S-I23A



Photograph Direction NW

Comments:

STREAM ID S-123A	STREAM NAME UNT to Boggs Creek						
LAT 37.917457 LONG -80.738603	DATE 04/17/2015						
CLIENT MVP	CLIENT MVP						
INVESTIGATORS R Sparhawk, A Hatfield, M E	INVESTIGATORS R Sparhawk, A Hatfield, M Brice						
FLOW REGIME Perennial Intermittent Ephemeral	WATER TYPE TNW RPW ✓ NRPW						

Perenniai =	_	nt <u> — Epnem</u>	erai INVV —	RPW —	NRPW —		
_							
			/leasurements k Width: 4.0 ft		Stream Erosion	Носули	
		·	K Widui.		NoneModerate	<u> —</u> пеаvy	
		Top of Ban	-		Artificial, Modified or Char	nnelized	
		LB <u>3.0</u>	in RB <u>3.0</u>	<u>in</u>	<u>✓</u> Yes No		
CHANNEL FE	ATURES	Water Dep	th: 2.00 in		Dam PresentYes _	∠ No	
		Water Widt	h: 2.0 ft		Dam Flesent 165 _	<u>/ No</u>	
		High Water	Mark: <u>4.0 ft</u>		Sinuosity Low Medium		
		Flow Direct	tion: NW		Gradient		
					Flat Moderate _	Severe	
					, ,	(10 ft/100 ft)	
		Water Pres	sent r, stream bed dry		Proportion of Reach Repre Morphology Types	esented by Stream	
			ned moist		Riffle 25 % Run 65	%	
EL OW		Standing	g water		Pool 10 %		
FLOW CHARACTER	ISTICS	<u>✓</u> Flowing	water		T		
		Velocity			Turbidity Clear ∠ Slightly	turbidTurbid	
		<u>✓</u> Fast	Moderate		OpaqueStained		
		Slow			Other		
INOR		-	MPONENTS	0	RGANIC SUBSTRATE CON	MPONENTS	
	(should a	add up to 10	·	(c	loes not necessarily add u	p to 100%)	
Substrate Type	Diame	ter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area	
Bedrock				Detritus	sticks, wood, coarse		
Boulder	> 256	mm (10")		Detritus	plant materials (CPOM)	5	
Cobble	64-256 m	m (2.5"-10")	30	Muck-Mud	black, very fine organic		
Gravel	2-64 mm	(0.1"-2.5")	45	Widok Wida	(FPOM)		
Sand	0.06-2n	nm (gritty)	10				
Silt	0.004-0	0.06 mm	10	Marl	grey, shell fragments		
Clay	< 0.004 ı	mm (slick)	5				
		Predomina ✓ Forest	ant Surrounding Lan Commer	iduse	Indicate the dominant type ✓ Trees Shrub		
		Field/P				iceous	
		Agricult		tial			
WATERSHED FEATURES		Other:	<u>—</u>		Floodplain Width Wide > 30ft Moderate 15-30ft		
		Canopy Co			✓ Narrow <16ft		
		Partly of		aded	_		
		Shaded			Wetland PresentYes Wetland ID	<u>✓</u> No	
		Indicate th	e dominant type and		Iominant species present		
AQUATIC VE	GETATION			Rooted subme		ting Free floating	
		Floatin	g algae	Attached algae	e		
		Intermittent	stream on two-track	road			
MACROINVER OR OTHER	RTEBRATES						
WILDLIFE	TUES						
OBSERVED/C							
NOTES							
ĺ							

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

USACE FILE NO./ Project Name: (v2.1, Sept 2015)			'alley Pipeline Project SWVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37.917347	Lon.	-80.738534	WEATHER:	Cloudy, 80°	DATE:	September 21, 2016
IMPACT STREAM/SITE ID (watershed size (acreage)				l ggs Creek; 10.61ac n: Mitigation Bank		MITIGATION STREAM CLASS./ (watershed size {acreage					Comments:	No/low water flow at time of survey. Unable to sample water quality or WVSCI
STREAM IMPACT LENGTH:	33	FORM OF MITIGATION:	RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0.30"	Mitigation Length:	
Column No. 1- Impact Existin	g Condition (Deb	pit)	Column No. 2- Mitigation Existing Co	ondition - Baseline (Credit)		Column No. 3- Mitigation Pr Post Completio		ive Years	Column No. 4- Mitigation Proje Post Completion (C		Column No. 5- Mitigation Projec	ted at Maturity (Credit)
Stream Classification:	Intern	nittent	Stream Classification:	Intermittent		Stream Classification:		Intermittent	Stream Classification:	Intermittent	Stream Classification:	Intermittent
Percent Stream Channel Si	lope	15	Percent Stream Channel Slo	ре		Percent Stream Channel Si	ope	0	Percent Stream Channel Slo	pe 0	Percent Stream Channel S	lope 0
HGM Score (attach d	lata forms):		HGM Score (attach o	lata forms):		HGM Score (attach	data forms	5):	HGM Score (attach da	ta forms):	HGM Score (attach o	lata forms):
Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and	0.52 0.58 0.37	Average 0.49	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and	0		Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical a		0	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and E	0	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and	0
PART 1 - Physical, Chemical and	_	Site Score	PART 1 - Physical, Greinical and			PART 1 - Physical, Chemical at	_		PART 1 - Physical, Chemical and B		FARTT- Physical, Chemical and	
PHYSICAL INDICATOR (Applies to all stream	ns classifications)		PHYSICAL INDICATOR (Applies to all streams	classifications)		PHYSICAL INDICATOR (Applies to all stream	s classification	is)	PHYSICAL INDICATOR (Applies to all streams	classifications)	PHYSICAL INDICATOR (Applies to all stream	s classifications)
USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermitte WYDEP Water Quality Indicators (Genera Specific Conductivity 100-199 - 85 points PH 5.6-5.9 = 45 points DO Sub-Total BIOLOGICAL INDICATOR (Applies to Interm	0-90		USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Rifles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermittent WVDEP Water Quality Indicators (General) Specific Conductivity PH DO Sub-Total BIOLOGICAL INDICATOR (Applies to Intermittent	0-90 5-90 0-1		USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Internitte WVDEP Water Quality Indicators (General Specific Conductivity PH DO Sub-Total BIOLOGICAL INDICATOR (Applies to Internite BIOLOGICAL INDICATOR (Applies to Internite BIOLOGICAL INDICATOR (Applies to Internite BIOLOGICAL INDICATOR (Applies to Internite	5-90	0 ial Streams) 0-1 5.6	USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermittent WVDEP Water Quality Indicators (General) Specific Conductivity DO Sub-Total BIOLOGICAL INDICATOR (Applies to Intermit	0-90 5-90 0-1	USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Internitte WVDEP Water Quality Indicators (Genera Specific Conductivity PH DO Sub-Total BIOLOGICAL INDICATOR (Applies to Internite	5-90 0-1
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 Sub-Total	0-100 0-1	0	Sub-Total	0-100 0-1 0		Sub-Total	0-100	0-1	Sub-Total	0-100 0-1	Sub-Total	0-100 0-1 0
PART II - Index and I	Unit Score		PART II - Index and	Unit Score		PART II - Index and	d Unit Score		PART II - Index and Ur	it Score	PART II - Index and	Unit Score
Index	Linear Feet	Unit Score	Index	Linear Feet Unit Score		Index	Linear F	Feet Unit Score	Index	Linear Feet Unit Score	Index	Linear Feet Unit Score
0.538	33	17.7375	0	0 0		0	0	0	0	0 0	0	0 0

		(See instruction p		- Impact Factors It values for MITIGATIO	N BANKING and II	LF)			
*Note: Reflects duration of aquatic functional loss		t (debit) and completion of compensatory			% Add. Mitigati	Longon and Monitoring Period	term Protection Long	-Term Protection (Years)	
Years	mitigation (credit).	0							
Sub-Total Ter	nporal Loss-Maturity	0				10 Year Monitoring		101	
*Note: Period between completion of compensator function (i.e. maturity of tree stratum to provide					Sub-Total	PART IV - Index	to Unit Score Con	0 oversion	
					Final Index Score		Unit Score	ILF Costs	
% Add. Mitigation		Temporal Loss-Maturity (Years)			(Debit)		(Debit)	(Offsetting Debit	
					0.5375	33	17.7375	\$14,190.00	
0% Sub-Total		0							
			•						
		PART V	/- Comparison of U	nit Scores and Projecte	d Balance				
Final Unit Score (Debit)	17.7375	Mitigation Existing Condition - Baseline		Mitigation Projected at Five Years		Mitigation Projected at Ten Years		Mitigation Projected At Maturity	
[No Net Loss Value]	17.7373	(Credit)		Post Completion (Credit)		Post Completion (Credit)		(Credit)	
FINAL PROJECTED NET BALANCE					•				•
					0		0		0
		F	Part VI - Mitigation (Considerations (Incentiv	/es)				
	Extent of Stream Remail handout to determine the collace an "X" in the appropriate of	orrect Restoration Levels (below) for your pr	oject		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)				s (below)
☐ Restoration Level 1							e appropriate mitigation		
☐ Restoration Level 2					Buffer Width		Left Bank	(
☐ Restoration Level 3						0-50		None	
					Buffer Width	51-150	Right Ban	None k	
Compagatory Mitigation Plan income	rates IIIIC 42 based water	rahad annua ah 2 (Vaa ay Na)		1		0-50 51-150		None None	
Compensatory Mitigation Plan incorporation *Note: HUC 12-based watershed			No		Average Buffer	0 0		None	
				1	Width/Side				
Site Impact Unit Yield (Debit)			Mitigation Unit Yield (Credit)				Stra	ight Preservation Ratio (v2.1, Sept 2015)	
S-I23A		17.7375	#DIV/0!			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 <u>UPPERMOST STRATUM</u> 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-I23A

Sampling Date: 09/21/2016 Project Site Before Project

Subclass for this SAR:

Intermittent Stream

Uppermost stratum present at this SAR: SAR number:

Tree/Sapling Strata

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.52
Biogeochemical Cycling	0.58
Habitat	0.37

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
V _{CCANOPY}	Percent canpoy over channel.	42.50	0.40
V _{EMBED}	Average embeddedness of channel.	2.30	0.57
V _{SUBSTRATE}	Median stream channel substrate particle size.	0.75	0.38
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.	7.70	0.81
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.	0.80	0.38
V _{DETRITUS}	Average percent cover of leaves, sticks, etc.	10.42	0.13
V_{HERB}			Not Used
V _{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.81	0.85

	High-G	Gradient	Headwat				entucky a alculator		tern Wes	t Virginia	a
	Team:	C. Vileno, J	I. Bittner						M Northing:	37.917347	
Pro	oject Name:								TM Easting:		
	Location:							-	npling Date:		
SA	R Number:		Reach	Length (ft):	100	Stream Ty	/pe: Interr	mittent Stream	m		-
	Top Strata:	Tre	e/Sapling St	rata	(determined	d from perce	ent calculate	d in V _{CCANO}	_{PY})		
Site	and Timing:	Project Site				•	Before Projec	ct			•
Sample	Variables •	1-4 in strea	m channel								
1											42.5 %
ı						_	_	_	_	_	ı
	20	30	20	30	0	0	0	0	0	0	
2	60	70	80	60	80	80	80	80	80	80	
2	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								2.3		
	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										
			_	osed of bed				inic ocairii	onio, aso a i	alling soore	
						_		d from Platt	s, Megahan	, and	
		Minshall 19	-	3 ,			(, .	,	
		Rating	Rating Des	scription							
		5	<5 percent	of surface c	overed, surr	rounded, or	buried by fin	e sediment	(or bedrock)	
		4					d, or buried b				
		3					ed, or buried				
		2					ed, or buried			l ourfoos)	
	List the ratio	ngs at each			covered, su	rrounaea, o	i buried by i	ine seaimer	nt (or artificia	ii suriace)	
	3	2	2	2	2	2	3	3	2	2	
	2	2	3	2	2	3	2	3	2	2	
	2	2	2	3	3	3	2	2	2	2	
				<u> </u>	3	3					
3							it no fewer the ed in V _{EMBED}		hly equidista	ant points	0.75 in
									unted as 99	in, asphalt	
				particles as		, po 20.01	(200.00.00.00.00.00.00.00.00.00.00.00.00.			, αορ.ια.ι	
	6.00	3.00	2.00	2.00	0.50	0.50	1.00	1.00	1.00	1.00	
	1.00	2.00	0.75	0.75	0.75	0.75	0.75	0.75	1.00	1.00	
	0.75	0.50	1.00	0.50	0.50	1.00	0.50	0.50	0.50	0.50	
4	V_{BERO}								oded bank o		
		and the tota up to 200%		e will be cal	culated If be	oth banks a	re eroded, t	otal erosion	for the strea	am may be	40 %
			Left Bank:	10) ft		Right Bank:	30	O ft		

Sample	ple Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).										
5	V_{LWD}	stream read	ch. Enter th		om the entir ılated.	e 50'-wide l	ter and 36 in buffer and wi	ithin the cha			0.0
							oody stems:		0		
6	V_{TDBH}				ly if V _{CCANOP} tree DBHs i		ng cover is a	t least 20%)	. Trees are	at least 4	7.7
		List the dbh	n measurem	ents of indiv	idual trees ((at least 4 in	n) within the	buffer on ea	ch side of		
	_	the stream									•
		1	Left Side				1	Right Side			
	5 5	10	8	10	6	8	10				
	5	7	8								
7	V	Ni walan af		t 411 allala -	- d OC!! tall)	a = 400 fa =	t of other one			b	
7	V_{SNAG}				t per 100 fee		t of stream. Iculated.	Enter numb	er of snags	on eacn	0.0
			Left Side:		0		Right Side:		0		
8	V_{SSD}						nes dbh) per				
			cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount 100 ft of stream will be calculated.						Not Used		
		pci 100 it 0	Left Side:	i be calculat	iou.		Right Side:				
9	V_{SRICH}						m reach. Ch				
							ve species p from these d		strata. Spe	ecies	0.80
			p 1 = 1.0	ind the subh	Idex will be	Calculated	irom tricse di		2 (-1.0)		
Ш	Acer rubru			Magnolia ti	ripetala	☐ Ailanthus altissima ☐ Lonicera ja					ponica
	Acer sacci	harum		Nyssa sylv			Albizia julib			Lonicera ta	
	Aesculus t	flava		Oxydendrun	n arboreum		Alliaria peti	iolata		Lotus corni	culatus
Ш	Asimina tr	iloba		Prunus ser	otina		Alternanthe	era	Ш	Lythrum sa	licaria
	Betula alle	ghaniensis	7	Quercus al	lba		philoxeroid		7	Microstegiun	n vimineum
	Betula len	ta		Quercus co	occinea	\Box	Aster tatari	icus		Paulownia	tomentosa
Ш	Carya alba	э		Quercus in	nbricaria		Cerastium	fontanum		Polygonum o	cuspidatum
	Carya glal	bra		Quercus pi	rinus		Coronilla va	aria		Pueraria m	ontana
Ш	Carya ova	lis	4	Quercus ru	ıbra	\Box	Elaeagnus u	ımbellata	√	Rosa multi	flora
2	Carya ova	ta		Quercus ve	elutina	Ш	Lespedeza	bicolor		Sorghum h	alepense
	Cornus flo	rida		Sassafras	albidum		Lespedeza	cuneata		Verbena bi	asiliensis
Ш	Fagus gra	ndifolia		Tilia amerio	cana		Ligustrum ol	btusifolium			
	Fraxinus a			Tsuga cana	adensis		Ligustrum s				
	Liriodendroi			Ulmus ame		_	-				
	Magnolia a	-	_								
	.viagiiona (
		3	Species in	Group 1				2	Species in	Group 2	

	le Variables The four su								one within	25 feet from	n each
10	V_{DETRITUS}	Average pe	rcent cover	of leaves,	sticks, or oth	ner organic r	material. W	oody debris	<4" diamete	er and <36"	10.42 %
		long are inc		Side	nt cover of th	ne detrital la		nt Side		7	
		10	15	10	0	10	0	0	0		
		20	20			20	20				
11	V_{HERB}							tree cover is be several la			
		vegetation	percentages					rcent cover			Not Used
		each subpl		Side			Righ	nt Side		1	
				0.00			rtigi	li Giao			
Samp	le Variable 1	2 within the	entire cate	chment of	the stream.						
12	V_{WLUSE}	Weighted A	verage of R	Runoff Score	e for watersh	ned:					0.81
	Land Use (Choose From Drop List) Runoff Score Runoff Ment Runoff None										
	Forest and native range (>75% ground cover)								1	75	75
	Open space	(pasture, lawr	is, parks, etc.)	, grass cover	>75%			•	0.3	15	90
	Residential of	districts, 1/4 -	1/3 ac (38% 1	to 30% cover)			_	0.1	10	100
	-							•			
	-							•			
	-							-			
	-							-	_		
								~	\vdash		
	Sı	ımmary					No	otes:			
١	/ariable	Value	VSI								
V,	CCANOPY	43 %	0.40								
	EMBED	2.3	0.57								
V,	SUBSTRATE	0.75 in	0.38								
	BERO	40 %	0.86								
V,	_WD	0.0	0.00								
V-	грвн	7.7	0.81								
V,	SNAG	0.0	0.10								
V,	SSD	Not Used	Not Used								
V	SRICH	0.80	0.38								
	DETRITUS	10.4 %	0.13								
V	HERB	Not Used	Not Used								
V,	WLUSE	0.81	0.85								

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

STREAM NAME S-I23A	LOCATION Greenbrier, WV			
STATION # RIVERMILE	STREAM CLASS Intermittent			
Lat <u>37.917347</u> Long <u>-80.738534</u>	RIVER BASIN Sewell Creek			
STORET#	AGENCY Tetra Tech			
INVESTIGATORS C. Vileno, J. Bittner				
FORM COMPLETED BY C.Vileno	DATE .09/21/2016 TIME 12:00	REASON FOR SURVEY SWVM		

	Habitat		Condition	ı Category		
	Parameter	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 <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
	SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
n sampling reach	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.	
ted in	SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
Parameters to be evaluated in sampling reach	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).	
ıram	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
P ₂	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 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)

	Habitat		Condition Category											
	Habitat Parameter	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									
ling reach	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.									
samp	score 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0									
Parameters to be evaluated broader than sampling reach	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.									
e eva	SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0									
to b	SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0									
Parameter	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 4 (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 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0									

Total Score 74

No / low flow at time of survey. Unable to sample water quality or $\ensuremath{\mathbf{WVSCI}}$.



Photograph Direction SE

Comments:

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

(v2.1, Sept 2015)			in Valley Pipeline Project SWVM v2.1	(in Decimal Degrees)	Lat.	37.917137	Lon.	-80.742452	WEATHER:	Cloudy, 80°	DATE:	September 21, 2016
IMPACT STREAM/SITE ID (watershed size {acreage}				oggs Creek; 1.23ac		MITIGATION STREAM CLASS (watershed size {acrea					Comments:	No/low water flow at time of survey. Unable to sample water quality or WVSCI
STREAM IMPACT LENGTH:	31	FORM OF MITIGATION		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0.30"	Mitigation Length:	
Column No. 1- Impact Existin	g Condition (Dek	oit)	Column No. 2- Mitigation Existing C	ondition - Baseline (Credit)		Column No. 3- Mitigation F Post Completi		e Years	Column No. 4- Mitigation Proje Post Completion (C		Column No. 5- Mitigation Proje	cted at Maturity (Credit)
Stream Classification:	Epher	meral	Stream Classification:	Ephemeral		Stream Classification:	E	Ephemeral	Stream Classification:	Ephemeral	Stream Classification:	Ephemeral
Percent Stream Channel Si	ope	8	Percent Stream Channel Sk	рре		Percent Stream Channel	Slope	0	Percent Stream Channel Slo	pe 0	Percent Stream Channel	Slope 0
HGM Score (attach d	ata forms):		HGM Score (attach	data forms):		HGM Score (attac	h data forms):		HGM Score (attach da	ta forms):	HGM Score (attach	data forms):
		Average		Average				Average		Average		Average
Hydrology	0.47		Hydrology			Hydrology			Hydrology		Hydrology	
Biogeochemical Cycling	0.5	0.44	Biogeochemical Cycling	0		Biogeochemical Cycling		0	Biogeochemical Cycling	0	Biogeochemical Cycling	0
Habitat	0.35		Habitat			Habitat			Habitat		Habitat	
PART I - Physical, Chemical and	Biological Indic	ators	PART I - Physical, Chemical an	d Biological Indicators		PART I - Physical, Chemical	and Biological I	Indicators	PART I - Physical, Chemical and E	Biological Indicators	PART I - Physical, Chemical a	nd Biological Indicators
	Points Scale Range	Site Score		Points Scale Range Site Score			Points Scale Ran	ige Site Score		Points Scale Range Site Score		Points Scale Range Site Score
PHYSICAL INDICATOR (Applies to all stream	ns classifications)		PHYSICAL INDICATOR (Applies to all streams	classifications)		PHYSICAL INDICATOR (Applies to all stream	ms classifications	s)	PHYSICAL INDICATOR (Applies to all streams	classifications)	PHYSICAL INDICATOR (Applies to all stre	ams 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	;)
Epifaunal Substrate/Available Cover	0-20	0	Epifaunal Substrate/Available Cover	0-20		Epifaunal Substrate/Available Cover	0-20		Epifaunal Substrate/Available Cover	0-20	Epifaunal Substrate/Available Cover	0-20
2. Embeddedness	0-20	6	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
Sediment Deposition Channel Flow Status	0-20	0	Sediment Deposition Channel Flow Status	0-20	-	Sediment Deposition Channel Flow Status	0-20		Sediment Deposition Channel Flow Status	0-20	Sediment Deposition Channel Flow Status	0-20
6. Channel Alteration	0-20 0-20 0-1	12	6. Channel Alteration	0-20 0-1	1	6. Channel Alteration	0-20 0-20	.1	6. Channel Alteration	0-20 0-1	6. Channel Alteration	0-20 0-1
7. Frequency of Riffles (or bends)	0-20	0	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
8. Bank Stability (LB & RB)	0-20	10	8. Bank Stability (LB & RB)	0-20	1	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	8	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	1	10. Riparian Vegetative Zone Width (LB & RB)			10. Riparian Vegetative Zone Width (LB & RB)	0-20	10. Riparian Vegetative Zone Width (LB & RB	
Total RBP Score	Marginal	60	Total RBP Score	Poor 0	1	Total RBP Score	Poor	0	Total RBP Score	Poor 0	Total RBP Score	Poor 0
Sub-Total		0.5	Sub-Total	0	1	Sub-Total		0	Sub-Total	0	Sub-Total	0
CHEMICAL INDICATOR (Applies to Intermitte	ent and Perennial S	streams)	CHEMICAL INDICATOR (Applies to Intermitted	nt and Perennial Streams)		CHEMICAL INDICATOR (Applies to Intermi	ttent and Perennia	ıl Streams)	CHEMICAL INDICATOR (Applies to Intermitter	at and Perennial Streams)	CHEMICAL INDICATOR (Applies to Interm	ittent and Perennial Streams)
WVDEP Water Quality Indicators (Genera	ıl)		WVDEP Water Quality Indicators (General)		WVDEP Water Quality Indicators (General	ral)		WVDEP Water Quality Indicators (General)		WVDEP Water Quality Indicators (Gene	eral)
Specific Conductivity			Specific Conductivity]	Specific Conductivity			Specific Conductivity		Specific Conductivity	
100-199 - 85 points	0-90			0-90			0-90			0-90		0-90
pH		45	рН	0		pH			pH		рН	
	0-80			5-90 0-1	[5-90	.1 5.6		5-90 0-1		5-90 0-1
5.6-5.9 = 45 points												
DO	T		ВО			ВО			ро		DO	
	10-30			10-30			10-30			10-30		10-30
Sub-Total	1 1		Sub-Total	0	1	Sub-Total		0	Sub-Total	0	Sub-Total	0
BIOLOGICAL INDICATOR (Applies to Interm	ittent and Perennial	l Streams)	BIOLOGICAL INDICATOR (Applies to Intermit	tent and Perennial Streams)		BIOLOGICAL INDICATOR (Applies to Inte	rmittent and Pere	ennial Streams)	BIOLOGICAL INDICATOR (Applies to Interm	ittent and Perennial Streams)	BIOLOGICAL INDICATOR (Applies to International Control of Control	ermittent 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)	
	0-100 0-1			0-100 0-1			0-100 0-	-1		0-100 0-1		0-100 0-1
0 Sub-Total		0	Sub-Total	0		Sub-Total		0	Sub-Total	0	Sub-Total	0
		- 1		<u> </u>	ш			"				
PART II - Index and t	Jnit Score		PART II - Index and	Unit Score		PART II - Index ai	nd Unit Score		PART II - Index and Ur	it Score	PART II - Index and	d Unit Score
Index	Linear Feet	Unit Score	Index	Linear Feet Unit Score	•	Index	Linear Fee	et Unit Score	Index	Linear Feet Unit Score	Index	Linear Feet Unit Score
0.545	31	16.895	0	0 0		0	0	0	0	0 0	0	0 0

		(See instruction n		 Impact Factors It values for MITIGATIO 	N BANKING and I	II E)			
Temn	oral Loss-Construction	(See matruction po	ge to misert delau	it values for will to A i to		<u> </u>	-term Protection		
*Note: Reflects duration of aquatic function	al loss between the time of a	n impact (debit) and completion of			% Add. Mitigation	on and Monitoring Period		-Term Protection (Years)	
сотре	ensatory mitigation (credit).								
Years		0							
Sub-Total		0							
Tor	nporal Loss-Maturity				0 + 5/	10 Year Monitoring		101	
*Note: Period between completion of compensato		he time required for maturity, as it relates			Sub-Total	TO Year Monitoring		0	
to function (i.e. maturity of tree stratum to provid	e organic matter and detritus corridor).	within riparian stream or wetland buffer						_	
	comaor).					<u> </u>	to Unit Score Cor		
% Add. Mitigation		Temporal Loss-Maturity (Years)			Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit	
70 Add. Willigation		Temporal Loss-Maturity (Tears)			0.545	31	16.895	\$13,516.00	
					0.545	31	10.095	\$13,516.00	,
0%		0							
Sub-Total		0							
		PART V	- Comparison of U	nit Scores and Projecte	ed Balance				
				T	T	1			
		Mitigation Existing		Mitigation Projected at		Mitigation Projected at		Mitigation Projected	
Final Unit Score (Debit)	16.895	Condition - Baseline		Five Years		Ten Years		At Maturity	
[No Net Loss Value]		(Credit)		Post Completion (Credit)		Post Completion (Credit)		(Credit)	
				(
FINAL PROJECTED NET BALANCE					0		0		0
		Р	art VI - Mitigation (Considerations (Incenti	ves)				
		-4							
*Note1: Reference the Instruction	Extent of Stream Re	STORATION orrect Restoration Levels (below) for your pr	roiect				Upland Buffer Zone		
	lace an "X" in the appropriate		-,		*Note¹: Referen	ce Instructional handout for the def *Note ² : Enter the buffer width for			s (below)
Restoration Level 1							e appropriate mitigation		
				_					
Restoration Level 2					Buffer Width		Left Bank	(
Restoration Level 3]		0-50		None	
L				J		51-150		None	
					Buffer Width		Right Ban	k	
Compensatory Mitigation Plan incorpo	rates HLIC 12-hased wate	rehed approach? (Ves or No)		1		0-50 51-150		None None	
*Note: HUC 12-based watershed			No		Average Buffer			110110	
				-	Width/Side	0			
		Impact	Mitigation Unit]			Ctua	ight Preservation Ratio	
Site Impact Unit Yield (Debit)			Yield (Credit)				Sira	(v2.1, Sept 2015)	
Onit Hold (Book)			(272)	-				, , , , , , , , , , , , , , , , , , , ,	
S-IJ54		16.895	#DIV/0!			Final Mitigation Unit Yield			
			1	1		#DIV/0!			

STREAM ID	S-IJ54		STREAM NA	STREAM NAME UNT to Boggs Creek					
CLIENT MVI	Ρ		PROJECT N	AME MVP					
LAT 37.91713		ONG -80.74245			COUNTY Greenbrier				
INVESTIGATO	ORS E. Fo	ster, S. Ryan, A	. Carrano						
WATER TYPE	RPW	NRPW [FLOW REG Perennial	IME Intermi	ttent Ephemeral				
		Estimate Mea	surements		Sinuosity Low	Medium High			
			Vidth: <u>5.0</u> ft leight: : RB <u>2.0</u>	ft	Gradient Flat Mo	derate			
					Artificial, Modified or Chani	_			
CHANNEL FE	ATURES	Water Width:_		_	Yes V No				
		Ordinary High	Water Mark (Width):	<u>2.0</u> ft	<u> </u>				
		Ordinary High	Water Mark (Height)	: <u>6.0</u> in	Within Roadside Ditch Yes ✓ No				
		Flow Direction	: Northwest	_					
					Culvert PresentYes _				
					Culvert Material:				
					Culvert Size:in				
FLOW		Stream bed	tream bed dry I moist vater		Proportion of Reach Represented by Stream Morphology Types (Only enter if water present) Riffle % Run % Pool %				
CHARACTERISTICS — Flowing water Velocity			_ Moderate		Turbidity Clear Slightly to Other	urbidTurbid			
INOR	-	UBSTRATE CO			ORGANIC SUBSTRATE COM (does not necessarily add u				
Substrate Type	Dia	meter	% Composition in Sampling Reach	Substrat Type	e Characteristic	% Composition in Sampling Area			
Bedrock				Detritus	sticks, wood, coarse				
Boulder	> 25	56 mm (10")	60	Dountdo	plant materials (CPOM)	10			
Cobble	64-256	mm (2.5"-10")	20	Muck-Muc	black, very fine organic				
Gravel	2-64 r	nm (0.1"-2.5")		maon mao	(FPOM)				
Sand	0.06	-2mm (gritty)	10						
Silt	0.00	14-0.06 mm	10	Marl	grey, shell fragments				
Clay	< 0.00	04 mm (slick)							
WATERSHED FEATURES		Predominant ✓ Forest — Field/Past — Agricultura — ROW Canopy Cove — Open ✓ Shaded	Residential Other:	al	Floodplain Width Wide > 30ft Modera Narrow <15ft	ate 15-30ft			
MAC	ROINVER	TEBRATES/OT	HER WILDLIFE OBS	ERVED OR	OTHER NOTES AND OBSER	RVATIONS			
					s sheet flow flowing into S-IJ53				

Before Project

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

To ensure accurate calculations, the <u>UPPERMOST STRATUM</u> 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-IJ54

Sampling Date: 09/21/2016 Project Site

Subclass for this SAR:

Ephemeral Stream

Uppermost stratum present at this SAR: SAR number:

Tree/Sapling Strata

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.47
Biogeochemical Cycling	0.50
Habitat	0.35

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
V _{CCANOPY}	Percent canpoy over channel.	50.00	0.50
V _{EMBED}	Average embeddedness of channel.	1.73	0.36
V _{SUBSTRATE}	Median stream channel substrate particle size.	0.08	0.04
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.	1.00	0.13
V _{TDBH}	Average dbh of trees.	10.00	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.	0.90	0.43
V _{DETRITUS}	Average percent cover of leaves, sticks, etc.	31.25	0.38
V _{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V _{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.81	0.85

	High-G	Bradient	Headwat				entucky a alculator		ern Wes	t Virginia	1
	Team:	C. Vileno,	J. Bittner						M Northing:	37.917125	•
Pr	oject Name:	MVP								-80.742425	
	Location:									09/21/2016	
SA	AR Number:		Reach	Length (ft):	100	Stream Ty	/pe: Ephe	meral Stream	-		•
	Top Strata:	Tre	e/Sapling St	rata	(determined	d from perce	ent calculate	d in V _{CCANOR}	_{>Y})		
Site	and Timing:	Project Site	P.			•	Before Proje	ct			•
Sample	e Variables										
1	V _{CCANOPY}	equidistant	points along	g the stream	. Measure	only if tree/s	anopy. Mea apling cover trata choice.	r is at least 2			50.0 %
	List the per		neasuremer	nts at each p	oint below:	Ī:		Ī:			
	60	50	60	60	40	40	30	50	50	60	
2	V_{EMBED}	along the s	tream. Sele	ct a particle	from the be	d. Before n	at no fewer to noving it, de	termine the	percentage	of the	1.7
							y fine sedim composed of				
			bed is comp					illie seulille	erito, use a i	alling score	
							les (rescale	d from Platt	s Megahan	and	
		Minshall 19	983)		Jobie and bi	Juider partic	ies (rescare	u nom riau	s, Meganan	, and	
		Rating	Rating Des				harada al las c e la		/	,	
		5 4					buried by fir d, or buried b			.)	
		3					ed, or buried				
		2					ed, or buried	_			
		1					r buried by f			al surface)	
	List the rati	ngs at each	point below	:							
	2	1	2	2	2	2	1	2	2	2	
	2	2	1	2	2	1	2	1	2	2	
	2	2	2	1	1	1	2	2	2	2	
3	V _{SUBSTRATE}						it no fewer the		hly equidista	ant points	0.08 in
	Enter partic	le size in in	ches to the i	nearest 0.1 i	inch at each	point below	/ (bedrock sl	hould be co	unted as 99	in, asphalt	
	or concrete	as 0.0 in, s	and or finer	particles as	0.08 in):	•	,			, ,	
	0.08	0.08	0.08	0.75	0.08	0.08	0.75	0.08	0.08	0.08	
	1.00	0.08	0.50	0.08	0.08	0.08	0.08	0.50	0.08	0.75	
	0.08	0.08	1.00	0.08	0.08	1.00	0.08	0.08	0.08	0.08	
4	V_{BERO}	and the total	al percentag				otal number of re eroded, t				20 %
		up to 200%	Left Bank:	10) ft		Right Bank:	10) ft		

Sampl	e Variables	5-9 within t	he entire ri	parian/buff	er zone adj	acent to th	e stream cha	annel (25 f	eet from ea	ch bank).	
5	V_{LWD}	stream read	ch. Enter th		om the entir		ter and 36 inc buffer and wit				1.0
		per 100 ice	t or stream	Will be caled		f downed w	oody stems:		1		
6	V_{TDBH}	Average db	h of trees (measure on			ng cover is at	least 20%)	. Trees are	at least 4	40.0
		inches (10	cm) in diam	eter. Enter	tree DBHs in	n inches.					10.0
				ents of indiv	vidual trees	(at least 4 ir	n) within the b	ouffer on ea	ach side of		
		the stream	Left Side			Ī		Right Side			T
	8	9	12	12	21	8	7	7	6		
	0	3	12	12	21	0	,	•			
											1
7	V	Number of	enage (at le	act 4" dbh a	and 36" tall)	ner 100 fee	t of stream.	Enter numh	oer of enage	on each	
,	V_{SNAG}				t per 100 fee			Linter Harris	er or snags	on each	0.0
			Left Side:		0		Right Side:		0		
8	V_{SSD}						nes dbh) per				Not Used
			,	nter numbe Il be calcula		and shrubs	s on each sid	e or the str	eam, and the	e amount	Not Used
		po. 100 11 0	Left Side:				Right Side:				
9	V_{SRICH}						m reach. Ch				
							ve species pr from these da		strata. Spe	ecies	0.90
			p 1 = 1.0						2 (-1.0)		
Ш	Acer rubru			Magnolia t	ripetala	Ш	Ailanthus ai			Lonicera ja	ponica
	Acer sacc	harum		Nyssa sylv			Albizia julib	rissin		Lonicera ta	
	Aesculus	flava			n arboreum		Alliaria petio			Lotus corni	iculatus
_	Asimina tr		_	Prunus sei	rotina		•		_	Lythrum sa	licaria
		ghaniensis		Quercus a			Alternanthe philoxeroide		7	Microstegiun	
4	Betula len	•		Quercus a		1.1	Aster tatario			Paulownia	
1 1											
	Carya alba			Quercus in			Cerastium f			Polygonum o	•
Ш	Carya gla			Quercus p			Coronilla va			Pueraria m	
Н	Carya ova			Quercus ru			Elaeagnus ui			Rosa multin	
	Carya ova			Quercus v			Lespedeza	bicolor		Sorghum h	•
	Cornus flo	orida		Sassafras	albidum		Lespedeza	cuneata		Verbena bi	rasiliensis
	Fagus gra	ndifolia		Tilia ameri	cana		Ligustrum ob	tusifolium			
Ш	Fraxinus a	americana		Tsuga can	adensis	\Box	Ligustrum s	inense			
	Liriodendro	n tulipifera		Ulmus ame	ericana						
Ш	Magnolia	acuminata									
			Cmaalaa !	One 4		-			0	0	
		2	Species in	Group 1				1	Species in	Group 2	

Samp	le Variables	10-11 within	n at least 8	subplots (40" x 40", o	r 1m x 1m)	in the ripar	ian/buffer a	zone within	25 feet fron	n each
bank.	The four su	bplots shou	ld be place	ed roughly	equidistant	ly along ea	ch side of t	he stream.			
10	V _{DETRITUS}				sticks, or oth at cover of th				<4" diamete	er and <36"	31.25 %
				Side		Ī		t Side]	
		30	20	30	30	40	40	30	30		
11	V_{HERB}	Average pe	rcentage co	over of herb	aceous vege	etation (mea	sure only if	tree cover is	s < 20%) D	o not	
	▼ HERB	include woo	ody stems a	t least 4" db	oh and 36" ta	all. Because	there may I	oe several la	ayers of grou	und cover	Not Used
		vegetation each subplo		s up through	n 200% are a	accepted. E	Inter the per	cent cover	of ground ve	egetation at	1101 0000
				Side			Righ	t Side]	
C	la Mariabla 4	O swithin the			the etmoore						
	le Variable 1					o di					
12	V _{WLUSE}	vveignted A	werage of R	cunon Score	e for watersh	iea:					0.81
			1 1	H (Ob		- 1:-O			Runoff	% in Catch	Running
			Land	Use (Choos	se From Dro	p List)			Score	ment	Percent (not >100)
	Forest and n	alive range (>	75% ground	cover)				-	1	75	75
	Open space	(pasture, lawn	is, parks, etc.)	, grass cover	>75%			•	0.3	15	90
	Residential o	districts, 1/4 -	1/3 ac (38% 1	to 30% cover)			-	0.1	10	100
								•			
	•							•			
	Ī							•			
								-			
	-							_			
	Su	ımmary					No	otes:			
١	/ariable	Value	VSI								
V	CCANOPY	50 %	0.50	1							
V	EMBED	1.7	0.36								
V,	SUBSTRATE	0.08 in	0.04								
V	BERO	20 %	0.97								
V	LWD	1.0	0.13								
	TDBH	10.0	1.00								
	SNAG	0.0	0.10								
	SSD	Not Used	Not Used								
	SRICH	0.90	0.43								
	DETRITUS	31.3 %	0.38								
	HERB	Not Used	Not Used								
	WLUSE	0.81	0.85								

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

STREAM NAME S-IJ54	LOCATION Greenbrier, WV			
STATION # RIVERMILE	STREAM CLASS Ephemeral			
Lat <u>37.917125°</u> long <u>-80.742425°</u>	RIVER BASIN Sewell Creek			
STORET#	AGENCY Tetra Tech			
INVESTIGATORS C. Vileno, J. Bittner				
FORM COMPLETED BY C.Vileno	DATE 09/21/2016 TIME 09:45	REASON FOR SURVEY Proposed Pipeline		

	Habitat		Condition	ı Category		
	Parameter	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 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
n sampling reach	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.	
ted in	SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
Parameters to be evaluated in sampling reach	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).	
ıram	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
Pa	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)

	Habitat		Condition	ı Category	
	Parameter Parameter	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 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
ling reach	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.
samp	score 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Parameters to be evaluated broader than sampling reach	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.
e eva	SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
to b	SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
Parameters	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 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
	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 60

No / low flow at time of survey. Unable to sample water quality or $\ensuremath{\mathbf{WVSCI}}$.



Photograph Direction SE

Comments:

STREAM ID	S-IJ53		STREAM NA	STREAM NAME UNT to Boggs Creek					
CLIENT EQ	Γ		PROJECT N	PROJECT NAME MVP					
LAT 37.91685	57 L .	ONG -80.74325	DATE 08/13	/2016	COUNTY Greenbrier				
INVESTIGATO	ORS E. Fo	ster, S. Ryan, A	. Carrano						
TNW		NRPW	FLOW REG Perennial		ttent Ephemeral				
		Estimate Mea	asurements		Sinuosity Low 🗸	Medium High			
		Top of Bank V Top of Bank I LB <u>2.0</u> f	Vidth:12.0ft Height: t	ft	Gradient Flat Moderate Severe (0.5/100 ft) (2 ft/100 ft) (10 ft/100 ft) Stream Erosion None ✓ Moderate Heavy				
		Water Depth:				_ ′			
CHANNEL FE	ATURES	Water Width:_	6.0 ft		Artificial, Modified or Chani ✓ Yes No				
		Ordinary High	Water Mark (Width):	: <u>9.0</u> ft	<u> </u>	•			
		Ordinary High	Water Mark (Height)): <u>13.0</u> in	Within Roadside Ditch YesNo				
		Flow Direction	n: West	_					
					Culvert Present Yes				
					Culvert Material: Corrugated	Metal			
					Culvert Size: 24 in				
FLOW		Stream bed	stream bed dry d moist vater		Proportion of Reach Represented by Stream Morphology Types (Only enter if water present) Riffle 30 % Run 50 % Pool 20 %				
CHARACTER	ISTICS	<u>✓</u> Flowing wa	ilei		Turbidity				
		Velocity			Clear Slightly to	urbidTurbid			
			_ Moderate		Other				
INOR	0.4110.01	✓ Slow	MONENTO		ODO ANIO GUDOTDATE CON	IDONENTO			
INOR	_	UBSTRATE CO ld add up to 10	0%) 100		ORGANIC SUBSTRATE COM (does not necessarily add u	p to 100%)			
Substrate Type	Dia	meter	% Composition in Sampling Reach	Substrat Type	e Characteristic	% Composition in Sampling Area			
Bedrock					sticks, wood, coarse				
Boulder	> 25	56 mm (10")	30	Detritus	plant materials (CPOM)	5			
Cobble	64-256	mm (2.5"-10")	20	Musels Muse	black, very fine organic				
Gravel	2-64 r	nm (0.1"-2.5")	20	Muck-Muc	(FPOM)				
Sand	0.06	-2mm (gritty)	20						
Silt	0.00	4-0.06 mm	10	Marl	grey, shell fragments				
Clay	< 0.00	04 mm (slick)							
WATERSHED FEATURES		Predominant ✓ Forest ✓ Field/Past — Agricultura — ROW Canopy Cove — Open ✓ Shaded	al Residentia Other:	al I	Floodplain Width Wide > 30ft Narrow <15ft	ate 15-30ft			
MAC	ROINVER	TEBRATES/OT	HER WILDLIFE OBS	SERVED OR	OTHER NOTES AND OBSER	RVATIONS			
					historic flooding within past 2 m				
W-IJ47 I I O al	id i Livi ad	ut 3-1000. IVIII III	ows and macros pres	ent. Hecenti	instante nooding within past 2 in	ioniis.			
I .									

USACE FILE NO./ Project Name: (v2.1, Sept 2015)			IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37.916240° Lon.	-80.744158°	WEATHER:		DATE:	8/10/2015
IMPACT STREAM/SITE ID AND SITE DESCRIPTION	ION:	S-IJ53; UNT to Boggs	s Creek: 219.74ac		MITIGATION STREAM CLASS./SITE ID AN	ID SITE DESCRIPTION:			Comments:	In active cow pasture
(watershed size {acreage}, unaltered or impairments)		, 30			(watershed size {acreage}, unaltered o	r impairments)				·
	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 Con	dition - Baseline (Credit)	·	Column No. 3- Mitigation Projected at F Post Completion (Credit)	ive Years	Column No. 4- Mitigation Proje Post Completion (C		Column No. 5- Mitigation Project	ed at Maturity (Credit)
Stream Classification: Perennial	Stream	m Classification:	Intermittent		Stream Classification:	Intermittent	Stream Classification:	Intermittent	Stream Classification:	Intermittent
Percent Stream Channel Slope 3	3	Percent Stream Channel Slope	e		Percent Stream Channel Slope	0	Percent Stream Channel Slo	ope 0	Percent Stream Channel S	lope 0
HGM Score (attach data forms):		HGM Score (attach dat	ta forms):		HGM Score (attach data form	s):	HGM Score (attach da	ta forms):	HGM Score (attach d	ata forms):
Avera	rage		Average			Average		Average		Average
Hydrology	Hydro	ology	1		Hydrology 1		Hydrology	1	Hydrology	1
Biogeochemical Cycling 0	Biogeo	eochemical Cycling	1 0		Biogeochemical Cycling 1	0	Biogeochemical Cycling	1 0	Biogeochemical Cycling	1 0
PART I - Physical, Chemical and Biological Indicators	Habita	PART I - Physical, Chemical and E	1 Biological Indicators		Habitat 1 PART I - Physical, Chemical and Biologic	al Indicators	Habitat PART I - Physical, Chemical and I	1 Biological Indicators	Habitat PART I - Physical, Chemical and	1 Biological Indicators
Points Scale Range Site Sci	Score	Pi	oints 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)	PHYSI	SICAL INDICATOR (Applies to all streams cla	assifications)		PHYSICAL INDICATOR (Applies to all streams classification	ons)	PHYSICAL INDICATOR (Applies to all streams	s classifications)	PHYSICAL INDICATOR (Applies to all stream	ns classifications)
USEPA RBP (High Gradient Data Sheet)	USEPA	A RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)		USEPA RBP (High Gradient Data Sheet)		USEPA RBP (High Gradient Data Sheet)	
Epifaunal Substrate/Available Cover 0-20			0-20		Epifaunal Substrate/Available Cover 0-20	0	Epifaunal Substrate/Available Cover	0-20	Epifaunal Substrate/Available Cover	0-20
2. Embeddedness 0-20 13			0-20		2. Embeddedness 0-20	0	2. Embeddedness	0-20	2. Embeddedness	0-20
3. Velocity/ Depth Regime 0-20 4	0. 10.0		0-20 0		3. Velocity/ Depth Regime 0-20	0	3. Velocity/ Depth Regime	0-20	Velocity/ Depth Regime Sediment Deposition	0-20
4. Sediment Deposition 0-20 10 5. Channel Flow Status 0-20 5			0-20 0 0		4. Sediment Deposition 0-20 5. Channel Flow Status 0-20	0	Sediment Deposition Channel Flow Status	0-20 0 0	5. Channel Flow Status	0-20
6. Channel Alteration 0-20 0-1			0-20 0-1 0		6. Channel Alteration 0-20	0-1	6. Channel Alteration	0-20 0-1 0	6. Channel Alteration	0-20 0-1
7. Frequency of Riffles (or bends) 0-20 9			0-20 0		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
8. Bank Stability (LB & RB) 0-20			0-20 0		8. Bank Stability (LB & RB) 0-20	0	8. Bank Stability (LB & RB)	0-20	8. Bank Stability (LB & RB)	0-20
9. Vegetative Protection (LB & RB) 0-20 6		7 /	0-20 0		9. Vegetative Protection (LB & RB) 0-20	0	9. Vegetative Protection (LB & RB)	0-20	9. Vegetative Protection (LB & RB)	0-20
10. Riparian Vegetative Zone Width (LB & RB) 0-20 14	4 10. Rip	parian 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	10. Riparian Vegetative Zone Width (LB & RB)	0-20
Total RBP Score Marginal 103		RBP Score	Poor 0		Total RBP Score Poo		Total RBP Score	Poor 0	Total RBP Score	Poor 0
Sub-Total 0.51	515 Sub-To	otal	0		Sub-Total	0	Sub-Total	0	Sub-Total	0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)		MICAL INDICATOR (Applies to Intermittent a	nd Perennial Streams)		CHEMICAL INDICATOR (Applies to Intermittent and Perer	nial Streams)	CHEMICAL INDICATOR (Applies to Intermitter	· · · · · · · · · · · · · · · · · · ·	CHEMICAL INDICATOR (Applies to Intermitte	· · · · · · · · · · · · · · · · · · ·
WVDEP Water Quality Indicators (General)		EP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General)		WVDEP Water Quality Indicators (General)	WVDEP Water Quality Indicators (General	ıl)
Specific Conductivity 100-199 - 85 points 0-90	Specif	ific Conductivity	0-90 0		Specific Conductivity 0-90	0	Specific Conductivity	0-90	Specific Conductivity	0-90
pH	рН		0-1		рН	0-1	рН	0-1	рН	0-1
5.6-5.9 = 45 points	DO		5-90		5-90 DO	· ·	DO	5-90	DO	5-90
10-30			10-30		10-30	0		10-30		10-30
Sub-Total	Sub-To	otal	0		Sub-Total	0	Sub-Total	0	Sub-Total	0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)	s) BIOLO	OGICAL INDICATOR (Applies to Intermittent	t and Perennial Streams)		BIOLOGICAL INDICATOR (Applies to Intermittent and P	erennial Streams)	BIOLOGICAL INDICATOR (Applies to Interm	ittent and Perennial Streams)	BIOLOGICAL INDICATOR (Applies to Interi	mittent and Perennial Streams)
WV Stream Condition Index (WVSCI)	WV St	tream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)		WV Stream Condition Index (WVSCI)		WV Stream Condition Index (WVSCI)	
0-100 0-1 52	62		0-100 0-1		0-100	0-1		0-100 0-1 0		0-100 0-1
Fair Sub-Total 0.4:		otal	0		Sub-Total	0	Sub-Total	0	Sub-Total	0
PART II - Index and Unit Score		PART II - Index and Un	nit Score		PART II - Index and Unit Score		PART II - Index and Ur	nit Score	PART II - Index and U	Jnit Score
Index Linear Feet Unit So	Score	Index	Linear Feet Unit Score		Index Linear I	Feet Unit Score	Index	Linear Feet Unit Score	Index	Linear Feet Unit Score
0.578 20 11.566	66667	0	0 0		0 0	0	0	0 0	0	0 0

		(See instruction page		t values for MITIGATIC	N BANKING and II	LF)			
Tempo	oral Loss-Construction					Long	term Protection		
*Note: Reflects duration of aquatic functions	al loss between the time of ar nsatory mitigation (credit).	n impact (debit) and completion of			% Add. Mitigation	on and Monitoring Period		Term Protection (Years)	
Years		0							
Sub-Total		0							
	nporal Loss-Maturity					0 Year Monitoring		101	
*Note: Period between completion of compensator to function (i.e. maturity of tree stratum to provide					Sub-Total			0	
to function (i.e. maturity of free stratum to provide	corridor).	within riparian stream of wettand buller				PART IV - Index	to Unit Score Con	version	
% Add. Mitigation		Temporal Loss-Maturity (Years)			Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit	
					0.578333333	20	11.56666667	\$9,253.33	
201		0							
0% Sub-Total		0							
		 	ı						
		DART		wit Cooper and Ducinete	al Dalaman				
		PARIV	- Comparison of U	nit Scores and Projecte	ed Balance				
Final Unit Score (Debit) [No Net Loss Value]	11.56666667	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
		D	lout VI Mitigation (`anaidarationa (Inconti	(vec)				
			art vi - mitigation c	Considerations (Incenti	ves)				
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).					*Note ¹ : Referenc	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			
Restoration Level 1						^Note : Select th	e appropriate mitigation	туре	
Restoration Level 2					Buffer Width		Left Bank		
Restoration Level 3						0-50		None	
						51-150		None	
					Buffer Width		Right Bank		
				1		0-50		None	
Compensatory Mitigation Plan incorpor *Note: HUC 12-based watershed a			No		Average Buffer	51-150		None	
			, no	l	Width/Side	0			
Site		Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)					ight Preservation Ratio (v2.1, Sept 2015)	
S-IJ53		11.56666667	#DIV/0!			Final Mitigation Unit Yield			
<u> </u>			<u> </u>	I		#DIV/0!			

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

STREAM NAME S-IJ53	LOCATION Greenbrier, WV				
STATION # RIVERMILE	STREAM CLASS Perennial				
Lat <u>37.916240°</u> long <u>-80.744158°</u>	RIVER BASIN Sewell Creek				
STORET#	AGENCY Tetra Tech				
INVESTIGATORS C. Vileno, J. Bittner					
FORM COMPLETED BY J. Bittner	DATE 09/21/2016 TIME 10:15	REASON FOR SURVEY Proposed Pipeline			

	Habitat		Condition	ı Category			
	Parameter	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 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
sampling reach	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.		
ted in	SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
Parameters to be evaluated in sampling reach	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).		
ıram	SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
Pa	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.		
L	SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		

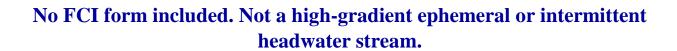
HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

	Habitat	Condition Category											
	Parameter	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								
ng reach	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.								
samp	score 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0								
Parameters to be evaluated broader than sampling reach	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.								
e eva	SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0								
s to b	SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0								
Parameters	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 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								
	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 103

Insects	Count	Tolerance	TV	Insects	Count	Tolerance	TV	Non-Insects	Count	Tolerance	TV]	
Ephemeroptera			7	Odonata			0	Crustacea			0		
Ameletidae		2	0	Aeshnidae		3	0	Asellidae		7	0		
Baetidae		4	0	Calopterygidae		6	0	Cambaridae		5	0		
Beatiscidae		4	0	Coenagrionidae		7	0	Gammaridae		5	0		
Caenidae		5	0	Cordulegastridae		3	0	Palaemonidae		5	0		
Ephemerellidae		3	0	Gomphidae		5	0	Annelida	-	•	0		
Ephemeridae		5	0	Lestidae		7	0	Hirudinea		10	0		
Heptageniidae	7	3	21	Libellulidae		7	0	Nematoda		10	0		
Isonychiidae		3	0	Coleoptera			0	Nematomorpha		10	0		
Leptophlebiidae		4	0	Chrysomelidae		7	0	Oligochaeta		10	0		
Potamanthidae		5	0	Dryopidae		5	0	Turbellaria	-	•	0		
Siphlonuridae		3	0	Dytiscidae		6	0	Turbellaria		7	0		
Tricorythidae		5	0	Elmidae		4	0	Bivalvia	-	•	0		
Plecoptera			0	Gyrinidae		5	0	Corbiculidae		6	0		
Capniidae		2	0	Haliplidae		7	0	Sphaeriidae		5	0		
Chloroperlidae		2	0	Hydrophilidae		7	0	Unionidae		4	0		
Leuctridae		2	0	Psephenidae		3	0	Gastropoda			0		
Nemouridae		2	0	Ptilodactylidae		5	0	Ancylidae		7	0		
Peltoperlidae		1	0	Hemiptera			0	Hydrobiidae		4	0		
Perlidae		1	0	Belostomatidae		8	0	Physidae		7	0		
Perlodidae		1	0	Corixidae		8	0	Planorbidae		5	0		
Pteronarcyidae		1	0	Gerridae		10	0	Pleuroceridae		5	0		
Taeniopterygidae		2	0	Hydrometridae		8	0	Viviparidae		5	0		
Trichoptera			0	Nepidae		8	0	Miscellaneous			0		
Brachycentridae		2	0	Notonectidae		8	0	Collembola		6	0		
Glossosomatidae		2	0	Megaloptera			0	Lepidoptera		5	0		
Helicopsychidae		3	0	Corydalidae		3	0	Neuroptera		5	0		
Hydropsychidae		5	0	Sialidae		6	0	Hydrachnidae		6	0		
Hydroptilidae		3	0	Diptera			0	Totals	Total r	number	7		
Lepidostomatidae		3	0	Athericidae		3	0	Totals	Total f	amilies	1		
Leptoceridae		3	0	Blephariceridae		2	0			Metric	calculations		
Limnephilidae		4	0	Ceratopogonidae		8	0		Richnes	is		Additional metrics	
Molannidae		3	0	Chironomidae		9	0	Total Taxa		1	4.5	Ephemeroptera Taxa	1
Philopotamidae		4	0	Culicidae		10	0	EPT Taxa		1	7.7	Plecoptera Taxa	0
Phryganeidae		4	0	Dixidae		6	0		Toleran	ce		Trichoptera Taxa	0
Polycentropodidae		5	0	Empididae		7	0	Biotic Index		3.00	100.0	Long-lived Taxa	0
Psychomiidae		3	0	Psychodidae		8	0	% Tolerant		0.0	100.0	Odonata Taxa	0
Rhyacophilidae		3	0	Ptychopteridae		8	0	Composition			Diptera Taxa	0	
Uenoidae		2	0	Simuliidae		6	0	% EPT Abundance		100.0	100.0	COET Taxa	1
	Total Tol	erance Value	21	Stratiomyidae		10	0	% Dominance		100.0	0.0	% Sensitive	100.0
	rginia Save O			Syrphidae		10	0	% Net-spinners		0.0	NA	% Chironomidae	0.0
601 57th Stre			04	Tabanidae		7	0	Stream Condition Index 52.0		% Clingers	100.0		
http://	/www.dep.w	v.gov/sos_		Tipulidae		5	0	Integrity Ra	ating	Mar	ginal	More diversity meas	sures

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 surve	ey. Unable to sample water quality.	

S-FF1

Stream ID S-FF1



Photograph Direction South

Date: 07/23/2015

Comments: 2015 stream identification.



Photograph Direction North

Date: <u>10/22/2</u>019

Comments: 2019 stream identification confirmation.

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	me: Mountain Valley Pipeline Project SWVM v2.1		IMPACT COORDINATES: (in Decimal Degrees)			WEATHER:	WEATHER:		DATE:	8/10/	8/10/2015			
IMPACT STREAM/SITE ID (watershed size {acreage}				S-FF1 UNT to Meadow River Form of Mitigation: Mitigation Bank			MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments)					Comments:	No survey ac have been as represent a g	ssumed and good quality
STREAM IMPACT LENGTH:	31	FORM OF MITIGATION:	RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:			Mitigation Length:		
Column No. 1- Impact Existin	g Condition (Debi	t)	Column No. 2- Mitigation Existing Co	ondition - Baseline (Credit)	·	Column No. 3- Mitigation F Post Completi		ears	Column No. 4- Mitigation Pro Post Completion		ears	Column No. 5- Mitigation Project	ed at Maturity (C	Credit)
Stream Classification:	Ephem	ieral	Stream Classification:	Ephemeral		Stream Classification:	Eph	emeral	Stream Classification:	Ephe	meral	Stream Classification:	Epher	meral
Percent Stream Channel S	оре	5	Percent Stream Channel Slo	ре		Percent Stream Channel	Slope	0	Percent Stream Channel S	Slope	0	Percent Stream Channel S	оре	0
HGM Score (attach d	ata forms):		HGM Score (attach d	lata forms):		HGM Score (attach data forms):			HGM Score (attach data forms):			HGM Score (attach data forms):		
		Average		Average				Average			Average			Average
Hydrology	1	-	Hydrology			Hydrology		-	Hydrology			Hydrology		
Biogeochemical Cycling Habitat	1	1	Biogeochemical Cycling Habitat	0		Biogeochemical Cycling Habitat		0	Biogeochemical Cycling Habitat		0	Biogeochemical Cycling Habitat	-	0
PART I - Physical, Chemical and	Biological Indica	tors	PART I - Physical, Chemical and	l Biological Indicators		PART I - Physical, Chemical	and Biological Ind	icators	PART I - Physical, Chemical an	d Biological Indi	cators	PART I - Physical, Chemical and	Biological Indic	cators
	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 stream	ns classifications)		PHYSICAL INDICATOR (Applies to all streams	classifications)		PHYSICAL INDICATOR (Applies to all stream	ams classifications)		PHYSICAL INDICATOR (Applies to all stream	nms classifications)		PHYSICAL INDICATOR (Applies to all stream	s classifications)	•
USEPA RBP (High Gradient Data Sheet)	1 1	00	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		
Epifaunal Substrate/Available Cover Embeddedness	0-20	20	Epifaunal Substrate/Available Cover Embeddedness	0-20 0-20		Epifaunal Substrate/Available Cover Embeddedness	0-20 0-20		Epifaunal Substrate/Available Cover Embeddedness	0-20 0-20		Epifaunal Substrate/Available Cover Embeddedness	0-20	
3. Velocity/ Depth Regime	0-20	20	3. Velocity/ Depth Regime	0-20		Velocity/ Depth Regime	0-20		Velocity/ Depth Regime	0-20		3. Velocity/ Depth Regime	0-20	
4. Sediment Deposition	0-20	20	4. Sediment Deposition	0-20		4. Sediment Deposition	0-20		Sediment Deposition	0-20		4. Sediment Deposition	0-20	
5. Channel Flow Status	0-20 0-1	20	5. Channel Flow Status	0-20 0-1		5. Channel Flow Status	0-20 0-1		5. Channel Flow Status	0-20 0-1		5. Channel Flow Status	0-20 0-1	
6. Channel Alteration	0-20	20	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	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		7. Frequency of Riffles (or bends)	0-20	
Bank Stability (LB & RB) Vegetative Protection (LB & RB)	0-20	20	Bank Stability (LB & RB) Vegetative Protection (LB & RB)	0-20		Bank Stability (LB & RB) Vegetative Protection (LB & RB)	0-20		Bank Stability (LB & RB) Vegetative Protection (LB & RB)	0-20		8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB)	0-20	
Vegetative Protection (LB & RB) Reparam Vegetative Zone Width (LB & RB)	0-20	20	10. Riparian Vegetative Zone Width (LB & RB)	0-20 0-20		10. Riparian Vegetative Zone Width (LB & RB)	0-20		10. Riparian Vegetative Zone Width (LB & RB)	0-20 0-20		10. Riparian Vegetative Zone Width (LB & RB)	0-20 0-20	
Total RBP Score	Optimal	120	Total RBP Score	Poor 0		Total RBP Score	Poor	0	Total RBP Score	Poor	0	Total RBP Score	Poor	0
Sub-Total		1	Sub-Total	0		Sub-Total		0	Sub-Total		0	Sub-Total		0
CHEMICAL INDICATOR (Applies to Intermitte	ent and Perennial Str	reams)	CHEMICAL INDICATOR (Applies to Intermitten	t and Perennial Streams)		CHEMICAL INDICATOR (Applies to Intermi	ttent and Perennial St	reams)	CHEMICAL INDICATOR (Applies to Intermi	ttent and Perennial	Streams)	CHEMICAL INDICATOR (Applies to Intermitte	nt and Perennial S	Streams)
WVDEP Water Quality Indicators (General	nl)		WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (Gener	ral)		WVDEP Water Quality Indicators (Gene	ral)		WVDEP Water Quality Indicators (General	1)	
Specific Conductivity			Specific Conductivity			Specific Conductivity			Specific Conductivity			Specific Conductivity		
<=99 - 90 points	0-90	50		0-90			0-90			0-90			0-90	
pH		100	pH			рН			рН			pH		
6.0-8.0 = 80 points	0-80	6		5-90 0-1			5-90 0-1	5.6		5-90			5-90 0-1	
0.0-6.0 – 80 points			DO			no			no			DO		
	10-30	30		10-30			10-30			10-30			10-30	
>5.0 = 30 points	1.000		0.17.11	.0 00			10 00	0		1000		2 . 7		
Sub-Total	ittent and Barannial S	Stroams	Sub-Total BIOLOGICAL INDICATOR (Applies to Intermitte	ont and Perannial Streams)		Sub-Total BIOLOGICAL INDICATOR (Applies to Inte	ermittent and Berenn		Sub-Total BIOLOGICAL INDICATOR (Applies to Inte	rmittent and Barar	0	Sub-Total BIOLOGICAL INDICATOR (Applies to Intern	mittant and Barani	nial Strooms)
			ent and i eleminal offeams)			emilitent and referin	lai Streams)		innittent and Ferei	illiai Streams)		intent and referin	mai Streams)	
WV Stream Condition Index (WVSCI)	0-100 0-1	100	WV Stream Condition Index (WVSCI)	0-100 0-1		WV Stream Condition Index (WVSCI)	0-100 0-1		WV Stream Condition Index (WVSCI)	0-100 0-1		WV Stream Condition Index (WVSCI)	0-100 0-1	
Very Good	0-100 0-1	100					0-100 0-1			0-100 0-1				
Sub-Total		1	Sub-Total	0		Sub-Total		0	Sub-Total		0	Sub-Total		0
PART II - Index and I	Jnit Score		PART II - Index and I	Jnit Score		PART II - Index ar	nd Unit Score		PART II - Index and	Unit Score		PART II - Index and I	Init 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
1.000	31	31	0	0 0		0	0	0	0	0	0	0	0	0
<u></u>			<u> </u>	<u> </u>		L			<u> </u>			<u> </u>		

		(See instruction page		 Impact Factors It values for MITIGATIC 	N BANKING and I	ILF)			
Temp	oral Loss-Construction	(222 2222)				<u> </u>	-term Protection		
*Note: Reflects duration of aquatic function		nn impact (debit) and completion of			% Add. Mitigation	on and Monitoring Period		-Term Protection (Years)	
Years	,	0							
Sub-Total		0							
	mporal Loss-Maturity		0 + 5/	10 Year Monitoring	101				
*Note: Period between completion of compensate to function (i.e. maturity of tree stratum to provid					Sub-Total			0	
to function (i.e. maturity of free stratum to provid	corridor).	within riparian stream of wetland buller				PART IV - Index	to Unit Score Cor	nversion	
					Final Index Score	Linear Feet	Unit Score	ILF Costs	
% Add. Mitigation		Temporal Loss-Maturity (Years)			(Debit)		(Debit)	(Offsetting Debit	
					1	31	31	\$24,800.00	0
0%		0							
Sub-Total		U							
		DADTV	. Commonicon of II	wit Coores and Dusinets	ad Dalamaa				
		PARIV	- Companson of U	nit Scores and Projecte	eu balance				
Final Unit Score (Debit) [No Net Loss Value]	31	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
		n	lort VI Mitigation (Considerations (Incenti					
			art vi - mitigation (Considerations (incenti	ves)				
	Extent of Stream Renamination in the control of the	correct Restoration Levels (below) for your pr	oject		*Note ¹ : Referen	ce Instructional handout for the def *Note ² : Enter the buffer width for		ne Mitigation Extents and Type Bank and Right Bank)	es (below)
Restoration Level 2							Left Bank	,	
				-	Buffer Width		Loit Bally	•	
Restoration Level 3]		0-50		None	
					Buffer Width	51-150	Right Ban	None	
				_		0-50	Tagat Dan	None	
Compensatory Mitigation Plan incorpo			N-		A	51-150		None	
*Note: HUC 12-based watershed	approach required to obtain Strea	am Restoration incentive	No	I	Average Buffer Width/Side	0			
Site		Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)				Stra	ight Preservation Ratio (v2.1, Sept 2015)	
S-FF1		31	#DIV/0!			Final Mitigation Unit Yield			
				1		#DIV/0!			

STREAM ID S-FF1	STREAM NAME UNT to Meadow River								
LAT 37.837628 LONG -80.751984	DATE 07/23/2015								
CLIENT MVP	PROJECT NAME MVP								
INVESTIGATORS C. Vileno, B. Schrotenboer, C. Sorden									
FLOW REGIME Perennial Intermittent Ephemeral ✓	WATER TYPE TNW RPW NRPW_✓								

FLOW REGIN Perennial		ntEpheme	eral ✓ WATER TY		NRPW <u></u> ✓					
			Neasurements k Width: 3.0 ft		Stream ErosionNone✓ Moderate Heavy					
		Top of Ban	k Height:		Artificial, Modified or Channelized					
		LB <u>1.0</u>	ft RB <u>1.0</u>	<u>ft</u>	Yes ✓ No					
CHANNEL FE	ATURES	Water Dept	th: 0.00 in		Dom Drocont Voc	/ No				
		Water Widt	h: 0.0 in		Dam PresentYes <u>✓</u> No					
		High Water	Mark: <u>2.0 ft</u>		Sinuosity Low _✓	Medium High				
		Flow Direct	tion: North		Gradient					
					Flat Moderate Severe (2 ft/100 ft) (10 ft/100 ft)					
		Water Pres	sent		Proportion of Reach Repre	,				
			r, stream bed dry		Morphology Types	0/				
		✓ Stream I Standing			Riffle % Run Pool %	%				
FLOW CHARACTER	ISTICS	— Standing								
CHARACTER	101100	_			Turbidity ClearSlightly	turbidTurbid				
		Velocity Fast	Moderate		OpaqueStained					
		Slow	Moderate		Other					
INOR		STRATE CO		_	DRGANIC SUBSTRATE COMPONENTS does not necessarily add up to 100%)					
Substrate Type	Diame	ter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area				
Bedrock				Detritus	sticks, wood, coarse					
Boulder		mm (10")	0	Detilitus	plant materials (CPOM)	30				
Cobble		m (2.5"-10")	10	Muck-Mud	black, very fine organic					
Gravel		1 (0.1"-2.5")	20		(FPOM)					
Sand Silt		nm (gritty) 0.06 mm	30 25	Marl	grey, shell fragments					
Clay		mm (slick)	15	IVIGIT	grey, onen nagmento					
J.S.		Predomina _✓ Forest	ant Surrounding Lan Commer	cial	Indicate the dominant type ✓ Trees Shrub	S				
		Field/Pa			GrassesHerbaceous					
WATERSHED FEATURES		Other:			Floodplain Width Wide > 30ft Moderate 15-30ft					
LATORES		Conony Co			✓ Narrow <16ft	rate 13-301t				
		Canopy Co <u>√</u> Partly c		aded						
		Shaded	Open		Wetland PresentYes _√No Wetland ID					
A OU A TIO X TO	DETATION:				dominant species present	ing Franks				
AQUATIC VE	EIATION	— Rooted	_	Rooted subme		ingFree floating				
<u></u>			<u></u>		-					
		Information	listed on this form re	presents the d	ata collected in 2015. The st	ream was revisited				
				•	nnel and OHWM was confirm					
MACROINVER OR OTHER	RTEBRATES	;								
WILDLIFE	TUED									
OBSERVED/C										
NOTES										

Assessment not completed in the field. HGM, RBP, WVDEP Water Quality, and WVSCI scores used on SWVM forms represent a high quality stream.



Photograph Direction West

Comments:

STREAM ID S-I12	STREAM NAME Lick Creek							
LAT 37.775867 LONG -80.710972	DATE 04/16/2015							
CLIENT MVP	CLIENT MVP							
INVESTIGATORS RS, AH, MB								
FLOW REGIME Perennial Intermittent Ephemeral	WATER TYPE TNW — RPW ✓ NRPW —							

Perenniai —	intermitte			RPW —					
		F-4'4- 1			04				
			/leasurements k Width: <u>4.0 ft</u>		Stream Erosion None ✓ Moderate	Heavy			
		Top of Ban	· ·		Artificial, Modified or Channelized				
		LB <u>10.0</u>	ft RB <u>10.0</u>	<u>tt</u>	<u>✓</u> YesNo				
CHANNEL FE	ATURES	Water Dep	th: 3.00 in		Dam Present Yes ✓ No Sinuosity ✓ Low Medium High				
		Water Widt	h: <u>2.5 ft</u>						
		High Water	Mark: <u>4.0 ft</u>						
		Flow Direct	tion: W		Gradient				
					Flat Moderate _	✓ Severe			
					(0.5/100 ft (2 ft/100 ft)	,			
		Water Pres			Proportion of Reach Repre	esented by Stream			
			r, stream bed dry oed moist		Morphology Types Riffle 15 % Run 75	%			
		Standing			Pool 10 %	70			
FLOW CHARACTER	ISTICS	Flowing	-						
					Turbidity Clear ∠ Slightly	turbidTurbid			
		Velocity <u>✓</u> Fast	Moderate		OpaqueStained				
		Slow	Woderate		Other				
INOR	GANIC SUB	STRATE CO	MPONENTS	0	RGANIC SUBSTRATE CON	IPONENTS			
inon		add up to 10			does not necessarily add u				
Substrate Type	Diame	eter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area			
Bedrock					sticks, wood, coarse				
Boulder	> 256	mm (10")	5	Detritus	plant materials (CPOM)	5			
Cobble	64-256 m	ım (2.5"-10")	30	Muck-Mud	black, very fine organic				
Gravel	2-64 mm	า (0.1"-2.5")	30	iviuck-iviuu	(FPOM)				
Sand	0.06-2n	nm (gritty)	15						
Silt	0.004-0	0.06 mm 10		Marl	grey, shell fragments				
Clay	< 0.004	mm (slick)	10						
			ant Surrounding Lan		Indicate the dominant type (Check one)				
		Forest	Commer		<u>✓</u> Trees Shrubs				
		— Field/Pa			Grasses Herba	ceous			
WATERSHED		Other:	itesidein	liai	Floodplain Width				
FEATURES						rate 15-30ft			
		Canopy Co			✓ Narrow <16ft				
		Partiy o	ppen <u>v</u> Partly sh	aded	Wetland PresentYes	∠ No			
		— Shaded	OpenOpen		Wetland ID				
					lominant species present				
AQUATIC VE	SETATION	<u>✓</u> Rooted Floating	_	Rooted subme Attached algae	<u> </u>	tingFree floating			
				Allacried algai	<u> </u>				
MACROINVER	TERRATES								
OR OTHER	CIEDRAIES	'							
WILDLIFE OBSERVED/C	THER								
OBSERVATIO NOTES									
HUIES									

USACE FILE NO./ Project Name: (v2.1, Sept 2015)		Mou		y Pipeline Project M v2.1		COORDINATES: cimal Degrees)	Lat.	37.775891	Lon.	-80.710797	WEATHER:				DATE:	8/10/	/2015
IMPACT STREAM/SITE ID / (watershed size (acreage), u				S-I12; Lick Creek Form of Mitigation				MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)							Comments:		
STREAM IMPACT LENGTH:	38	FORM MITIGAT		RESTORATION (Levels I-III)		OORDINATES: cimal Degrees)	Lat.		Lon.		PRECIPITATION PAST	7 48 HRS:			Mitigation Length:		
Column No. 1- Impact Existing	Condition (De	ebit)		Column No. 2- Mitigation Existing C	ondition - Basel	line (Credit)		Column No. 3- Mitigation Properties		Years	Column No. 4- M Post	litigation Proje Completion (ars	Column No. 5- Mitigation Projec	ted at Maturity (C	Credit)
Stream Classification:	Inter	mittent	;	Stream Classification:	Inte	rmittent		Stream Classification:	Int	termittent	Stream Classification:		Interm	nittent	Stream Classification:	Intern	mittent
Percent Stream Channel Slo	ре	3		Percent Stream Channel Slo	рре			Percent Stream Channel Sl	рре	0	Percent Stream	n Channel Sle	рре	0	Percent Stream Channel S	lope	0
HGM Score (attach da	ita forms):			HGM Score (attach	data forms):			HGM Score (attach	data forms):		HGM Sco	ore (attach da	ata forms):		HGM Score (attach o	lata forms):	
		Average	ļ			Average				Average				Average			Average
Hydrology Biogeochemical Cycling Habitat	0.72 0.48 0.28	0		Hydrology Biogeochemical Cycling Habitat		0		Hydrology Biogeochemical Cycling		0	Hydrology Biogeochemical Cycling Habitat			0	Hydrology Biogeochemical Cycling Habitat		0
PART I - Physical, Chemical and I		icators	<u> </u>	PART I - Physical, Chemical an	d Biological Indi	icators		Habitat PART I - Physical, Chemical ar	d Biological In	dicators	PART I - Physical, C	Chemical and	Biological Indic	ators	PART I - Physical, Chemical and	l Biological Indic	ators
	Points Scale Range	Site Score			Points Scale Range	Site Score			Points Scale Range	e Site Score			Points Scale Range	Site Score		Points Scale Range	e 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 (Appli	ies to all streams	classifications)		PHYSICAL INDICATOR (Applies to all stream	s classifications)	
USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient				USEPA RBP (High Gradient Data Sheet)	_	
Epifaunal Substrate/Available Cover Embeddedness	0-20	12 14		Epifaunal Substrate/Available Cover Embeddedness	0-20			Epifaunal Substrate/Available Cover Embeddedness	0-20		 Epifaunal Substrate/Availab Embeddedness 	ole Cover	0-20 0-20		Epifaunal Substrate/Available Cover Embeddedness	0-20 0-20	
Velocity/ Depth Regime	0-20 0-20	0	l :	3. Velocity/ Depth Regime	0-20			Velocity/ Depth Regime	0-20 0-20		3. Velocity/ Depth Regime		0-20		3. Velocity/ Depth Regime	0-20	
Velocity/ Depth Regime Sediment Deposition	0-20	6	l E	4. Sediment Deposition	0-20			Velocity Depth Regime Sediment Deposition	0-20		Velocity/ Depth Regime Sediment Deposition		0-20		4. Sediment Deposition	0-20	
5. Channel Flow Status	0-20	15	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 0-1	13	l :	6. Channel Alteration	0-20 0-1			6. Channel Alteration	0-20 0-1		6. Channel Alteration		0-20 0-1		6. Channel Alteration	0-20 0-1	
7. Frequency of Riffles (or bends)	0-20	16	P	7. Frequency of Riffles (or bends)				7. Frequency of Riffles (or bends)			7. Frequency of Riffles (or ben	-1-1	0-20		7. Frequency of Riffles (or bends)	0-20	
8. Bank Stability (LB & RB)		0	l .	8. Bank Stability (LB & RB)	0-20			8. Bank Stability (LB & RB)	0-20		8. Bank Stability (LB & RB)	ius)			8. Bank Stability (LB & RB)		
	0-20 0-20	- 0	1	9. Vegetative Protection (LB & RB)	0-20			9. Vegetative Protection (LB & RB)	0-20		9. Vegetative Protection (LB &	DD)	0-20		9. Vegetative Protection (LB & RB)	0-20 0-20	
Vegetative Protection (LB & RB) Riparian Vegetative Zone Width (LB & RB)		4		9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB)	0-20 0-20			Vegetative Protection (LB & RB) Registrative Zone Width (LB & RB)	0-20 0-20		Vegetative Protection (LB & 10. Riparian Vegetative Zone Wid		0-20		Vegetative Protection (LB & RB) Reparian Vegetative Zone Width (LB & RB)	0-20	
Total RBP Score	0-20 Marginal	104	-	Total RBP Score	Poor	0		Total RBP Score	Poor	0	Total RBP Score	ulii (LD & ND)	0-20 Poor	0	Total RBP Score	Poor	0
Sub-Total	iviargiriai	0.52	l .	Sub-Total	POOI	0		Sub-Total	P001	0	Sub-Total		POOI	0	Sub-Total	POOI	0
CHEMICAL INDICATOR (Applies to Intermittent	t and Perennial S		-	CHEMICAL INDICATOR (Applies to Intermitter	t and Perennial Stre			CHEMICAL INDICATOR (Applies to Intermitter	t and Perennial S	, ,	CHEMICAL INDICATOR (Appl	lies to Intermitte	nt and Perennial St		CHEMICAL INDICATOR (Applies to Intermitte	ent and Perennial St	
WVDEP Water Quality Indicators (General)			,	WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General			WVDEP Water Quality Indica	ators (General)		WVDEP Water Quality Indicators (Genera	ıl)	
WVDEP Water Quality Indicators (General) Specific Conductivity				Specific Conductivity				Specific Conductivity			Specific Conductivity				Specific Conductivity		
<=99 - 90 points	0-90	50			0-90				0-90				0-90			0-90	
pH	0-80	6	J	pH	5-90 0-1			pH	5-90 0-1	5.€	рН		5-90 0-1		pH	5-90 0-1	
6.0-8.0 = 80 points DO	0 00	, and the second	Ī	DO				DO	0 00		DO		0 00		DO		
>5.0 = 30 points	10-30	30			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 Intermitt	ent and Perennia	al Streams)	1	BIOLOGICAL INDICATOR (Applies to Intermit	tent and Perennial S	Streams)		BIOLOGICAL INDICATOR (Applies to Interm	ittent and Peren	nial Streams)	BIOLOGICAL INDICATOR (A	Applies to Intern	nittent and Perenr	nial Streams)	BIOLOGICAL INDICATOR (Applies to Inter	nittent and Perenn	ial Streams)
WV Stream Condition Index (WVSCI)			1	WV Stream Condition Index (WVSCI)	T T			WV Stream Condition Index (WVSCI)	1 1		WV Stream Condition Index	(WVSCI)			WV Stream Condition Index (WVSCI)		
Poor	0-100 0-1	29.1			0-100 0-1				0-100 0-1				0-100 0-1			0-100 0-1	
Sub-Total		0.191		Sub-Total		0		Sub-Total		0	Sub-Total			0	Sub-Total		0
PART II - Index and Ur	nit Score			PART II - Index and	Unit Score			PART II - Index and	Unit Score		PART II	- Index and U	nit 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
0.570	38	21.67266667		0	0	0		0	0	0	0		0	0	0	0	0

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 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). PART IV - Index to Unit Score Conversion Final Index Score Linear Feet Unit Score (Debit) (Offsetting Debit Units) (Debit) (Offsetting Debit Units) (Offsetting Debit Units) (Offsetting Debit Units)
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit). Years O Sub-Total 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). PART IV - Index to Unit Score Conversion Final Index Score Linear Feet Unit Score (Debit) (Offsetting Debit Units)
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). PART IV - Index to Unit Score Conversion Final Index Score Linear Feet Unit Score Unit Score (Debit) (Opebit) (Offsetting Debit Units)
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). Sub-Total
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). Sub-Total
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). PART IV - Index to Unit Score Conversion
*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). PART IV - Index to Unit Score Conversion Final Index Score Linear Feet Unit Score Unit
*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). PART IV - Index to Unit Score Conversion Final Index Score Linear Feet Unit Score Unit
function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor). PART IV - Index to Unit Score Conversion Final Index Score Linear Feet Unit Score ILF Costs (Debit) (Offsetting Debit Units)
Final Index Score Linear Feet Unit Score ILF Costs (Debit) (Offsetting Debit Units)
% Add. Mitigation Temporal Loss-Maturity (Years) (Debit) (Offsetting Debit Units)
% Add. Mitigation Temporal Loss-Maturity (Years) (Debit) (Offsetting Debit Units)
0.07 0000000
0%
Sub-Total 0
PART V- Comparison of Unit Scores and Projected Balance
Final Unit Score (Debit) Mitigation Existing Mitigation Projected at Ten
[No Net Loss Value] 21.0/20000/ Condition - Baseline Five Years Maturity
(Credit) Post Completion (Credit) Post Completion (Credit) (Credit)
FINAL PROJECTED NET BALANCE
Part VI - Mitigation Considerations (Incentives)
Extent of Stream Restoration Extended Upland Buffer Zone
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (helow)
*Note2: Place an "X" in the appropriate category (only select one). *Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)
Restoration Level 1 *Note ³ : Select the appropriate mitigation type
Restoration Level 2 Buffer Width Left Bank
Restoration Level 3 0-50 None
51-150 None
Buffer Width Right Bank
0-50 None
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 No No
Width/Side
No. of the second secon
Site Impact Mitigation Unit Straight Preservation Ratio (v.2.4. Sept. 2015)
Unit Yield (Debit) Yield (Credit) (v2.1, Sept 2015)
S-I12 #DIV/0! 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 <u>UPPERMOST STRATUM</u> 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-I12 (Summers County, WV)

Sampling Date: 5/26/2016 Project Site Before Project

Subclass for this SAR:

Intermittent Stream

Uppermost stratum present at this SAR: SAR number:

Shrub/Herb Strata

Functional Results Summary: Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.72
Biogeochemical Cycling	0.48
Habitat	0.28

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.	2.80	0.75
V _{SUBSTRATE}	Median stream channel substrate particle size.	0.50	0.25
V _{BERO}	Total percent of eroded stream channel bank.	60.00	0.75
V_{LWD}	Number of down woody stems per 100 feet of stream.	5.00	0.63
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.	1.00	0.02
V _{SRICH}	Riparian vegetation species richness.	0.00	0.00
V _{DETRITUS}	Average percent cover of leaves, sticks, etc.	5.00	0.06
V _{HERB}	Average percent cover of herbaceous vegetation.	23.64	0.32
V _{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.98	1.00

Field Data Sheet and Calculator Team: C. Vileno, J. McGuirk, A. Mengel Project Name: MVP Location: S-I12 (Summers County, WV) 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 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 rourequidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less that 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) List the percent cover measurements at each point below: 20 20 20 20 20 20 0 0 0 0 0 0 0 0 0 0	797 16 V Not Used, <20%										
Project Name: MVP Location: S-I12 (Summers County, WV) 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 rougequidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less the 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) List the percent cover measurements at each point below: 20 20 20 20 20 20 0 0 0 0 0 0 0 0 0 0	797 16 V Not Used, <20%										
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 Reach Length (ft): Project Site Refore Project Sample Variables 1-4 in stream channel Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 rouge equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less the 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) List the percent cover measurements at each point below: 20 20 20 20 20 0 0 0 0 0 0 0 0 0 0 0 0	Not Used, <20%										
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 Reach Length (ft): Sample Variables 1-4 in stream channel V _{CCANOPY} Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 rour equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less that 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) List the percent cover measurements at each point below: 20 20 20 20 20 20 0 0 0 0 0 0 0 0 0 0	Not Used, <20%										
Top Strata: Shrub/Herb Strata (determined from percent calculated in V _{CCANOPY}) Site and Timing: Project Site Project Site Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 rouge equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less that 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) List the percent cover measurements at each point below: 20	Not Used, <20%										
Site and Timing: Project Site	Not Used, <20%										
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 rouse equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less that 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) List the percent cover measurements at each point below: 20 20 20 20 20 20 0 0 0 0 0 0 0 0 0 0	Not Used, <20%										
Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 rouse equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less that 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) List the percent cover measurements at each point below: 20	Not Used, <20%										
equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less that 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) List the percent cover measurements at each point below: 20	Not Used, <20%										
20 20 20 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0	OI										
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 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, a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and	OI										
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 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, a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and	OI										
points along the stream. Select a particle from the bed. Before moving it, determine the percentage 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, a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and	OI										
according to the following table. If the bed is an artificial surface, or composed of fine sediments, a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and	se										
a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and	se										
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											
List the ratings at each point below:											
4 4 4 4 4 4 4 4 4 4											
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3											
3 3 3 3 3 3 3 3 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 per along the stream; use the same points and particles as used in V _{EMBED} .	nts 0.50 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):											
0.25											
0.25											
0.50											
0.50											
0.50											
Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on early side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream be up to 200%. Left Bank: 30 ft Right Bank: 30 ft											

Sampl	e Variables	5-9 within	the entire	riparian/buffer	djacent to the stream channel (25 feet from each bank).								
5	V_{LWD}	stream rea	ach. Enter t	dy stems (at leas the number from of stream will be	the ent	ire 50'-wid					5.0		
		Number of downed woody stems: 5 Average dbh of trees (measure only if V _{CCANOPY} tree/sapling cover is at least 20%). Trees are at least											
6	V_{TDBH}			(measure only if ameter. Enter to				at least 20%	b). Trees a	are at least	Not Used		
		List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:											
		or the street	Left Side					Right Side			Ì		
						2							
	\ /	N		4 4 1 1 1	00" (11)	100 (
7	V_{SNAG}			east 4" dbh and d the amount pe				. Enter num	iber of sna	igs on each	0.0		
			Left Side				Right Side:	(•				
8	V_{SSD}			nd shrubs (wood							1.0		
	only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream amount per 100 ft of stream will be calculated.									m, and the	1.0		
			Left Side				Right Side:	(
9	V_{SRICH}			oecies richness լ stratum. Check							0.00		
				and the subinde					iii Strata. V	opecies -	0.00		
		Grou	up 1 = 1.0										
✓	Acer rubru	ım		Magnolia tripet	ala		Ailanthus a	ltissima		Lonicera ja	ponica		
	Acer sacci	harum		Nyssa sylvatica	a		Albizia julib	rissin		Lonicera ta	itarica		
	Aesculus f	flava		Oxydendrum arb	oreum	V	Alliaria peti	olata	V	Lotus corn	iculatus		
	Asimina tri	iloba		Prunus serotin	а		Alternanthe	era		Lythrum sa	licaria		
	Betula alleg	ghaniensis		Quercus alba			philoxeroid	es	V	Microstegiun	n vimineum		
	Betula lent	ta		Quercus cocci	nea		Aster tatari	icus		Paulownia	tomentosa		
	Carya alba	3		Quercus imbrio	aria		Cerastium	fontanum		Polygonum d	uspidatum		
	Carya glal	ora		Quercus prinus	6	V	Coronilla va	aria		Pueraria m	ontana		
	Carya ova	lis		Quercus rubra			Elaeagnus u	mbellata	V	Rosa multii	flora		
	Carya ova	ta		Quercus veluti	na		Lespedeza	bicolor		Sorghum h	alepense		
	Cornus flo	rida		Sassafras albio	dum		Lespedeza	cuneata		Verbena bi	rasiliensis		
	Fagus gra	ndifolia		Tilia americana	<u> </u>		Ligustrum ob						
	Fraxinus a			Tsuga canade			Ligustrum s						
	Liriodendron			Ulmus america			•						
	Magnolia a	•	_										
				<u> </u>						_			
		1	Species in	Group 1				5	Species in	Group 2			

-				•	•		n) in the rip each side of			nin 25 feet 1	from each
10	V _{DETRITUS}	Average pe	ercent cover	of leaves,	sticks, or otl	her organic	material. Writal layer at	oody debri/	s <4" diame	ter and	5.00 %
			Left	Side			Right	Side			
		0	0	0	0	10	10	10	10		
44	W	A				-4-4: (4	i- 000() [2	
11	V _{HERB}	include woo	ody stems a tation perce	at least 4" d entages up t	bh and 36" t	tall. Becaus	easure only if se there may pted. Enter	be several	layers of gr	ound	24 %
				Side			Right	Side			
		0	0	0	0	20	30	0	0		
		80	80			50					
Sample		2 within th	e entire ca	tchment of	the strean	n.					
12	V _{WLUSE}	Weighted A	Average of F	Runoff Scor	e for waters	hed:					0.98
	Land Use (Choose From Drop List)									% in Catch- ment	Running Percent (not >100)
	Gravel Forest and native range (>75% ground cover)								0	2	2
									1	98	100
	-							~			
								_			
	_										
								~			
	Su	mmary						tes:			
Va	ariable	Value	VSI	Evaluted	section of	stream aln	nost entirely	y within roa	adway and	or roadwa	y ROW.
V _c	CANOPY	Not Used, <20%	Not Used								
VE	MBED	2.8	0.75								
Vs	UBSTRATE	0.50 in	0.25								
V_{B}	ERO	60 %	0.75								
VL	WD	5.0	0.63								
V _T	DBH	Not Used	Not Used								
Vs	NAG	0.0	0.10								
Vs	SD	1.0	0.02								
Vs	RICH	0.00	0.00								
	ETRITUS	5.0 %	0.06								
	ERB	24 %	0.32								
Vw	LUSE	0.98	1.00								

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

STREAM NAME S-I12	LOCATION Summers County				
STATION # RIVERMILE	STREAM CLASS Intermittent				
Lat <u>37.775891</u> long <u>-80.710797</u>	RIVER BASIN Lower New				
STORET#	AGENCY Tetra Tech				
INVESTIGATORS C. Vileno, J. McGuirk, A	Mengel				
FORM COMPLETED BY	DATE 05/26/2016 TIME 11/15	REASON FOR SURVEY			
A. Mengel	11:15	SWVM			

	Habitat		Condition	ı Category			
	Parameter	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		
n sampling reach	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.		
ted in	SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
Parameters to be evaluated in sampling reach	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).		
ıram	SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
Par	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 15	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		Condition	Category			
	Parameter	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 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
ling reach	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.		
samp	SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
Parameters to be evaluated broader than sampling reach	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.		
e ev	SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0		
to b	SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0		
Parameter	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 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 104

Insects	Count	Tolerance	TV	Insects	Count	Tolerance	TV	Non-Insects	Count	Tolerance	TV	Ţ	
Ephemeroptera			3	Odonata	•	II.	4	Crustacea	1		17	†	
Ameletidae		2	0	Aeshnidae		3	0	Asellidae	17	7	119	Ť	
Baetidae		4	0	Calopterygidae		6	0	Cambaridae		5	0		
Beatiscidae		4	0	Coenagrionidae	4	7	28	Gammaridae		5	0		
Caenidae		5	0	Cordulegastridae		3	0	Palaemonidae		5	0		
Ephemerellidae		3	0	Gomphidae		5	0	Annelida	·	•	0		
Ephemeridae		5	0	Lestidae		7	0	Hirudinea		10	0		
Heptageniidae		3	0	Libellulidae		7	0	Nematoda		10	0		
Isonychiidae		3	0	Coleoptera			0	Nematomorpha		10	0		
Leptophlebiidae	3	4	12	Chrysomelidae		7	0	Oligochaeta		10	0		
Potamanthidae		5	0	Dryopidae		5	0	Turbellaria	-	•	25		
Siphlonuridae		3	0	Dytiscidae		6	0	Turbellaria	25	7	175		
Tricorythidae		5	0	Elmidae		4	0	Bivalvia			0		
Plecoptera			4	Gyrinidae		5	0	Corbiculidae		6	0		
Capniidae		2	0	Haliplidae		7	0	Sphaeriidae		5	0		
Chloroperlidae		2	0	Hydrophilidae		7	0	Unionidae		4	0		
Leuctridae		2	0	Psephenidae		3	0	Gastropoda			0		
Nemouridae	2	2	4	Ptilodactylidae		5	0	Ancylidae		7	0		
Peltoperlidae		1	0	Hemiptera			0	Hydrobiidae		4	0		
Perlidae		1	0	Belostomatidae		8	0	Physidae 7		0			
Perlodidae		1	0	Corixidae		8	0	Planorbidae		5	0		
Pteronarcyidae		1	0	Gerridae		10	0	Pleuroceridae		5	0		
Taeniopterygidae	2	2	4	Hydrometridae		8	0	Viviparidae		5	0		
Trichoptera			0	Nepidae		8	0	Miscellaneous			0		
Brachycentridae		2	0	Notonectidae		8	0	Collembola		6	0		
Glossosomatidae		2	0	Megaloptera			0	Lepidoptera		5	0		
Helicopsychidae		3	0	Corydalidae		3	0	Neuroptera		5	0		
Hydropsychidae		5	0	Sialidae		6	0	Hydrachnidae		6	0		
Hydroptilidae		3	0	Diptera			52	Totals	Total r	number	105		
Lepidostomatidae		3	0	Athericidae		3	0	Totals	Total f	amilies	8		
Leptoceridae		3	0	Blephariceridae		2	0			Metric o	calculations		
Limnephilidae		4	0	Ceratopogonidae		8	0		Richnes	SS		Additional metri	cs
Molannidae		3	0	Chironomidae	50	9	450	Total Taxa		8	36.4	Ephemeroptera Taxa	1
Philopotamidae		4	0	Culicidae		10	0	EPT Taxa		3	23.1	Plecoptera Taxa	2
Phryganeidae		4	0	Dixidae		6	0		Toleran	ce		Trichoptera Taxa	0
Polycentropodidae		5	0	Empididae		7	0	Biotic Index		7.64	33.7	Long-lived Taxa	3
Psychomiidae		3	0	Psychodidae		8	0	% Tolerant		91.4	8.7	Odonata Taxa	1
Rhyacophilidae		3	0	Ptychopteridae		8	0	Composition			Diptera Taxa	2	
Uenoidae		2	0	Simuliidae		6	0	% EPT Abundance		6.7	7.4	COET Taxa	2
		erance Value	802	Stratiomyidae		10	0	% Dominance 47		47.6	65.5	% Sensitive	3.8
	rginia Save O			Syrphidae		10	0	% Net-spinners 0.0 NA			% Chironomidae	47.6	
601 57th Stre	et, SE, Charle	ston WV 253	304	Tabanidae		7	0	Stream Condition Index 29.1		29.1	% Clingers	6.7	
http://	/www.dep.w	v.gov/sos_		Tipulidae	2	5	10	Integrity R	ating	Po	or	More diversity meas	<u>sures</u>

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.



Photograph Direction SW

Comments:

STREAM ID S-I10	STREAM NAME UNT to Lick Creek					
LAT 37.772438 LONG -80.713785	DATE 04/16/2015					
CLIENT MVP	CLIENT MVP					
INVESTIGATORS RS, AH, MB						
FLOW REGIME Perennial — Intermittent ✓ Ephemeral —	WATER TYPE TNW — RPW ✓ NRPW —					

Perenniai		nt <u> </u>	erai rivvv	RPW —	NRPW —			
		F-4'4- 1			Ota			
			/leasurements k Width: <u>3.0 ft</u>		Stream Erosion None ✓ Moderate	Heavy		
		Top of Ban	ŭ		Artificial, Modified or Channelized			
		LB <u>10.0</u>	in RB <u>10.0</u>	<u>in</u>	<u>✓</u> YesNo			
CHANNEL FE	ATURES	Water Dep	th: 3.00 in		Dam PresentYes _	∠ No		
		Water Widt	h: 2.0 ft			<u>/ </u>		
		High Water	Mark: <u>3.0</u> ft		Sinuosity <u>v</u> Low	Medium High		
		Flow Direct	tion: SW		Gradient			
					Flat Moderate _	✓ Severe		
					, , ,	(10 ft/100 ft)		
		Water Pres			Proportion of Reach Representation Morphology Types	esented by Stream		
			r, stream bed dry bed moist		Riffle 40 % Run 40	%		
		Standing			Pool 20 %			
FLOW CHARACTER	ISTICS	Flowing	-					
					Turbidity Clear _✓ Slightly	turbidTurbid		
		Velocity <u>✓</u> Fast	Moderate		OpaqueStained			
		Slow	Moderate		Other			
INOR	GANIC SUB	STRATE CO	MPONENTS	0	RGANIC SUBSTRATE COM	//PONENTS		
	(should	add up to 10	0%)	(0	p to 100%)			
Substrate Type	Diame	eter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area		
Bedrock			5	Detritue	sticks, wood, coarse			
Boulder	> 256	mm (10")	5	Detritus	plant materials (CPOM)	10		
Cobble	64-256 m	ım (2.5"-10")	15	Music Mud	black, very fine organic			
Gravel	2-64 mm	า (0.1"-2.5")	25	Muck-Mud	(FPOM)			
Sand	0.06-2r	mm (gritty) 20						
Silt	0.004-0	0.06 mm	06 mm 20		grey, shell fragments			
Clay	< 0.004	mm (slick)	10					
			ant Surrounding Lar		Indicate the dominant type			
		Forest	Commer		<u>✓</u> Trees Shrub			
		— Field/Pa			Grasses Herba	iceous		
WATERSHED		Other:	itesideli	liai	Floodplain Width			
FEATURES						rate 15-30ft		
		Canopy Co			✓ Narrow <16ft			
		Partiy o	ppen <u>v</u> Partly sh	aded	Wetland PresentYes	<u>✓</u> No		
		_Siladed	Open		Wetland ID			
					dominant species present			
AQUATIC VE	SETATION	— Rooted Floating	_	Rooted subme Attached algae	_	tingFree floating		
				Attacrica aiga				
MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER								
		'						
OBSERVATION NOTES								
110120								

USACE FILE NO./ Project Name: (v2.1, Sept 2015) Mountain Valley Pipeline Project SWVM v2.1			IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37.772437 L	on.	-80.713781	WEATHER:		DATE:	May 26, 2016
IMPACT STREAM/SITE ID AND SITE I (watershed size (acreage), unaltered or im		S-I10; UNT to Lick Cre Form of Mitigation	· · · · ·		MITIGATION STREAM CLASS/SIT (watershed size {acreage}, ur					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.	L	on.		PRECIPITATION PAST 48 HRS:		Mitigation Length:	
Column No. 1- Impact Existing Condition (Debit)	Column No. 2- Mitigation Existing Co	ndition - Baseline (Credit)		Column No. 3- Mitigation Project Post Completion (C		Years	Column No. 4- Mitigation Proje Post Completion (0		Column No. 5- Mitigation Project	ed at Maturity (Credit)
Stream Classification: Int	ermittent	Stream Classification:	Intermittent		Stream Classification:	Inte	ermittent	Stream Classification:	Intermittent	Stream Classification:	Intermittent
Percent Stream Channel Slope	3	Percent Stream Channel Slop	е		Percent Stream Channel Slope)	0	Percent Stream Channel Sic	ope 0	Percent Stream Channel SI	ope 0
HGM Score (attach data forms):		HGM Score (attach da	ata forms):		HGM Score (attach dat	ta forms):		HGM Score (attach da	ta forms):	HGM Score (attach da	ata forms):
	Average		Average				Average	. 1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	Average		Average
Hydrology 0.69 Biogeochemical Cycling 0.5 Habitat 0.35	0	Hydrology Biogeochemical Cycling	0		Hydrology Biogeochemical Cycling		0	Hydrology Biogeochemical Cycling	0	Hydrology Biogeochemical Cycling Habitat	0
PART I - Physical, Chemical and Biological Ir		Habitat PART I - Physical, Chemical and	_		PART I - Physical, Chemical and E	_	dicators	PART I - Physical, Chemical and	Biological Indicators	PART I - Physical, Chemical and	_
Points Scale Re	nge Site Score		Points Scale Range Site Score		Pc	pints 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 cla	assifications)		PHYSICAL INDICATOR (Applies to all streams cla	ssifications)		PHYSICAL INDICATOR (Applies to all streams	classifications)	PHYSICAL INDICATOR (Applies to all streams	classifications)
USEPA RBP (High Gradient Data Sheet)	16 5 16 10 10 10 15 0.575	USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermittent at WVDEP Water Quality Indicators (General) Specific Conductivity DH DO Sub-Total	0-20 0-30 0-40		2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermittent ar WVDEP Water Quality Indicators (General) Specific Conductivity DO	0-20 0-30 0-40	O O O O O O O O O O O O O O O O O O O	USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermitten WVDEP Water Quality Indicators (General) Specific Conductivity DO Sub-Total	·	USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermitter WVDEP Water Quality Indicators (General Specific Conductivity PH DO	•
BIOLOGICAL INDICATOR (Applies to Intermittent and Perer	nial Streams)	BIOLOGICAL INDICATOR (Applies to Intermitter	nt and Perennial Streams)		BIOLOGICAL INDICATOR (Applies to Intermitte	nt and Perenr	nial Streams)	BIOLOGICAL INDICATOR (Applies to Interm	ittent and Perennial Streams)	BIOLOGICAL INDICATOR (Applies to Interm	ittent 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 C	0	Sub-Total	0-100 0-1		Sub-Total	0-100 0-1	0	Sub-Total	0-100 0-1	Sub-Total	0-100 0-1
PART II - Index and Unit Score	·	PART II - Index and U	nit Score	-]	PART II - Index and Un	nit Score		PART II - Index and U	nit Score	PART II - Index and U	nit Score
Index Linear Fe	et Unit Score	Index	Linear Feet Unit Score		Index	Linear Feet	Unit Score	Index	Linear Feet Unit Score	Index	Linear Feet Unit Score
0.688 26	17.875	0	0 0]	0	0	0	0	0 0	0	0 0

PART III - Impact Factors

		(See manuchon pa	age to misert delau	it values for Willigation	DANKING and IL	<u> </u>			
	oral Loss-Construction	(/d=h2) - and - and - frame for a first and - a			0/ 0 11 84''		term Protection	T D (() ()	
*Note: Reflects duration of aquatic functional loss	mitigation (credit).	t (debit) and completion of compensatory			% Add. Mitigation	on and Monitoring Period	Long-	Term Protection (Years)	
	·····gation (or oaily)								
Years		0							
Sub-Total		0							
	mporal Loss-Maturity					0 Year Monitoring		101	
*Note: Period between completion of compensator function (i.e. maturity of tree stratum to provide					Sub-Total			U	
Tundion (i.e. maturity of tree stratum to provide	corridor).	minin riparian sucam or wedana banci				DAPT IV - Index	to Unit Score Con	vorsion	
	,				Final Index Coope				
% Add. Mitigation		Temporal Loss-Maturity (Years)			Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit	l Inita)
76 Add. Willigation		Temporal Loss-Maturity (Tears)							
					0.6875	26	17.875	\$14,300.00	
0%		0							
Sub-Total		0							
		PART V	- Comparison of U	nit Scores and Projected	d Balance				
		.,,,,,,			u Bululioo				
Final Unit Score (Debit)		Mitigation Existing		Mitigation Projected at		Mitigation Projected at Ten		Mitigation Projected At	
[No Net Loss Value]	17.875	Condition - Baseline		Five Years		Years		Maturity	
[NO Net 2033 Value]		(Credit)		Post Completion (Credit)		Post Completion (Credit)		(Credit)	
FINAL PROJECTED NET BALANCE							0		0
					0		0		0
		P	Part VI - Mitigation (Considerations (Incentiv	ves)				
		·	art tr inningation (
	Extent of Stream Re					Extended	Upland Buffer Zone		
	nal handout to determine the co Place an "X" in the appropriate o	orrect Restoration Levels (below) for your processory (only select one)	oject		*Note ¹ : Referen	ce Instructional handout for the def			(below)
Notez. I	I	satisfies (only select one).				*Note ² : Enter the buffer width for			
☐ Restoration Level 1						*Note ³ : Select th	e appropriate mitigation	type	
Restoration Level 2					Buffer Width		Left Bank		
Restoration Level 3					Barror Wiatri				
Nesionation Level 5						0-50		None	
					D (()A().	51-150	D: 14 D	None	
					Buffer Width	0-50	Right Banl	None	
Compensatory Mitigation Plan incorpo	orates HLIC 12-hased water	rshed approach? (Ves or No)]		51-150		None	
*Note: HUC 12-based watershed			No		Average Buffer			TYONG	
				1	Width/Side	0			
				Ţ					
Site		Impact	Mitigation Unit					ght Preservation Ratio	
		Unit Yield (Debit)	Yield (Credit)					(v2.1, Sept 2015)	
		<u> </u>							
S-I10		17.875	#DIV/0!			Final Mitigation Unit Yield			
				I		#DIV/0!			

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

To ensure accurate calculations, the <u>UPPERMOST STRATUM</u> 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-I10 (Summers County, WV)

Sampling Date: 05/26/2016 Project Site Before Project

Subclass for this SAR:

Intermittent Stream

Uppermost stratum present at this SAR: SAR number:

Shrub/Herb Strata

Functional Results Summary: Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.69
Biogeochemical Cycling	0.50
Habitat	0.35

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.	2.94	0.80
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.	2.00	0.25
V_{TDBH}	Average dbh of trees.	Not Used	Not Used
V _{SNAG}	Number of snags per 100 feet of stream.	1.00	1.00
V _{SSD}	Number of saplings and shrubs per 100 feet of stream.	10.00	0.15
V _{SRICH}	Riparian vegetation species richness.	1.80	0.86
V _{DETRITUS}	Average percent cover of leaves, sticks, etc.	3.75	0.05
V _{HERB}	Average percent cover of herbaceous vegetation.	36.25	0.48
V _{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.98	1.00

	High-G	radient l	Headwat		ms in ea Data She			_		tern Wes	st Virgini	а
	Toomi	C Vilono	L MaCuirle		Jala Sile	et and C	aicui			A Northing	27 772427	
Dra		C. Vileno,	J. MCGuirk,	A. Mengel			-			M Northing:		
PIC	oject Name:		G-I10 (Summers County, WV)						-	M Easting:		
		3-110 (Sull		•					Saiii	pling Date:	03/20/2010	
SA	AR Number:		Reach	Length (ft):	100	Stream T	ype:	Intermi	ittent Strean	n		•
	Top Strata:	Shi	rub/Herb Str	ata	(determine	d from perc	ent calc	culated	d in V _{CCANO}	_{DPY})		
Site	and Timing:	Project Site				•	Before P	Project				•
Sample	e Variables	1-4 in stream	am channe									
equidistant points along the stream. Measure only if tree/sabiling cover is at least 70%. If less than										Not Used, <20%		
	0	0	0	0	0	0	0		0	20	20	
	20	20	20	30	30	30	30		30	30	30	
2	V _{EMBED}	Average en points alon	nbeddednes g the strean	s of the stren. Select a	eam channe particle fror	el. Measure n the bed.	e at no fe Before r	ewer t movin	than 30 roung it, deterr	ughly equidi	stant rcentage of	2.9
		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. Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)										
		Rating	Rating Des	scription								
		5			covered, sur	rounded, o	r buried	by fin	ne sedimer	nt (or bedroo	ck)	
		4			ace covered							
		3			face covere							
		1			face covere						sial	
	l ist the reti	ings at each			covered, su	irrounded, (or buried	и бу п	ine seaime	in (or artino	Jai	
	2	2	2	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	3	3	3		3	3	3	
	3	3	3	3	3	3	3		3	3	3	
3		Median stre		l substrate	particle size	. Measure	at no fe		han 30 rou	_		1.00 in
		cle size in in					ow (bedr	rock s	should be o	counted as 9	99 in,	
		concrete as					4.00	o I	4.00	4.00	4.00	
	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	
	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	
	0.25	0.25	0.25	0.25	0.25	0.08	0.08		0.08	0.08	0.08	
	0.08	0.08	0.08	0.08	0.25	0.25	0.25		0.25	0.25	0.25	
	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	
4	V_{BERO}	•	ent of eroded e total perce to 200%.									40 %
		•	Left Bank:	20) ft	I	Right Ba	ank:	20) ft		

Sampl	e Variables	5-9 within	the entire	riparian/bu	ffer zone a	djacent to	the stream	channel (2	5 feet from	each bank).
5	V_{LWD}	stream rea	ch. Enter t		from the ent	ire 50'-wide	eter and 36 i buffer and v				2.0
							oody stems:		2		
6	V_{TDBH}						ing cover is	at least 20%	6). Trees a	re at least	Not Used
		,	•	ameter. En				- h			
		of the stream		nents of ind	ividual trees	(at least 4	in) within the	e butter on	each side		
		00 000	Left Side					Right Side			Ì
	5	6				7	7	2			
7	V_{SNAG}		• .			•	et of stream	. Enter nun	nber of sna	gs on each	4.0
		side of the	stream, an	d the amou	nt per 100 fe	et will be c	alculated.				1.0
			Left Side		1		Right Side:		0	·	
8	V_{SSD}						ches dbh) pe				400
		-		20%). Enter stream will b			d shrubs on	each side c	of the strear	n, and the	10.0
		amount po	Left Side		7		Right Side:	;	3		
9	V_{SRICH}						am reach. C				
							sive species I from these		all strata. S	Species	1.80
			p 1 = 1.0	and the ede	maox viii be	Caroaratoa	THOM thoo		2 (-1.0)		
V	Acer rubru			Magnolia t	ripetala		Ailanthus a	-		Lonicera ja	ponica
☑	Acer sacci	harum		Nyssa sylv	atica	l 🗆	Albizia julib	rissin		Lonicera ta	tarica
	Aesculus f	flava		Oxydendrun			Alliaria peti			Lotus corn	iculatus
	Asimina tri			Prunus se			Alternanthe			Lythrum sa	ilicaria
	Betula alleg			Quercus a			philoxeroide			Microstegiun	
	Betula lent			Quercus c			Aster tatari	icus		Paulownia	
	Carya alba			Quercus ir			Cerastium			Polygonum d	
	Carya glab			Quercus p			Coronilla va			Pueraria m	
			_	Quercus r						Rosa multii	
	Carya ova						Elaeagnus ui				
<u> </u>	Carya ova			Quercus v			Lespedeza			Sorghum h	-
	Cornus flo			Sassafras			Lespedeza			Verbena bi	rasiliensis
	Fagus gra			Tilia ameri			Ligustrum ob				
	Fraxinus a	mericana		Tsuga can	adensis		Ligustrum s	sinense			
	Liriodendron	tulipifera		Ulmus am	ericana						
	Magnolia a	acuminata									
		3	Species in	Group 1				1	Species in	Group 2	

	e Variables The four su									nin 25 feet	from each
10	V _{DETRITUS}				sticks, or oth					eter and	
	BETTATOO		re include.	Enter the p	ercent cove		rital layer at	each subpl		-	3.75 %
				Side				t Side			
		0	0	0	10	0	0	0	20		
11	V_{HERB}				aceous veg						
					bh and 36" t hrough 200'						36 %
		vegetation			mougn 200	% are accep	piea. Eniei	trie percent	cover or gr	- -	
			Left	Side				t Side			
		60	0	0	90	50	0	0	90		
Sample	e Variable 1	2 within th	e entire ca	tchment of	the stream).					
12	V _{WLUSE}				e for waters						
		_									0.98
			Land	Hea (Chaos	e From Dro	n Liet)			Runoff	% in Catch-	Running Percent
			Lanu	036 (011003	e Floiii Dio	ρ List)			Score	ment	(not >100)
	Gravel							~	0	2	2
	Forest and na	ative range (>	75% ground	cover)				-	1	98	100
								-			
								-			
								-			
								-			
								-			
								-			
	Su	mmary					No	tes:			
Va	ariable	Value	VSI								
V _c	CANOPY	Not Used, <20%	Not Used								
VE	MBED	2.9	0.80								
Vs	UBSTRATE	1.00 in	0.50								
V_{B}	ERO	40 %	0.86								
VL	WD	2.0	0.25								
V_{T}	DBH	Not Used	Not Used								
Vs	NAG	1.0	1.00								
Vs	SD	10.0	0.15								
Vs	RICH	1.80	0.86								
V_D	ETRITUS	3.8 %	0.05								
V_{H}	ERB	36 %	0.48								
V_{W}	LUSE	0.98	1.00								

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

STREAM NAME S-I10	LOCATION Summers County			
STATION # RIVERMILE	STREAM CLASS Intermitte	ent		
Lat <u>37.772437</u> Long <u>-80.713781</u>	RIVER BASIN Lower New	1		
STORET#	AGENCY Tetra Tech			
INVESTIGATORS C. Vileno, J. McGuirk, A	. Mengel			
FORM COMPLETED BY C. Vileno	DATE 05/26/2016 TIME 9:30	REASON FOR SURVEY SWVM		

	Habitat		Condition	ı Category	
	Parameter	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 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
n sampling reach	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.
ted ir	SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Parameters to be evaluated in sampling reach	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).
ıram	SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
P	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 9	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		Condition	ı Category			
	Parameter	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 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
oling reach	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.		
samp	SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
Parameters to be evaluated broader than sampling reach	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.		
eva	SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0		
to be	SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0		
Parameters	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 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		

Total Score 115

No / low flow at time of survey. Unable to sample water quality or $\ensuremath{\mathbf{WVSCI}}$.



Photograph Direction SW

Comments:

STREAM ID S-K10	STREAM NAME UNT to Greenbrier River
LAT 37.675066 LONG -80.734473	DATE 04/14/2015
CLIENT MVP	PROJECT NAME MVP
INVESTIGATORS J. Hart, B. Czeck, N. Katsiał	iicas
FLOW REGIME Perennial Intermittent ✓ Ephemeral	WATER TYPE TNW RPW NRPW NRPW

i cicilliai—	<u> </u>	пс— приспи	ciai iiiw	111 77 —	INICI VV			
			Measurements k Width: 6.0 ft		Stream Erosion None Moderate	Heavy		
		Top of Ban	k Height:	f <u>t</u>	Artificial, Modified or Channelized Yes No			
CHANNEL FE	ATURES	Water Dept	th: <u>5.00 in</u> h: <u>2.5 ft</u>		Dam PresentYesv No			
		High Water	Mark: <u>2.5 ft</u>		Sinuosity <u>v</u> Low	Medium High		
		Flow Direct	tion: NW		Gradient			
					Flat	Severe (10 ft/100 ft)		
FLOW		Stream I	r, stream bed dry bed moist g water		Proportion of Reach Representations of Reach R	-		
CHARACTER	ISTICS	✓ Flowing Velocity Fast Slow	water ✓ Moderate		Turbidity Clear Slightly turbid Turbid Opaque Stained Other			
INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)				ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)				
Substrate Type	Diame	ter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area		
Bedrock				Detritus	sticks, wood, coarse			
Boulder		mm (10")			plant materials (CPOM)	20		
Cobble Gravel		m (2.5"-10")	15 15	Muck-Mud	black, very fine organic (FPOM)			
Sand		nm (gritty)	10		()			
Silt		0.06 mm	30	Marl	grey, shell fragments			
Clay	< 0.004	mm (slick)	30					
WATERSHED FEATURES		Predominant Surrounding Landuse Forest Commercial Field/Pasture Industrial Agricultural Residential Other: Canopy Cover Partly open			✓ Narrow <16ft	s ceous		
		Shaded		d record the	Wetland PresentYes Wetland ID dominant species present	<u>✓</u> No		
AQUATIC VE	GETATION		emergent	Rooted subme Attached algae	ergentRooted float	ingFree floating		
		Drains from	ditch adjacent to acc	ess road on th	he north side of railroad track	s. Sampled during		

MACROINVERTEBRATES OR OTHER WILDLIFE OBSERVED/OTHER OBSERVATIONS AND NOTES	Drains from ditch adjacent to access road on the north side of railroad tracks. Sampled during heavy rain and high flows. Water is black in color at time of sampling (coal from trains?). Crosses road and loses structure for short stretch within ATWS.
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USACE FILE NO./ Project Name: Mo (v2.1, Sept 2015)	Intain Valley Pipeline Project SWVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37.675070 L	on.	-80.734447	WEATHER:	Rain, 50°	DATE:	November 9, 2016
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)	,	er River; 10.96ac watershed		MITIGATION STREAM CLASS./SITI (watershed size {acreage}, un					Comments:	No/low water flow at time of survey. Unable to sample water quality or WVSCI
STREAM IMPACT LENGTH: 31 FORM MITIGA		MIT COORDINATES: (in Decimal Degrees)	Lat.	L	on.		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 Project Post Completion (C		e Years	Column No. 4- Mitigation Project Post Completion (C		Column No. 5- Mitigation Project	ted at Maturity (Credit)
Stream Classification: Intermittent	Stream Classification:	Intermittent		Stream Classification:	ı	ntermittent	Stream Classification:	Intermittent	Stream Classification:	Intermittent
Percent Stream Channel Slope 8	Percent Stream Channel S	lope		Percent Stream Channel Slope		0	Percent Stream Channel Slo	pe 0	Percent Stream Channel	Slope 0
HGM Score (attach data forms):	HGM Score (attacl	data forms):		HGM Score (attach dat	a forms):		HGM Score (attach dat	a forms):	HGM Score (attach	data forms):
Hydrology	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical a	0		Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and B		0	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and B	0	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical an	0
Points Scale Range Site Score		Points Scale Range Site Score			ints Scale Ra	nge Site Score		Points Scale Range Site Score		Points Scale Range Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)	PHYSICAL INDICATOR (Applies to all stream			PHYSICAL INDICATOR (Applies to all streams class	sifications)		PHYSICAL INDICATOR (Applies to all streams of	classifications)	PHYSICAL INDICATOR (Applies to all stream	
SEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover	USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermitted)	· ·		2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermittent an	0-20 0-20	O O Streams)	USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermittent	0-20 0-20 0-20 0-20 0-20 0-20 0-20 0-20 0-20 0-20 0-20 Poor 0	USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermit	
WVDEP Water Quality Indicators (General) Specific Conductivity 100-199 - 85 points PH 5.6-5.9 = 45 points DO 10-30 Sub-Total	WVDEP Water Quality Indicators (General Specific Conductivity PH DO Sub-Total	0-90 5-90 0-1		pH DO	0-90 5-90	-1 5-6	WVDEP Water Quality Indicators (General) Specific Conductivity PH DO Sub-Total	0-90 5-90 0-1	WVDEP Water Quality Indicators (General Specific Conductivity PH DO Sub-Total	0-90 5-90 0-1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)	BIOLOGICAL INDICATOR (Applies to Interm	ittent and Perennial Streams)		BIOLOGICAL INDICATOR (Applies to Intermitted	nt and Pere	nnial Streams)	BIOLOGICAL INDICATOR (Applies to Intermi	ttent and Perennial Streams)	BIOLOGICAL INDICATOR (Applies to Inter	mittent and Perennial Streams)
WV Stream Condition Index (WVSCI) 0 0-100 0-1 Sub-Total 0	WV Stream Condition Index (WVSCI) Sub-Total	0-100 0-1 0		WV Stream Condition Index (WVSCI) Sub-Total	D-100 0	-1 0	WV Stream Condition Index (WVSCI) Sub-Total	0-100 0-1 0	WV Stream Condition Index (WVSCI) Sub-Total	0-100 0-1 0
PART II - Index and Unit Score	PART II - Index an			PART II - Index and Un			PART II - Index and Un		PART II - Index and	
Index Linear Feet Unit Score	Index	Linear Feet Unit Score		Index	Linear Fe	et Unit Score	Index	Linear Feet Unit Score	Index	Linear Feet Unit Score
0.368 31 11.40541667	0	0 0		0	0	0	0	0 0	0	0 0

		(See instruction p		 Impact Factors It values for MITIGATIO 	N BANKING and I	LF)			
Temp	oral Loss-Construction	· · · · · · · · · · · · · · · · · · ·				Long	-term Protection		
*Note: Reflects duration of aquatic functional loss		ct (debit) and completion of compensatory			% Add. Mitigati	on and Monitoring Period		-Term Protection (Years)	
•	mitigation (credit).								
Years		0							
Sub-Total		0							
Tor	mporal Loss-Maturity				0 + 5/	10 Year Monitoring		101	
*Note: Period between completion of compensator		e time required for maturity, as it relates to			Sub-Total	. o . ca. m.c.m.g		0	
function (i.e. maturity of tree stratum to provide	e organic matter and detritus w	vithin riparian stream or wetland buffer				-			
	corridor).					PART IV - Index	to Unit Score Cor	nversion	
					Final Index Score	Linear Feet	Unit Score	ILF Costs	
% Add. Mitigation		Temporal Loss-Maturity (Years)			(Debit)		(Debit)	(Offsetting Debit	: Units)
					0.367916667	31	11.40541667	\$9,124.33	
					0.007.010001			40 ,121100	
0%		0							
Sub-Total		0							
		PART V	- Comparison of U	Init Scores and Projecte	d Balance				
					T			1	
		Battation at the Cartina		Battle of the Boots of the		Barrier at a se Brata at a Lat Tax		BRIGIT OF THE STREET	
Final Unit Score (Debit)	44 40544007	Mitigation Existing Condition - Baseline		Mitigation Projected at		Mitigation Projected at Ten		Mitigation Projected At	
[No Net Loss Value]	11.40541667			Five Years		Years		Maturity	
		(Credit)		Post Completion (Credit)		Post Completion (Credit)		(Credit)	
FINAL PROJECTED NET BALANCE					0		0		0
				•					
		P	art VI - Mitigation	Considerations (Incentiv	ves)				
	E 4 4 4 6 04 4 4 7 P								
	Extent of Stream Re					Extended	Upland Buffer Zone	e	
	nal nandout to determine the co Place an "X" in the appropriate of	correct Restoration Levels (below) for your pr	oject		*Note ¹ : Referer	nce Instructional handout for the def			s (below)
NOTEZ. I	I ace an X in the appropriate	category (only select one).				*Note ² : Enter the buffer width for			
Restoration Level 1						*Note ³ : Select th	ne appropriate mitigation	1 type	
Restoration Level 2				†			Left Dead	_	
					Buffer Width		Left Bank	<u> </u>	
Restoration Level 3						0-50		None	
				_		51-150		None	
					Buffer Width		Right Ban		
				•		0-50		None	
Compensatory Mitigation Plan incorpo			Ma		Average Buffer	51-150		None	
*Note: HUC 12-based watershed	approach required to obtain Strea	am Restoration incentive	No		Width/Side	0			
			Batela esta de la la	1				light Description Dati	
Site		Impact	Mitigation Unit				Stra	ight Preservation Ratio	
		Unit Yield (Debit)	Yield (Credit)					(v2.1, Sept 2015)	
S-K10		11.40541667	#DIV/0!	1		Final Mitigation Unit Yield			
				J		#DIV/0!			

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

To ensure accurate calculations, the <u>UPPERMOST STRATUM</u> 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-K10 (Summers County, WV)

Sampling Date: 11/09/2016 Project Site Before Project

Subclass for this SAR:

Intermittent Stream

Uppermost stratum present at this SAR: SAR number:

Shrub/Herb Strata

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.44
Biogeochemical Cycling	0.17
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.	1.00	0.10
V _{SUBSTRATE}	Median stream channel substrate particle size.	0.08	0.04
V _{BERO}	Total percent of eroded stream channel bank.	30.00	0.91
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.	20.00	0.24
V _{HERB}	Average percent cover of herbaceous vegetation.	118.75	1.00
V _{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.81	0.85

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia Field Data Sheet and Calculator											
	Team:	C. Vileno, C	C. Stoliker				Latitude/UTM Northing: 37.675070				
Pro	oject Name:	MVP					Longitude/UTM Easting: -80.734447				
-			nmers Cour	ity, WV)			Sampling Date: 11/09/2016				
SAR Number:			Reach	Length (ft):	100	Stream Ty	/pe: Inter	mittent Stream	m		•
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}	equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20% INC									Not Used, <20%
	List the per	cent cover r	neasuremer	nts at each p	oint below:						
	0										
2	along the stream. Select a particle from the bed. Before moving it, determine the percentage of the								1.0		
	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.										
	Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)										
	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 rati	ngs at each	point below	:							
	1	1	1	1	1	1	1	1	1	1	
	1	1	1	1	1	1	1	1	1	1	
	1	1	1	1	1	1	1	1	1	1	
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} .									0.08 in	
	Enter partic	le size in in	ches to the i	nearest 0.1	inch at each	point below	(bedrock s	hould be co	unted as 99	in, asphalt	
	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%.									30 %		
		αρ to 200%	Left Bank:	1	5 ft		Right Bank:	15	5 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					ī						
		Left Side										
7	V_{SNAG}	Number of	snags (at le	ast 4" dbh a	ind 36" tall)	per 100 feet	t of stream.	Enter numb	er of snags	on each		
	SIVIG				t per 100 fee				J		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 (mea tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the											
	per 100 ft of stream will be calculated.					ie oi trie str	eam, and me	e amount	0.0			
			Left Side:		0		Right Side:		0	'		
9	V _{SRICH} Riparian vegetation species richness per 100 f											
	Group 1 in the tallest stratum. Check all exotic richness per 100 feet and the subindex will be or								strata. Spe	ecies	0.00	
			ıp 1 = 1.0									
	Acer rubrum		Ш	Magnolia tripetala			Ailanthus altissima			2 (-1.0) Lonicera ja		
	Acer sacci	Acer saccharum		Nyssa sylvatica			Albizia julib	orissin		Lonicera tatarica		
	Aesculus	Aesculus flava		Oxydendrum arboreum		Ш	Alliaria petiolata			Lotus corniculatus		
Ш	Asimina tr	Asimina triloba		Prunus serotina		☐ Alternanthera			Lythrum salicaria			
	Betula alleghaniensis			Quercus alba			philoxeroides			Microstegium vimineum		
Ш	Betula lenta			Quercus coccinea			Aster tataricus			Paulownia tomentosa		
Ш	Carya alba			Quercus imbricaria			Cerastium fontanum			Polygonum cuspidatu		
	Carya glabra			Quercus prinus			Coronilla varia			Pueraria montana		
Ш	Carya ovalis			Quercus rubra			Elaeagnus umbellata			Rosa multiflora		
Ш	Carya ovata			Quercus velutina			Lespedeza bicolor			Sorghum halepense		
	Cornus florida			Sassafras albidum			Lespedeza cuneata			Verbena brasiliensis		
Ш	Fagus gra	Fagus grandifolia		Tilia americana			Ligustrum ob					
Ш	Fraxinus a	americana		Tsuga can	adensis		Ligustrum s	sinense				
	Liriodendro	n tulipifera		Ulmus ame			=					
	Magnolia a	•										
		0	Species in	Group 1				0	Species in	Group 2		

	le Variables The four sul								one within	25 feet fron	n each
10	$V_{DETRITUS}$				sticks, or other				4" diamete	r and <36"	20.00 %
		long are inc		Side	it cover or the	e detilital lay		Side		1	
		20	20	20	20	20	20	20	20	1	
4.4	.,								000()		
11	V_{HERB}				aceous vege oh and 36" ta						440.0/
		include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cove vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation									119 %
		each subplo		Side			Righ	Side		1	
		100	110	120	130	120	130	140	100		
Samp	le Variable 1										
12	V_{WLUSE}	Weighted A	verage of R	tunoff Score	e for watersh	ed:					0.81
									Runoff	% in Catch	Running
	Land Use (Choose From Drop List)									ment	Percent (not >100)
	Forest and native range (>75% ground cover) Residential districts, 1/4 - 1/3 ac (38% to 30% cover) Open space (pasture, lawns, parks, etc.), grass cover >75%								1	75	75
									0.1	10	85
									0.3	15	100
								•			
								•			
								•			
								•			
	-							•			
	Su	ımmary					No	tes:			
\	/ariable	Value	VSI								
V	CCANOPY	Not Used, <20%	Not Used								
V	EMBED	1.0	0.10								
V,	SUBSTRATE	0.08 in	0.04								
V	BERO	30 %	0.91								
Vı	LWD	0.0	0.00								
V	ГДВН	Not Used	Not Used								
V,	SNAG	0.0	0.10								
V,	SSD	0.0	0.00								
V,	SRICH	0.00	0.00								
V	DETRITUS	20.0 %	0.24								
V	HERB	119 %	1.00								
٧v	WLUSE	0.81	0.85								

STREAM NAME S-K10	LOCATION Summers Co., WV				
STATION # RIVERMILE	STREAM CLASS Intermittent				
Lat <u>37.675070</u> long <u>-80.734447</u>	RIVER BASIN Little Muskingum-Middle Island				
STORET#	AGENCY Tetra Tech				
INVESTIGATORS C. Vileno, C. Stoliker					
FORM COMPLETED BY C. Vileno	DATE 11/09/2016 TIME 1:15pm	REASON FOR SURVEY SWVM			

	Habitat		Condition	ı Category			
	Parameter	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 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
n sampling reach	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.		
ted in	SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
Parameters to be evaluated in sampling reach	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).		
ıram	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
Par	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		

	Habitat		Condition	n Category				
	Parameter	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 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0			
ding reach	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.			
amp	score 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0			
Parameters to be evaluated broader than sampling reach	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.			
eva	SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0			
to be	SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0			
Parameters	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 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			
	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 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			

Total Score 41

Stream ID S-K4



Photograph Direction West

Date: <u>04/13/2015</u>

Comments: 2015 stream identification.



Photograph Direction NE

Date: 10/22/2019

Comments: 2019 stream identification confirmation.

STREAM ID S-K4	STREAM NAME UNT to Kelly Creek
LAT 37.665806 LONG -80.725709	DATE 04/13/2015
CLIENT MVP	PROJECT NAME MVP
INVESTIGATORS J. Hart, B. Czeck, N. Katsiat	ficas
FLOW REGIME Perennial Intermittent ✓ Ephemeral	WATER TYPE TNW RPW_✓ NRPW

Perenniai_	<u> </u>	nt <u> V Ephem</u> e	eral TNW	RPW <u>▼</u>	NRPW			
			Measurements		Stream ErosionNone _✓ Moderate	Новии		
		· ·	k Width: 2.0 in		INOTIEINTOGETALE	rieavy		
		Top of Ban	k Height:		Artificial, Modified or Char	nnelized		
		LB <u>6.0</u>	<u>in</u> RB <u>6.0</u>	<u>in</u>	Yes _ <u>√</u> No			
CHANNEL FE	ATURES	Water Dept	th: <u>1.50 in</u>		Dam Danasat Vas	/ Na		
	,,,,,,,,	Water Widt	h: <u>1.0 ft</u>		Dam PresentYes _✓ No			
		High Water	Mark: <u>18.0 in</u>		Sinuosity _/ Low	Medium High		
		Flow Direct	<u></u>		Cuadiant			
		l low Bileon			Gradient Flat _✓ Moderate _	Severe		
						(10 ft/100 ft)		
		Water Pres			Proportion of Reach Repre	sented by Stream		
			r, stream bed dry		Morphology Types Riffle 20 % Run 80	%		
		Stream by Standing			Pool % Kuii 80	70		
FLOW	IOTIOO	Flowing √	-		70			
CHARACTER	ISTICS	<u> </u>			Turbidity			
		Velocity			✓ Clear — Slightly — Opaque — Stained			
			Moderate		OpaqueStainedOther			
		✓ Slow		_				
INOR		STRATE CO			RGANIC SUBSTRATE CON does not necessarily add u			
Substrate		-	% Composition in	· ·	1	% Composition in		
Туре	I Diame		Sampling Reach	Туре	Characteristic	Sampling Area		
Bedrock			10	Detritus	sticks, wood, coarse			
Boulder		mm (10")	0	200.000	plant materials (CPOM)			
Cobble	64 - 256 m	m (2.5" - 10")	10	Muck-Mud	black, very fine organic			
Gravel	2-64 mm	ı (0.1" - 2.5")	20	maon mao	(FPOM)			
Sand	0.06-2n	nm (gritty)	10					
Silt	0.004-0	0.06 mm	20	Marl	grey, shell fragments			
Clay	< 0.004	mm (slick)	30					
			ant Surrounding Lar	nduse	Indicate the dominant type (Check one)			
		Forest	Commer astureIndustria		Trees Shrub Grasses Herba			
			turalResiden		Olasseslleiba	Ceous		
WATERSHED		Other:			Floodplain Width	45.00%		
FEATURES					Wide > 30ft Mode ✓ Narrow <16ft Mode	rate 15-30ft		
		Canopy Co		adad	<u>v</u> Nanow Toll			
		Shaded	ppen <u>√</u> Partly sh d Open	aueu		_✓_No		
					Wetland ID			
A OU A TIC VE	CETATION			d record the o Rooted subme	lominant species present ergent Rooted float	ting Free floating		
AQUATIC VE	SETATION	- Floating	_	Attached algae	_	ingi ree iloating		
				, mas, ea algai	-			
		l=f=====+!	Bata d an Abb &		ata adliantad in COAE TIL. 1			
					ata collected in 2015. The stance and OHWM was confirm			
MACROINVE	RTEBRATES		2 . 2 . 1 . 10 procented of	oa oani onan	3.14 3.111111 1140 0011111111			
OR OTHER								
WILDLIFE OBSERVED/C								
OBSERVATION NOTES	NS AND							

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

USACE FILE NO./ Project Name: (v2.1, Sept 2015)		Mounta	in Valley Pipeline Project SWVM v2.1	IMPACT COORDINATES (in Decimal Degrees)	Lat.	37.665806	Lon.	-80.725709	WEATHER:		Cloudy, 50	DATE:	June :	2, 2016	
IMPACT STREAM/SITE ID (watershed size {acreage}				creek; 6.5ac Watershed		MITIGATION STREAM CLAS: (watershed size {acre	S./SITE ID AND S age}, unaltered or impa					Comments:	of survey.	er flow at time v. Unable to ter quality or VSCI	
STREAM IMPACT LENGTH:	22	FORM OF MITIGATION		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48	B HRS:		Mitigation Length:			
Column No. 1- Impact Existin	g Condition (Del	bit)	Column No. 2- Mitigation Existing C	condition - Baseline (Credit)		Column No. 3- Mitigation Post Complet		Years		gation Projected at Ten Yo ompletion (Credit)	ears	Column No. 5- Mitigation Project	ed at Maturity (Credit)	
Stream Classification:	Intern	nittent	Stream Classification:	Intermittent		Stream Classification:	Inte	ermittent	Stream Classification:	Inter	mittent	Stream Classification:	Intern	mittent	
Percent Stream Channel S	оре	22	Percent Stream Channel SI	оре		Percent Stream Channel	Slope	0	Percent Stream C	channel Slope	0	Percent Stream Channel Slope		0	
HGM Score (attach o	ata forms):		HGM Score (attach	data forms):		HGM Score (atta	ch data forms):		HGM Score	(attach data forms):		HGM Score (attach d	ita forms):		
		Average		Average				Average			Average			Average	
Hydrology	0.23		Hydrology			Hydrology			Hydrology			Hydrology			
Biogeochemical Cycling Habitat	0.36	0.22	Biogeochemical Cycling Habitat	0		Biogeochemical Cycling Habitat		0	Biogeochemical Cycling Habitat		0	Biogeochemical Cycling Habitat		0	
PART I - Physical, Chemical and		cators	PART I - Physical, Chemical ar	d Biological Indicators		PART I - Physical, Chemical	I and Biological In	dicators		emical and Biological Ind	icators	PART I - Physical, Chemical and	Biological Indic	cators	
	Points Scale Range	Site Score		Points Scale Range Site Score			Points Scale Range	Site Score		Points Scale Range	e Site Score		Points Scale Range	e Site Score	
PHYSICAL INDICATOR (Applies to all stream	ns classifications)		PHYSICAL INDICATOR (Applies to all stream	s classifications)		PHYSICAL INDICATOR (Applies to all stre	eams classifications)		PHYSICAL INDICATOR (Applies	to all streams classifications))	PHYSICAL INDICATOR (Applies to all stream	s classifications)	'	
USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Shee	t)		USEPA RBP (High Gradient Da			USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	4	Epifaunal Substrate/Available Cover	0-20	-	1. Epifaunal Substrate/Available Cover	0-20		Epifaunal Substrate/Available			Epifaunal Substrate/Available Cover	0-20		
Embeddedness Velocity/ Depth Regime	0-20 0-20	5	Embeddedness Velocity/ Depth Regime	0-20 0-20	-	Embeddedness Velocity/ Depth Regime	0-20 0-20		Embeddedness Velocity/ Depth Regime	0-20 0-20		Embeddedness Velocity/ Depth Regime	0-20 0-20		
4. Sediment Deposition	0-20	5	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	8	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			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	4	9. Vegetative Protection (LB & RB)	0-20 0-20		Vegetative Protection (LB & RB) Riparian Vegetative Zone Width (LB & RE)	0-20 3) 0-20		Vegetative Protection (LB & R Riparian Vegetative Zone Width			9. Vegetative Protection (LB & RB)	0-20 0-20		
10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score	Poor	44	10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score	Poor 0		Total RBP Score	Poor	0	Total RBP Score	Poor	0	10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score	Poor	0	
Sub-Total		0.22	Sub-Total	0		Sub-Total		0	Sub-Total		0	Sub-Total		0	
CHEMICAL INDICATOR (Applies to Intermitt	ent and Perennial S	Streams)	CHEMICAL INDICATOR (Applies to Intermitte	nt and Perennial Streams)		CHEMICAL INDICATOR (Applies to Interm	nittent and Perennial	Streams)	CHEMICAL INDICATOR (Applies	s to Intermittent and Perennial	l Streams)	CHEMICAL INDICATOR (Applies to Intermitte	nt and Perennial S	Streams)	
WVDEP Water Quality Indicators (General	ıl)		WVDEP Water Quality Indicators (General)		WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicato	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			0-90			0-90			0-90			0-90		
pH			рН			рН			На			На			
	0-80 0-1			5-90 0-1			5-90 0-1	5.€		5-90 0-1			5-90 0-1		
5.6-5.9 = 45 points			DO			DO.			DO.			DO			
ВС	10-30		<u> </u>	10-30		<u>BO</u>	10-30		B0	10-30		ВО	10-30		
	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 Interm	ittent and Perennia	l Streams)	BIOLOGICAL INDICATOR (Applies to Intermi	tent and Perennial Streams)		BIOLOGICAL INDICATOR (Applies to Int	termittent and Peren	nial Streams)	BIOLOGICAL INDICATOR (App		nnial Streams)	BIOLOGICAL INDICATOR (Applies to Intern	ittent and Perenr	inial Streams)	
WV Stream Condition Index (WVSCI)	1 1		WV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)			WV Stream Condition Index (W			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 I	Jnit 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	
0.365	22	8.03	0	0 0		0	0	0	0	0	0	0	0	0	
<u> </u>			<u> </u>	<u> </u>		<u> </u>			<u> </u>	I		<u> </u>		1	

		(See instruction page		- Impact Factors It values for MITIGATIC	ON BANKING and I	LF)			
Temn	oral Loss-Construction	(Goo menuenen pe				<u> </u>	-term Protection		
*Note: Reflects duration of aquatic function	nal loss between the time of a	n impact (debit) and completion of			% Add. Mitigation	on and Monitoring Period		-Term Protection (Years)	1
compe	ensatory mitigation (credit).								
Years		0							
Sub-Total		0							
_								404	
*Note: Period between completion of compensate	mporal Loss-Maturity bry mitigation measures and the	ne time required for maturity, as it relates			0 + 5/1 Sub-Total	10 Year Monitoring		101 0	
to function (i.e. maturity of tree stratum to provide	le organic matter and detritus							<u> </u>	
	corridor).					PART IV - Index	to Unit Score Cor	nversion	
				Final Index Score	Linear Feet	Unit Score	ILF Costs		
% Add. Mitigation		Temporal Loss-Maturity (Years)			(Debit)		(Debit)	(Offsetting Debit	
					0.365	22	8.03	\$6,424.00	
0%		0							
Sub-Total		0							
		DADT V	Comparison of II	nit Scores and Projecte	nd Ralanco				
		FART	- Companison of C	ini ocores and Projecti	su Dalalice				
				Mitigation Projected at					
Final Unit Score (Debit)	0.00	Mitigation Existing		Five Years		Mitigation Projected at		Mitigation Projected	
[No Net Loss Value]	8.03	Condition - Baseline (Credit)		Post Completion		Ten Years Post Completion (Credit)		At Maturity (Credit)	
		(Crount)		(Credit)		i dot dompionom (drount)		(Ground)	
FINAL PROJECTED NET BALANCE							_		
					0		0		0
		Р	art VI - Mitigation (Considerations (Incenti	ves)				
				`	,				
	Extent of Stream Re	storation							
		orrect Restoration Levels (below) for your pr	oject		*Note ¹ : Reference	Extended ce Instructional handout for the def	Upland Buffer Zone		es (helow)
*Note2: F	Place an "X" in the appropriate	category (only select one).			Note : Reference	*Note ² : Enter the buffer width for			is (below)
Restoration Level 1						*Note ³ : Select th	ne appropriate mitigation	type	
Restoration Level 2					Buffer Width		Left Bank	(
Restoration Level 3						0-50		None	
L	<u> </u>			1		51-150		None	
					Buffer Width		Right Ban		
Compensatory Mitigation Plan incorpo	orates HIIC 12 based water	rehed approach? (Voc.or No.)		1		0-50 51-150		None None	
*Note: HUC 12-based watershed			No		Average Buffer			NOTIC	
				•	Width/Side	0			
			B#141 - 41 - 11 14]				lasht Dagoti D. ()	
Site		Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)				Stra	ight Preservation Ratio (v2.1, Sept 2015)	
		Office Field (Debit)	Tiela (Clealt)					(*2.1, Ocpt 2010)	
S-K4		8.03	#DIV/0!			Final Mitigation Unit Yield			
			<u> </u>	1		#DIV/0!			

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

To ensure accurate calculations, the <u>UPPERMOST STRATUM</u> 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-K4 (Summers County)

Sampling Date: 11/06/2019 Project Site Before Project

Subclass for this SAR:

Intermittent Stream

Uppermost stratum present at this SAR: SAR number:

Shrub/Herb Strata

Functional Results Summary: Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.23
Biogeochemical Cycling	0.36
Habitat	0.07

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.	3.00	0.82
V _{SUBSTRATE}	Median stream channel substrate particle size.	0.10	0.05
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.	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.	2.00	0.03
V _{SRICH}	Riparian vegetation species richness.	0.00	0.00
V _{DETRITUS}	Average percent cover of leaves, sticks, etc.	10.00	0.12
V _{HERB}	Average percent cover of herbaceous vegetation.	50.00	0.67
V _{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.42	0.44

	High-G	radient l	-leadwat		ms in ea Oata She			y and wes	tern Wes	t Virgini	а
	Team [.]	C. Vileno, F	R Aher	i icia L	outu Onc	ct and o	aioaic	Latitude/UT	M Northina	37 665807	
Pro	ject Name:		(17100)					Longitude/U	-		
	-		mers Count	v)			Sampling Date: 11/06/2019				
SA	R Number:			Length (ft):	100	Stream Ty	/pe:	ntermittent Strea			~
	Top Strata:	Shi	rub/Herb Str	ata	(determine	d from perce	ent calcu	ılated in V _{CCANO}	_{DPY})		
Site a	and Timing:	Project Site	N. Carlotte			-	Before P	roject			•
Sample	· Variables	1-4 in strea	m channel								
Eduluistatit politis alottu tile streatti. Measure ottiv ii tree/sapiittu covet is at least 20 /0. Til less tilati										Not Used, <20%	
į											1
	10	8	0	0	0						
		۸		£ () (1 14			1.1	1 1	
2	V_{EMBED}							wer than 30 rou oving it, determ			3.0
		the surface	and area s	urrounding t	he particle t	hat is cover	ed by fir	ne sediment, ar	nd enter the	rating	
		_		•				or composed of	f fine sedime	ents, use a	
			of 1. If the								
		Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)									
		Rating	Rating Des								
		5						by fine sedimen		k)	
		4						ied by fine sedi			,
		3						uried by fine securiced by fine securic			,
		1						by fine sedime		ial surface)	
	List the rati	ngs 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								ver than 30 rou	ghly equidis	tant points	0.10 in
		_	tream; use t								31.0
							w (bedro	ock shou l d be c	ounted as 9	9 in,	
			0.0 in, sand								
	0.10	0.10	0.10	0.10	0.10	0.10	0.10		0.10	0.10	
	0.10	0.10	0.10	0.10	0.10	0.10	0.10		0.10	0.10	
	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	
1	\/	Total paras	nt of crades	l etroom ob	annol book	Enter the t	otal num	ber of feet of e	rodod bank	on oach	
4	V_{BERO}	•	e total perce					eroded, total e			0 %
			Left Bank:	0	ft	Ī	Right Ba	nk: 0	ft		

Sampl	e Variables	5-9 within	the entire r	iparian/buf	fer zone ad	jacent to tl	ne stream c	hannel (25	feet from e	ach bank).		
5	V_{LWD}	stream rea	ch. Enter th		rom the enti		eter and 36 in buffer and v				0.0	
		•			Number of	f downed w	oody stems:		0			
6	V_{TDBH}				nly if V _{CCANOR} tree DBHs		ng cover is a	at least 20%	6). Trees ar	e at least 4	Not Used	
		List the dbl the stream		nents of indi	vidual trees	(at least 4	in) within the	buffer on e	each side of	'		
			Left Side			I		Right Side				
7	$V_{\sf SNAG}$				and 36" tall) nt per 100 fe		et of stream. alculated.	Enter num	nber of snag	s on each	0.0	
			Left Side:		0		Right Side:		0			
8	V_{SSD}						hes dbh) pe				0.0	
					per of sapiin e calculated		ubs on each	side of the	stream, and	i the	2.0	
		·	Left Side:		2		Right Side:		0		1	
9	V_{SRICH}						am reach. C ive species					
							from these		iii Sii ala. Of	Jecies .	0.00	
		Grou	ıp 1 = 1.0									
	Acer rubru	ım		Magnolia t	ripetala	34 · · ·	Ailanthus a	Iltissima	1	Lonicera ja	ponica	
	Acer sacc	harum		Nyssa sylv	vatica .	34-3	Albizia julib	orissin	34	Lonicera ta	tarica	
	Aesculus	flava		Oxydendrur	n arboreum		Alliaria peti	iolata	34	Lotus corni	culatus	
	Asimina tr	iloba	1	Prunus se	rotina	35-3	Alternanthe	era	34 3	Lythrum sa	licaria	
	Betula alle	ghaniensis		Quercus a	lba		philoxeroid	es	~	Microstegiun	n vimineum	
	Betula len	ta		Quercus c	occinea	34	Aster tatari	cus	34	Paulownia	tomentosa	
	Carya alba	э		Quercus in	nbricaria	25	Cerastium	fontanum	34	Polygonum d	cuspidatum	
	Carya glal	bra		Quercus p	rinus	25	Coronilla v	aria	35.	Pueraria m	ontana	
	Carya ova	lis		Quercus ru	ıbra	34 7	Elaeagnus u	ımbellata	4	Rosa multii	flora	
	Carya ova	ta		Quercus v	elutina	±	Lespedeza	bicolor	±	Sorghum h	alepense	
	Cornus flo	rida		Sassafras	albidum	j 🗀	Lespedeza	cuneata		Verbena br	asiliensis	
	Fagus gra	ndifolia		Tilia ameri	cana	()-1 ()-2	Ligustrum ol	btusifolium				
	Fraxinus a	mericana		Tsuga can	adensis	()-1 ()-2	Ligustrum :	sinense				
	Liriodendro	n tulipifera		Ulmus am	ericana							
G3	Magnolia a		-									
	<u>-</u>											
		1	Species in	Group 1				3	Species in	Group 2		

	e Variables The four sul									n 25 feet fro	om each
10		Average pe	rcent cover	of leaves,	sticks, or oth	ner organic r	material. W	oody debris	<4" diamet	er and	10.00 %
	Left Side Right Side				Side		'				
		10	10	10		10	10	10			
11	V_{HERB}	Average pe	rcentage co	over of herb	aceous veg	etation (mea	sure only if	tree cover	is <20%). D	o not	
					oh and 36" ta n 200% are						50 %
	vegetation percentages up through 200% are accepted. Enter the percent coverate each subplot.									• egetation	
		50	Left 50	Side		50		Side			
		50	50			50	50				
Sample	e Variable 1	2 within the	e entire cat	chment of	the stream.		•				
12	V _{WLUSE}	Weighted A	\verage of F	Runoff Score	e for watersl	ned:					0.42
			Land	Use (Choos	se From Dro	p List)			Runoff Score	% in Catch- ment	Running Percent (not >100)
	Open space	(pasture, lawr	ns, parks, etc.)	, grass cover	<50%			•	0.1	40	40
	Forest and n	ative range (5	60% to 75% g	round cover)	ÿ				0.7	40	80
	Forest and n	ative range (<	50% ground	cover)				~	0.5	20	100
								•			
								-			
								-			
								-			
	Su	mmary					No	tes:			
Va	ariable	Value	VSI								
Vc	CANOPY	Not Used, <20%	Not Used								
VEI	MBED	3.0	0.82								
Vsı	JBSTRATE	0.10 in	0.05								
V BI	ERO	0 %	1.00								
V _{LWD} 0.0 0.00											
V _{TDBH} Not Used Not Used											
V _{sı}		0.0	0.10								
Vs		2.0	0.03								
	RICH	0.00	0.00								
	ETRITUS	10.0 %	0.12								
	ERB	50 %	0.67								
	LUSE	0.42	0.44								

STREAM NAME S-K4	LOCATION Summers County				
STATION # RIVERMILE	STREAM CLASS Intermittent				
Lat <u>37.665807</u> long <u>-80.725708</u>	RIVER BASIN Hungard C	RIVER BASIN Hungard Creek-Greenbrier River			
STORET#	AGENCY Tetra Tech				
INVESTIGATORS CV, RA					
FORM COMPLETED BY	DATE 11/06/2019	REASON FOR SURVEY			
C.Vileno	TIME 4:00	Proposed pipeline			

	Habitat		Condition	Category		
	Parameter	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	
ı sampling reach	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.	
ted in	score 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
Parameters to be evaluated in sampling reach	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).	
ıram	score 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
Par	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 5	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		Condition	Category		
	Parameter	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	
ding reach	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.	
amp	score 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
Parameters to be evaluated broader than sampling reach	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.	
e ev	SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0	
s to b	SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0	
Parameter	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	

4.4	DO:
Total Score 44	pH:
	SC·

A-8



Photograph Direction $\underline{\text{NE}}$

Comments:

STREAM ID S-A63	STREAM NAME Slate Run
LAT 37.560504 LONG -80.71002	DATE 04/10/2015
CLIENT MVP	PROJECT NAME MVP
INVESTIGATORS Yarbrough, Stoliker, Heule	
FLOW REGIME	WATER TYPE
Perennial / Intermittent _ Ephemeral _	TNW RPW NRPW

Perennial -	_ Intermitte	nt <u> </u>	eral TNW	RPW <u>→</u>	NRPW		
			_				
			Measurements		Stream Erosion None ✓ Moderate	Незуу	
		·	k Width: 10.0 ft		None _v woderate	Tleavy	
		Top of Ban	ŭ		Artificial, Modified or Channelized		
		LB <u>31.0</u>	<u>in</u> RB <u>17.0</u>	<u>in</u>	Yes No		
CHANNEL FE	ATURES	Water Dep	th: 4.00 in		Dam Procent Vos	No	
OHANNELTEATOREO		Water Widt	h: <u>68.0 in</u>		Dam PresentYes _	<u> N</u> O	
		High Water	Mark: <u>16.0 in</u>		Sinuosity <u>v</u> Low	Medium High	
		Flow Direc	tion: SW		Gradient		
					Flat Moderate _		
					(0.5/100 ft (2 ft/100 ft)		
		Water Pres	sent r, stream bed dry		Proportion of Reach Representation Morphology Types	esented by Stream	
		Stream			Riffle 60 % Run 15	%	
FLOW		Standin			Pool 25 %		
CHARACTER	ISTICS	<u></u> Flowing	water		Turbidity		
		Velocity			ClearSlightly	turbidTurbid	
			Moderate		Opaque Stained		
		Slow			Other		
INOR			MPONENTS	_	RGANIC SUBSTRATE COM		
	(should a	add up to 10		,	does not necessarily add u	<u>'</u>	
Substrate Type	Diame	ter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area	
Bedrock				Detritus	sticks, wood, coarse		
Boulder		mm (10")	20	2011.100	plant materials (CPOM)		
Cobble		m (2.5"-10")	30	Muck-Mud	black, very fine organic		
Gravel		(0.1"-2.5")	30		(FPOM)		
Sand		nm (gritty)	20				
Silt		0.06 mm		Marl	grey, shell fragments		
Clay	< 0.004 i	mm (slick)			In all a set of the order of the section of the sec	(2)	
		✓ Forest	ant Surrounding Lar Commer		Indicate the dominant type ✓ Trees ✓ Shrub	(Check one)	
		_	astureIndustria		✓ Grasses Herba		
		Agricul	tural Residen		Floodulain Width		
WATERSHED FEATURES		Other:			Floodplain Width Wide > 30ft ✓ Mode	rate 15-30ft	
		Canopy Co	over		Narrow <16ft		
		Partly o	penPartly sh	aded	Walland Duranat Van	4 No	
		<u></u> ✓ Shaded	Open		Wetland PresentYes Wetland ID	<u>✓</u> No	
		Indicate th	e dominant type and	d record the d	lominant species present		
AQUATIC VE	GETATION			Rooted subme	<u> </u>	tingFree floating	
		Floatin	g algae	Attached algae	e		
		_					
		Perennial s	tream in forest, but no	ear a rural resi	dence.		
MACDOWN /=	TEDD 4 TEA	1					
MACROINVER OR OTHER	KIEBKAIES						
WILDLIFE OBSERVED/C	THER						
OBSERVATIO							
NOTES							
I		1					

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

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	Mountair	n Valley Pipeline Project SWVM v2.1		OORDINATES: mal Degrees)	Lat.	37.560504	Lon.	-80.710001	WEATHER:	C	loudy, 50	DATE:	June 2, 2016
	O AND SITE DESCRIPTION: , unaltered or impairments)	•	Slate Run on: Mitigation Ba	ınk		MITIGATION STREAM CLASS (watershed size {acrea						Comments:	No/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)		ORDINATES: mal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:			Mitigation Length:	
Column No. 1- Impact Existin	ng Condition (Debit)	Column No. 2- Mitigation Existing (Condition - Baselin	ne (Credit)		Column No. 3- Mitigation P Post Completic		Years	Column No. 4- Mitigation Proj Post Completion (rs	Column No. 5- Mitigation Project	cted at Maturity (Credit)
Stream Classification:	Perennial	Stream Classification:	Intern	nittent		Stream Classification:	Int	termittent	Stream Classification:	Interm	ittent	Stream Classification:	Intermittent
Percent Stream Channel S	•	Percent Stream Channel Si				Percent Stream Channel S	<u> </u>	0	Percent Stream Channel Si		0	Percent Stream Channel S	•
HGM Score (attach o	data forms):	HGM Score (attach	data forms):			HGM Score (attack	h data forms):		HGM Score (attach d	ata 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		PART I - Physical, Chemical ar	nd Biological Indic	ators		PART I - Physical, Chemical a			PART I - Physical, Chemical and	Biological Indica	ators	PART I - Physical, Chemical an	d Biological Indicators
	Points Scale Range Site Score		Points Scale Range	Site Score			Points Scale Rang	e Site Score		Points Scale Range	Site Score		Points Scale Range Site Score
PHYSICAL INDICATOR (Applies to all stream	ms classifications)	PHYSICAL INDICATOR (Applies to all stream	ns classifications)			PHYSICAL INDICATOR (Applies to all strea	•		PHYSICAL INDICATOR (Applies to all stream	ns classifications)		PHYSICAL INDICATOR (Applies to all strea	
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)	
Epifaunal Substrate/Available Cover Embeddedness	0-20 11 0-20 12	Epifaunal Substrate/Available Cover Embeddedness	0-20			Epifaunal Substrate/Available Cover Embeddedness	0-20 0-20		Epifaunal Substrate/Available Cover Embeddedness	0-20		Epifaunal Substrate/Available Cover 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		Velocity/ Depth Regime	0-20
4. Sediment Deposition	0-20	4. Sediment Deposition	0-20			Sediment Deposition	0-20		4. Sediment Deposition	0-20		4. Sediment Deposition	0-20
5. Channel Flow Status	0-20	5. Channel Flow Status	0-20 0-1			5. Channel Flow Status	0-20		5. Channel Flow Status	0-20 0-1		5. Channel Flow Status	0-20
6. Channel Alteration	0-20 0-1 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	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 14	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) Total RBP Score	0-20 14 93	10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score	0-20 Poor	0		10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score	0-20 Poor	0	10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score	0-20 Poor	0	10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score	0-20 0
Sub-Total	0.465	Sub-Total	POOI	0		Sub-Total	Pool	0	Sub-Total	F001	0	Sub-Total	0
CHEMICAL INDICATOR (Applies to Intermitt		CHEMICAL INDICATOR (Applies to Intermittee	ent and Perennial Stre			CHEMICAL INDICATOR (Applies to Intermit	tent and Perennial	-	CHEMICAL INDICATOR (Applies to Intermitte	ent and Perennial S		CHEMICAL INDICATOR (Applies to Intermit	
WVDEP Water Quality Indicators (General	ol)	WVDEP Water Quality Indicators (Genera	n			WVDEP Water Quality Indicators (Gener	nal)		WVDEP Water Quality Indicators (Genera	-I\		WVDEP Water Quality Indicators (Gener	
Specific Conductivity	ai)	Specific Conductivity	" <u>'</u>			Specific Conductivity	ai)		Specific Conductivity			Specific Conductivity	ai)
	0-90		0-90			,	0-90			0-90			0-90
100-199 - 85 points			1				1 2 2 2						
рн	0-1	рн	0-1			рн	0-1	5.6	рн	0-1		рн	0-1
5.6-5.9 = 45 points	0-80		5-90				5-90	5.0		5-90			5-90
DO		DO		11		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	
BIOLOGICAL INDICATOR (Applies to Interm	nittent and Perennial Streams)	BIOLOGICAL INDICATOR (Applies to Intermi	ittent and Perennial St	itreams)		BIOLOGICAL INDICATOR (Applies to Intel	rmittent and Pere	nnial Streams)	BIOLOGICAL INDICATOR (Applies to Intern	mittent and Perenn		BIOLOGICAL INDICATOR (Applies to Inte	rmittent 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)	
(**************************************	0-100 0-1		0-100 0-1				0-100 0-1			0-100 0-1			0-100 0-1
0			0 100 0 1				0.00			0 100 0 1			
Sub-Total	0	Sub-Total		0		Sub-Total		0	Sub-Total		0	Sub-Total	0
PART II - Index and I	Unit Score	PART II - Index and	I Unit Score			PART II - Index ar	d Unit Score		PART II - Index and U	Jnit Score		PART II - Index and	Unit Score
Index	Linear Feet Unit Score	Index	Linear Feet	Unit Score		Index	Linear Feet	t Unit Score	Index	Linear Feet	Unit Score	Index	Linear Feet Unit Score
0.633	25 15.8125	0	0	0		0	0	0	0	0	0	0	0 0
<u> </u>		<u> </u>							<u> </u>			<u> </u>	

		(See instruction n		- Impact Factors It values for MITIGATIC	ON BANKING and I	II F)			
Temn	oral Loss-Construction	(See monacion po	age to mocre acida	TO THE TOTAL TO THE		<u> </u>	-term Protection		
*Note: Reflects duration of aquatic function	al loss between the time of a	n impact (debit) and completion of			% Add. Mitigati	on and Monitoring Period		-Term Protection (Years)	
compe	ensatory mitigation (credit).								
Years		0							
Sub-Total		0							
Tor			0 + 5/	10 Year Monitoring		101			
*Note: Period between completion of compensato					Sub-Total	TO Fear Monitoring		0	
to function (i.e. maturity of tree stratum to provid	e organic matter and detritus corridor).	within riparian stream or wetland buffer						_	
	comaor).						to Unit Score Cor		
% Add. Mitigation		Temporal Loss-Maturity (Years)			Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit	
70 Add. Miligation		Temporal Loss-Maturity (Tears)				25			
					0.6325	25	15.8125	\$12,650.00	,
0%		0							
Sub-Total		0							
		PART V	- Comparison of U	nit Scores and Projecte	ed Balance				
				.					
		Mitigation Existing		Mitigation Projected at		Mitigation Projected at		Mitigation Projected	
Final Unit Score (Debit)	15.8125	Condition - Baseline		Five Years		Ten Years		At Maturity	
[No Net Loss Value]		(Credit)		Post Completion (Credit)		Post Completion (Credit)		(Credit)	
				(Grount)					
FINAL PROJECTED NET BALANCE					0		0		0
		Р	art VI - Mitigation (Considerations (Incenti	ives)				
				I					
	Extent of Stream Re					Extended	Upland Buffer Zone	е	
	nal handout to determine the co Place an "X" in the appropriate of	orrect Restoration Levels (below) for your pr category (only select one).	oject		*Note ¹ : Referen	*Note ¹ : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)			
Restoration Level 1						*Note ² : Enter the buffer width for	each channel side (Left e appropriate mitigation		
Restoration Level 1						Note : Ocidet ti	ic appropriate intigation	турс	
Restoration Level 2					Buffer Width		Left Bank	(
Restoration Level 3						0-50		None	
				l		51-150		None	
					Buffer Width		Right Ban	k	
Compensatory Mitigation Plan incorpo	urates HIIC 12 based water	rehad approach? (Vac or No)		1		0-50 51-150		None None	
*Note: HUC 12-based watershed			No		Average Buffer			None	
				•	Width/Side	0			
		Impact	Mitigation Unit				Stra	ight Preservation Ratio	
Site		Unit Yield (Debit)	Yield (Credit)				- Cita	(v2.1, Sept 2015)	
		,	, ,					,	
S-K4		15.8125	#DIV/0!			Final Mitigation Unit Yield			
				ı		#DIV/0!			

STREAM NAME S-A63	LOCATION Monroe County				
STATION # RIVERMILE	STREAM CLASS Perennial				
LAT <u>37.560504</u> LONG <u>-80.710001</u>	RIVER BASIN Middle Indian Creek				
STORET#	AGENCY Tetra Tech				
INVESTIGATORS CV, RA					
FORM COMPLETED BY	DATE 11/06/2019 REASON FOR SURVEY				
C.Vileno	TIME 4:30 Proposed pipeline				

	Habitat		Condition	Category		
	Parameter Parameter	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 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
n sampling reach	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.	
ted in	SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
Parameters to be evaluated in sampling reach	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).	
ıram	SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
P_{ϵ}	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 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

	Habitat		Condition	Category	
	Parameter	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 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
ling reach	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.
amp	score 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Parameters to be evaluated broader than sampling reach	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.
pe e	SCORE $\frac{7}{-}$ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
s to	SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
Parameter	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

0.2	DO:
Total Score 93	pH:
	SC·

A-8



Photograph Direction East

Comments:

STREAM ID S-A61	STREAM NAME UNT to Slate Run							
LAT 37.559328 LONG -80.710071	DATE 04/10/2015							
CLIENT MVP	PROJECT NAME MVP							
INVESTIGATORS Yarbrough, Stoliker, Heule	INVESTIGATORS Yarbrough, Stoliker, Heule							
FLOW REGIME Perennial Intermittent Ephemeral ✓	WATER TYPE TNW RPW NRPW✓							

FLOW REGIN Perennial		nt Ephemo	eral VMATER TY	PE RPW	NRPW <u></u> ✓		
1	-						
			/leasurements k Width: 7.0 ft		Stream ErosionNone _✓ Moderate	Ноэм	
					NoneNoderate	rieavy	
		Top of Ban	•	·	Artificial, Modified or Channelized		
		LB <u>6.0</u>		<u>in</u>	Yes✓ No		
CHANNEL FE	ATURES	Water Dept	th: 2.00 in		Dam PresentYes	/ No	
		Water Widt	h: 41.0 in		Dani Flesent1es	<u>/_</u> NO	
		High Water	Mark: <u>4.0 in</u>		Sinuosity Low	Medium High	
		Flow Direct	tion: W		Gradient		
					Flat✓ Moderate _	Severe	
						(10 ft/100 ft)	
		Water Pres			Proportion of Reach Repre	esented by Stream	
		Stream I	r, stream bed dry		Morphology Types Riffle 20 % Run 60	%	
		Standing			Pool 20 %		
FLOW CHARACTER	ISTICS	√ Flowing	water				
					Turbidity Clear Slightly	turbidTurbid	
		Velocity Fast	✓ Moderate		OpaqueStained		
		Slow	Woderate		Other		
INOR	GANIC SUB	STRATE CO	MPONENTS	0	DRGANIC SUBSTRATE COMPONENTS		
		add up to 10		_	does not necessarily add up to 100%)		
Substrate	Diame	tor	% Composition in	Substrate	Characteristic	% Composition in	
Туре	Diame		Sampling Reach	Туре	Onaracteristic	Sampling Area	
Bedrock				Detritus	sticks, wood, coarse		
Boulder		mm (10")			plant materials (CPOM)		
Cobble		m (2.5"-10")		Muck-Mud	black, very fine organic		
Gravel	2-64 mm	(0.1"-2.5")	40		(FPOM)		
Sand		nm (gritty)	40				
Silt		0.06 mm		Marl	grey, shell fragments		
Clay	< 0.004 r	mm (slick)	20	-			
		Predomina Forest	ant Surrounding Lan Commer		Indicate the dominant type Trees Shrub		
		✓ Field/Pa			✓ Grasses — Herba		
		Agricult	tural Resident	tial			
WATERSHED FEATURES		Other:			Floodplain Width Wide > 30ft Mode	rate 15-30ft	
		Canopy Co	over		✓ Narrow <16ft		
		Partly c		aded			
		Shaded	√ Open		Wetland Present <u>√</u> Yes Wetland ID _{W-A13}	No	
		Indicate th	e dominant type and		Iominant species present		
AQUATIC VE	GETATION			Rooted subme		ingFree floating	
		Floating	g algae	Attached algae	e		
	·	This feature	e is only flowing now l	because of the	rainfall over the last couple	of days.	
MACROINVER OR OTHER	RTEBRATES						
WILDLIFE	THES						
OBSERVED/C OBSERVATION							
NOTES							
		1					

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

(v2.1, Sept 2015)		Mountaii	n Valley Pipeline Project SWVM v2.1	(in Decimal Degrees)	Lat.	37.559328	Lon.	-80.710071	WEATHER:		DATE:	8/10/2015
	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments) Form of Mitigation: N				MITIGATION STREAM CLASS (watershed size {acrea					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	g Condition (Deb	oit)	Column No. 2- Mitigation Existing Co	ondition - Baseline (Credit)		Column No. 3- Mitigation I Post Completi		e Years	Column No. 4- Mitigation F Post Completion		Column No. 5- Mitigation Proje	ected at Maturity (Credit)
Stream Classification:	Epher	meral	Stream Classification:	Ephemeral		Stream Classification:	E	Ephemeral	Stream Classification:	Ephemeral	Stream Classification:	Ephemeral
Percent Stream Channel Sl	ope		Percent Stream Channel Slo	ре		Percent Stream Channel	Slope	0	Percent Stream Channe	I Slope 0	Percent Stream Channel	Slope 0
HGM Score (attach d	ata forms):		HGM Score (attach o	lata forms):		HGM Score (attac	ch data forms):		HGM Score (attack	h data forms):	HGM Score (attach	ı data forms):
		Average		Average				Average		Average		Average
Hydrology	0.33		Hydrology			Hydrology			Hydrology		Hydrology	
Biogeochemical Cycling	0.33	0	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 Indic	ators	PART I - Physical, Chemical and	Biological Indicators		PART I - Physical, Chemical	and Biological	Indicators	PART I - Physical, Chemical a	and Biological Indicators	PART I - Physical, Chemical a	nd Biological Indicators
	Points Scale Range	Site Score		Points Scale Range Site Score			Points Scale Ran	ige Site Score		Points Scale Range Site Score		Points Scale Range Site Score
PHYSICAL INDICATOR (Applies to all stream	s classifications)		PHYSICAL INDICATOR (Applies to all streams	classifications)		PHYSICAL INDICATOR (Applies to all stream	ams classifications	s)	PHYSICAL INDICATOR (Applies to all str	eams classifications)	PHYSICAL INDICATOR (Applies to all stre	eams classifications)
USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)		USEPA RBP (High Gradient Data Shee	et)	USEPA RBP (High Gradient Data Sheet	t)
Epifaunal Substrate/Available Cover	0-20	0	Epifaunal Substrate/Available Cover	0-20		Epifaunal Substrate/Available Cover	0-20		Epifaunal Substrate/Available Cover	0-20	Epifaunal Substrate/Available Cover	0-20
2. Embeddedness	0-20	1	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	0	Sediment Deposition Channel Flow Status	0-20		Sediment Deposition Channel Flow Status	0-20		Sediment Deposition Channel Flow Status	0-20	Sediment Deposition Channel Flow Status	0-20
Channel Flow Status Channel Alteration	0-20 0-20 0-1	8	6. Channel Alteration	0-20 0-20 0-1		6. Channel Alteration	0-20 0-20	-1	6. Channel Alteration	0-20 0-1	6. Channel Alteration	0-20 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	6	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		Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB)			10. Riparian Vegetative Zone Width (LB & R		10. Riparian Vegetative Zone Width (LB & RB	
Total RBP Score	Poor	30	Total RBP Score	Poor 0		Total RBP Score	Poor	0	Total RBP Score	Poor 0	Total RBP Score	Poor 0
Sub-Total	•	0.25	Sub-Total	0		Sub-Total	•	0	Sub-Total	0	Sub-Total	0
CHEMICAL INDICATOR (Applies to Intermitte	ent and Perennial S	treams)	CHEMICAL INDICATOR (Applies to Intermitten	t and Perennial Streams)		CHEMICAL INDICATOR (Applies to Intermi	ittent and Perennia	al Streams)	CHEMICAL INDICATOR (Applies to Inter	mittent and Perennial Streams)	CHEMICAL INDICATOR (Applies to Interm	nittent and Perennial Streams)
WVDEP Water Quality Indicators (Genera	I)		WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (Gene	ral)		WVDEP Water Quality Indicators (Gen	neral)	WVDEP Water Quality Indicators (Gene	eral)
Specific Conductivity			Specific Conductivity			Specific Conductivity			Specific Conductivity		Specific Conductivity	
100-199 - 85 points	0-90			0-90			0-90			0-90		0-90
pH			pH			pH			рН		рН	
	0-80			5-90 0-1	ı		5-90	5.6		5-90 0-1		5-90 0-1
5.6-5.9 = 45 points			DO.			DO.			DO.		DO.	
DO	 		DO -			В			БО		БО	
	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 Intermi	ittent and Perennial	l Streams)	BIOLOGICAL INDICATOR (Applies to Intermitt	ent and Perennial Streams)		BIOLOGICAL INDICATOR (Applies to Inte	ermittent and Pere	ennial Streams)	BIOLOGICAL INDICATOR (Applies to In	termittent and Perennial Streams)	BIOLOGICAL INDICATOR (Applies to Inte	ermittent 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)	
_	0-100 0-1			0-100 0-1			0-100 0-	-1		0-100 0-1		0-100 0-1
0 Sub-Total		0	Sub-Total	0		Sub-Total		0	Sub-Total	0	Sub-Total	0
UOUD-10tal		<u> </u>	Porn-Toral	U	IJ.	Oup-10tal		· ·	Gub-10tal	U	[Sub-10tal	U
PART II - Index and U	Init Score		PART II - Index and	Jnit Score		PART II - Index a	nd Unit Score		PART II - Index an	d Unit Score	PART II - Index and	d Unit Score
Index	Linear Feet	Unit Score	Index	Linear Feet Unit Score		Index	Linear Fee	et Unit Score	Index	Linear Feet Unit Score	Index	Linear Feet Unit Score
0.525	26	13.65	0	0 0		0	0	0	0	0 0	0	0 0
L			<u> </u>	<u> </u>	1				<u> </u>		<u></u>	

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)												
Temn	oral Loss-Construction	(Goo menuenen pe	ago to moont actua			<u> </u>	-term Protection					
*Note: Reflects duration of aquatic function	nal loss between the time of a	n impact (debit) and completion of			% Add. Mitigation	on and Monitoring Period		-Term Protection (Years)				
сотре	ensatory mitigation (credit).											
Years		0										
Sub-Total		0										
	mporal Loss-Maturity					10 Year Monitoring		101 0				
*Note: Period between completion of compensate to function (i.e. maturity of tree stratum to provide					Sub-Total			U				
	corridor).	μ				PART IV - Index	to Unit Score Cor	nversion				
					Final Index Score	Linear Feet	Unit Score	ILF Costs				
% Add. Mitigation		Temporal Loss-Maturity (Years)			(Debit)		(Debit)	(Offsetting Debit				
					0.525	26	13.65	\$10,920.00)			
0%		0										
Sub-Total		U										
	PART V- Comparison of Unit Scores and Projected Balance											
	1			T	T	T			ı			
		Mitigation Existing		Mitigation Projected at		Mitigation Projected at		Mitigation Projected				
Final Unit Score (Debit)	13.65	Condition - Baseline		Five Years		Ten Years		At Maturity				
[No Net Loss Value]		(Credit)		Post Completion		Post Completion (Credit)		(Credit)				
				(Credit)								
FINAL PROJECTED NET BALANCE					0		0		0			
					•		<u> </u>					
		Р	art VI - Mitigation (Considerations (Incenti	ves)							
	Extent of Stream Re	storation				Extended	Unland Buffer Zone	a				
		orrect Restoration Levels (below) for your pr	oject		*Note ¹ : Reference	Extended Upland Buffer Zone *Note¹: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)						
"Note2: F	Place an "X" in the appropriate	category (only select one).				*Note ² : Enter the buffer width for	each channel side (Left	Bank and Right Bank)	. ,			
Restoration Level 1						*Note ³ : Select th	ne appropriate mitigation	type				
Restoration Level 2				-								
Restoration Level 2					Buffer Width		Left Bank	(
Restoration Level 3						0-50		None				
	l			1		51-150		None				
					Buffer Width	2.72	Right Ban					
Compensatory Mitigation Plan incorpo	protos HIIC 12 beand water	rehad approach? (Ves ex Ne)		1		0-50 51-150		None None				
*Note: HUC 12-based watershed			No		Average Buffer			None				
			-		Width/Side	0						
]				1.14B				
Site		Impact Unit Yield (Debit)	Mitigation Unit				Stra	ight Preservation Ratio (v2.1, Sept 2015)				
		Offic Field (Debit)	Yield (Credit)					(vz.1, 3ept 2015)				
S-A61		13.65	#DIV/0!			Final Mitigation Unit Yield						
				1		#DIV/0!						

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

To ensure accurate calculations, the <u>UPPERMOST STRATUM</u> 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-A61 (Monroe County)

Sampling Date: 11/06/2019 Project Site Before Project

Subclass for this SAR:

Ephemeral Stream

Uppermost stratum present at this SAR: SAR number:

Shrub/Herb Strata

Functional Results Summary: Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.33
Biogeochemical Cycling	0.33
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.	5.00	0.50
V _{SUBSTRATE}	Median stream channel substrate particle size.	0.10	0.05
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.	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.	5.00	0.06
V _{HERB}	Average percent cover of herbaceous vegetation.	70.00	0.93
V _{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.60	0.63

	High-G	radient l	Headwat		ms in ea			_		ern Wes	t Virgini	а
	Team:	C. Vileno, F	R. Aber		- C. C. C. T. C.		u.10 u.			√ Northina:	37.559328	
Pro	ject Name:						•			_	-80.710071	
	-		nroe County	·)			•		-	_	11/06/2019	
SA	R Number:	· ·	-	Length (ft):	100	Stream Ty	/pe:	Ephe	meral Stream			~
	Top Strata:	Shi	rub/Herb Str	rata	(determined	d from perce	ent cal	culate	ed in V _{CCANO}	_{PY})		
Site a	and Timing:	Project Site				-	Before	Proje	ct			•
Sample	e Variables											
1		equidistant 20%, enter	points along at least one	g the stream value betw	el by tree ar n. Measure reen 0 and 1	only if tree/s 9 to trigger	sapling	cove	er is at least			Not Used, <20%
İ		List the percent cover measurements at each point below:										
	0											
	\/	A.,		£ 41 4m		I Manageman	-1	£	4h a.u. 20 u.a.	ناوند و و باوارد	-44	
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 5.0									5.0		
		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.										
			Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)									
		Rating										
		5			overed, sur						k)	
		4			ce covered							
		3			face covered							
		1			covered, su						ial surface)	
	List the rati	ngs at each	point below			,		<u> </u>		(21 211 211 2		
	5	5	5	5	5	5	5	,	5	5	5	
	5	5	5	5	5	5	5	,	5	5	5	
	5	5	5	5	5	5	5	;	5	5	5	
3	V _{SUBSTRATE}				particle size					ghly equidis	tant points	0.10 in
					inch at each		w (bed	rock	should be co	ounted as 9	9 in,	
	0.10	0.10	0.10	0.10	0.10	0.10	0.1	0	0.10	0.10	0.10	
	0.10	0.10	0.10	0.10	0.10	0.10	0.1		0.10	0.10	0.10	
	0.10	0.10	0.10	0.10	0.10	0.10	0.1		0.10	0.10	0.10	
	5.10	5110	0.10	3.10	3.10	3.10	0.1		3.10	5.10	0.10	
4	V_{BERO}	Total perce	ent of eroded	stream cha	annel bank.	Enter the to	otal nu	mber	of feet of er	oded bank	on each	
	DENO	•	e total perce		e calculated							0 %
			Left Bank:	0	ft	F	Right E	Bank:	0	ft		

Sampl	pple Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).										
5	V_{LWD}	stream rea	ch. Enter tl		rom the enti		eter and 36 in buffer and v				0.0
					Number of	f downed w	oody stems:		0		
6	V_{TDBH}				nly if V _{CCANOR} tree DBHs		ng cover is a	at least 20%	6). Trees ar	e at least 4	Not Used
		List the dbl		nents of indi	vidual trees	(at least 4	in) within the	buffer on e	each side of	'	
			Left Side			I					
7	$V_{\sf SNAG}$				and 36" tall) nt per 100 fe		et of stream. alculated.	Enter num	nber of snag	s on each	0.0
			Left Side:		0		Right Side:		0		
8	V_{SSD}						hes dbh) pe				0.0
	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		1
9	V_{SRICH}						am reach. C ive species				
							from these		iii Sii ala. Of	Jecies .	0.00
		Grou	ıp 1 = 1.0			Group 2 (-1.0)					
	Acer rubru	ım		Magnolia t	ripetala	34 · · ·	Ailanthus a	Iltissima	34 - 5 No. 2	Lonicera ja	ponica
	Acer sacc	harum		Nyssa sylv	vatica .	34-3	Albizia julib	orissin	34	Lonicera ta	tarica
	Aesculus	flava	-	Oxydendrun	n arboreum	34	Alliaria peti	iolata	34	Lotus corni	culatus
	Asimina tr	iloba		Prunus se	rotina	31 7	Alternanthe	era	3. 3	Lythrum sa	licaria
	Betula alle	ghaniensis		Quercus a	lba		philoxeroid	es	35	Microstegiun	n vimineum
4	Betula len	ta	2	Quercus c	occinea		Aster tatari	cus	d4 - 9	Paulownia	tomentosa
	Carya alba	3		Quercus in	nbricaria	d-1	Cerastium	fontanum	d4 9	Polygonum d	cuspidatum
	Carya glal	bra		Quercus p	rinus	3	Coronilla v	aria	3. 3	Pueraria m	ontana
	Carya ova	lis		Quercus ru	ubra	34-7	Elaeagnus u	ımbellata	d4-0	Rosa multii	flora
	Carya ova	ta		Quercus v	elutina	D4	Lespedeza	bicolor	34	Sorghum h	alepense
	Cornus flo	rida		Sassafras	albidum		Lespedeza	cuneata		Verbena br	asiliensis
	Fagus gra	ndifolia		Tilia ameri	cana		Ligustrum ol	btusifolium			
2:3	Fraxinus a			Tsuga can	adensis	35	Ligustrum :	sinense			
	Liriodendro			Ulmus am							
5-3	Magnolia a										
		0	Species in	Group 1				0	Species in	Group 2	

-	e Variables The four sul						•			n 25 feet fro	m each
10	V _{DETRITUS}	Average pe	ercent cover are include.	of leaves, s	sticks, or oth	ner organic i	material. W	oody debris	<4" diamet	er and	5.00 %
			Left	Side			Right	Side			
		5	5	5		5	5	5			
11	V_{HERB}	Average pe	ercentage co	over of herb	aceous veg	etation (mea	asure only if	tree cover	is <20%). [o not	
	TIEND	include woo	ody stems a	t least 4" db	oh and 36" ta	all. Because	there may	be several l	ayers of gro	und cover	70 %
		vegetation at each sub	percentage: oplot.	s up through	1 200% are	accepted. I	nter the pe	rcent cover	of ground v	egetation	
			Left	Side			Right	Side			
		80	80	20		80	80	80			
Sample	e Variable 1	2 within the	o ontiro cat	chmont of	the stream					<u> </u>	
12	V _{WLUSE}										
12 V _{WLUSE} Weighted Average of Runoff Score for watershed:										0.60	
			المسما	Haa (Chaaa	- F D	l :-4\			Runoff	% in	Running
	Land Use (Choose From Drop List)									Catch- ment	Percent (not >100)
	Forest and native range (50% to 75% ground cover)								0.7	70	70
	Forest and native range (<50% ground cover)									20	90
	Open space	(pasture, lawr	•	0.1	10	100					
								•			
								•			
								~			
								•			
								~			
	Su	mmary					No	tes:			
Va	ariable	Value	VSI								
Vc	CANOPY	Not Used, <20%	Not Used								
VEI	MBED	5.0	0.50								
Vsı	JBSTRATE	0.10 in	0.05								
V _{BI}	ERO	0 %	1.00								
VLV	WD	0.0	0.00								
V _{TI}	овн	Not Used	Not Used								
Vsı	NAG	0.0	0.10								
Vs	SD	0.0	0.00								
Vsı	RICH	0.00	0.00								
V _{DI}	ETRITUS	5.0 %	0.06								
V _{HI}	ERB	70 %	0.93								
V _w	LUSE	0.6	0.63								

STREAM NAME S-A61	LOCATION Monroe County			
STATION # RIVERMILE	STREAM CLASS Ephemeral			
LAT <u>37.559328</u> LONG <u>-80.710071</u>	RIVER BASIN Middle Indian Creek			
STORET#	AGENCY Tetra Tech			
INVESTIGATORS CV, RA				
FORM COMPLETED BY	DATE 11/06/2019	REASON FOR SURVEY		
C.Vileno	TIME 4:30	Proposed pipeline		

	Habitat	Condition Category											
	Parameter Parameter	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 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0								
n sampling reach	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.								
ted in	SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0								
Parameters to be evaluated in sampling reach	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).								
ıram	score 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0								
P_{ϵ}	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 5	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 Parameter	Condition Category			
Parameters to be evaluated broader than sampling reach		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 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 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
	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

20	DO:
Total Score 30	pH:
	SC·



Photograph Direction South

Comments:

STREAM ID	S-CV26		STREAM NA	STREAM NAME UNT to Slate Run					
CLIENT MVI	Р		PROJECT N	PROJECT NAME MVP					
LAT 37.55644	45 L (ONG -80.70888	3 DATE 01/09/	2018	COUNTY Monroe				
INVESTIGATO	DRS CV, P	(P							
WATER TYPE	RPW	NRPW	FLOW REG Perennial		tent Ephemeral				
		Estimate Mos	euromonte	1	Sinuscity Low	/ Medium High			
CHANNEL FE	ATURES	Top of Bank H LB 3.0 ft Water Depth: Water Width: Ordinary High Flow Direction	Vidth:6.0ft leight: RB2.0ft 8.00 _ in _2.5ft Water Mark (Width): Water Mark (Height) Southwest	ft ft :in 	Artificial, Modified or C Yes Within Roadside Ditch	<u>∕</u> No <u>∕</u> No esNo ated Metal			
FLOW CHARACTER	ISTICS	Stream bed Standing w Flowing wat	tream bed dry I moist vater		Morphology Types (Only Riffle 50 % Run Pool 20 % Turbidity				
INORGANIC SUBSTRATE COMPO									
INOR	-	JBSTRATE CO	-	_	DRGANIC SUBSTRATE				
	-)%) 100	(does not necessarily a	dd up to 100%)			
Substrate Type	(shoul	JBSTRATE CO	-	_	does not necessarily a	dd up to 100%)			
Substrate Type Bedrock	(shoul	JBSTRATE COM d add up to 100 meter	0%) 100 % Composition in	Substrate	Characteristic sticks, wood, coar	dd up to 100%) % Composition in Sampling Area			
Substrate Type Bedrock Boulder	(shoul	JBSTRATE COM Id add up to 100 meter	0%) 100 % Composition in	Substrate Type	Characteristic	dd up to 100%) % Composition in Sampling Area			
Substrate Type Bedrock Boulder Cobble	Diar	JBSTRATE COMMeter 56 mm (10") mmm (2.5"-10")	% Composition in Sampling Reach	Substrate Type	Characteristic sticks, wood, coar plant materials (CPC) black, very fine orga	% Composition in Sampling Area			
Substrate Type Bedrock Boulder Cobble Gravel	Shoul Diar	JBSTRATE COM Id add up to 100 meter 56 mm (10") is mm (2.5"-10") nm (0.1"-2.5")	% Composition in Sampling Reach	Substrate Type Detritus	Characteristic sticks, wood, coar plant materials (CP6)	% Composition in Sampling Area			
Substrate Type Bedrock Boulder Cobble Gravel Sand	Shoul Diar	JBSTRATE COM d add up to 100 meter 56 mm (10") mm (2.5"-10") nm (0.1"-2.5") -2mm (gritty)	% Composition in Sampling Reach	Substrate Type Detritus Muck-Mud	Characteristic sticks, wood, coar plant materials (CPC black, very fine organ (FPOM)	dd up to 100%) % Composition in Sampling Area se OM) anic			
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt	Shoul Diar	DBSTRATE COMMeter 56 mm (10") 5 mm (2.5"-10") 5 mm (0.1"-2.5") 5 mm (gritty) 6 mm (9.06 mm	% Composition in Sampling Reach 30 20 10	Substrate Type Detritus	Characteristic sticks, wood, coar plant materials (CPC) black, very fine orga	dd up to 100%) % Composition in Sampling Area se OM) anic			
Substrate Type Bedrock Boulder Cobble Gravel Sand	Shoul Diar	DBSTRATE COMMeter 56 mm (10") 5 mm (2.5"-10") 5 mm (0.1"-2.5") 5 mm (gritty) 6 mm (slick)	% Composition in Sampling Reach 30 20 10 40 Surrounding Landu — Commercia ure — Industrial — Residential — Other:	Substrate Type Detritus Muck-Mud Marl	Characteristic Sticks, wood, coar plant materials (CPC black, very fine orga (FPOM) grey, shell fragment	dd up to 100%) % Composition in Sampling Area se OM) anic			
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay WATERSHED FEATURES	Shoul Diar	JBSTRATE CON d add up to 100 meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 4-0.06 mm 04 mm (slick) Predominant Forest Jefield/Paste Agricultura ROW Canopy Cove Open Shaded	% Composition in Sampling Reach 30 20 10 40 Surrounding Landu — Commercia — Industrial — Residential — Other: Y Partly shade	Substrate Type Detritus Muck-Mud Marl ISE II	Characteristic Sticks, wood, coar plant materials (CPC) black, very fine orga (FPOM) grey, shell fragment Floodplain Width Wide > 30ft Mo	dd up to 100%) % Composition in Sampling Area se OM) anic others are 15-30ft			

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

USACE FILE NO./ Project Name: (v2.1, Sept 2015)		Mountain	SWVM v2.1	(in Decimal Degrees)	Lat.	37.556445	Lon.	-80.708883	WEATHER:	Cloudy, 50	DATE:	8/10/2015
IMPACT STREAM/SITE ID . (watershed size (acreage),			S-CV26; UNT to Slate Form of Mitigation			MITIGATION STREAM CLASS (watershed size {acrea					Comments:	
STREAM IMPACT LENGTH:	32	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 (Deb	pit)	Column No. 2- Mitigation Existing Co	ondition - Baseline (Credit)		Column No. 3- Mitigation F Post Completi		e Years	Column No. 4- Mitigation Pro Post Completion		Column No. 5- Mitigation Project	ed at Maturity (Credit)
Stream Classification:	Perer	nnial	Stream Classification:	Perennial		Stream Classification:	ı	Perennial	Stream Classification:	Perennial	Stream Classification:	Perennial
Percent Stream Channel Slo	ope		Percent Stream Channel Slo	ре		Percent Stream Channel	Slope	0	Percent Stream Channel S	lope 0	Percent Stream Channel St	lope 0
HGM Score (attach da	ata forms):		HGM Score (attach d	ata forms):		HGM Score (attac	h data forms):	:	HGM Score (attach d	ata forms):	HGM Score (attach d	ata forms):
		Average		Average	l			Average		Average		Average
Hydrology			Hydrology		1	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 Indic	ators	PART I - Physical, Chemical and	Biological Indicators		PART I - Physical, Chemical	and Biological I	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 Ran	nge Site Score		Points Scale Range Site Score		Points Scale Range Site Score
PHYSICAL INDICATOR (Applies to all streams	s classifications)		PHYSICAL INDICATOR (Applies to all streams	classifications)		PHYSICAL INDICATOR (Applies to all stream	ams classifications	5)	PHYSICAL INDICATOR (Applies to all stream	ns classifications)	PHYSICAL INDICATOR (Applies to all stream	s 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)	
Epifaunal Substrate/Available Cover	0-20	10	Epifaunal Substrate/Available Cover	0-20		Epifaunal Substrate/Available Cover	0-20		Epifaunal Substrate/Available Cover	0-20	Epifaunal Substrate/Available Cover	0-20
2. Embeddedness	0-20	11	2. Embeddedness	0-20		2. Embeddedness	0-20		2. Embeddedness	0-20	2. Embeddedness	0-20
3. Velocity/ Depth Regime	0-20	10	3. Velocity/ Depth Regime	0-20		3. Velocity/ Depth Regime	0-20		3. Velocity/ Depth Regime	0-20	3. Velocity/ Depth Regime	0-20
Sediment Deposition Channel Flow Status	0-20	7	Sediment Deposition Channel Flow Status	0-20	1	Sediment Deposition Channel Flow Status	0-20		Sediment Deposition Channel Flow Status	0-20	Sediment Deposition Channel Flow Status	0-20
6. Channel Alteration	0-20 0-20 0-1	13	6. Channel Alteration	0-20 0-20	1	6. Channel Alteration	0-20 0-20	-1	6. Channel Alteration	0-20 0-1	6. Channel Alteration	0-20 0-20 0-1
7. Frequency of Riffles (or bends)	0-20	8	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
8. Bank Stability (LB & RB)	0-20	14	8. Bank Stability (LB & RB)	0-20	1	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	8	9. Vegetative Protection (LB & RB)	0-20	1	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)			10. Riparian Vegetative Zone Width (LB & RB)	0-20	10. Riparian Vegetative Zone Width (LB & RB)	0-20
Total RBP Score	Marginal	106	Total RBP Score	Poor 0	1	Total RBP Score	Poor	0	Total RBP Score	Poor 0	Total RBP Score	Poor 0
Sub-Total		0.53	Sub-Total	0		Sub-Total		0	Sub-Total	0	Sub-Total	0
CHEMICAL INDICATOR (Applies to Intermitted	nt and Perennial S	treams)	CHEMICAL INDICATOR (Applies to Intermitten	and Perennial Streams)		CHEMICAL INDICATOR (Applies to Intermi	ttent and Perennia	al Streams)	CHEMICAL INDICATOR (Applies to Intermitt	ent and Perennial Streams)	CHEMICAL INDICATOR (Applies to Intermitte	ent and Perennial Streams)
WVDEP Water Quality Indicators (General	1)		WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General	ral)		WVDEP Water Quality Indicators (General	ai)	WVDEP Water Quality Indicators (Genera	1)
Specific Conductivity			Specific Conductivity			Specific Conductivity			Specific Conductivity		Specific Conductivity	
	0-90	326		0-90			0-90			0-90		0-90
300-399 - 70 points			nH			aU			nH		~H	
рп	0-1		рп	0-1	Ш	рп	0-	-1 5.6	рн	0-1	рн	0-1
6.0-8.0 = 80 points	0-80	7.78		5-90			5-90	0.0		5-90		5-90
DO			DO			DO			DO		DO	
	10-30	8.68		10-30			10-30			10-30		10-30
>5.0 = 30 points Sub-Total		0.9	Sub-Total			Sub-Total		0	Sub-Total	0	Sub-Total	
BIOLOGICAL INDICATOR (Applies to Intermit	ttent and Perennial		BIOLOGICAL INDICATOR (Applies to Intermitte	ent and Perennial Streams)		BIOLOGICAL INDICATOR (Applies to Inte	ermittent and Pere		BIOLOGICAL INDICATOR (Applies to Inter		BIOLOGICAL INDICATOR (Applies to Intern	nittent 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)	
The Guidan Condition made (11156)	0-100 0-1	55.1	The Carolina Containers made (1775 City	0-100 0-1		The Carolin Contained mask (1990)	0-100 0-	.1	The same contains mask (11100)	0-100 0-1	The care and a contained makes (virtue)	0-100 0-1
Fair	0-100 0-1			0-100			0-100					
Sub-Total		0.451	Sub-Total	0	ı	Sub-Total		0	Sub-Total	0	Sub-Total	0
PART II - Index and U	nit Score		PART II - Index and I	Jnit Score		PART II - Index at	nd Unit Score		PART II - Index and I	Jnit Score	PART II - Index and U	Init Score
Index	Linear Feet	Unit Score	Index	Linear Feet Unit Score		Index	Linear Fee	et Unit Score	Index	Linear Feet Unit Score	Index	Linear Feet Unit Score
0.627	32	20.064	0	0 0		0	0	0	0	0 0	0	0 0

		(See instruction page		- Impact Factors It values for MITIGATIO	N BANKING and I	LF)			
Temp	oral Loss-Construction	(222 2222)				<u> </u>	-term Protection		
*Note: Reflects duration of aquatic function		nn impact (debit) and completion of			% Add. Mitigation	on and Monitoring Period		-Term Protection (Years)	
		0							
Years Sub-Total		0							
Ter	mporal Loss-Maturity				0 + 5/	10 Year Monitoring		101	
*Note: Period between completion of compensato	ory mitigation measures and ti				Sub-Total 0				
to function (i.e. maturity of tree stratum to provid	e organic matter and detritus corridor).	s witnin riparian stream or wetiand buffer				PART IV - Index to Unit Score Conversion			
					Final Index Score	Linear Feet	Unit Score	ILF Costs	
% Add. Mitigation		Temporal Loss-Maturity (Years)			(Debit)		(Debit)	(Offsetting Debit	
					0.627	32	20.064	\$16,051.20)
0%		0							
Sub-Total		0							
		D.D.T.V.		".0					
		PARIV	- Comparison of U	nit Scores and Projecte	ed Balance				
Final Unit Score (Debit) [No Net Loss Value]	20.064	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
		n	lort VI Mitigation (Considerations (Incenti					
			art vi - mitigation C	Sonsiderations (incenti	ves)				
	Extent of Stream Renamination in the color of the color o	correct Restoration Levels (below) for your pr	roject		*Note ¹ : Referen	ce Instructional handout for the def *Note ² : Enter the buffer width for		ne Mitigation Extents and Type Bank and Right Bank)	s (below)
Restoration Level 2							Left Bank		
				-	Buffer Width		Leit Dank		
Restoration Level 3						0-50		None	
					Buffer Width	51-150	Dight Don	None	
					Buller Width	0-50	Right Ban	None	
Compensatory Mitigation Plan incorpo						51-150		None	
*Note: HUC 12-based watershed	approach required to obtain Strea	am Restoration incentive	No		Average Buffer Width/Side	0			
Site		Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)				Stra	ight Preservation Ratio (v2.1, Sept 2015)	
S-CV26		20.064	#DIV/0!			Final Mitigation Unit Yield			
				J		#DIV/0!			

Insects	Count	Tolerance	TV	Insects	Count	Tolerance	TV	Non-Insects	Count	Tolerance	TV	1	
Ephemeroptera	•	•	0	Odonata		•	0	Crustacea		•	0	1	
Ameletidae		2	0	Aeshnidae		3	0	Asellidae		7	0	1	
Baetidae		4	0	Calopterygidae		6	0	Cambaridae		5	0	1	
Beatiscidae		4	0	Coenagrionidae		7	0	Gammaridae		5	0	1	
Caenidae		5	0	Cordulegastridae		3	0	Palaemonidae		5	0	1	
Ephemerellidae		3	0	Gomphidae		5	0	Annelida			0		
Ephemeridae		5	0	Lestidae		7	0	Hirudinea		10	0		
Heptageniidae		3	0	Libellulidae		7	0	Nematoda		10	0		
Isonychiidae		3	0	Coleoptera	-		4	Nematomorpha		10	0		
Leptophlebiidae		4	0	Chrysomelidae		7	0	Oligochaeta		10	0		
Potamanthidae		5	0	Dryopidae		5	0	Turbellaria			0		
Siphlonuridae		3	0	Dytiscidae		6	0	Turbellaria		7	0		
Tricorythidae		5	0	Elmidae	1	4	4	Bivalvia			0		
Plecoptera	•		82	Gyrinidae		5	0	Corbiculidae		6	0		
Capniidae		2	0	Haliplidae		7	0	Sphaeriidae		5	0		
Chloroperlidae		2	0	Hydrophilidae	3	7	21	Unionidae		4	0	7	
Leuctridae	82	2	164	Psephenidae		3	0	Gastropoda			0		
Nemouridae		2	0	Ptilodactylidae		5	0	Ancylidae		7	0		
Peltoperlidae		1	0	Hemiptera			0	Hydrobiidae		4	0		
Perlidae		1	0	Belostomatidae		8	0	Physidae		7	0		
Perlodidae		1	0	Corixidae		8	0	Planorbidae		5	0		
Pteronarcyidae		1	0	Gerridae		10	0	Pleuroceridae		5	0		
Taeniopterygidae		2	0	Hydrometridae		8	0	Viviparidae		5	0		
Trichoptera	-		0	Nepidae		8	0	Miscellaneous			0		
Brachycentridae		2	0	Notonectidae		8	0	Collembola		6	0		
Glossosomatidae		2	0	Megaloptera	-	-	0	Lepidoptera		5	0		
Helicopsychidae		3	0	Corydalidae		3	0	Neuroptera		5	0		
Hydropsychidae		5	0	Sialidae		6	0	Hydrachnidae		6	0		
Hydroptilidae		3	0	Diptera		-	2	Totals	Totalı	number	88		
Lepidostomatidae		3	0	Athericidae		3	0	Totals	Total f	amilies	4		
Leptoceridae		3	0	Blephariceridae		2	0			Metric	calculations		
Limnephilidae		4	0	Ceratopogonidae		8	0		Richnes	is		Additional metri	ics
Molannidae		3	0	Chironomidae	2	9	18	Total Taxa		4	18.2	Ephemeroptera Taxa	0
Philopotamidae		4	0	Culicidae		10	0	EPT Taxa		1	7.7	Plecoptera Taxa	1
Phryganeidae		4	0	Dixidae		6	0		Toleran	ce		Trichoptera Taxa	0
Polycentropodidae		5	0	Empididae		7	0	Biotic Index		2.35	100.0	Long-lived Taxa	3
Psychomiidae		3	0	Psychodidae		8	0	% Tolerant		5.7	96.2	Odonata Taxa	0
Rhyacophilidae		3	0	Ptychopteridae		8	0		Composit	ion		Diptera Taxa	1
Uenoidae		2	0	Simuliidae		6	0	% EPT Abundance		93.2	100.0	COET Taxa	2
	Total To	lerance Value	207	Stratiomyidae		10	0	% Dominance		93.2	8.5	% Sensitive	93.2
West Vi	irginia Save O	ur Streams		Syrphidae		10	0	% Net-spinners		0.0	NA	% Chironomidae	2.3
601 57th Stre	et, SE, Charle	eston WV 253	304	Tabanidae		7	0	Stream Condition Index			55.1	% Clingers	94.3
http:/	/www.dep.w	v.gov/sos		Tipulidae		5	0	Integrity Ra	ating	Mar	ginal	More diversity mea:	sures

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-CV26	LOCATION Monroe County				
STATION # RIVERMILE	STREAM CLASS Perennial				
LAT <u>37.556445</u> LONG <u>-80.708883</u>	RIVER BASIN Middle Indian Creek				
STORET#	AGENCY Tetra Tech				
INVESTIGATORS CV, RA					
FORM COMPLETED BY	DATE 11/06/2019	REASON FOR SURVEY			
C.Vileno	TIME 5:00 Proposed pipeline				

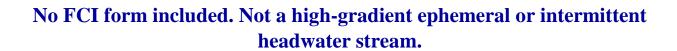
	Habitat		Condition	Category			
	Parameter Parameter	Optimal	Suboptimal	Marginal	Poor		
	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage 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 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
ı sampling reach	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.		
ted in	SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
Parameters to be evaluated in sampling reach	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).		
ıram	SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0		
PA	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 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)

	Habitat		Condition	Condition Category							
	Parameter	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 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0						
ling reach	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.						
amp	score 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0						
Parameters to be evaluated broader than sampling reach	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.						
e ev	SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0						
s to b	SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0						
Parameter	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 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						
	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 106

A-8





Photograph Direction SW

Comments:

USACE FILE NO./ Project Name: (v2.1, Sept 2015)		lley Pipeline Project NVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37.53826886 Lon.	-80.7190732	WEATHER:		DATE:	8/10/2015
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments) S-F18; UNT to Hans Creek Form of Mitigation: Mitigation Bank				MITIGATION STREAM CLASS./SITE ID A (watershed size {acreage}, unaltered		: S-F18; UNT to UNT to Hans Creek; 493.78 ac watershed		Comments:		
STREAM IMPACT LENGTH:	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 Condi	tion (Debit)	Column No. 2- Mitigation Existing Co	ondition - Baseline (Credit)	•	Column No. 3- Mitigation Projected at Post Completion (Credit)	Five Years	Column No. 4- Mitigation Proje Post Completion (Column No. 5- Mitigation Projecte	d 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 Slo	ре		Percent Stream Channel Slope	0	Percent Stream Channel Slo	ope 0	Percent Stream Channel Sl	ope 0
HGM Score (attach data for	ns):	HGM Score (attach d	ata forms):		HGM Score (attach data for	ns):	HGM Score (attach da	ata forms):	HGM Score (attach da	ita forms):
Hydrology	Average	Hydrology	Average 1		Hydrology 1	Average	Hydrology	Average	Hydrology	Average
Biogeochemical Cycling	0	Biogeochemical Cycling	1 0		Biogeochemical Cycling 1		Biogeochemical Cycling	1 0	Biogeochemical Cycling	1 0
PART I - Physical, Chemical and Biolog	ical Indicators	Habitat PART I - Physical, Chemical and	Biological Indicators		Habitat PART I - Physical, Chemical and Biologi	cal Indicators	PART I - Physical, Chemical and	Biological Indicators	Habitat PART I - Physical, Chemical and	Biological Indicators
Points Sca	ale 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 classif	ications)	PHYSICAL INDICATOR (Applies to all streams	classifications)		PHYSICAL INDICATOR (Applies to all streams classification)	ions)	PHYSICAL INDICATOR (Applies to all stream	s classifications)	PHYSICAL INDICATOR (Applies to all streams	s classifications)
Sub-Total CHEMICAL INDICATOR (Applies to Intermittent and P WVDEP Water Quality Indicators (General) Specific Conductivity	10 2 15 3 3 16 1 1 16 14 10 10 10 10 10 10 10 10 10 10 10 10 10	USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermittent WVDEP Water Quality Indicators (General) Specific Conductivity			USEPA RBP (High Gradient Data Sheet)	0 nnial Streams)	USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermitte WVDEP Water Quality Indicators (Genera Specific Conductivity		USEPA RBP (High Gradient Data Sheet) 1. Epifaunal Substrate/Available Cover 2. Embeddedness 3. Velocity/ Depth Regime 4. Sediment Deposition 5. Channel Flow Status 6. Channel Alteration 7. Frequency of Riffles (or bends) 8. Bank Stability (LB & RB) 9. Vegetative Protection (LB & RB) 10. Riparian Vegetative Zone Width (LB & RB) Total RBP Score Sub-Total CHEMICAL INDICATOR (Applies to Intermitted WVDEP Water Quality Indicators (General Specific Conductivity	
<=99 - 90 points pH 6.0-8.0 = 80 points 0-80 0-80 >5.0 = 30 points 10-30 Sub-Total BIOLOGICAL INDICATOR (Applies to Intermittent and	7.46 120	DO Sub-Total BIOLOGICAL INDICATOR (Applies to Intermittee	0-90 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		DO 10-30 Sub-Total BIOLOGICAL INDICATOR (Applies to Intermittent and	0 0 0 0 Perennial Streams)	pH DO Sub-Total BIOLOGICAL INDICATOR (Applies to Intern	0-90 0 0 0 1 10-30 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	DO Sub-Total BIOLOGICAL INDICATOR (Applies to Interm	5-90 0-1 10-30 0 ittent and Perennial Streams)
WV Stream Condition Index (WVSCI)	0-1 58.9	WV Stream Condition Index (WVSCI)	0-100		WV Stream Condition Index (WVSCI) 0-100	0.1	WV Stream Condition Index (WVSCI)	0-100 0-1 0	WV Stream Condition Index (WVSCI)	0-100 0-1
Fair Sub-Total	0-1 58.9 0.489	Sub-Total	0-100 0-1		Sub-Total	0-1 0	Sub-Total	0-100 0-1	Sub-Total	0-100 0-1
PART II - Index and Unit Sco	re	PART II - Index and U	Jnit Score		PART II - Index and Unit Sco	re	PART II - Index and U	nit Score	PART II - Index and U	nit Score
Index Line	ar Feet Unit Score	Index	Linear Feet Unit Score		Index Linear	Feet Unit Score	Index	Linear Feet Unit Score	Index	Linear Feet Unit Score
0.658	26 17.108	0	0 0		0 0	0	0	0 0	0	0 0

		(See instruction page		- Impact Factors It values for MITIGATIO	N BANKING and I	LF)			
Tempo	oral Loss-Construction	(222 2222)					-term Protection		
*Note: Reflects duration of aquatic function		n impact (debit) and completion of			% Add. Mitigation	on and Monitoring Period		Term Protection (Years)	
compe	ensatory mitigation (credit).					Ŭ		,	
Years		0							
Sub-Total		U							
Ton	nporal Loss-Maturity				0 + 5/1	10 Year Monitoring		101	
*Note: Period between completion of compensator	ry mitigation measures and th	he time required for maturity, as it relates			Sub-Total	Teal Monitoring		0	
to function (i.e. maturity of tree stratum to provide									
	corridor).					PART IV - Index	to Unit Score Con	version	
					Final Index Score	Linear Feet	Unit Score	ILF Costs	
% Add. Mitigation		Temporal Loss-Maturity (Years)			(Debit)		(Debit)	(Offsetting Debit	Units)
•					0.658	26	17.108	\$13,686.40	
					0.030	20	17.100	\$13,000.40	
00/		0							
0% Sub-Total		0							
oub rotal		•							
		PART V	- Comparison of U	nit Scores and Projecte	d Balance				
				Mitigation Projected at					
Final Unit Score (Debit)		Mitigation Existing		Five Years		Mitigation Projected at		Mitigation Projected	
[No Net Loss Value]	17.108	Condition - Baseline		Post Completion		Ten Years		At Maturity	
[No not zood range]		(Credit)		(Credit)		Post Completion (Credit)		(Credit)	
				(,					
FINAL PROJECTED NET BALANCE					0		0		0
					U		U		<u> </u>
		Р	art VI - Mitigation (Considerations (Incenti	ves)				
			art vi - imitigation (1 03,				
	Extent of Stream Re					Extended	Upland Buffer Zone	1	
		orrect Restoration Levels (below) for your pr	oject		*Note1: Reference	ce Instructional handout for the def			s (below)
"Notez: P	lace an "X" in the appropriate o	category (only select one).				*Note ² : Enter the buffer width for			
Restoration Level 1						*Note ³ : Select th	e appropriate mitigation	type	
Restoration Level 2					Buffer Width		Left Bank		
E Destauation Level 2					Bullet Width				
Restoration Level 3						0-50		None	
						51-150		None	
					Buffer Width	0.50	Right Bank		
0 1 14%		10.00		1		0-50 51-150		None None	
Compensatory Mitigation Plan incorpo *Note: HUC 12-based watershed a			No		Average Buffer	51-150		None	
Note: 1100 12-based watershed a	approach required to obtain offea	an restoration incentive	140		Width/Side	0			
				1	TTIALIII OIGE				
		Impact	Mitigation Unit				Strai	ght Preservation Ratio	
Site		Unit Yield (Debit)	Yield (Credit)					(v2.1, Sept 2015)	
		2 (2.0)	(2.2)					, , , , , , , , , , , , , , , , , , , ,	
S-F18		17.108	#DIV/0!			Final Mitigation Unit Yield			
J. 10		17.100	#DIVIO:			_			
						#DIV/0!			

STREAM ID S-F18	STREAM NAME UNT to Hans Creek
LAT 37.537587 LONG -80.717815	DATE 04/10/2015
CLIENT MVP	PROJECT NAME MVP
INVESTIGATORS E. Stromhaier, A. Flake, D. McC	Cullough
FLOW REGIME	WATER TYPE
Perennial / Intermittent _ Ephemeral _	TNW RPW NRPW

Perenniai -	_	nt <u> — Epnem</u>	erai INVV	RPW —	NRPW	
		F-4'4- B			Ota	
			/leasurements k Width: 18.0 ft		Stream Erosion None ✓ Moderate	Heavy
		·	<u> </u>		Woderate	
		Top of Ban	ŭ		Artificial, Modified or Char	nnelized
		LB <u>3.0</u>	ft RB <u>3.0</u>	<u>ft</u>	<u>✓</u> YesNo	
CHANNEL FE	ATURES	Water Dep	th: <u>1.00 in</u>		Dam PresentYes _	∠ No
		Water Widt	th: 6.0 ft		Daili Fleseill 165 _	<u>/ </u>
		High Water	Mark: <u>2.0 ft</u>		Sinuosity Low	Medium High
		Flow Direct	tion: NW		Gradient	
						Severe
					(0.5/100 ft (2 ft/100 ft)	(10 ft/100 ft)
Water Present				Proportion of Reach Repre	esented by Stream	
			r, stream bed dry bed moist		Morphology Types Riffle 75 % Run 25	%
		— Standin			Pool %	70
FLOW CHARACTER	ISTICS	Flowing	-			
OHARAGIER	101100				Turbidity	turbidTurbid
		Velocity	✓ Madarata		Clear Slightly Stained	
		Fast Slow	<u>✓</u> Moderate		Other	
INOR	CANIC SUB	STRATE CO	MDONENTS	0	RGANIC SUBSTRATE CON	ADONENTS
INOR		add up to 10			does not necessarily add u	
Substrate	Diame	tor	% Composition in	Substrate		% Composition in
Type	Diame	eter	Sampling Reach	Type	Characteristic	Sampling Area
Bedrock			55	Detritus	sticks, wood, coarse	
Boulder	> 256	mm (10")	15	Detrituo	plant materials (CPOM)	10
Cobble	64-256 m	m (2.5"-10")	10	Muck-Mud	black, very fine organic	
Gravel	2-64 mm	า (0.1"-2.5")	5	Widok Wida	(FPOM)	
Sand	0.06-2n	nm (gritty)	5			
Silt	0.004-0	0.06 mm	5	Marl	grey, shell fragments	
Clay	< 0.004	mm (slick)	5			
			ant Surrounding Lan		Indicate the dominant type	
		Forest Field/P	Commer		Trees Shrub Grasses Herba	
		Agricul			<u>✓</u> Grasses Herba	iceous
WATERSHED		Other:		iidi	Floodplain Width	
FEATURES		_			Wide > 30ftMode	rate 15-30ft
		Canopy Co			Narrow < roll	
		Partly of Shaded	· —	aded	Wetland PresentYes	<u>✓</u> No
			<u>✓</u> Open		Wetland ID	
					dominant species present	
AQUATIC VE	GETATION		_	Rooted subme Attached algae	_	tingFree floating
		1 10atii1	y algae <u>v</u>	Allacried alga-	<u> </u>	
		1				
MACROINVER	TERDATES					
OR OTHER	VIEDNATES	'				
WILDLIFE OBSERVED/OTHER						
OBSERVATIO						
NOTES						

STREAM ID S-F18	STREAM NAME UNT to Hans Creek
LAT 37.537587 LONG -80.717815	DATE 04/10/2015
CLIENT MVP	PROJECT NAME MVP
INVESTIGATORS E. Stromhaier, A. Flake, D. McC	Cullough
FLOW REGIME	WATER TYPE
Perennial / Intermittent _ Ephemeral _	TNW RPW NRPW

r el el li liai -	_	nt <u> — Epnem</u>	erai INW	RPW —	NRPW				
			_						
		Estimate Measurements Top of Bank Width: _18.0 _ft_			Stream Erosion None Moderate Heavy				
		·			None Nouerate neavy				
		Top of Ban	=		Artificial, Modified or Channelized				
		LB <u>3.0</u>		<u>ft</u>	<u>v</u> YesNo				
CHANNEL FE	ATURES	Water Dep	th: 1.00 in		Dam PresentYes _v_No				
		Water Widt	th: 6.0 ft		Dami resent res res				
		High Water	Mark: <u>2.0 ft</u>		Sinuosity Low Medium High				
		Flow Direc	tion: NW		Gradient				
					Flat Moderate Severe				
					` '	(10 ft/100 ft)			
		Water Pres	sent r, stream bed dry		Proportion of Reach Repre Morphology Types	esented by Stream			
			bed moist		Riffle 75 % Run 25	%			
FLOW		Standin	g water		Pool %				
CHARACTER	ISTICS	<u>✓</u> Flowing	water		Turbidity				
		Velocity			Clear Slightly	turbidTurbid			
			✓ Moderate		OpaqueStained				
		Slow			Other				
INOR		STRATE CO			RGANIC SUBSTRATE CON	-			
	(should a	add up to 10	,	•	loes not necessarily add u	1			
Substrate Type	Diame	eter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area			
Bedrock			55	Detritus	sticks, wood, coarse	40			
Boulder	> 256	mm (10")	15	Detritus	plant materials (CPOM)	10			
Cobble	64-256 mm (2.5"-10")		10	Muck-Mud	black, very fine organic				
Gravel	2-64 mm	1 (0.1"-2.5")	5	Widok Wida	(FPOM)				
Sand	0.06-2n	nm (gritty)	5						
Silt	0.004-0	0.06 mm	5	Marl	grey, shell fragments				
Clay	< 0.004	mm (slick)	5						
		Predomina Forest	ant Surrounding Lar Commer		Indicate the dominant type Trees Shrub				
		Field/P			✓ Grasses — Silido				
		Agricul		tial	<u> </u>				
WATERSHED FEATURES		Other:			Floodplain Width Wide > 30ft ✓ Moderate 15-30ft				
1 2711 5112 5		Conony C			Narrow <16ft				
		Canopy Co		aded					
		Shaded			Wetland PresentYes Wetland ID	<u>✓</u> No			
		Indicate th	e dominant type and						
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									
		3							
		1							

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

STREAM NAME S-F18	LOCATION Monroe County, WV				
STATION # RIVERMILE	STREAM CLASS Perennial				
Lat <u>37.53826</u> Long <u>-80.719073</u>	RIVER BASIN Middle Indian Creek				
STORET#	AGENCY Tetra Tech				
INVESTIGATORS C. Vileno, C. Stoliker					
FORM COMPLETED BY C. Vileno	DATE 11/09/2016 TIME 9:30	REASON FOR SURVEY SWVM			

	Habitat	Condition Category										
	Parameter Parameter	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 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0							
ı sampling reach	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.							
ted in	SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0							
Parameters to be evaluated in sampling reach	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 2	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 15	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 3	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)

	II-lia-a	Condition Category										
	Habitat Parameter	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 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6								
ling reach	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.							
samp	SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0							
Parameters to be evaluated broader than sampling reach	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.							
e eva	SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0							
to b	SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0							
Parameters	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 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							

Total Score 97

Insects	Count	Tolerance	TV	Insects	Count	Tolerance	TV	Non-Insects	Count	Tolerance	TV	1	
Ephemeroptera	•	10		Odonata		0	Crustacea			0	1		
Ameletidae		2	0	Aeshnidae		3	0	Asellidae		7	0	1	
Baetidae		4	0	Calopterygidae		6	0	Cambaridae		5	0	1	
Beatiscidae		4	0	Coenagrionidae		7	0	Gammaridae		5	0	1	
Caenidae		5	0	Cordulegastridae		3	0	Palaemonidae		5	0	1	
Ephemerellidae		3	0	Gomphidae		5	0	Annelida			3		
Ephemeridae		5	0	Lestidae		7	0	Hirudinea		10	0		
Heptageniidae	8	3	24	Libellulidae		7	0	Nematoda		10	0		
Isonychiidae		3	0	Coleoptera			1	Nematomorpha		10	0		
Leptophlebiidae	2	4	8	Chrysomelidae		7	0	Oligochaeta	3	10	30		
Potamanthidae		5	0	Dryopidae		5	0	Turbellaria			0		
Siphlonuridae		3	0	Dytiscidae		6	0	Turbellaria		7	0		
Tricorythidae		5	0	Elmidae	1	4	4	Bivalvia			0		
Plecoptera	-		0	Gyrinidae		5	0	Corbiculidae		6	0		
Capniidae		2	0	Haliplidae		7	0	Sphaeriidae		5	0		
Chloroperlidae		2	0	Hydrophilidae		7	0	Unionidae		4	0		
Leuctridae		2	0	Psephenidae		3	0	Gastropoda			0		
Nemouridae		2	0	Ptilodactylidae		5	0	Ancylidae		7	0		
Peltoperlidae		1	0	Hemiptera			0	Hydrobiidae		4	0		
Perlidae		1	0	Belostomatidae		8	0	Physidae		7	0		
Perlodidae		1	0	Corixidae		8	0	Planorbidae		5	0		
Pteronarcyidae		1	0	Gerridae		10	0	Pleuroceridae		5	0		
Taeniopterygidae		2	0	Hydrometridae		8	0	Viviparidae		5	0		
Trichoptera			2	Nepidae		8	0	Miscellaneous			0		
Brachycentridae		2	0	Notonectidae		8	0	Collembola		6	0		
Glossosomatidae		2	0	Megaloptera			0	Lepidoptera		5	0		
Helicopsychidae		3	0	Corydalidae		3	0	Neuroptera		5	0		
Hydropsychidae		5	0	Sialidae		6	0	Hydrachnidae		6	0		
Hydroptilidae		3	0	Diptera			0	Totals	Totalı	number	16		
Lepidostomatidae		3	0	Athericidae		3	0	Totals	Total f	amilies	5		
Leptoceridae		3	0	Blephariceridae		2	0			Metric	calculations		
Limnephilidae		4	0	Ceratopogonidae		8	0		Richnes	SS		Additional metri	ics
Molannidae		3	0	Chironomidae		9	0	Total Taxa		5	22.7	Ephemeroptera Taxa	2
Philopotamidae		4	0	Culicidae		10	0	EPT Taxa		3	23.1	Plecoptera Taxa	0
Phryganeidae		4	0	Dixidae		6	0	Tolerance			Trichoptera Taxa	1	
Polycentropodidae		5	0	Empididae		7	0	Biotic Index		4.50	78.6	Long-lived Taxa	3
Psychomiidae		3	0	Psychodidae		8	0	% Tolerant		18.8	82.9	Odonata Taxa	0
Rhyacophilidae	2	3	6	Ptychopteridae		8	0		Composit	ion		Diptera Taxa	0
Uenoidae		2	0	Simuliidae		6	0	% EPT Abundance		75.0	83.3	COET Taxa	4
	Total Tolerance Value 72		72	Stratiomyidae		10	0	% Dominance		50.0	62.5	% Sensitive	62.5
West Vi	West Virginia Save Our Streams			Syrphidae		10	0	% Net-spinners		0.0	NA	% Chironomidae	0.0
601 57th Street, SE, Charleston WV 25304			Tabanidae		7	0	Stream	Condition Ind	ex	58.9	% Clingers	68.8	
http://	http://www.dep.wv.gov/sos			Tipulidae		5	0	Integrity R	ating	Mar	ginal	More diversity meas	sures

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.

