0.5/100 ft) ___Moderate (2 ft/100 ft) ___Severe (10 ft/100 ft)

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
___ Standing water
✔ Flowing water

Velocity
___ Fast ___ Moderate
✔ Slow

Proportion of Reach Represented by Stream Morphology Types
Riffle 25 % Run 60 %
Pool 15 %

Turbidity
___ Clear ___Slightly turbid ___Turbid
✔ Opaque ___Stained
___Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		
Boulder	> 256 mm (10")	
Cobble	64-256 mm (2.5"-10")	45
Gravel	2-64 mm (0.1"-2.5")	10
Sand	0.06-2mm (gritty)	
Silt	0.004-0.06 mm	45
Clay	< 0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	10
Muck-Mud	black, very fine organic (FPOM)	10
Marl	grey, shell fragments	0

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___Industrial
___ Agricultural ___ Residential
✔ Other: Road on right bank, boat laun

Canopy Cover
✔ Partly open ___Partly shaded
___ Shaded ___ Open

Indicate the dominant type (Check one)
✔ Trees ___ Shrubs
___ Grasses ___ Herbaceous

Floodplain Width
✔ Wide > 30ft ___ Moderate 15-30ft
___ Narrow <16ft

Wetland Present ___Yes ✔ No
Wetland ID

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
___ Rooted emergent ___Rooted submergent ___Rooted floating ___Free floating
___ Floating algae ___Attached algae

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES

Many macroinverts, songbirds, butterflies

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2015

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	Mountain Valley Pipeline Project SWVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	38.969345	Lon.	-80.593157	WEATHER:	Sunny, 80°	DATE:	September 7, 2016
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	S-I63; Sand Fork; 6957ac Form of Mitigation: Mitigation Bank	MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)							Comments:	Low water flow at time of survey. Unable to sample WVSCI
STREAM IMPACT LENGTH: 26	FORM OF MITIGATION: RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	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:	Intermittent			Stream Classification:	Intermittent			Stream Classification:	Intermittent			Stream Classification:	Intermittent		
Percent Stream Channel Slope	1			Percent Stream Channel Slope				Percent Stream Channel Slope	0			Percent Stream Channel Slope	0			Percent Stream Channel Slope	0		
HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):			
		Average				Average				Average				Average				Average	
Hydrology		0		Hydrology	1	0		Hydrology	1	0		Hydrology	1	0		Hydrology	1	0	
Biogeochemical Cycling				Biogeochemical Cycling	1			Biogeochemical Cycling	1			Biogeochemical Cycling	1			Biogeochemical Cycling	1		
Habitat				Habitat	1			Habitat	1			Habitat	1			Habitat	1		
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 (High 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	17	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		10	2. Embeddedness	0-20		0	2. Embeddedness	0-20		0	2. Embeddedness	0-20		0	2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		11	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		13	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		8	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		15	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		11	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		14	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		16	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		0	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		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Suboptimal		128	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0
Sub-Total			0.64	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			
100-199 - 85 points	0-90	0-1			0-90	0-1	0		0-90	0-1	0		0-90	0-1	0		0-90	0-1	
pH				pH				pH				pH				pH			
5.6-5.9 = 45 points	0-80				5-90		0		5-90		0		5-90		0		5-90		
DO				DO				DO				DO				DO			
	10-30				10-30		0		10-30		0		10-30		0		10-30		
Sub-Total				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)			
Grey Zone	0-100	0-1	66.9		0-100	0-1	0		0-100	0-1	0		0-100	0-1	0		0-100	0-1	
Sub-Total			0.669	Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.703	26	18.278

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

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.703	26	18.278	$14,622.40

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	18.278	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

**Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project*
**Note2: Place an "X" in the appropriate category (only select one).*

Restoration Level 1	
Restoration Level 2	
Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-I63	18.278	#DIV/0!

Extended Upland Buffer Zone

**Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)*
**Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)*
**Note[3]: Select the appropriate mitigation type*

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME S-I63	LOCATION Lewis County, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Perennial	
LAT 38.969302° LONG -80.593172°	RIVER BASIN Headwaters Sand Fork	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS C. Vileno, J. Bittner		
FORM COMPLETED BY C. Vileno, J. Bittner	DATE 09/07/2016 TIME 1:00	REASON FOR SURVEY Proposed pipeline

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
1. Epifaunal Substrate/ Available Cover	Greater than 50% 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).	30-50% 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).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 11	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 <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% 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 80% 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	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 8	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—LOW 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 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 11	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)	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 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	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 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	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 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 128

Insects	Count	Tolerance	TV
Ephemeroptera			10
Ameletidae		2	0
Baetidae		4	0
Beatiscidae		4	0
Caenidae	1	5	5
Ephemerellidae		3	0
Ephemeridae	3	5	15
Heptageniidae	5	3	15
Isonychiidae		3	0
Leptophlebiidae		4	0
Potamanthidae		5	0
Siphlonuridae	1	3	3
Tricorythidae		5	0
Plecoptera			0
Capniidae		2	0
Chloroperlidae		2	0
Leuctridae		2	0
Nemouridae		2	0
Peltoperlidae		1	0
Perlidae		1	0
Perlodidae		1	0
Pteronarcyidae		1	0
Taeniopterygidae		2	0
Trichoptera			0
Brachycentridae		2	0
Glossosomatidae		2	0
Helicopsychidae		3	0
Hydropsychidae		5	0
Hydroptilidae		3	0
Lepidostomatidae		3	0
Leptoceridae		3	0
Limnephilidae		4	0
Molannidae		3	0
Philopotamidae		4	0
Phryganeidae		4	0
Polycentropodidae		5	0
Psychomiidae		3	0
Rhyacophilidae		3	0
Uenoidae		2	0
Total Tolerance Value			64

West Virginia Save Our Streams
601 57th Street, SE, Charleston WV 25304
http://www.dep.wv.gov/sos

Insects	Count	Tolerance	TV
Odonata			2
Aeshnidae		3	0
Calopterygidae		6	0
Coenagrionidae		7	0
Cordulegastridae		3	0
Gomphidae	2	5	10
Lestidae		7	0
Libellulidae		7	0
Coleoptera			1
Chrysomelidae		7	0
Dryopidae		5	0
Dytiscidae		6	0
Elmidae		4	0
Gyrinidae		5	0
Haliplidae		7	0
Hydrophilidae		7	0
Psephenidae	1	3	3
Ptilodactylidae		5	0
Hemiptera			0
Belostomatidae		8	0
Corixidae		8	0
Gerridae		10	0
Hydrometridae		8	0
Nepidae		8	0
Notonectidae		8	0
Megaloptera			0
Corydalidae		3	0
Sialidae		6	0
Diptera			2
Athericidae		3	0
Blephariceridae		2	0
Ceratopogonidae		8	0
Chironomidae		9	0
Culicidae		10	0
Dixidae		6	0
Empididae		7	0
Psychodidae	1	8	8
Ptychopteridae		8	0
Simuliidae		6	0
Stratiomyidae		10	0
Syrphidae		10	0
Tabanidae		7	0
Tipulidae	1	5	5

Non-Insects	Count	Tolerance	TV
Crustacea			0
Asellidae		7	0
Cambaridae		5	0
Gammaridae		5	0
Palaemonidae		5	0
Annelida			0
Hirudinea		10	0
Nematoda		10	0
Nematomorpha		10	0
Oligochaeta		10	0
Turbellaria			0
Turbellaria		7	0
Bivalvia			0
Corbiculidae		6	0
Sphaeriidae		5	0
Unionidae		4	0
Gastropoda			0
Ancylidae		7	0
Hydrobiidae		4	0
Physidae		7	0
Planorbidae		5	0
Pleuroceridae		5	0
Viviparidae		5	0
Miscellaneous			0
Collembola		6	0
Lepidoptera		5	0
Neuroptera		5	0
Hydrachnidae		6	0

Totals		
	Total number	**15**
	Total families	**8**

Metric calculations			
Richness			**Additional metrics**	
Total Taxa	8	36.4	Ephemeroptera Taxa	4
EPT Taxa	4	30.8	Plecoptera Taxa	0
Tolerance			Trichoptera Taxa	0
Biotic Index	4.27	81.9	Long-lived Taxa	3
% Tolerant	6.7	95.2	Odonata Taxa	1
Composition			Diptera Taxa	2
% EPT Abundance	66.7	74.1	COET Taxa	6
% Dominance	33.3	83.3	% Sensitive	46.7
% Net-spinners	0.0	NA	% Chironomidae	0.0
Stream Condition Index		**66.9**	% Clingers	40.0
Integrity Rating	**Suboptimal**		More diversity measures	

Note: There may be instances when families are collected that are not listed above. In those cases choose a similar family/tolerance value if known, to calculate the metrics. You should contact the WV Save Our Streams Coordinator to confirm your choice. Provide as much detail as possible so that family-level identification can be determined.

No FCI form included. Not a high-gradient ephemeral or intermittent headwater stream.

S-UV11

Stream Photograph Page

Stream ID S-UV11 Date: 06/16/2016

Photograph Direction SW

Comments:

STREAM ID S-UV11	**STREAM NAME** Oil Creek		
CLIENT EQT	**PROJECT NAME** MVP		
LAT 38.893147 **LONG** -80.555856	**DATE** 06/16/2016	**COUNTY** Lewis	
INVESTIGATORS C. Stoliker J. Niergarth L. McCarrell			
WATER TYPE TNW ☐ RPW ☑ NRPW ☐	**FLOW REGIME** Perennial ☑ Intermittent ☐ Ephemeral ☐		

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 30.0 ft
Top of Bank Height:
LB 10.0 ft RB 6.0 ft
Water Depth: 8.00 in
Water Width: 6.0 ft
Ordinary High Water Mark (Width): 15.0 ft
Ordinary High Water Mark (Height): 24.0 in
Flow Direction: Southwest

Sinuosity ✔ Low ___Medium ___High

Gradient ✔ Flat (0.5/100 ft) ___Moderate (2 ft/100 ft) ___Severe (10 ft/100 ft)

Stream Erosion
___None ___Moderate ✔Heavy

Artificial, Modified or Channelized
___ Yes ✔ No

Within Roadside Ditch
___ Yes ✔No

Culvert Present ___Yes ✔ No
Culvert Material:_____
Culvert Size: _____in

FLOW CHARACTERISTICS

Water Present
___No water, stream bed dry
___Stream bed moist
___Standing water
✔ Flowing water

Velocity
___Fast ✔ Moderate
___Slow

Proportion of Reach Represented by Stream Morphology Types (Only enter if water present)
Riffle 25 % Run 25 %
Pool 50 %

Turbidity
✔ Clear ___Slightly turbid ___Turbid
___ Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%) 100

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		
Boulder	> 256 mm (10")	20
Cobble	64-256 mm (2.5"-10")	50
Gravel	2-64 mm (0.1"-2.5")	25
Sand	0.06-2mm (gritty)	5
Silt	0.004-0.06 mm	
Clay	< 0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	5
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___Industrial
___ Agricultural ___ Residential
___ ROW ___Other:

Canopy Cover
___Open ___Partly shaded
✔ Shaded

Floodplain Width
✔ Wide > 30ft ___ Moderate 15-30ft
___ Narrow <15ft

MACROINVERTEBRATES/OTHER WILDLIFE OBSERVED OR OTHER NOTES AND OBSERVATIONS

Observed crayfish, small fish, and other macroinvertebrates within stream

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2015

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	Mountain Valley Pipeline Project SWVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	38.892980°	Lon.	-80.556210°	WEATHER:		DATE:	8/10/2015
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	S-UV11; Oil Creek Form of Mitigation: Mitigation Bank	MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)							Comments:	
STREAM IMPACT LENGTH:	25	FORM OF MITIGATION:	RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:		Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				Column No. 2- Mitigation Existing Condition - Baseline (Credit)				Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				Column No. 5- Mitigation Projected at Maturity (Credit)			
Stream Classification:	Perennial			Stream Classification:	Intermittent			Stream Classification:	Intermittent			Stream Classification:	Intermittent			Stream Classification:	Intermittent		
Percent Stream Channel Slope	7			Percent Stream Channel Slope				Percent Stream Channel Slope	0			Percent Stream Channel Slope	0			Percent Stream Channel Slope	0		
HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):			
		Average				Average				Average				Average				Average	
Hydrology				Hydrology	1			Hydrology	1			Hydrology	1			Hydrology	1		
Biogeochemical Cycling		0		Biogeochemical Cycling	1	0		Biogeochemical Cycling	1	0		Biogeochemical Cycling	1	0		Biogeochemical Cycling	1	0	
Habitat				Habitat	1			Habitat	1			Habitat	1			Habitat	1		
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 (Low Gradient Data Sheet)				USEPA RBP (High 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	17	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Pool Substrate Characterization	0-20		15	2. Embeddedness	0-20		0	2. Embeddedness	0-20		0	2. Embeddedness	0-20		0	2. Embeddedness	0-20		
3. Pool Variability	0-20		15	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		13	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		5	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		17	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		
7. Channel Sinuosity	0-20		14	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		16	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		15	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Suboptimal		143	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0
Sub-Total			0.715	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	0-1	0.191		0-90	0-1	0		0-90	0-1	0		0-90	0-1	0		0-90	0-1	
pH				pH				pH				pH				pH			
6.0-8.0 = 80 points	0-80		7.63		5-90		0		5-90		0		5-90		0		5-90		
DO				DO				DO				DO				DO			
>5.0 = 30 points	10-30		98.5		10-30		0		10-30		0		10-30		0		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)			
Fair	0-100	0-1	55.9		0-100	0-1	0		0-100	0-1	0		0-100	0-1	0		0-100	0-1	
Sub-Total			0.459	Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.725	25	18.1166667

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

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.724666667	25	18.11666667	$14,493.33

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	18.11666667	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

**Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project*
**Note2: Place an "X" in the appropriate category (only select one).*

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-UV11	18.11666667	#DIV/0!

Extended Upland Buffer Zone

**Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)*
**Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)*
**Note[3]: Select the appropriate mitigation type*

Buffer Width	Left Bank
0-50	None
51-150	None
Buffer Width	**Right Bank**
0-50	None
51-150	None
Average Buffer Width/Side	0

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME S-UV11	LOCATION Lewis County, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Perennial	
LAT 38.892980° LONG -80.556210°	RIVER BASIN Oil Creek	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS J. Bittner, C.Vileno		
FORM COMPLETED BY J. Bittner	DATE 09/06/2016 TIME 14:40	REASON FOR SURVEY Proposed pipeline

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	**1. Epifaunal Substrate/ Available Cover**	Greater than 50% 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).	30-50% 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).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE 15	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 <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% 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 80% 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	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 5	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—LOW 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 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 14	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)	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 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	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 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	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 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 143

Insects	Count	Tolerance	TV
Ephemeroptera			64
Ameletidae		2	0
Baetidae		4	0
Beatiscidae		4	0
Caenidae		5	0
Ephemerellidae		3	0
Ephemeridae		5	0
Heptageniidae	64	3	192
Isonychiidae		3	0
Leptophlebiidae		4	0
Potamanthidae		5	0
Siphlonuridae		3	0
Tricorythidae		5	0
Plecoptera			0
Capniidae		2	0
Chloroperlidae		2	0
Leuctridae		2	0
Nemouridae		2	0
Peltoperlidae		1	0
Perlidae		1	0
Perlodidae		1	0
Pteronarcyidae		1	0
Taeniopterygidae		2	0
Trichoptera			0
Brachycentridae		2	0
Glossosomatidae		2	0
Helicopsychidae		3	0
Hydropsychidae		5	0
Hydroptilidae		3	0
Lepidostomatidae		3	0
Leptoceridae		3	0
Limnephilidae		4	0
Molannidae		3	0
Philopotamidae		4	0
Phryganeidae		4	0
Polycentropodidae		5	0
Psychomiidae		3	0
Rhyacophilidae		3	0
Uenoidae		2	0
Total Tolerance Value			260

Insects	Count	Tolerance	TV
Odonata			5
Aeshnidae	4	3	12
Calopterygidae	1	6	6
Coenagrionidae		7	0
Cordulegastridae		3	0
Gomphidae		5	0
Lestidae		7	0
Libellulidae		7	0
Coleoptera			0
Chrysomelidae		7	0
Dryopidae		5	0
Dytiscidae		6	0
Elmidae		4	0
Gyrinidae		5	0
Haliplidae		7	0
Hydrophilidae		7	0
Psephenidae		3	0
Ptilodactylidae		5	0
Hemiptera			0
Belostomatidae		8	0
Corixidae		8	0
Gerridae		10	0
Hydrometridae		8	0
Nepidae		8	0
Notonectidae		8	0
Megaloptera			0
Corydalidae		3	0
Sialidae		6	0
Diptera			0
Athericidae		3	0
Blephariceridae		2	0
Ceratopogonidae		8	0
Chironomidae		9	0
Culicidae		10	0
Dixidae		6	0
Empididae		7	0
Psychodidae		8	0
Ptychopteridae		8	0
Simuliidae		6	0
Stratiomyidae		10	0
Syrphidae		10	0
Tabanidae		7	0
Tipulidae		5	0

Non-Insects	Count	Tolerance	TV
Crustacea			10
Asellidae		7	0
Cambaridae	10	5	50
Gammaridae		5	0
Palaemonidae		5	0
Annelida			0
Hirudinea		10	0
Nematoda		10	0
Nematomorpha		10	0
Oligochaeta		10	0
Turbellaria			0
Turbellaria		7	0
Bivalvia			0
Corbiculidae		6	0
Sphaeriidae		5	0
Unionidae		4	0
Gastropoda			0
Ancylidae		7	0
Hydrobiidae		4	0
Physidae		7	0
Planorbidae		5	0
Pleuroceridae		5	0
Viviparidae		5	0
Miscellaneous			0
Collembola		6	0
Lepidoptera		5	0
Neuroptera		5	0
Hydrachnidae		6	0
Totals	**Total number**		**79**
	Total families		**4**

Metric calculations			
Richness			**Additional metrics**	
Total Taxa	4	18.2	Ephemeroptera Taxa	1
EPT Taxa	1	7.7	Plecoptera Taxa	0
Tolerance			Trichoptera Taxa	0
Biotic Index	3.29	95.8	Long-lived Taxa	3
% Tolerant	0.0	100.0	Odonata Taxa	2
Composition			Diptera Taxa	0
% EPT Abundance	81.0	90.0	COET Taxa	3
% Dominance	81.0	23.7	% Sensitive	86.1
% Net-spinners	0.0	NA	% Chironomidae	0.0
Stream Condition Index		**55.9**	% Clingers	81.0
Integrity Rating	**Marginal**		More diversity measures	

West Virginia Save Our Streams
601 57th Street, SE, Charleston WV 25304
http://www.dep.wv.gov/sos

Note: There may be instances when families are collected that are not listed above. In those cases choose a similar family/tolerance value if known, to calculate the metrics. You should contact the WV Save Our Streams Coordinator to confirm your choice. Provide as much detail as possible so that family-level identification can be determined.

S-L61

Stream Photograph Page

Stream ID S-L61 Date: 05/16/2015

Photograph Direction NE

Comments:

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	Mountain Valley Pipeline Project SWVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	38.880121	Lon.	-80.563499	WEATHER:	Sunny, 85 degrees	DATE:	8/10/2015
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	S-L61; Crooked Run; 291ac Form of Mitigation; Mitigation bank	MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)							Comments:	
STREAM IMPACT LENGTH:	58	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)			
Stream Classification:	Intermittent		
Percent Stream Channel Slope	5		
HGM Score (attach data forms):			
			Average
Hydrology	0.82		0.77
Biogeochemical Cycling	0.86		
Habitat	0.63		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	14
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		14
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		15
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		8
9. Vegetative Protection (LB & RB)	0-20		10
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Marginal		78
Sub-Total			0.39
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
100-199 - 85 points	0-90	0-1	
pH			
5.6-5.9 = 45 points	0-80		
DO			
	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.683	58	39.585

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
Stream Classification:	Intermittent		
Percent Stream Channel Slope			
HGM Score (attach data forms):			
			Average
Hydrology	1		0
Biogeochemical Cycling	1		
Habitat	1		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	0
pH			
	5-90		0
DO			
	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

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

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
Stream Classification:	Intermittent		
Percent Stream Channel Slope	0		
HGM Score (attach data forms):			
			Average
Hydrology	1		0
Biogeochemical Cycling	1		
Habitat	1		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	0
pH			
	5-90		0
DO			
	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

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

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
Stream Classification:	Intermittent		
Percent Stream Channel Slope	0		
HGM Score (attach data forms):			
			Average
Hydrology	1		0
Biogeochemical Cycling	1		
Habitat	1		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	0
pH			
	5-90		0
DO			
	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

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

Column No. 5- Mitigation Projected at Maturity (Credit)			
Stream Classification:	Intermittent		
Percent Stream Channel Slope	0		
HGM Score (attach data forms):			
			Average
Hydrology	1		0
Biogeochemical Cycling	1		
Habitat	1		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

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

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.6825	58	39.585	$31,668.00

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	39.585	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

**Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project*
**Note2: Place an "X" in the appropriate category (only select one).*

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-L61	39.585	#DIV/0!

Extended Upland Buffer Zone

**Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)*
**Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)*
**Note[3]: Select the appropriate mitigation type*

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)
Final Mitigation Unit Yield
#DIV/0!

STREAM ID S-L61	**STREAM NAME** Crooked Run
LAT 38.880121 **LONG** -80.563499	**DATE** 05/16/2015
PROJEC MVP	**CLIENT** MVP
INVESTIGATORS Sean Kite, Ashley Hatfield	
FLOW REGIME Perennial ___ Intermittent ✔ Ephemeral ___	**WATER TYPE** TNW ___ RPW ✔ NRPW ___

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 10.0 ft
Top of Bank Height:
LB 3.0 ft RB 3.0 ft
Water Depth: 3.00 in
Water Width: 2.0 ft
High Water Mark: 1.0 ft
Flow Direction: W

Stream Erosion
___ None ✔ Moderate ___ Heavy

Artificial, Modified or Channelized
___ Yes ✔ No

Dam Present ___ Yes ✔ No

Sinuosity ___ Low ✔ Medium ___ High

Gradient
___ Flat (0.5/100 ft) ✔ Moderate (2 ft/100 ft) ___ Severe (10 ft/100 ft)

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
___ Standing water
✔ Flowing water

Velocity
___ Fast ✔ Moderate
___ Slow

Proportion of Reach Represented by Stream Morphology Types
Riffle 70 % Run 10 %
Pool 20 %

Turbidity
✔ Clear ___ Slightly turbid ___ Turbid
___ Opaque ___ Stained
___ Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		
Boulder	> 256 mm (10")	
Cobble	64-256 mm (2.5"-10")	70
Gravel	2-64 mm (0.1"-2.5")	20
Sand	0.06-2mm (gritty)	5
Silt	0.004-0.06 mm	5
Clay	< 0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	10
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___ Industrial
___ Agricultural ___ Residential
___ Other:

Canopy Cover
___ Partly open ___ Partly shaded
✔ Shaded ___ Open

Indicate the dominant type (Check one)
✔ Trees ___ Shrubs
___ Grasses ___ Herbaceous

Floodplain Width
___ Wide > 30ft ✔ Moderate 15-30ft
___ Narrow <16ft

Wetland Present ___ Yes ✔ No
Wetland ID

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
___ Rooted emergent ___ Rooted submergent ___ Rooted floating ___ Free floating
___ Floating algae ___ Attached algae

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES	Salamanders observed. original S-L61

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

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 Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: MVP
Location: S-L61 (Lewis County)
Sampling Date: 9/7/2016

Project Site Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number:

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.82
Biogeochemical Cycling	0.86
Habitat	0.63

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	64.50	0.69
V_{EMBED}	Average embeddedness of channel.	3.28	0.92
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.00	0.50
V_{BERO}	Total percent of eroded stream channel bank.	40.00	0.86
V_{LWD}	Number of down woody stems per 100 feet of stream.	9.00	1.00
V_{TDBH}	Average dbh of trees.	8.40	0.94
V_{SNAG}	Number of snags per 100 feet of stream.	4.00	0.90
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	16.25	0.20
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.84	0.88

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	C.Vileno, J. Bittner	Latitude/UTM Northing:	38.881097°
Project Name:	MVP	Longitude/UTM Easting:	-80.562782°
Location:	S-L61 (Lewis County)	Sampling Date:	9/7/2016

SAR Number: | Reach Length (ft): 100 | Stream Type: Intermittent Stream

Top Strata: Tree/Sapling 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.)

64.5 %

List the percent cover measurements at each point below:

50	40	40	60	80	90	40	40	80	80
90	90	70	60	40	80	80	60	70	50

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.

3.3

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:

3	3	4	4	3	3	3	3	3	4
3	3	3	3	3	4	4	3	3	3
3	3	4	4	3	3	4	3	4	3
3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	4	4	4	4	4

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}.

1.00 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):

3.00	5.00	2.00	1.00	1.00	1.00	0.50	2.00	2.00	1.00
1.00	0.50	0.50	0.50	0.50	0.25	0.25	1.00	1.00	1.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.25	0.25	0.25
0.25	0.25	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00

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%.

40 %

Left Bank: 20 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: 9	9.0
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.	8.4

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				
6	5	8	6	5	24	10	5	10	8
5	7	10	12	5					

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: 2 Right Side: 2	4.0
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: Right Side:	Not Used
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

Group 1 = 1.0		Group 2 (-1.0)	
☐ *Acer rubrum*	☐ *Magnolia tripetala*	☐ *Ailanthus altissima*	☐ *Lonicera japonica*
☐ *Acer saccharum*	☐ *Nyssa sylvatica*	☐ *Albizia julibrissin*	☑ *Lonicera tatarica*
☐ *Aesculus flava*	☐ *Oxydendrum arboreum*	☐ *Alliaria petiolata*	☐ *Lotus corniculatus*
☐ *Asimina triloba*	☐ *Prunus serotina*	☐ *Alternanthera philoxeroides*	☐ *Lythrum salicaria*
☐ *Betula alleghaniensis*	☐ *Quercus alba*		☑ *Microstegium vimineum*
☐ *Betula lenta*	☐ *Quercus coccinea*	☐ *Aster tataricus*	☐ *Paulownia tomentosa*
☐ *Carya alba*	☐ *Quercus imbricaria*	☐ *Cerastium fontanum*	☐ *Polygonum cuspidatum*
☐ *Carya glabra*	☐ *Quercus prinus*	☐ *Coronilla varia*	☐ *Pueraria montana*
☐ *Carya ovalis*	☐ *Quercus rubra*	☑ *Elaeagnus umbellata*	☐ *Rosa multiflora*
☐ *Carya ovata*	☐ *Quercus velutina*	☐ *Lespedeza bicolor*	☐ *Sorghum halepense*
☐ *Cornus florida*	☐ *Sassafras albidum*	☐ *Lespedeza cuneata*	☐ *Verbena brasiliensis*
☐ *Fagus grandifolia*	☐ *Tilia americana*	☐ *Ligustrum obtusifolium*	
☐ *Fraxinus americana*	☐ *Tsuga canadensis*	☐ *Ligustrum sinense*	
☐ *Liriodendron tulipifera*	☐ *Ulmus americana*		
☐ *Magnolia acuminata*			
0 Species in Group 1		3 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.

16.25 %

Left Side				Right Side			
30	20	10	10	10	20	10	10
20	30	10	10	10	20	20	20

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.

Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

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

0.84

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	80	80
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	10	90
Residential districts, 1/4 - 1/3 ac (38% to 30% cover)	0.1	10	100

Summary

Variable	Value	VSI
$V_{CCANOPY}$	65 %	0.69
V_{EMBED}	3.3	0.92
$V_{SUBSTRATE}$	1.00 in	0.50
V_{BERO}	40 %	0.86
V_{LWD}	9.0	1.00
V_{TDBH}	8.4	0.94
V_{SNAG}	4.0	0.90
V_{SSD}	Not Used	Not Used
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	16.3 %	0.20
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.84	0.88

Notes:

No / low flow at time of survey. Unable to sample water quality or WVSCI.

S-L57

Stream Photograph Page

Stream ID S-L57

Photograph Direction East

Date: 05/15/2015

Comments: 2015 stream identification.

Photograph Direction East

Date: 09/25/2019

Comments: 2019 stream identification confirmation.

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2015

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	Mountain Valley Pipeline Project SWVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	38.828304	Lon.	-80.525748	WEATHER:	Cloudy, 50°	DATE:	September 21, 2016
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	S-L57; UNT to Barbecue Run Form of Mitigation: Mitigation Bank	MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)							Comments:	No/low water flow at time of survey. Unable to sample water quality or WVSCI
STREAM IMPACT LENGTH: 26	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:	Ephemeral			Stream Classification:	Intermittent			Stream Classification:	Intermittent			Stream Classification:	Intermittent			Stream Classification:	Intermittent		
Percent Stream Channel Slope	15			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	0.36			Hydrology				Hydrology				Hydrology				Hydrology			
Biogeochemical Cycling	0.65	0.41666667		Biogeochemical Cycling		0		Biogeochemical Cycling		0		Biogeochemical Cycling		0		Biogeochemical Cycling		0	
Habitat	0.24			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 (High 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	4	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		1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		8	2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		10	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		0	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		6	6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		8	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		4	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		6	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		42	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0
Sub-Total			0.35	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			
100-199 - 85 points	0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1	
pH				pH				pH				pH				pH			
5.6-5.9 = 45 points	0-80				5-90				5-90		5.6		5-90				5-90		
DO				DO				DO				DO				DO			
	10-30				10-30				10-30				10-30				10-30		
Sub-Total				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		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			PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score		
Index	Linear Feet	Unit Score	Index	Linear Feet	Unit Score	Index	Linear Feet	Unit Score	Index	Linear Feet	Unit Score	Index	Linear Feet	Unit Score
0.496	26	12.8916667	0	0	0	0	0	0	0	0	0	0	0	0

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.495833333	26	12.89166667	$10,313.33

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	12.89166667	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

**Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project*
**Note2: Place an "X" in the appropriate category (only select one).*

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-L57	12.89166667	#DIV/0!

Extended Upland Buffer Zone

**Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)*
**Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)*
**Note[3]: Select the appropriate mitigation type*

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

STREAM ID S-L57	**STREAM NAME** UNT to Barbecue Run
LAT 38.828304 **LONG** -80.525748	**DATE** 05/15/2015
PROJEC MVP	**CLIENT** MVP
INVESTIGATORS Sean Kite, Ashley Hatfield	
FLOW REGIME Perennial___ Intermittent___ Ephemeral ✓	**WATER TYPE** TNW___ RPW___ NRPW ✓

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 4.0 ft
Top of Bank Height:
LB 8.0 in RB 8.0 in
Water Depth: 1.00 in
Water Width: 1.0 ft
High Water Mark: 4.0 in
Flow Direction: W

Stream Erosion
___None ✓ Moderate ___Heavy

Artificial, Modified or Channelized
___ Yes ✓ No

Dam Present ___Yes ✓ No

Sinuosity ___ Low ✓ Medium ___ High

Gradient
___ Flat (0.5/100 ft) ✓ Moderate (2 ft/100 ft) ___Severe (10 ft/100 ft)

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
✓ Standing water
___ Flowing water

Velocity
___ Fast ___ Moderate
___ Slow

Proportion of Reach Represented by Stream Morphology Types
Riffle 80 % Run % Pool 20 %

Turbidity
✓ Clear ___Slightly turbid ___Turbid
___ Opaque ___Stained
___Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		
Boulder	> 256 mm (10")	
Cobble	64-256 mm (2.5"-10")	5
Gravel	2-64 mm (0.1"-2.5")	10
Sand	0.06-2mm (gritty)	5
Silt	0.004-0.06 mm	10
Clay	< 0.004 mm (slick)	70

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	10
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✓ Forest ___ Commercial
___ Field/Pasture ___Industrial
___ Agricultural ___ Residential
___ Other:

Canopy Cover
✓ Partly open ___Partly shaded
___ Shaded ___ Open

Indicate the dominant type (Check one)
✓ Trees ___ Shrubs
___ Grasses ___ Herbaceous

Floodplain Width
___ Wide > 30ft ___ Moderate 15-30ft
✓ Narrow <16ft

Wetland Present ___Yes ✓ No
Wetland ID

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
___Rooted emergent ___Rooted submergent ___Rooted floating ___Free floating
___Floating algae ___Attached algae

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES

Information listed on this form represents the data collected in 2015. The stream was revisited on 09/27/2019. The presence of a stream channel and OHWM was confirmed.

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

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 Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: MVP
Location: S-L57 (Braxton County)
Sampling Date: 11/06/2019

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number:

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.36
Biogeochemical Cycling	0.65
Habitat	0.24

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	27.14	0.19
V_{EMBED}	Average embeddedness of channel.	3.00	0.82
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.25	0.13
V_{BERO}	Total percent of eroded stream channel bank.	0.00	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	0.00	0.00
V_{TDBH}	Average dbh of trees.	8.88	1.00
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.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	1.60	0.76
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	11.67	0.14
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.62	0.65

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	C. Vileno, R. Aber	Latitude/UTM Northing:	38.828304
Project Name:	MVP	Longitude/UTM Easting:	-80.525748
Location:	S-L57 (Braxton County)	Sampling Date:	11/06/2019
SAR Number:		Reach Length (ft): 100	Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling 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.)

27.1 %

List the percent cover measurements at each point below:

60	20	0	0	20	40	50			

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.

3.0

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)

List the ratings at each point below:

3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3

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}.

0.25 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):

0.10	0.25	0.25	0.10	0.10	0.10	0.10	0.10	0.25	1.00
0.25	0.25	0.25	0.25	0.25	0.25	0.10	0.10	0.10	0.10
0.10	0.10	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

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%.

0 %

Left Bank: 0 ft Right Bank: 0 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: 0	0.0
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.	8.9
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: Right Side:	Not Used
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.	1.60

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				
8	10	10	7		8	10	10	8	

Group 1 = 1.0				Group 2 (-1.0)			
☑	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☑	*Lonicera japonica*
☐	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☑	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☑	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☑	*Quercus rubra*	☐	*Elaeagnus umbellata*	☐	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☑	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☐	*Liriodendron tulipifera*	☐	*Ulmus americana*				
☐	*Magnolia acuminata*						

4 Species in Group 1	2 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.

11.67 %

Left Side				Right Side			
15	10	10		15	10	10	

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.

Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

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

0.62

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (50% to 75% ground cover)	0.7	80	80
Forest and native range (<50% ground cover)	0.5	10	90
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	10	100

Summary

Variable	Value	VSI
$V_{CCANOPY}$	27 %	0.19
V_{EMBED}	3.0	0.82
$V_{SUBSTRATE}$	0.25 in	0.13
V_{BERO}	0 %	1.00
V_{LWD}	0.0	0.00
V_{TDBH}	8.9	1.00
V_{SNAG}	0.0	0.10
V_{SSD}	Not Used	Not Used
V_{SRICH}	1.60	0.76
$V_{DETRITUS}$	11.7 %	0.14
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.62	0.65

Notes:

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME S-L57	LOCATION Braxton County	
STATION #_____ RIVERMILE_____	STREAM CLASS Ephemeral	
LAT 38.828304 LONG -80.525748	RIVER BASIN Burnsville Lake-Little Kanawha River	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS CV, RA		
FORM COMPLETED BY C.Vileno	DATE 11/06/2019 TIME 2:15	REASON FOR SURVEY Proposed pipeline

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 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 4	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 8	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 0	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 10	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 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Stream Name:

S-L57

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

	Habitat Parameter	Condition Category			
		Optimal	**Suboptimal**	**Marginal**	**Poor**
Parameters to be evaluated broader than sampling reach	**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 6	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)	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 0	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 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 4 (RB)	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 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 2 (RB)	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 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 46

DO: _____

pH: _____

SC: _____

No / low flow at time of survey. Unable to sample water quality or WVSCI.

S-IJ27

Stream Photograph Page

Stream ID S-IJ27-ordinary Date: 05/07/2016

Photograph Direction NW

Comments:

STREAM ID S-IJ27-ordinary		**STREAM NAME** Little Knawl Creek	
CLIENT MVP		**PROJECT NAME** MVP	
LAT 38.808	**LONG** -80.546279	**DATE** 05/07/2016	**COUNTY** Braxton
INVESTIGATORS E. Foster, S. Therkildson			
WATER TYPE TNW ☐ RPW ☑ NRPW ☐		**FLOW REGIME** Perennial ☑ Intermittent ☐ Ephemeral ☐	

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 20.0 ft
Top of Bank Height:
LB 2.0 ft RB 2.0 ft
Water Depth: 3.00 in
Water Width: 10.0 ft
Ordinary High Water Mark (Width): 20.0 ft
Ordinary High Water Mark (Height): 12.0 in
Flow Direction: West

Sinuosity ___ Low ✔ Medium ___ High

Gradient ___ Flat (0.5/100 ft) ✔ Moderate (2 ft/100 ft) ___ Severe (10 ft/100 ft)

Stream Erosion
✔ None ___ Moderate ___ Heavy

Artificial, Modified or Channelized
___ Yes ✔ No

Within Roadside Ditch
___ Yes ✔ No

Culvert Present ___ Yes ✔ No
Culvert Material:_____
Culvert Size: _____in

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
___ Standing water
✔ Flowing water

Velocity
___ Fast ✔ Moderate
___ Slow

Proportion of Reach Represented by Stream Morphology Types (Only enter if water present)
Riffle 50 % Run 50 %
Pool %

Turbidity
___ Clear ✔ Slightly turbid ___ Turbid
___ Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%) 100

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		
Boulder	> 256 mm (10")	20
Cobble	64-256 mm (2.5"-10")	30
Gravel	2-64 mm (0.1"-2.5")	30
Sand	0.06-2mm (gritty)	20
Silt	0.004-0.06 mm	
Clay	< 0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
✔ Field/Pasture ___ Industrial
___ Agricultural ___ Residential
___ ROW ___ Other:

Canopy Cover
___ Open ___ Partly shaded
✔ Shaded

Floodplain Width
___ Wide > 30ft ✔ Moderate 15-30ft
___ Narrow <15ft

MACROINVERTEBRATES/OTHER WILDLIFE OBSERVED OR OTHER NOTES AND OBSERVATIONS

Re-doing form to document ordinary stream conditions. Form from 5/5/16 documents stream during heavy rains and flooding.

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2015

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	**Mountain Valley Pipeline Project SWVM v2.1**	**IMPACT COORDINATES: (in Decimal Degrees)**	**Lat.**	**38.809619 38.808958 38.808539**	**Lon.**	**-80.541463 -80.543128 -80.547202**	**WEATHER:**	**Cloudy, 85°**	**DATE:**	**September 8, 2016**
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	**S-IJ27; Little Knawl Creek; 884ac Multiple stream crossing impacts combined on SWVM form See site description for additional impact locations Form of Mitigation: Mitigation Bank**	**MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION:** (watershed size {acreage}, unaltered or impairments)					**Additional Impact Coordinates: 38.808242, -80.546896 38.808197, -80.544673**		**Comments:**	
STREAM IMPACT LENGTH: **84**	**FORM OF MITIGATION:** **RESTORATION (Levels I-III)**	**MIT COORDINATES: (in Decimal Degrees)**	**Lat.**		**Lon.**		**PRECIPITATION PAST 48 HRS:**	**0**	**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:**	**Perennial**			**Stream Classification:**	**Perennial**			**Stream Classification:**	**Perennial**			**Stream Classification:**	**Perennial**		
Percent Stream Channel Slope	**1**			**Percent Stream Channel Slope**				**Percent Stream Channel Slope**	**0**			**Percent Stream Channel Slope**	**0**			**Percent Stream Channel Slope**	**0**		
HGM Score (attach data forms):				**HGM Score (attach data forms):**				**HGM Score (attach data forms):**				**HGM Score (attach data forms):**				**HGM Score (attach data forms):**			
			Average				**Average**				**Average**				**Average**				**Average**
Hydrology				**Hydrology**				**Hydrology**				**Hydrology**				**Hydrology**			
Biogeochemical Cycling			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**	**Biogeochemical Cycling**			**0**
Habitat				Habitat				Habitat				Habitat				Habitat			
PART I - Physical, Chemical and Biological Indicators				**PART I - Physical, Chemical and Biological Indicators**				**PART I - Physical, Chemical and Biological Indicators**				**PART I - Physical, Chemical and Biological Indicators**				**PART I - Physical, Chemical and Biological Indicators**			
	Points Scale	Range	Site Score		Points Scale	Range	Site Score		Points Scale	Range	Site Score		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 (High 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	**17**	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		1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		**15**	2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		**3**	3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		**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		**4**	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		**9**	6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		**4**	7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		**16**	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		**12**	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		**14**	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		**107**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**	Total RBP Score	Poor		**0**
Sub-Total			**0.535**	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	0-1	**0.149**		0-90	0-1			0-90	0-1			0-90	0-1			0-90	0-1	
pH				**pH**				**pH**				**pH**				**pH**			
6.0-8.0 = 80 points	0-80		**6.89**		5-90				5-90		5.6		5-90				5-90		
DO				**DO**				**DO**				**DO**				**DO**			
>5.0 = 30 points	10-30		**50.08**		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)**			
Good	0-100	0-1	**71.5**		0-100	0-1			0-100	0-1			0-100	0-1			0-100	0-1	
Sub-Total			**0.715**	Sub-Total			**0**	Sub-Total			**0**	Sub-Total			**0**	Sub-Total			**0**

PART II - Index and Unit Score		
Index	**Linear Feet**	**Unit Score**
0.750	**84**	**63**

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**

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.75	84	63	$50,400.00

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	63	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

**Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project*
**Note2: Place an "X" in the appropriate category (only select one).*

Restoration Level 1	
Restoration Level 2	
Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-IJ27	63	#DIV/0!

Extended Upland Buffer Zone

**Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)*
**Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)*
**Note[3]: Select the appropriate mitigation type*

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

Insects	Count	Tolerance	TV
Ephemeroptera			25
Ameletidae		2	0
Baetidae		4	0
Beatiscidae		4	0
Caenidae		5	0
Ephemerellidae		3	0
Ephemeridae	3	5	15
Heptageniidae	18	3	54
Isonychiidae		3	0
Leptophlebiidae	4	4	16
Potamanthidae		5	0
Siphlonuridae		3	0
Tricorythidae		5	0
Plecoptera			4
Capniidae		2	0
Chloroperlidae		2	0
Leuctridae		2	0
Nemouridae		2	0
Peltoperlidae		1	0
Perlidae	4	1	4
Perlodidae		1	0
Pteronarcyidae		1	0
Taeniopterygidae		2	0
Trichoptera			6
Brachycentridae		2	0
Glossosomatidae		2	0
Helicopsychidae		3	0
Hydropsychidae		5	0
Hydroptilidae		3	0
Lepidostomatidae	6	3	18
Leptoceridae		3	0
Limnephilidae		4	0
Molannidae		3	0
Philopotamidae		4	0
Phryganeidae		4	0
Polycentropodidae		5	0
Psychomiidae		3	0
Rhyacophilidae		3	0
Uenoidae		2	0
Total Tolerance Value			162

Insects	Count	Tolerance	TV
Odonata			0
Aeshnidae		3	0
Calopterygidae		6	0
Coenagrionidae		7	0
Cordulegastridae		3	0
Gomphidae		5	0
Lestidae		7	0
Libellulidae		7	0
Coleoptera			13
Chrysomelidae		7	0
Dryopidae		5	0
Dytiscidae		6	0
Elmidae	6	4	24
Gyrinidae		5	0
Haliplidae		7	0
Hydrophilidae		7	0
Psephenidae	7	3	21
Ptilodactylidae		5	0
Hemiptera			0
Belostomatidae		8	0
Corixidae		8	0
Gerridae		10	0
Hydrometridae		8	0
Nepidae		8	0
Notonectidae		8	0
Megaloptera			0
Corydalidae		3	0
Sialidae		6	0
Diptera			0
Athericidae		3	0
Blephariceridae		2	0
Ceratopogonidae		8	0
Chironomidae		9	0
Culicidae		10	0
Dixidae		6	0
Empididae		7	0
Psychodidae		8	0
Ptychopteridae		8	0
Simuliidae		6	0
Stratiomyidae		10	0
Syrphidae		10	0
Tabanidae		7	0
Tipulidae		5	0

Non-Insects	Count	Tolerance	TV
Crustacea			2
Asellidae		7	0
Cambaridae	2	5	10
Gammaridae		5	0
Palaemonidae		5	0
Annelida			0
Hirudinea		10	0
Nematoda		10	0
Nematomorpha		10	0
Oligochaeta		10	0
Turbellaria			0
Turbellaria		7	0
Bivalvia			0
Corbiculidae		6	0
Sphaeriidae		5	0
Unionidae		4	0
Gastropoda			0
Ancylidae		7	0
Hydrobiidae		4	0
Physidae		7	0
Planorbidae		5	0
Pleuroceridae		5	0
Viviparidae		5	0
Miscellaneous			0
Collembola		6	0
Lepidoptera		5	0
Neuroptera		5	0
Hydrachnidae		6	0
Totals	**Total number**		**50**
	Total families		**8**

Metric calculations			
Richness			**Additional metrics**
Total Taxa	8	36.4	Ephemeroptera Taxa 3
EPT Taxa	5	38.5	Plecoptera Taxa 1
Tolerance			Trichoptera Taxa 1
Biotic Index	3.24	96.6	Long-lived Taxa 5
% Tolerant	0.0	100.0	Odonata Taxa 0
Composition			Diptera Taxa 0
% EPT Abundance	70.0	77.8	COET Taxa 6
% Dominance	36.0	80.0	% Sensitive 70.0
% Net-spinners	0.0	NA	% Chironomidae 0.0
Stream Condition Index		**71.5**	% Clingers 90.0
Integrity Rating	**Suboptimal**		More diversity measures

West Virginia Save Our Streams
601 57th Street, SE, Charleston WV 25304
http://www.dep.wv.gov/sos

Note: There may be instances when families are collected that are not listed above. In those cases choose a similar family/tolerance value if known, to calculate the metrics. You should contact the WV Save Our Streams Coordinator to confirm your choice. Provide as much detail as possible so that family-level identification can be determined.

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME S-IJ27	LOCATION Braxton County, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Perennial	
LAT 38.808539 LONG -80.547202	RIVER BASIN Burnsville Lake-Little Kanawha River	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS Jason McGuirk, Cody Stoliker		
FORM COMPLETED BY C. Stoliker	DATE 09/08/2016 TIME 13:00	REASON FOR SURVEY Proposed Pipeline

	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 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 17	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	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 3	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	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 4	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 9	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)	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 4	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 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	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 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	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 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 107

No FCI form included. Not a high-gradient ephemeral or intermittent headwater stream.

S-IJ32

Stream Photograph Page

Stream ID S-IJ32 Date: 05/07/2016

Photograph Direction SW

Comments:

STREAM ID S-IJ32		**STREAM NAME** UNT to Little Knawl Creek	
CLIENT MVP		**PROJECT NAME** MVP	
LAT 38.809616	**LONG** -80.537231	**DATE** 05/07/2016	**COUNTY** Braxton
INVESTIGATORS E. Foster, S. Therkildson			
WATER TYPE TNW ☐ RPW ☐ NRPW ☑		**FLOW REGIME** Perennial ☐ Intermittent ☐ Ephemeral ☑	

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 5.0 ft
Top of Bank Height:
LB 2.0 ft RB 2.0 ft
Water Depth: 0.00 in
Water Width: 0.0 ft
Ordinary High Water Mark (Width): 1.0 ft
Ordinary High Water Mark (Height): 6.0 in
Flow Direction: Southwest

Sinuosity ___ Low ___ Medium ✔ High

Gradient ___ Flat (0.5/100 ft) ___ Moderate (2 ft/100 ft) ✔ Severe (10 ft/100 ft)

Stream Erosion
✔ None ___ Moderate ___ Heavy

Artificial, Modified or Channelized
✔ Yes ___ No

Within Roadside Ditch
___ Yes ✔ No

Culvert Present ___ Yes ✔ No
Culvert Material:_____
Culvert Size: _____in

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
✔ Standing water
___ Flowing water

Velocity
___ Fast ___ Moderate
___ Slow

Proportion of Reach Represented by Stream Morphology Types (Only enter if water present)
Riffle % Run %
Pool %

Turbidity
___ Clear ___ Slightly turbid ___ Turbid
___ Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%) 100

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		
Boulder	> 256 mm (10")	30
Cobble	64-256 mm (2.5"-10")	30
Gravel	2-64 mm (0.1"-2.5")	30
Sand	0.06-2mm (gritty)	10
Silt	0.004-0.06 mm	
Clay	< 0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	40
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___ Industrial
___ Agricultural ___ Residential
___ ROW ___ Other:

Canopy Cover
___ Open ___ Partly shaded
✔ Shaded

Floodplain Width
___ Wide > 30ft ___ Moderate 15-30ft
✔ Narrow <15ft

MACROINVERTEBRATES/OTHER WILDLIFE OBSERVED OR OTHER NOTES AND OBSERVATIONS

Stream cuts across dirt road.

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2015

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	**Mountain Valley Pipeline Project SWVM v2.1**	**IMPACT COORDINATES: (in Decimal Degrees)**	**Lat.**	**38.809457**	**Lon.**	**-80.537428**	**WEATHER:**	**Cloudy, 85°**	**DATE:**	**September 8, 2016**
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	**S-IJ32; UNT to Little Knawl Creek; 7.35ac** **Form of Mitigation: Mitigation Bank**	**MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION:** (watershed size {acreage}, unaltered or impairments)							**Comments:**	**No/low water flow at time of survey. Unable to sample water quality or WVSCI**
STREAM IMPACT LENGTH:	**26**	**FORM OF MITIGATION:**	**RESTORATION (Levels I-III)**	**MIT COORDINATES: (in Decimal Degrees)**	**Lat.**		**Lon.**		**PRECIPITATION PAST 48 HRS:**	**0**	**Mitigation Length:**	

Column No. 1- Impact Existing Condition (Debit)

Stream Classification: Ephemeral

Percent Stream Channel Slope: 15

HGM Score (attach data forms):

		Average
Hydrology	0.65	
Biogeochemical Cycling	0.68	0.706666667
Habitat	0.79	

PART I - Physical, Chemical and Biological Indicators

	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		9
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		10
9. Vegetative Protection (LB & RB)	0-20		10
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Marginal		56
Sub-Total			0.466666667
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
100-199 - 85 points			
pH	0-80		
5.6-5.9 = 45 points			
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0.670	26	17.42

Column No. 2- Mitigation Existing Condition - Baseline (Credit)

Stream Classification: Ephemeral

Percent Stream Channel Slope:

HGM Score (attach data forms):

		Average
Hydrology		
Biogeochemical Cycling		0
Habitat		

PART I - Physical, Chemical and Biological Indicators

	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0	0	0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)

Stream Classification: Ephemeral

Percent Stream Channel Slope: 0

HGM Score (attach data forms):

		Average
Hydrology		
Biogeochemical Cycling		0
Habitat		

PART I - Physical, Chemical and Biological Indicators

	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0	0	0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)

Stream Classification: Ephemeral

Percent Stream Channel Slope: 0

HGM Score (attach data forms):

		Average
Hydrology		
Biogeochemical Cycling		0
Habitat		

PART I - Physical, Chemical and Biological Indicators

	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0	0	0

Column No. 5- Mitigation Projected at Maturity (Credit)

Stream Classification: Ephemeral

Percent Stream Channel Slope: 0

HGM Score (attach data forms):

		Average
Hydrology		
Biogeochemical Cycling		0
Habitat		

PART I - Physical, Chemical and Biological Indicators

	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0	0	0

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.67	26	17.42	$13,936.00

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	17.42	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

***Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project**
***Note2: Place an "X" in the appropriate category (only select one).**

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-IJ32	17.42	#DIV/0!

Extended Upland Buffer Zone

***Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)**
***Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)**
***Note[3]: Select the appropriate mitigation type**

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

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 Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: MVP
Location: S-IJ32 (Braxton County, WV)
Sampling Date: 09/08/2016

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number:

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.65
Biogeochemical Cycling	0.68
Habitat	0.79

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	93.50	1.00
V_{EMBED}	Average embeddedness of channel.	2.40	0.60
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	13.35	0.53
V_{BERO}	Total percent of eroded stream channel bank.	70.00	0.70
V_{LWD}	Number of down woody stems per 100 feet of stream.	8.00	1.00
V_{TDBH}	Average dbh of trees.	13.20	1.00
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.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	2.70	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	88.44	1.00
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.51	0.54

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	J. McGuirk, C. Stoliker	Latitude/UTM Northing:	38.809457
Project Name:	MVP	Longitude/UTM Easting:	-80.537428
Location:	S-IJ32 (Braxton County, WV)	Sampling Date:	09/08/2016

SAR Number: | Reach Length (ft): 100 | Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling 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.)

93.5 %

List the percent cover measurements at each point below:

95	95	100	100	100	100	65	70	70	95
100	100	95	100	90	100	95	100	100	100

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.

2.4

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:

3	2	3	3	3	1	2	1	1	1
3	3	3	2	2	1	1	2	2	3
3	3	3	3	3	3	3	3	3	3

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}.

13.35 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):

32.70	7.10	48.50	21.00	5.10	0.08	2.30	7.50	14.80	31.20
1.70	0.01	0.01	8.50	14.10	12.60	25.50	28.20	0.08	8.70
99.00	99.00	99.00	42.00	39.10	8.70	3.20	24.30	99.00	3.30

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%.

70 %

Left Bank: 30 ft Right Bank: 40 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: 8	8.0
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.	13.2

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				
21	4	36	4	4	4	4	9	28	18

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: Right Side:	Not Used
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.	2.70

Group 1 = 1.0				Group 2 (-1.0)			
☑	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☑	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☑	*Quercus rubra*	☐	*Elaeagnus umbellata*	☐	*Rosa multiflora*
☑	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☑	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☐	*Liriodendron tulipifera*	☐	*Ulmus americana*				
☐	*Magnolia acuminata*						
4	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 $V_{DETRITUS}$ 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.

88.44 %

Left Side				Right Side			
70	90	65	100	70	90	95	90
100	90	95	80	100	80	100	100

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.

Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

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

0.51

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Open space (pasture, lawns, parks, etc.), grass cover 50% - 75%	0.2	15	15
Forest and native range (<50% ground cover)	0.5	60	75
Forest and native range (50% to 75% ground cover)	0.7	25	100

Summary

Variable	Value	VSI
$V_{CCANOPY}$	94 %	1.00
V_{EMBED}	2.4	0.60
$V_{SUBSTRATE}$	13.35 in	0.53
V_{BERO}	70 %	0.70
V_{LWD}	8.0	1.00
V_{TDBH}	13.2	1.00
V_{SNAG}	0.0	0.10
V_{SSD}	Not Used	Not Used
V_{SRICH}	2.70	1.00
$V_{DETRITUS}$	88.4 %	1.00
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.51	0.54

Notes:

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME S-IJ32	LOCATION Braxton County, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Ephemeral	
LAT 38.809457 LONG -80.537428	RIVER BASIN Burnsville Lake-Little Kanawha River	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS J. McGuirk, C. Stoliker		
FORM COMPLETED BY J. McGuirk	DATE 09/08/2016 TIME	REASON FOR SURVEY Proposed Pipeline

	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 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 0	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 0	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 0	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 11	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 0	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 9	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)	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 0	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 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	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 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	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 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 56

No / low flow at time of survey. Unable to sample water quality or WVSCI.

S-B62

Stream Photograph Page

Stream ID S-B62 Date: 05/06/2015

Photograph Direction SW

Comments:

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2015

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	Mountain Valley Pipeline Project SWVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	38.642046	Lon.	-80.484571	WEATHER:	Sunny, 55°	DATE:	November 10, 2016
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	S-B62; UNT to Right Fork Holly River; 1013.24 ac watershed Form of Mitigation; Mitigation Bank	MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)							Comments:	
STREAM IMPACT LENGTH:	29	FORM OF MITIGATION:	RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0.40"	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:	Intermittent			Stream Classification:	Intermittent			Stream Classification:	Intermittent			Stream Classification:	Intermittent		
Percent Stream Channel Slope	2			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		Hydrology	1	0		Hydrology	1	0		Hydrology	1	0		Hydrology	1	0	
Biogeochemical Cycling				Biogeochemical Cycling	1			Biogeochemical Cycling	1			Biogeochemical Cycling	1			Biogeochemical Cycling	1		
Habitat				Habitat	1			Habitat	1			Habitat	1			Habitat	1		
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 (High 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	17	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		17	2. Embeddedness	0-20		0	2. Embeddedness	0-20		0	2. Embeddedness	0-20		0	2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		13	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		11	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		0	4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		14	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		19	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		0	6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		16	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		18	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		0	8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		18	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		0	9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		14	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Suboptimal		157	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0
Sub-Total			0.785	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	0-1	0.038		0-90	0-1	0		0-90	0-1	0		0-90	0-1	0		0-90	0-1	
pH				pH				pH				pH				pH			
6.0-8.0 = 80 points	0-80		7.12		5-90		0		5-90		0		5-90		0		5-90		
DO				DO				DO				DO				DO			
>5.0 = 30 points	10-30		15		10-30		0		10-30		0		10-30		0		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)			
Good	0-100	0-1	72.8		0-100	0-1	0		0-100	0-1	0		0-100	0-1	0		0-100	0-1	
Sub-Total			0.728	Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.838	29	24.2923333

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

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	0
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.837666667	29	24.29233333	$19,433.87

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	24.29233333	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

**Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project*
**Note2: Place an "X" in the appropriate category (only select one).*

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No)
Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive*: **No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-B62	24.29233333	#DIV/0!

Extended Upland Buffer Zone

**Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)*
**Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)*
**Note[3]: Select the appropriate mitigation type*

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)

Final Mitigation Unit Yield
#DIV/0!

STREAM ID S-B62	**STREAM NAME** Narrows Run
LAT 38.642046 **LONG** -80.484571	**DATE** 05/06/2015
CLIENT MVP	**PROJECT NAME** Mountain Valley Pipeline
INVESTIGATORS E. Foster, K. Lamontagne, C. Ansari	
FLOW REGIME Perennial ✔ Intermittent ___ Ephemeral ___	**WATER TYPE** TNW ___ RPW ✔ NRPW ___

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 30.0 ft
Top of Bank Height:
LB 5.0 ft RB 15.0 ft
Water Depth: 3.00 in
Water Width: 15.0 ft
High Water Mark: 7.0 in
Flow Direction: Northeast

Stream Erosion
✔ None ___ Moderate ___ Heavy

Artificial, Modified or Channelized
___ Yes ✔ No

Dam Present ___ Yes ✔ No

Sinuosity ✔ Low ___ Medium ___ High

Gradient
___ Flat (0.5/100 ft) ___ Moderate (2 ft/100 ft) ✔ Severe (10 ft/100 ft)

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
___ Standing water
✔ Flowing water

Velocity
___ Fast ✔ Moderate
___ Slow

Proportion of Reach Represented by Stream Morphology Types
Riffle 40 % Run 40 %
Pool 20 %

Turbidity
✔ Clear ___ Slightly turbid ___ Turbid
___ Opaque ___ Stained
___ Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		70
Boulder	> 256 mm (10")	10
Cobble	64-256 mm (2.5"-10")	10
Gravel	2-64 mm (0.1"-2.5")	10
Sand	0.06-2mm (gritty)	
Silt	0.004-0.06 mm	
Clay	< 0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	10
Muck-Mud	black, very fine organic (FPOM)	
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✔ Forest ___ Commercial
___ Field/Pasture ___ Industrial
___ Agricultural ___ Residential
___ Other:

Canopy Cover
✔ Partly open ___ Partly shaded
___ Shaded ___ Open

Indicate the dominant type (Check one)
✔ Trees ___ Shrubs
___ Grasses ___ Herbaceous

Floodplain Width
✔ Wide > 30ft ___ Moderate 15-30ft
___ Narrow <16ft

Wetland Present ___ Yes ✔ No
Wetland ID

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
___ Rooted emergent ___ Rooted submergent ___ Rooted floating ___ Free floating
___ Floating algae ___ Attached algae

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME W-B62	LOCATION Webster County, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Perennial	
LAT 38.643910 LONG -80.485213	RIVER BASIN Outlet Right Fork Holly River	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS C. Vileno, C. Stoliker		
FORM COMPLETED BY C. Vileno	DATE 11/10/2016 TIME 12:15pm	REASON FOR SURVEY SWVM

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
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 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 17	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 17	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 11	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 14	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)	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 16	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 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	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 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	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 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 157

Insects	Count	Tolerance	TV
Ephemeroptera			11
Ameletidae		2	0
Baetidae		4	0
Beatiscidae		4	0
Caenidae		5	0
Ephemerellidae		3	0
Ephemeridae	3	5	15
Heptageniidae	6	3	18
Isonychiidae		3	0
Leptophlebiidae	2	4	8
Potamanthidae		5	0
Siphlonuridae		3	0
Tricorythidae		5	0
Plecoptera			1
Capniidae		2	0
Chloroperlidae		2	0
Leuctridae		2	0
Nemouridae		2	0
Peltoperlidae		1	0
Perlidae		1	0
Perlodidae		1	0
Pteronarcyidae	1	1	1
Taeniopterygidae		2	0
Trichoptera			2
Brachycentridae		2	0
Glossosomatidae		2	0
Helicopsychidae		3	0
Hydropsychidae		5	0
Hydroptilidae	2	3	6
Lepidostomatidae		3	0
Leptoceridae		3	0
Limnephilidae		4	0
Molannidae		3	0
Philopotamidae		4	0
Phryganeidae		4	0
Polycentropodidae		5	0
Psychomiidae		3	0
Rhyacophilidae		3	0
Uenoidae		2	0
Total Tolerance Value			58

West Virginia Save Our Streams
601 57th Street, SE, Charleston WV 25304
http://www.dep.wv.gov/sos

Insects	Count	Tolerance	TV
Odonata			1
Aeshnidae		3	0
Calopterygidae		6	0
Coenagrionidae		7	0
Cordulegastridae		3	0
Gomphidae	1	5	5
Lestidae		7	0
Libellulidae		7	0
Coleoptera			0
Chrysomelidae		7	0
Dryopidae		5	0
Dytiscidae		6	0
Elmidae		4	0
Gyrinidae		5	0
Haliplidae		7	0
Hydrophilidae		7	0
Psephenidae		3	0
Ptilodactylidae		5	0
Hemiptera			0
Belostomatidae		8	0
Corixidae		8	0
Gerridae		10	0
Hydrometridae		8	0
Nepidae		8	0
Notonectidae		8	0
Megaloptera			0
Corydalidae		3	0
Sialidae		6	0
Diptera			1
Athericidae		3	0
Blephariceridae		2	0
Ceratopogonidae		8	0
Chironomidae		9	0
Culicidae		10	0
Dixidae		6	0
Empididae		7	0
Psychodidae		8	0
Ptychopteridae		8	0
Simuliidae		6	0
Stratiomyidae		10	0
Syrphidae		10	0
Tabanidae		7	0
Tipulidae	1	5	5

Non-Insects	Count	Tolerance	TV
Crustacea			0
Asellidae		7	0
Cambaridae		5	0
Gammaridae		5	0
Palaemonidae		5	0
Annelida			0
Hirudinea		10	0
Nematoda		10	0
Nematomorpha		10	0
Oligochaeta		10	0
Turbellaria			0
Turbellaria		7	0
Bivalvia			0
Corbiculidae		6	0
Sphaeriidae		5	0
Unionidae		4	0
Gastropoda			0
Ancylidae		7	0
Hydrobiidae		4	0
Physidae		7	0
Planorbidae		5	0
Pleuroceridae		5	0
Viviparidae		5	0
Miscellaneous			0
Collembola		6	0
Lepidoptera		5	0
Neuroptera		5	0
Hydrachnidae		6	0
Totals	**Total number**		**16**
	Total families		**7**

Metric calculations			
Richness			**Additional metrics**	
Total Taxa	7	31.8	Ephemeroptera Taxa	3
EPT Taxa	5	38.5	Plecoptera Taxa	1
Tolerance			Trichoptera Taxa	1
Biotic Index	3.63	91.1	Long-lived Taxa	4
% Tolerant	0.0	100.0	Odonata Taxa	1
Composition			Diptera Taxa	1
% EPT Abundance	87.5	97.2	COET Taxa	5
% Dominance	37.5	78.1	% Sensitive	56.3
% Net-spinners	0.0	NA	% Chironomidae	0.0
Stream Condition Index		**72.8**	% Clingers	56.3
Integrity Rating	**Suboptimal**		More diversity measures	

Note: There may be instances when families are collected that are not listed above. In those cases choose a similar family/tolerance value if known, to calculate the metrics. You should contact the WV Save Our Streams Coordinator to confirm your choice. Provide as much detail as possible so that family-level identification can be determined.

No FCI form included. Not a high-gradient ephemeral or intermittent headwater stream.

S-H107

Stream Photograph Page

Stream ID S-H107

Photograph Direction West

Date: 05/02/2015

Comments: 2015 stream identification.

Photograph Direction North

Date: 10/08/2019

Comments: 2019 stream identification confirmation.

STREAM ID S-H107	**STREAM NAME** UNT to Camp Creek
LAT 38.548459 **LONG** -80.540022	**DATE** 05/02/2015
CLIENT MVP	**PROJECT NAME** MVP
INVESTIGATORS A. Grech, S. Kelly, M. Whitten	
FLOW REGIME Perennial ___ Intermittent ✓ Ephemeral ___	**WATER TYPE** TNW ___ RPW ✓ NRPW ___

CHANNEL FEATURES

Estimate Measurements
Top of Bank Width: 1.5 ft
Top of Bank Height:
LB 6.0 in RB 6.0 in
Water Depth: 0.50 in
Water Width: 1.0 ft
High Water Mark: 3.0 in
Flow Direction: Northwest

Stream Erosion
✓ None ___ Moderate ___ Heavy

Artificial, Modified or Channelized
___ Yes ✓ No

Dam Present ___ Yes ✓ No

Sinuosity ✓ Low ___ Medium ___ High

Gradient
___ Flat (0.5/100 ft) ___ Moderate (2 ft/100 ft) ✓ Severe (10 ft/100 ft)

FLOW CHARACTERISTICS

Water Present
___ No water, stream bed dry
___ Stream bed moist
___ Standing water
✓ Flowing water

Velocity
___ Fast ___ Moderate
✓ Slow

Proportion of Reach Represented by Stream Morphology Types
Riffle 90 % Run % Pool 10 %

Turbidity
___ Clear ✓ Slightly turbid ___ Turbid
___ Opaque ___ Stained
___ Other_____

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)

Substrate Type	Diameter	% Composition in Sampling Reach
Bedrock		
Boulder	> 256 mm (10")	
Cobble	64-256 mm (2.5"-10")	5
Gravel	2-64 mm (0.1"-2.5")	10
Sand	0.06-2mm (gritty)	35
Silt	0.004-0.06 mm	30
Clay	< 0.004 mm (slick)	20

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition in Sampling Area
Detritus	sticks, wood, coarse plant materials (CPOM)	20
Muck-Mud	black, very fine organic (FPOM)	10
Marl	grey, shell fragments	

WATERSHED FEATURES

Predominant Surrounding Landuse
✓ Forest ___ Commercial
___ Field/Pasture ___ Industrial
___ Agricultural ✓ Residential
___ Other:

Canopy Cover
___ Partly open ✓ Partly shaded
___ Shaded ___ Open

Indicate the dominant type (Check one)
___ Trees ✓ Shrubs
___ Grasses ___ Herbaceous

Floodplain Width
___ Wide > 30ft ___ Moderate 15-30ft
✓ Narrow <16ft

Wetland Present ___ Yes ✓ No
Wetland ID

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present
___ Rooted emergent ___ Rooted submergent ___ Rooted floating ___ Free floating
___ Floating algae ___ Attached algae

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES

Information listed on this form represents the data collected in 2015. The stream was revisited on 10/08/2019. The presence of a stream channel and OHWM was confirmed.

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	**Mountain Valley Pipeline Project SWVM v2.1**	**IMPACT COORDINATES: (in Decimal Degrees)**	**Lat.**	**38.548463**	**Lon.**	**-80.540050**	**WEATHER:**	**Rain, 50°**	**DATE:**	**November 9, 2016**
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)	**S-H107; UNT to Camp Creek; 1.97ac watershed** **Form of Mitigation: Mitigation Bank**	**MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION:** (watershed size {acreage}, unaltered or impairments)							**Comments:**	**No/low water flow at time of survey. Unable to sample water quality or WVSCI**
STREAM IMPACT LENGTH:	**30**	**FORM OF MITIGATION:**	**RESTORATION (Levels I-III)**	**MIT COORDINATES: (in Decimal Degrees)**	**Lat.**		**Lon.**		**PRECIPITATION PAST 48 HRS:**	**0.40"**	**Mitigation Length:**	

Column No. 1- Impact Existing Condition (Debit)			
Stream Classification:	**Intermittent**		
Percent Stream Channel Slope	**8**		
HGM Score (attach data forms):			
			Average
Hydrology	**0.24**		
Biogeochemical Cycling	**0.26**		**0.196666667**
Habitat	**0.09**		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	**8**
2. Embeddedness	0-20		**2**
3. Velocity/ Depth Regime	0-20		**7**
4. Sediment Deposition	0-20		**6**
5. Channel Flow Status	0-20		**7**
6. Channel Alteration	0-20		**8**
7. Frequency of Riffles (or bends)	0-20		**6**
8. Bank Stability (LB & RB)	0-20		**10**
9. Vegetative Protection (LB & RB)	0-20		**9**
10. Riparian Vegetative Zone Width (LB & RB)	0-20		**9**
Total RBP Score	Marginal		**72**
Sub-Total			**0.36**
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
100-199 - 85 points	0-90	0-1	
pH			
5.6-5.9 = 45 points	0-80	0-1	
DO			
	10-30	0-1	
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			**0**

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
Stream Classification:	**Intermittent**		
Percent Stream Channel Slope			
HGM Score (attach data forms):			
			Average
Hydrology			
Biogeochemical Cycling			**0**
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		**0**
Sub-Total			**0**
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90	0-1	
DO			
	10-30	0-1	
Sub-Total			**0**
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			**0**

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
Stream Classification:	**Intermittent**		
Percent Stream Channel Slope	**0**		
HGM Score (attach data forms):			
			Average
Hydrology			
Biogeochemical Cycling			**0**
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		**0**
Sub-Total			**0**
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90	0-1	
DO			
	10-30	0-1	
Sub-Total			**0**
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			**0**

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
Stream Classification:	**Intermittent**		
Percent Stream Channel Slope	**0**		
HGM Score (attach data forms):			
			Average
Hydrology			
Biogeochemical Cycling			**0**
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		**0**
Sub-Total			**0**
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90	0-1	
DO			
	10-30	0-1	
Sub-Total			**0**
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			**0**

Column No. 5- Mitigation Projected at Maturity (Credit)			
Stream Classification:	**Intermittent**		
Percent Stream Channel Slope	**0**		
HGM Score (attach data forms):			
			Average
Hydrology			
Biogeochemical Cycling			**0**
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		**0**
Sub-Total			**0**
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90	0-1	
DO			
	10-30	0-1	
Sub-Total			**0**
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			**0**

PART II - Index and Unit Score		
Index	**Linear Feet**	**Unit Score**
0.388	**30**	**11.65**

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**

PART III - Impact Factors
(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction

**Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).*

Years	
Sub-Total	0

Temporal Loss-Maturity

**Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).*

% Add. Mitigation	Temporal Loss-Maturity (Years)
0%	0
Sub-Total	0

Long-term Protection

% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.388333333	30	11.65	$9,320.00

PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	11.65	Mitigation Existing Condition - Baseline (Credit)		Mitigation Projected at Five Years Post Completion (Credit)		Mitigation Projected at Ten Years Post Completion (Credit)		Mitigation Projected At Maturity (Credit)	
FINAL PROJECTED NET BALANCE					0		0		0

Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration

***Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project**
***Note2: Place an "X" in the appropriate category (only select one).**

☐ Restoration Level 1	
☐ Restoration Level 2	
☐ Restoration Level 3	

Compensatory Mitigation Plan incorporates HUC 12-based watershed approach? (Yes or No) *Note: HUC 12-based watershed approach required to obtain Stream Restoration incentive	No

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
S-H107	11.65	#DIV/0!

Extended Upland Buffer Zone

***Note[1]: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)**
***Note[2]: Enter the buffer width for each channel side (Left Bank and Right Bank)**
***Note[3]: Select the appropriate mitigation type**

Buffer Width	Left Bank	
	0-50	None
	51-150	None
Buffer Width	**Right Bank**	
	0-50	None
	51-150	None
Average Buffer Width/Side	0	

Straight Preservation Ratio (v2.1, Sept 2015)	
Final Mitigation Unit Yield	
#DIV/0!	

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

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 Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: MVP
Location: S-H107
Sampling Date: 11/9/2016

Project Site Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Shrub/Herb Strata

SAR number:

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.24
Biogeochemical Cycling	0.26
Habitat	0.09

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.	1.93	0.44
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.10	0.05
V_{BERO}	Total percent of eroded stream channel bank.	40.00	0.86
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.	0.00	0.10
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	15.00	0.23
V_{SRICH}	Riparian vegetation species richness.	3.00	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	20.00	0.24
V_{HERB}	Average percent cover of herbaceous vegetation.	12.22	0.16
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.44	0.46

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	C. Vileno, C. Stoliker	Latitude/UTM Northing:	38.548463
Project Name:	MVP	Longitude/UTM Easting:	-80.540050
Location:	S-H107	Sampling Date:	11/9/2016

SAR Number: | Reach Length (ft): 100 | 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:

10	20	20	20	10	10	20	10	20	20

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.

1.9

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:

2	3	2	2	3	3	2	2	2	2
2	2	1	1	1	1	1	1	2	3
3	3	2	2	2	2	2	2	1	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}.

0.10 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):

1.00	0.08	0.20	0.10	0.10	0.08	0.08	0.25	0.08	0.20
0.20	0.20	0.20	0.20	0.10	0.10	0.08	0.08	0.25	0.25
0.25	0.25	0.10	0.10	0.08	0.08	0.08	0.05	0.05	0.25

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%.

40 %

Left Bank: 20 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. **0.0**

Number of downed woody stems: 0

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**

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				
					4	4	3	3	0

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. **0.0**

Left Side: 0 Right Side: 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. **15.0**

Left Side: 0 Right Side: 15

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. **3.00**

Group 1 = 1.0				Group 2 (-1.0)			
☑	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☑	*Quercus rubra*	☐	*Elaeagnus umbellata*	☐	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☑	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☐	*Liriodendron tulipifera*	☐	*Ulmus americana*				
☐	*Magnolia acuminata*						
3	Species in Group 1			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.

20.00 %

Left Side				Right Side			
				20	30	20	10

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.

12 %

Left Side				Right Side			
0				10	15	15	0
				0	0	30	40

Sample Variable 12 within the entire catchment of the stream.

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

0.44

Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	80	80
Forest and native range (>75% ground cover)	1	20	100

Summary

Variable	Value	VSI
$V_{CCANOPY}$	Not Used, <20%	Not Used
V_{EMBED}	1.9	0.44
$V_{SUBSTRATE}$	0.10 in	0.05
V_{BERO}	40 %	0.86
V_{LWD}	0.0	0.00
V_{TDBH}	Not Used	Not Used
V_{SNAG}	0.0	0.10
V_{SSD}	15.0	0.23
V_{SRICH}	3.00	1.00
$V_{DETRITUS}$	20.0 %	0.24
V_{HERB}	12 %	0.16
V_{WLUSE}	0.44	0.46

Notes:

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME S-H107	LOCATION Webster Co., WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Intermittent	
LAT 38.548463 LONG -80.540050	RIVER BASIN Elk River	
STORET #	AGENCY Tetra Tech	
INVESTIGATORS C. Vileno, C. Stoliker		
FORM COMPLETED BY C. Stoliker	DATE 11/09/2016 TIME 5:30pm	REASON FOR SURVEY

	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 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 2	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 7	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 6	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 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 8	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)	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 6	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 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	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 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	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 1 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 72

No / low flow at time of survey. Unable to sample water quality or WVSCI.