

Photograph Direction East

Comments:

STREAM ID S-A128	STREAM NAME Rockcamp Run
LAT 39.355557 LONG -80.490037	DATE 06/05/2015
CLIENT MVP	PROJECT NAME MVP
INVESTIGATORS S. Yarbrough, K. Lew, R. Sp	parhawk, W. Shannonberg
FLOW REGIME Perennial Intermittent Ephemeral	WATER TYPE TNW RPW ✓ NRPW

i cicililai =	_ 11116111111116	nt <u> — Epnem</u>	erai INVV —	RPW —	NRPW —	
			/leasurements k Width: <u>48.0 ft</u>		Stream ErosionNone ✓ Moderate	Heavy
		-				ricavy
		Top of Ban	ŭ		Artificial, Modified or Char	nnelized
		LB <u>21.0</u>	_	<u>π</u> .	Yes <u></u> ✓ No	
CHANNEL FE	ATURES		th: 12.00 in		Dam PresentYes _	∠ No
		Water Widt	h: 4.5 ft			
		High Water	Mark: <u>15.0 in</u>		Sinuosity Low	Medium High
		Flow Direct	tion: East		Gradient	
						Severe
		14/-4 D			,	(10 ft/100 ft)
		Water Pres No wate	senτ r, stream bed dry		Proportion of Reach Repre Morphology Types	esented by Stream
			ped moist		Riffle 20 % Run 40	%
FLOW		Standing	•		Pool 40 %	
CHARACTER	ISTICS	<u>✓</u> Flowing	water		Turbidity	
		Velocity			✓ Clear —Slightly	turbidTurbid
		Fast	Moderate		OpaqueStained	
		<u></u> ✓ Slow			Other	
INOR		STRATE CO		_	RGANIC SUBSTRATE CON	-
Substrate	(Siloulu a	add up to 10	% Composition in		does not necessarily add u	% Composition in
Type	Diame	ter	Sampling Reach	Type	Characteristic	Sampling Area
Bedrock				Detritus	sticks, wood, coarse	_
Boulder		mm (10")	15		plant materials (CPOM)	5
Cobble	64-256 m	m (2.5"-10")	25	Muck-Mud	black, very fine organic	
Gravel		1 (0.1"-2.5")	30		(FPOM)	
Sand		nm (gritty)	10			
Silt		0.06 mm	10	Marl	grey, shell fragments	
Clay	< 0.004	mm (slick)	10			
		Predomina ✓ Forest	ant Surrounding Lar Commer	iduse rcial	Indicate the dominant type ✓ Trees Shrub	
		Field/P				ceous
		Agricult		tial	Floodplain Width	
WATERSHED FEATURES		Other:				rate 15-30ft
		Canopy Co	over		Narrow <16ft	
		<u>✓</u> Partly o		aded	Matland Duagant (Vac	Na
		Shaded	Open		Wetland Present <u>v</u> Yes Wetland ID W-A37, W-A38	No
		Indicate th	e dominant type and		Iominant species present	
AQUATIC VE	GETATION		_	Rooted subme	_	tingFree floating
		Floating	g algae	Attached algae	9	
		•				
		Road and b	oroken concrete bridg	e located at ob	servation point.	
MACROINVER OR OTHER	RTEBRATES	· [
WILDLIFE OBSERVED/C	THED					
OBSERVATIO						
NOTES						
		1				

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

USACE FILE NO./ Project Name: (v2.1, Sept 2015)	Mo		ey Pipeline Project VM v2.1		COORDINATES: imal Degrees)	Lat.	39.355535°	Lon.	-80.490021°		WEATHER:		DATE:	8/10/201	15	
IMPACT STREAM/SITE ID AND SI' (watershed size {acreage}, unaltered			S-A128; Rockcamp R Form of Mitigatio				MITIGATION STREAM CLASS (watershed size {acres			l:				Comments:		
STREAM IMPACT LENGTH: 2		M OF ATION:	RESTORATION (Levels I-III)		OORDINATES: imal Degrees)	Lat.		Lon.			PRECIPITATION PAST 48 HRS:			Mitigation Length:		
Column No. 1- Impact Existing Conditi	on (Debit)		Column No. 2- Mitigation Existing Co	ondition - Basel	line (Credit)		Column No. 3- Mitigation Post Complet		e Years		Column No. 4- Mitigation Project Post Completion (C		ars	Column No. 5- Mitigation Project	ed at Maturity (Cred	dit)
Stream Classification:	Perennial		Stream Classification:	Per	rennial		Stream Classification:		Perennial	Strea	eam Classification:	Pere	ennial	Stream Classification:	Perennia	ial
Percent Stream Channel Slope	2		Percent Stream Channel Slo	ре			Percent Stream Channel	Slope	0		Percent Stream Channel Slop	ре	0	Percent Stream Channel S	оре	0
HGM Score (attach data form	s):		HGM Score (attach o	lata forms):			HGM Score (attac	h data forms)	:		HGM Score (attach data	a forms):		HGM Score (attach d	ata forms):	
	Average				Average				Average	•			Average			Average
Hydrology Biogeochemical Cycling	0		Hydrology Biogeochemical Cycling	1	0		Hydrology Biogeochemical Cycling	1	0	Biog	rology geochemical Cycling	1	0	Hydrology Biogeochemical Cycling	1	0
Habitat PART I - Physical, Chemical and Biologic	al Indicators		PART I - Physical, Chemical and	1 d Biological Ind	icators		Habitat PART I - Physical, Chemical	and Biological	Indicators	Habi	PART I - Physical, Chemical and B	iological Indi	cators	Habitat PART I - Physical, Chemical and	1 Biological Indicator	ors
Points Scale	Range Site Score			Points Scale Range	Site Score				ange Site Score			Points Scale Range	Site Score		Points Scale Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classification)	tions)		PHYSICAL INDICATOR (Applies to all streams of	classifications)			PHYSICAL INDICATOR (Applies to all strea				SICAL INDICATOR (Applies to all streams of	classifications)		PHYSICAL INDICATOR (Applies to all stream	classifications)	
USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)			USE	EPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)		
Epifaunal Substrate/Available Cover 0-20	16		Epifaunal Substrate/Available Cover	0-20	0		Epifaunal Substrate/Available Cover	0-20	0		pifaunal Substrate/Available Cover	0-20	0	Epifaunal Substrate/Available Cover	0-20	
2. Embeddedness 0-20	13		2. Embeddedness	0-20	0		2. Embeddedness	0-20	0		mbeddedness	0-20	0	2. Embeddedness	0-20	
3. Velocity/ Depth Regime 0-20 4. Sediment Deposition 0-20	16 15		Velocity/ Depth Regime Sediment Deposition	0-20 0-20	0		Velocity/ Depth Regime Sediment Deposition	0-20 0-20	0		elocity/ Depth Regime	0-20	0	Velocity/ Depth Regime Sediment Deposition	0-20 0-20	
5. Channel Flow Status 0-20	13		5. Channel Flow Status	0-20	0		5. Channel Flow Status	0-20	0		Channel Flow Status	0-20	0	5. Channel Flow Status	0-20	
6. Channel Alteration 0-20	0-1 10		6. Channel Alteration	0-20 0-1	0		6. Channel Alteration	0-20	0-1		Channel Alteration	0-20 0-1	0	6. Channel Alteration	0-20 0-1	
7. Frequency of Riffles (or bends) 0-20	17		7. Frequency of Riffles (or bends)	0-20	0		7. Frequency of Riffles (or bends)	0-20	0		requency of Riffles (or bends)	0-20	0	7. Frequency of Riffles (or bends)	0-20	
8. Bank Stability (LB & RB) 0-20	12		8. Bank Stability (LB & RB)	0-20	0		8. Bank Stability (LB & RB)	0-20	0		ank Stability (LB & RB)	0-20	0	8. Bank Stability (LB & RB)	0-20	
9. Vegetative Protection (LB & RB) 0-20	14		9. Vegetative Protection (LB & RB)	0-20	0		9. Vegetative Protection (LB & RB)	0-20	0		regretative Protection (LB & RB)	0-20	0	9. Vegetative Protection (LB & RB)	0-20	
10. Riparian Vegetative Zone Width (LB & RB) 0-20	14		10. Riparian Vegetative Zone Width (LB & RB)	0-20	0		10. Riparian Vegetative Zone Width (LB & RB)		0	10. F	Riparian Vegetative Zone Width (LB & RB)	0-20	0	10. Riparian Vegetative Zone Width (LB & RB)	0-20	
Total RBP Score Subo			Total RBP Score	Poor	0		Total RBP Score	Poor	0		al RBP Score	Poor	0	Total RBP Score	Poor	0
Sub-Total	0.7		Sub-Total		0		Sub-Total		0	Sub-	-Total		0	Sub-Total		0
CHEMICAL INDICATOR (Applies to Intermittent and Per	ennial Streams)		CHEMICAL INDICATOR (Applies to Intermittent	and Perennial Str	eams)		CHEMICAL INDICATOR (Applies to Intermit	tent and Perennia	l Streams)	CHE	EMICAL INDICATOR (Applies to Intermittent	and Perennial S	treams)	CHEMICAL INDICATOR (Applies to Intermitte	nt and Perennial Stream	ms)
WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General	al)			DEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (Genera)	
Specific Conductivity			Specific Conductivity				Specific Conductivity	T		Spec	ecific Conductivity			Specific Conductivity		
<=99 - 90 points 0-90	0.169		nH	0-90	0		nH	0-90	0	nН		0-90	0	nH	0-90	
0-80	0-1		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	5-90 0-1	0			5-90	0	рп	I	5-90 0-1	0	μ	5-90 0-1	
6.0-8.0 = 80 points	7.56			3-30				5-90				3-30			5-90	
DO			DO				DO		0	DO			0	DO	_	
>5.0 = 30 points	7.06			10-30	0			10-30	0			10-30	0		10-30	
Sub-Total	1		Sub-Total	•	0		Sub-Total		0	Sub-	-Total	•	0	Sub-Total		0
BIOLOGICAL INDICATOR (Applies to Intermittent and F	erennial Streams)		BIOLOGICAL INDICATOR (Applies to Intermitte	ent and Perennial	Streams)		BIOLOGICAL INDICATOR (Applies to Inte	ermittent and Per	ennial Streams)	ВЮ	LOGICAL INDICATOR (Applies to Intermit	tent and Peren	nial Streams)	BIOLOGICAL INDICATOR (Applies to Interr	nittent and Perennial S	Streams)
WV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)			wv s	Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)		
Good 0-100	0-1 73.8			0-100 0-1	0			0-100	o-1 0			0-100 0-1	0		0-100 0-1	
Sub-Total	0.738		Sub-Total	1	0		Sub-Total		0	Sub-	-Total		0	Sub-Total		0
PART II - Index and Unit Scor	9		PART II - Index and	Unit Score			PART II - Index a	nd Unit Score			PART II - Index and Uni	it Score		PART II - Index and U	Init Score	
Index Linea	r Feet Unit Score		Index	Linear Feet	Unit Score		Index	Linear Fe	et Unit Score		Index	Linear Feet	Unit Score	Index	Linear Feet U	Unit Score
0.813	9 23.5673333	3	0	0	0		0	0	0		0	0	0	0	0	0
									Ĭ	J <u>L</u>	<u> </u>	-			-	-

		(See instruction p		Impact Factors t values for MITIGATIO	N BANKING and IL	_F)			
Tempo				<u> </u>	-term Protection				
*Note: Reflects duration of aquatic functional loss b		et (debit) and completion of compensatory			% Add. Mitigation	on and Monitoring Period		Term Protection (Years)	
	mitigation (credit).				<u> </u>	<u>*</u>		, , ,	
Years		0							
Sub-Total		0							
Tom	nporal Loss-Maturity				0 . 5/1	IO Voor Monitoring		101	
*Note: Period between completion of compensatory		e time required for maturity, as it relates to			Sub-Total	0 Year Monitoring		0	
function (i.e. maturity of tree stratum to provide of				!					
	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)
					0.812666667	29	23.56733333	\$18,853.87	
				'					
0% Sub-Total		0							
Sup-10tal		U							
		PART V	/- Comparison of U	nit Scores and Projected	d Balance				
Final Unit Score (Debit)	22 5072222	Mitigation Existing Condition - Baseline		Mitigation Projected at Five Years		Mitigation Projected at Ten		Mitigation Projected At	
[No Net Loss Value]	23.56733333	(Credit)		Post Completion (Credit)		Years Post Completion (Credit)		Maturity (Credit)	
		(Gredit)		rost completion (credit)		rost completion (credit)		(Credit)	
FINAL PROJECTED NET BALANCE					_		_		•
					0		0		0
			Part VI - Mitigation (Considerations (Incentiv	voe)				
		'	art vi - imitigation ((63)				
	Extent of Stream Re	storation							
*Note1: Reference the Instruction		orrect Restoration Levels (below) for your pr	oiect				Upland Buffer Zone		
	ace an "X" in the appropriate of		•		*Note': Referen	ce Instructional handout for the def *Note ² : Enter the buffer width for			s (below)
Restoration Level 1							ne appropriate mitigation		
Restoration Level 1							o appropriate illinguieri	7,60	
Restoration Level 2					Buffer Width		Left Bank		
Restoration Level 3						0.50		Maria	
						0-50 51-150		None None	
					Buffer Width	31-150	Right Banl		
					Zanor man	0-50	itigiit Eaii	None	
Compensatory Mitigation Plan incorpor						51-150		None	
*Note: HUC 12-based watershed a	pproach required to obtain Strea	am Restoration incentive	No		Average Buffer	0			
					Width/Side	-			
		Impost	Mitigation Unit				C4===	ight Procoryation Potic	
Site		Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)					ight Preservation Ratio (v2.1, Sept 2015)	
		Office Field (Depit)	riela (Crealt)					(vz.1, 0ept 2010)	
S-A128		23.56733333	#DIV/0!			Final Mitigation Unit Yield			
0-A120		20.007 0000	#DIV/0:						
						#DIV/0!			

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

STREAM NAME S-A128	LOCATION Harrison County, WV				
STATION # RIVERMILE	STREAM CLASS Perennial				
Lat <u>39.355569°</u> long <u>-80.490100°</u>	RIVER BASIN Rockcamp Run, Tenmile Creek				
STORET#	AGENCY Tetra Tech				
INVESTIGATORS J. McGuirk, C. Stoliker					
FORM COMPLETED BY	DATE 09/06/2016	REASON FOR SURVEY			
J. McGuirk	TIME 12:00 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 16	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 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 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0						
Pe	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 fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	channel and mostly								
	SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0						

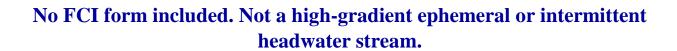
HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

	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 10	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 17	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 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0		
to be	SCORE 6 (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 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 140

Insects	Count	Tolerance	TV	Insects	Count	Tolerance	TV	Non-Insects	Count	Tolerance	TV	1	
Ephemeroptera			57	Odonata			4	Crustacea		•	2		
Ameletidae		2	0	Aeshnidae		3	0	Asellidae		7	0		
Baetidae	19	4	76	Calopterygidae	1	6	6	Cambaridae	2	5	10		
Beatiscidae		4	0	Coenagrionidae	1	7	7	Gammaridae		5	0		
Caenidae		5	0	Cordulegastridae		3	0	Palaemonidae		5	0		
Ephemerellidae		3	0	Gomphidae	2	5	10	Annelida	•	•	0		
Ephemeridae		5	0	Lestidae		7	0	Hirudinea		10	0		
Heptageniidae	31	3	93	Libellulidae		7	0	Nematoda		10	0		
Isonychiidae		3	0	Coleoptera			20	Nematomorpha		10	0		
Leptophlebiidae	7	4	28	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	18	4	72	Bivalvia		•	14		
Plecoptera	•	•	0	Gyrinidae		5	0	Corbiculidae		6	0		
Capniidae		2	0	Haliplidae		7	0	Sphaeriidae	14	5	70		
Chloroperlidae		2	0	Hydrophilidae		7	0	Unionidae		4	0		
Leuctridae		2	0	Psephenidae	2	3	6	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			13	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	8	5	40	Sialidae		6	0	Hydrachnidae		6	0		
Hydroptilidae		3	0	Diptera			3	Totals	Totalı	number	113		
Lepidostomatidae		3	0	Athericidae		3	0	Totals	Total f	amilies	13		
Leptoceridae		3	0	Blephariceridae		2	0			Metric	calculations		
Limnephilidae		4	0	Ceratopogonidae		8	0		Richnes	ss		Additional metric	cs
Molannidae		3	0	Chironomidae		9	0	Total Taxa		13	59.1	Ephemeroptera Taxa	3
Philopotamidae	5	4	20	Culicidae		10	0	EPT Taxa		5	38.5	Plecoptera Taxa	0
Phryganeidae		4	0	Dixidae		6	0		Toleran	ce		Trichoptera Taxa	2
Polycentropodidae		5	0	Empididae		7	0	Biotic Index		4.01	85.6	Long-lived Taxa	8
Psychomiidae		3	0	Psychodidae		8	0	% Tolerant		0.9	100.0	Odonata Taxa	3
Rhyacophilidae		3	0	Ptychopteridae		8	0		Composit	ion		Diptera Taxa	1
Uenoidae		2	0	Simuliidae		6	0	% EPT Abundance		61.9	68.8	COET Taxa	10
	Total To	erance Value	453	Stratiomyidae		10	0	% Dominance		27.4	90.7	% Sensitive	33.6
West Vi	irginia Save O	ur Streams		Syrphidae		10	0	% Net-spinners		11.5	NA	% Chironomidae	0.0
601 57th Stre	et, SE, Charle	ston WV 253	04	Tabanidae		7	0	Stream (Condition Ind	ex	73.8	% Clingers	63.7
http:/	/www.dep.w	v.gov/sos		Tipulidae	3	5	15	Integrity Ra	ating	Subo	ptimal	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.





Photograph Direction West

Comments:

STREAM ID			STREAM NA	AME UNT to I	ndian Run			
CLIENT EQ			PROJECT N					
LAT 39.32069	92 <u>L</u> (ONG -80.52649	9 DATE 04/26/	/2016	COUNTY Harrison			
INVESTIGATO	ORS S. To	wnsend, C. Stol	iker, K. Lew					
TNW	RPW	NRPW	FLOW REG Perennial	IME Intermitte	ent Ephemeral			
CHANNEL FE	ATURES	Top of Bank H LB 1.0 fl Water Depth: Water Width: Ordinary High	Vidth:3.0 ft Height: t	ft s	Within Roadside DitchYesNo Culvert PresentYesNo Culvert Material: Culvert Size:in			
FLOW CHARACTER	ISTICS	Stream bed Standing w Flowing wa	stream bed dry d moist vater	F F	Proportion of Reach Repres Morphology Types (Only ente Riffle 90 % Run Pool 10 % Furbidity ClearSlightly to _Other	er if water present) %		
INOR	-	JBSTRATE CO		_	RGANIC SUBSTRATE CON			
Substrate Type	(shoul	JBSTRATE COI d add up to 100 meter		(c	RGANIC SUBSTRATE CON does not necessarily add u Characteristic	p to 100%)		
Substrate	(shoul	d add up to 100	0%) 100 % Composition in	Substrate Type	Characteristic sticks, wood, coarse	p to 100%) % Composition in		
Substrate Type	(shoul	d add up to 100 meter 56 mm (10")	0%) 100 % Composition in	Substrate	Characteristic	p to 100%) % Composition in		
Substrate Type Bedrock Boulder Cobble	Shoul Dian > 25 64-256	meter 56 mm (10") mmm (2.5"-10")	% Composition in Sampling Reach	Substrate Type	Characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic	p to 100%) % Composition in Sampling Area		
Substrate Type Bedrock Boulder Cobble Gravel	Shoul Dial > 25 64-256 2-64 r	meter 66 mm (10") mm (2.5"-10") nm (0.1"-2.5")	% Composition in Sampling Reach	Substrate Type Detritus	Characteristic sticks, wood, coarse plant materials (CPOM)	p to 100%) % Composition in Sampling Area		
Substrate Type Bedrock Boulder Cobble Gravel Sand	> 25 64-256 2-64 r	d add up to 100 meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty)	% Composition in Sampling Reach 10 25	Substrate Type Detritus Muck-Mud	Characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM)	p to 100%) % Composition in Sampling Area		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt	Shoul Dial	meter 66 mm (10") mm (2.5"-10") nm (0.1"-2.5")	% Composition in Sampling Reach 10 25 20 20	Substrate Type Detritus	Characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic	p to 100%) % Composition in Sampling Area		
Substrate Type Bedrock Boulder Cobble Gravel Sand	Shoul Dial	d add up to 100 meter 56 mm (10") mm (2.5"-10") nm (0.1"-2.5") -2mm (gritty) 4-0.06 mm 04 mm (slick)	% Composition in Sampling Reach 10 25 20 20 25 Surrounding Landu — Commercia — Industrial — Residential — Other: Acce	Substrate Type Detritus Muck-Mud Marl Marl see Fal ess road	Characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM)	p to 100%) % Composition in Sampling Area		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay WATERSHED FEATURES	Shoul Diar	meter 56 mm (10") mm (2.5"-10") nm (0.1"-2.5") -2mm (gritty) 4-0.06 mm 04 mm (slick) Predominant Forest Field/Past Agricultura ROW Canopy Cove Open Shaded	% Composition in Sampling Reach 10 25 20 20 25 Surrounding Landu — Commercia — Industrial — Residential — Partly shad	Substrate Type Detritus Muck-Mud Marl Marl Lise F al ess road ed	Characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Modera	y to 100%) % Composition in Sampling Area 10 ate 15-30ft		

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

USACE FILE NO./ Project Name: (v2.1, Sept 2015)			illey Pipeline Project WVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	39.320682	Lon.	-80.526449	WEATHER:	Cloudy, 55	DATE:	6/1/2016
IMPACT STREAM/SITE ID (watershed size {acreage}			S-OP9; UNT (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:	36	FORM OF MITIGATION:	RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	
Column No. 1- Impact Existin	g Condition (Debit	t)	Column No. 2- Mitigation Existing Co	ndition - Baseline (Credit)		Column No. 3- Mitigation Pr Post Completio		ive Years	Column No. 4- Mitigation Proje Post Completion (0		Column No. 5- Mitigation Proj	ected at Maturity (Credit)
Stream Classification:	Ephem	neral	Stream Classification:	Ephemeral		Stream Classification:		Ephemeral	Stream Classification:	Ephemeral	Stream Classification:	Ephemeral
Percent Stream Channel SI	оре		Percent Stream Channel Slop	oe e		Percent Stream Channel SI	оре	0	Percent Stream Channel Slo	pe 0	Percent Stream Channel	Slope 0
HGM Score (attach d	lata forms):		HGM Score (attach d	ata forms):		HGM Score (attach	data forms	s):	HGM Score (attach da	ta forms):	HGM Score (attack	n data forms):
Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and	0.34 0.7 0.28	Average 0 tors	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and	0		Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical an		0	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and	0	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical a	0
	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	s classifications)		PHYSICAL INDICATOR (Applies to all streams of	lassifications)		PHYSICAL INDICATOR (Applies to all streams	classification	s)	PHYSICAL INDICATOR (Applies to all streams	classifications)	PHYSICAL INDICATOR (Applies to all stre	ams 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 WVDEP Water Quality Indicators (Genera Specific Conductivity		6 10 0 10 0 12 0 14 4 10 60 0.5	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	0-20 0-20		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 (General Specific Conductivity		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 Intermitten WVDEP Water Quality Indicators (General) 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 Interm WYDEP Water Quality Indicators (Gene Specific Conductivity	0-20 0-20
<=99 - 90 points pH 6.0-8.0 = 80 points DO >5.0 = 30 points Sub-Total BIOLOGICAL INDICATOR (Applies to Intermi	0-90 0-80 0-1 10-30	50 6 30 1 streams)	DO Sub-Total BIOLOGICAL INDICATOR (Applies to Intermittee	0-90 0-1 10-30 0 nt and Perennial Streams)		DO Sub-Total BIOLOGICAL INDICATOR (Applies to Intern	0-90 5-90 10-30	0-1 5.0	pH DO Sub-Total BIOLOGICAL INDICATOR (Applies to Interm	0-90 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 Int	0-90 0-1 10-30 0-ermittent and Perennial 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 Sub-Total	1 1	1	Sub-Total	0		Sub-Total		0	Sub-Total	0	Sub-Total	0
PART II - Index and l	Jnit Score		PART II - Index and U	Init Score		PART II - Index and	Unit Score		PART II - Index and U	nit Score	PART II - Index an	d Unit Score
Index	Linear Feet	Unit Score	Index	Linear Feet Unit Score		Index	Linear F	eet Unit Score	Index	Linear Feet Unit Score	Index	Linear Feet Unit Score
0.833	36	30	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	oral Loss-Construction between the time of an impac	t (debit) and completion of compensatory			% Add. Mitigati	Longon and Monitoring Period	term Protection	-Term Protection (Years)	
	mitigation (credit).	. ()			70 7 to di Williagati	on and Monitoring Fortion	<u></u>	101111 1 1010011011 (10010)	
Years Sub-Total		0							
	mporal Loss-Maturity	· · ·				40.Y M Y :		101	
*Note: Period between completion of compensator			Sub-Total	10 Year Monitoring		0			
function (i.e. maturity of tree stratum to provide	iunction (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 Con	nversion	
% Add. Mitigation		Temporal Loss-Maturity (Years)			Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit	
, o , taa miligation		Tomporal 2000 matarity (Toure)			0.833333333	36	30	\$24,000.00	
0%		0							
Sub-Total		U							
		PART \	/- Comparison of U	nit Scores and Projecte	d Balance				
Final Unit Score (Debit)	30	Mitigation Existing Condition - Baseline		Mitigation Projected at Five Years		Mitigation Projected at Ten Years		Mitigation Projected At Maturity	
[No Net Loss Value]	30	(Credit)		Post Completion (Credit)		Post Completion (Credit)		(Credit)	
FINAL PROJECTED NET BALANCE					0		0		0
		F	Part VI - Mitigation (Considerations (Incentiv	ves)				
	Extent of Stream Re					Extended	Upland Buffer Zone	a	
	nal handout to determine the co lace an "X" in the appropriate o	orrect Restoration Levels (below) for your pr category (only select one).	oject		*Note ¹ : Referen	nce Instructional handout for the def *Note ² : Enter the buffer width for	initions of the Buffer Zon	ne Mitigation Extents and Type	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 None	
Compensatory Mitigation Plan incorpo	orates HUC 12-based water	shed approach? (Yes or No)				0-50 51-150	-	None None	
*Note: HUC 12-based watershed			No		Average Buffer Width/Side	0			
		Impact	Mitigation Unit				Stra	light Preservation Ratio	
Site		Unit Yield (Debit)	Yield (Credit)				- Cira	(v2.1, Sept 2015)	
S-OP8		30	#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-OP9 (Harrison County)

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

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	0.34
Biogeochemical Cycling	0.70
Habitat	0.28

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
V _{CCANOPY}	Percent canpoy over channel.	35.00	0.30
V _{EMBED}	Average embeddedness of channel.	3.43	0.98
V _{SUBSTRATE}	Median stream channel substrate particle size.	0.25	0.13
V_{BERO}	Total percent of eroded stream channel bank.	0.00	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	0.00	0.00
V _{TDBH}	Average dbh of trees.	16.67	1.00
V _{SNAG}	Number of snags per 100 feet of stream.	0.00	0.10
V _{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V _{SRICH}	Riparian vegetation species richness.	2.70	1.00
V _{DETRITUS}	Average percent cover of leaves, sticks, etc.	15.00	0.18
V _{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V _{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.58	0.61

	High-G	radient l	Headwat		ms in ea Data She					tern Wes	st Virgini	a
	Team.	C. Vileno, F	R Aher	i iciu L	ala Siie	Ct and C	aicu		ı ₋atitude/UTI	M Northing	39 32060	
Dro	oject Name:		V. Abei							_	-80.526495	
110	=		rrison Coun	tv)				L'	_	_	11/06/2019	
		3-01 9 (11a							Jan	ipiniy Date.	11/00/2019	
SA	AR Number:		Reach	Length (ft):	100	Stream Ty	/pe:	Ephe	meral Stream	l		•
	Top Strata:	Tre	e/Sapling St	rata	(determined	d from perce	ent cal	culate	ed in V _{CCANO}	_{PY})		
Site	and Timing:	Project Site	!			•	Before	Proje	ct			•
Sample	e Variables	1-4 in strea	am channel									
1										35.0 %		
ĺ			measureme									
	50	40	15	15	40	50						
2	V_{EMBED}	points alon	nbeddednes g the strean and area s	n. Select a	particle from	the bed. E	Before	movir	ng it, determ	nine the per	centage of	3.4
			the following									
		•	e of 1. If the	•					•		•	
		Embedded Minshall 19	ness rating 983)	for gravel, c	obble and b	oulder parti	cles (re	escal	ed from Pla	tts, Megaha	n, and	
		Rating	Rating Des	scription								
		5			overed, sur	rounded, or	buried	by fi	ne sedimen	t (or bedroc	k)	
		4			ce covered				-			
		3			face covere							
		2			face covere						ial acurta aa\	
	Liet the rati	1	point below		covered, su	irrounaea, c	or burie	ed by	iine seaime	nt (or artific	iai suriace)	
	3	3	3	3	3	4	3		2	2	2	
	2	3	4	4	4	4	3		3	3	3	
	4	4	4	4	4	5	5		4	4	4	
	4	4	4	4	4	3	3		4	4	+	
3	V _{SUBSTRATE}		eam channe							ghly equidis	tant points	0.25 in
		along the s	tream; use t	ine same po	oints and pa	rticies as us	sea in v	EMBE	D·			0.20
			ches to the 0.0 in, sand				w (bed	rock	should be c	ounted as 9	9 in,	
	0.25	0.25	0.25	0.10	0.10	0.10	0.1	0	0.10	0.25	1.00	
	1.00	0.10	0.10	0.25	0.25	2.00	2.0		0.25	1.00	1.00	
	0.10	0.10	1.00	1.00	2.00	2.00	0.2		0.25	0.25	0.25	
	0.10	0.10	1.00	1.00	2.00	2.00	0.2		0.20	0.20	0.20	
4	V_{BERO}	•	ent of eroded									
		side and th may be up	e total perce to 200%.	entage will b	e calculated	d If both ba	nks ar	e ero	ded, total e	rosion for th	e stream	0 %
			Left Bank:	0	ft		Right E	Rank.	0	ft		

Sampl	le Variable	s 5-9 within t	the entire r	iparian/bu	ffer zone ad	jacent to t	he stream c	hannel (25	feet from e	ach bank).	
5	V_{LWD}		ch. Enter th	ne number	from the enti		eter and 36 ir buffer and w				0.0
							oody stems:		0		
6	V_{TDBH}				nly if V _{CCANOF} r tree DBHs		ing cover is a	at least 20%	6). Trees ar	e at least 4	16.7
				nents of ind	ividual trees	(at least 4	in) within the	buffer on e	each side of		
		the stream									•
		Left Side						Right Side	;		l
	25	10	15			20	20	10			
											ł
											1
											1
											1
											1
		NI I	(, ,)		1.0011 (11)	100 (- .			
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) pei				NI dili
					ber of sapiin e calculated		ubs on each	side of the	stream, and	tne	Not Used
		ао а ро.	Left Side:				Right Side:				
9	V_{SRICH}						am reach. C				
							sive species p from these o		all strata. Sp	pecies	2.70
			p 1 = 1.0	and the out	maox wiii bo	Calculated					
4	Acer rubri			Magnolia	tripetala		Ailanthus a		2 (-1.0)	Lonicera ja	nponica
	Acer sacc			Nyssa syl	•		Albizia julib			Lonicera ta	•
	Aesculus	flava		Oxydendrui	m arboreum		Alliaria peti	olata		Lotus corn	iculatus
	Asimina ti	riloba	✓	Prunus se	rotina		Alternanthe	era		Lythrum sa	alicaria
	Betula alle	eghaniensis		Quercus a	ılba		philoxeroid		✓	Microstegiur	m vimineum
	Betula ler	nta		Quercus d	coccinea		Aster tatari	cus		Paulownia	tomentosa
	Carya alb	а		Quercus ii	mbricaria		Cerastium	fontanum		Polygonum (cuspidatum
	Carya gla	bra		Quercus p	orinus		Coronilla va	aria		Pueraria m	ontana
	Carya ova	alis		Quercus r	ubra		Elaeagnus u	mbellata		Rosa multi	flora
√	Carya ova	ata		Quercus v	elutina		Lespedeza	bicolor		Sorghum h	alepense
	Cornus flo	orida		Sassafras	albidum		Lespedeza	cuneata		Verbena bi	rasiliensis
√	Fagus gra	andifolia		Tilia amer	icana		Ligustrum ob	otusifolium			
	Fraxinus	americana		Tsuga car	nadensis		Ligustrum s	sinense			
	Liriodendro	on tulipifera		Ulmus am	ericana						
		acuminata	<u>—</u>								
		4	Species in	Group 1				1	Species in	Group 2	

-	The four su	bplots shou	uld be place	ed roughly	equidistan	or 1m x 1m) tly along ea	ch side of	the stream			om each
10	V _{DETRITUS}					ner organic r er of the detr				er and	15.00 %
				Side				t Side		1	
		15	15	15		15	15	15		1	
11	V_{HERB}	Average pe	ercentage co	over of herba	aceous veg	etation (mea	asure only i	tree cover	is <20%). [o not	
	THERB	include woo	ody stems a	it least 4" db	h and 36" t	all. Because	there may	be several	layers of gro	ound cover	Not Used
		vegetation at each sub		s up through	1 200% are	accepted. E	nter the pe	ercent cover	of ground v	egetation	
			Left	Side			Righ	t Side			
0	- V	0 111-1 11-		alamant of	(l						
_		2 within the								1	
12	V _{WLUSE}	Weighted A	Average of F	Runoff Score	e for waters	hed:					0.58
									Runoff	% in	Running
			Land	Use (Choos	e From Dro	p List)			Score	Catch- ment	Percent (not >100)
	Forest and n	ative range (5	50% to 75% g	round cover)				•	0.7	60	60
	Forest and n	ative range (<50% ground	cover)				•	0.5	30	90
	Open space	(pasture, lawr	ns, parks, etc.)), grass cover	<50%			•	0.1	10	100
								•			
								-			
								•			
								•			
								•			
	Su	mmary					No	tes:			
Va	ariable	Value	VSI								
V _C	CANOPY	35 %	0.30								
VE	MBED	3.4	0.98								
Vs	UBSTRATE	0.25 in	0.13								
V_{B}	ERO	0 %	1.00								
VL	WD	0.0	0.00								
V _{TI}	DBH	16.7	1.00								
Vs	NAG	0.0	0.10								
Vs	SD	Not Used	Not Used								
Vs	RICH	2.70	1.00								
V_{D}	ETRITUS	15.0 %	0.18								
V_{H}	ERB	Not Used	Not Used								
Vw	LUSE	0.58	0.61								

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

STREAM NAME S-OP9	LOCATION Harrison County			
STATION # RIVERMILE	STREAM CLASS Ephemeral			
LAT <u>39.32069</u> LONG <u>-80.526495</u>	RIVER BASIN Tenmile Creek			
STORET#	AGENCY Tetra Tech			
INVESTIGATORS CV, RA				
FORM COMPLETED BY	DATE 11/06/2019	REASON FOR SURVEY		
C.Vileno	TIME 11:00 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 6	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).					
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	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 ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

	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 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 ev	SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0				
s to l	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 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 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				

00	DO:
Total Score 66	pH:
	SC:

A-8

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



Photograph Direction West

Comments:

STREAM ID	S-OP8		STREAM NA	AME UNT to	UNT to Indian Run			
CLIENT EQ	Т		PROJECT N	AME MVP				
LAT 39.32096	61 <u>L</u>	ONG -80.52644	2 DATE 04/27	/2016	COUNTY Harrison			
INVESTIGATO	ORS S. To	wnsend, C. Stol	iker, K. Lew					
WATER TYPE	RPW [NRPW [FLOW REG Perennial	IME Intermit	tent Ephemeral			
		Estimate Mea	asurements		Sinuosity Low	Medium High		
		Top of Bank N	Width: 5.0 ft Height:		Gradient Flat Mo	oderate		
		LB <u>3.0</u> f		ft	Stream Erosion	Haarin		
		Water Depth:	1.00 in		<u>✓</u> NoneModerate	_ ,		
CHANNEL FE	ATURES	Water Width:			Artificial, Modified or Chan Yes ✓ No			
		Ordinary High	Water Mark (Width):	2.0_ft		,		
		Ordinary High	Water Mark (Height)): <u>4.0</u> in	Within Roadside Ditch Yes ✓ No.			
		Flow Direction	n: South	_	_			
					Culvert PresentYes			
					Culvert Material:			
					Culvert Size:in			
		Water Presei No water, s Stream bec Standing v	stream bed dry d moist		Proportion of Reach Representation of Reach Representa			
FLOW CHARACTER	ISTICS	Flowing wa	iter		Turbidity			
		Volocity			✓ ClearSlightly to	urbid Turbid		
		Velocity Fast <u>✓</u>	_ Moderate		Other	_		
		Slow						
INOR	-	UBSTRATE CO			DRGANIC SUBSTRATE COM (does not necessarily add u			
Substrate Type	(shou				(does not necessarily add u			
Substrate Type Bedrock	(shou	ld add up to 10	0%) 100 % Composition in	Substrate	Characteristic sticks, wood, coarse	p to 100%) % Composition in Sampling Area		
Substrate Type Bedrock Boulder	(shou	meter 56 mm (10")	0%) 100 % Composition in Sampling Reach	Substrate Type	Characteristic	p to 100%) % Composition in		
Substrate Type Bedrock Boulder Cobble	(shou) Dia > 29 64-256	meter 56 mm (10") 6 mm (2.5"-10")	% Composition in Sampling Reach	Substrate Type	Characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic	p to 100%) % Composition in Sampling Area		
Substrate Type Bedrock Boulder Cobble Gravel	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5")	% Composition in Sampling Reach 25	Substrate Type Detritus	characteristic sticks, wood, coarse plant materials (CPOM)	p to 100%) % Composition in Sampling Area		
Substrate Type Bedrock Boulder Cobble Gravel Sand	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty)	% Composition in Sampling Reach 25 20 35	Substrate Type Detritus Muck-Mud	characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM)	y to 100%) % Composition in Sampling Area 15		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt	Shou Dia	meter 56 mm (10") 5 mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm	% Composition in Sampling Reach 25	Substrate Type Detritus	Characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic	p to 100%) % Composition in Sampling Area		
Substrate Type Bedrock Boulder Cobble Gravel Sand	Shou Dia	dd add up to 100 meter 56 mm (10") 5 mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick)	% Composition in Sampling Reach 25 20 35	Substrate Type Detritus Muck-Mud Marl	characteristic Sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments	y to 100%) % Composition in Sampling Area 15		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant	% Composition in Sampling Reach 25 20 35 20 Surrounding Landu	Substrate Type Detritus Muck-Mud Marl	characteristic Sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width	y to 100%) % Composition in Sampling Area 15		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt	Shoul Dia	dd add up to 100 meter 56 mm (10") 5 mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick)	% Composition in Sampling Reach 25 20 35 20 Surrounding Lando Commercia	Substrate Type Detritus Muck-Mud Marl	closes not necessarily add u Characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width	p to 100%) % Composition in Sampling Area 15 0		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay	Shou Dia	dadd up to 100 meter 56 mm (10") 5 mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant ✓ Forest — Field/Past — Agricultura	% Composition in Sampling Reach 25 20 35 20 Surrounding Landout Commercial Industrial Residential	Substrate Type Detritus Muck-Mud Marl	characteristic Sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Modera	p to 100%) % Composition in Sampling Area 15 0		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt	Shou Dia	dadd up to 100 meter 56 mm (10") 5 mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant ✓ Forest — Field/Past	% Composition in Sampling Reach 25 20 35 20 Surrounding Landu — Commercia	Substrate Type Detritus Muck-Mud Marl	characteristic Sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Modera	p to 100%) % Composition in Sampling Area 15 0		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay	Shou Dia	### Total Control of the Interest of the Inte	% Composition in Sampling Reach 25 20 35 20 Surrounding Landout Commercial Industrial Residential Other:	Substrate Type Detritus Muck-Mud Marl	characteristic Sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Modera	p to 100%) % Composition in Sampling Area 15 0		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant Forest Field/Past Agriculture ROW Canopy Cove	% Composition in Sampling Reach 25 20 35 20 Surrounding Landout Commercial Industrial Residential Other:	Substrate Type Detritus Muck-Mud Marl use	characteristic Sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Modera	p to 100%) % Composition in Sampling Area 15 0		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant Forest Field/Past Agriculture ROW Canopy Cove	% Composition in Sampling Reach 25 20 35 20 Surrounding Landu — Commercial — Industrial — Residential — Other:	Substrate Type Detritus Muck-Mud Marl use	characteristic Sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Modera	p to 100%) % Composition in Sampling Area 15 0		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant Forest Field/Past Agriculture ROW Canopy Cove	% Composition in Sampling Reach 25 20 35 20 Surrounding Landu — Commercial — Industrial — Residential — Other:	Substrate Type Detritus Muck-Mud Marl use	characteristic Sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Modera	p to 100%) % Composition in Sampling Area 15 0		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay WATERSHED FEATURES	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant Forest Field/Past Agriculture ROW Canopy Cove Open Shaded	% Composition in Sampling Reach 25 20 35 20 Surrounding Landu Commercial Industrial Residential Other: Partly shad	Substrate Type Detritus Muck-Mud Marl use al	characteristic Sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Modera	p to 100%) % Composition in Sampling Area 15 0 0 ate 15-30ft		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay WATERSHED FEATURES	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant Forest Field/Past Agriculture ROW Canopy Cove Open Shaded	% Composition in Sampling Reach 25 20 35 20 Surrounding Landu Commercial Industrial Residential Other: Partly shad	Substrate Type Detritus Muck-Mud Marl use al	characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Narrow <15ft	p to 100%) % Composition in Sampling Area 15 0 0 ate 15-30ft		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay WATERSHED FEATURES	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant Forest Field/Past Agriculture ROW Canopy Cove Open Shaded	% Composition in Sampling Reach 25 20 35 20 Surrounding Landu Commercial Industrial Residential Other: Partly shad	Substrate Type Detritus Muck-Mud Marl use al	characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Narrow <15ft	p to 100%) % Composition in Sampling Area 15 0 0 ate 15-30ft		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay WATERSHED FEATURES	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant Forest Field/Past Agriculture ROW Canopy Cove Open Shaded	% Composition in Sampling Reach 25 20 35 20 Surrounding Landu Commercial Industrial Residential Other: Partly shad	Substrate Type Detritus Muck-Mud Marl use al	characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Narrow <15ft	p to 100%) % Composition in Sampling Area 15 0 0 ate 15-30ft		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay WATERSHED FEATURES	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant Forest Field/Past Agriculture ROW Canopy Cove Open Shaded	% Composition in Sampling Reach 25 20 35 20 Surrounding Landu Commercial Industrial Residential Other: Partly shad	Substrate Type Detritus Muck-Mud Marl use al	characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Narrow <15ft	p to 100%) % Composition in Sampling Area 15 0 0 ate 15-30ft		
Substrate Type Bedrock Boulder Cobble Gravel Sand Silt Clay WATERSHED FEATURES	Shou Dia	meter 56 mm (10") mm (2.5"-10") mm (0.1"-2.5") -2mm (gritty) 04-0.06 mm 04 mm (slick) Predominant Forest Field/Past Agriculture ROW Canopy Cove Open Shaded	% Composition in Sampling Reach 25 20 35 20 Surrounding Landu Commercial Industrial Residential Other: Partly shad	Substrate Type Detritus Muck-Mud Marl use al	characteristic sticks, wood, coarse plant materials (CPOM) black, very fine organic (FPOM) grey, shell fragments Floodplain Width Wide > 30ft Narrow <15ft	p to 100%) % Composition in Sampling Area 15 0 0 ate 15-30ft		

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 WVM v2.1	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	39.320959	Lon.	-80.526445	WEATHER:	Cloudy, 55	DATE:	6/1/2016
IMPACT STREAM/SITE ID A (watershed size {acreage}, u			S-OP8; UNT			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:	41	FORM OF MITIGATION:	RESTORATION (Levels I-III)	MIT COORDINATES: (in Decimal Degrees)	Lat.	39.320961	Lon.	-80.526441	PRECIPITATION PAST 48 HRS:	PRECIPITATION PAST 48 HRS: 0		
Column No. 1- Impact Existing	Condition (Debit	t)	Column No. 2- Mitigation Existing Co	ondition - Baseline (Credit)		Column No. 3- Mitigation I Post Completi		Five Years	Column No. 4- Mitigation Proje Post Completion (C		Column No. 5- Mitigation Proje	cted at Maturity (Credit)
Stream Classification:	Ephemo	eral	Stream Classification:	Ephemeral		Stream Classification:		Ephemeral	Stream Classification:	Ephemeral	Stream Classification:	Ephemeral
Percent Stream Channel Slop	ре		Percent Stream Channel Slo	ре		Percent Stream Channel	Slope	0	Percent Stream Channel Slo	pe 0	Percent Stream Channel	Slope 0
HGM Score (attach dat	ta forms):		HGM Score (attach d	lata forms):		HGM Score (attac	h data form	s):	HGM Score (attach da	ta forms):	HGM Score (attach	data forms):
Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and B	0.43 0.75 0.35	Average 0 tors	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and	0		Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical		0	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical and E	0	Hydrology Biogeochemical Cycling Habitat PART I - Physical, Chemical a	0
	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 of	classifications)		PHYSICAL INDICATOR (Applies to all streams of	classifications)		PHYSICAL INDICATOR (Applies to all stream		ns)	PHYSICAL INDICATOR (Applies to all streams	classifications)	PHYSICAL INDICATOR (Applies to all stream	
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	t and Perennial Strea	10 12 0 10 0 16 0 18 6 12 74 0.616666667	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		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	0-20 0-20 0-20 0-20 0-20 0-20 0-20 0-20	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 Intermittent	0-20 0-20	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 Intermi	Poor 0 0 tent and Perennial Streams)
WVDEP Water Quality Indicators (General) Specific Conductivity 100-199 - 85 points PH 5.6-5.9 = 45 points DO Sub-Total BIOLOGICAL INDICATOR (Applies to Intermitte	0-90	treams)	WVDEP Water Quality Indicators (General) Specific Conductivity PH DO Sub-Total BIOLOGICAL INDICATOR (Applies to Intermitte	0-90		WVDEP Water Quality Indicators (Gener Specific Conductivity PH DO Sub-Total BIOLOGICAL INDICATOR (Applies to Inte	5-90	0-1 5 c	WVDEP Water Quality Indicators (General) Specific Conductivity PH DO Sub-Total BIOLOGICAL INDICATOR (Applies to Intermi	0-90	WVDEP Water Quality Indicators (Genesspecific Conductivity PH DO Sub-Total BIOLOGICAL INDICATOR (Applies to Interest)	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		Sub-Total	0-100	0-1	Sub-Total	0-100 0-1	Sub-Total	0-100 0-1
PART II - Index and Un	nit Score		PART II - Index and U	-		PART II - Index a	nd Unit Score		PART II - Index and Un		PART II - Index and	
Index	Linear Feet	Unit Score	Index	Linear Feet Unit Score		Index	Linear I	Feet Unit Score	Index	Linear Feet Unit Score	Index	Linear Feet Unit Score
0.708	41 2	29.04166667	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		f (debit) and completion of compensatory			% Add. Mitigati	Longon and Monitoring Period	term Protection Long	-Term Protection (Years)	
Vecre	mitigation (credit).	0							
Years Sub-Total		0							
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates					0 + 5/ ² Sub-Total	10 Year Monitoring		101 0	
function (i.e. maturity of tree stratum to provide	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 Con	nversion	
% Add. Mitigation		Temporal Loss-Maturity (Years)			Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit	
-		<u> </u>			0.708333333	41	29.04166667	\$23,233.33	
0% Sub-Total		0							
		PART V	/- Comparison of U	nit Scores and Projecte	d Balance				
Final Unit Score (Debit) [No Net Loss Value]	29.04166667	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
		F	Part VI - Mitigation (Considerations (Incentiv	ves)				
	Extent of Stream Remail handout to determine the collace an "X" in the appropriate of	prrect Restoration Levels (below) for your pr	oject		*Note ¹ : Referen	nce 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		
Restoration Level 3					Buffer Width		Leit Baili		
						0-50 51-150		None None	
					Buffer Width	0-50	Right Ban	None	
Compensatory Mitigation Plan incorpo *Note: HUC 12-based watershed a			No		Average Buffer Width/Side	51-150 0		None	
Site		Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)		Than Joide		Stra	ight Preservation Ratio (v2.1, Sept 2015)	
S-OP8		29.04166667	#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-OP8 (Harrison County)

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

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	0.43
Biogeochemical Cycling	0.75
Habitat	0.35

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
V _{CCANOPY}	Percent canpoy over channel.	37.00	0.32
V _{EMBED}	Average embeddedness of channel.	3.77	1.00
V _{SUBSTRATE}	Median stream channel substrate particle size.	0.25	0.13
V_{BERO}	Total percent of eroded stream channel bank.	0.00	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	3.00	0.38
V _{TDBH}	Average dbh of trees.	12.40	1.00
V _{SNAG}	Number of snags per 100 feet of stream.	2.00	1.00
V _{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V _{SRICH}	Riparian vegetation species richness.	1.80	0.86
V _{DETRITUS}	Average percent cover of leaves, sticks, etc.	15.00	0.18
V _{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V _{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.58	0.61

	High-G	radient l	Headwat					-		tern Wes		a
				Field D	oata She	et and C	alcul	ato	r			
		C. Vileno, F	R. Aber							M Northing:		
Pro	ject Name:							Lo	•	•	-80.526441	
	Location:	S-OP8 (Ha	rrison Coun	ty)					Sam	pling Date:	11/06/2019	1
SA	R Number:		Reach	Length (ft):	100	Stream Ty	/pe:	Ephe	meral Stream	l		•
	Top Strata:	Tree	e/Sapling St	rata	(determine	d from perce	ent calc	culate	ed in V _{CCANC}	_{PY})		
Site a	and Timing:	Project Site				•	Before	Proje	ct			•
Sample	Variables	1-4 in strea	ım channel									
1		equidistant 20%, enter	ercent cover points along at least one	g the stream value betw	n. Measure een 0 and 1	only if tree/s	sapling	cove	er is at least		٠,	37.0 %
			measureme		point below							
	40	40	20	20	30	30	40)	50	50	50	
2	V _{EMBED}	points alon	nbeddednes g the stream	n. Select a j	particle from	n the bed. E	Before r	movir	ng it, determ	nine the per	centage of	3.8
			and area so the followi				,		,		0	
		•	of 1. If the	•					•	inio oodiiri	orno, add a	
			peddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and									,
		Rating	Rating Des		overed our	rounded, or	huriod	l by fi	no codimor	t (or bodroe	alc)	
		5 4				, surrounde					ж)	
		3				d, surround			•			
		2				d, surround						
		1	>75 percen	t of surface	covered, su	urrounded, o	or burie	d by	fine sedime	ent (or artific	ial	
	List the rati	ngs at each	point below	' :								
	4	5	4	4	3	4	4		3	3	3	
	3	3	4	4	4	4	4		4	4	4	
	5	5	3	3	3	3	3		5	5	3	
3	V _{SUBSTRATE}		eam channe tream; use t							ghly equidis	tant points	0.25 in
			ches to the				w (bed	rock :	should be c	ounted as 9	9 in,	
ı	3.00	2.00	2.00	2.00	0.25	0.25	0.2	E	0.25	0.25	1.00	
	1.00	0.10	0.10	0.10	0.25	0.25	0.2		0.25	1.00	1.00	
	0.25	0.10	1.00	1.00	2.00	2.00	0.2		0.25	0.25	0.25	
	0.25	0.10	1.00	1.00	2.00	2.00	0.2	.:J	0.25	0.25	0.25	
4	V	Total paras	ent of orodos	l etroom ob	annol bank	Enter the t	atal nu	mhor	of foot of o	rodod bank	on oach	
4	V_{BERO}		ent of eroded e total perce to 200%.									0 %
		. '	Left Bank:	0	ft	F	Right B	ank:	0	ft		
							-					

Sample	e Variables	5-9 within t	he entire ri	iparian/buff	er zone ad	jacent to th	ne stream cl	hannel (25	feet from e	ach bank).		
5	V_{LWD}	stream read	ch. Enter th		om the enti		ter and 36 ir buffer and w				3.0	
					Number of	downed wo	ody stems:	;	3			
6	V_{TDBH}			measure on eter. Enter			ng cover is a	at least 20%	b). Trees ar	e at least 4	12.4	
		List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:										
		the stream	Left Side					Right Side				
	8	12	20	6	10	20	18	8	5	17		
7	V_{SNAG}		0 (ast 4" dbh a I the amoun	,	•	et of stream.	Enter num	ber of snag	s on each	2.0	
			,		•							
•		N	Left Side:		1		Right Side:	100 ()	1			
8	V_{SSD}			`	,	•	hes dbh) pei I shrubs on e				Not Used	
				ream will be						,		
_	V	Diamina	Left Side:			f+-f-+	Right Side:	de a altra III a a		- t f		
9	V_{SRICH}	•	• .		•		am reach. C ive species r		•		1.80	
		•					from these of					
		Grou	p 1 = 1.0					Group	2 (-1.0)			
\checkmark	Acer rubru	m		Magnolia tr	ripetala		Ailanthus a	ltissima		Lonicera ja	ponica	
	Acer sacci	harum		Nyssa sylv	atica		Albizia julib	rissin		Lonicera ta	tarica	
	Aesculus f	lava		Oxydendrum	arboreum		Alliaria peti	olata		Lotus corni	culatus	
	Asimina tri	iloba	✓	Prunus ser	otina		Alternanthe	era		Lythrum sa	licaria	
	Betula alleg	ghaniensis		Quercus al	ba		philoxeroide	es	✓	Microstegiun	n vimineum	
	Betula lent	ta		Quercus co	occinea		Aster tatario	cus		Paulownia	tomentosa	
	Carya alba	ì		Quercus in	nbricaria		Cerastium	fontanum		Polygonum o	cuspidatum	
	Carya glab	ora		Quercus pr	rinus		Coronilla va	aria		Pueraria m	ontana	
	Carya ova	lis		Quercus ru	ıbra		Elaeagnus ui	mbellata		Rosa multit	flora	
	Carya ova	ta		Quercus ve	elutina		Lespedeza	bicolor		Sorghum h	alepense	
	Cornus flo	rida		Sassafras	albidum		Lespedeza	cuneata		Verbena br	asiliensis	
✓	Fagus gra	ndifolia		Tilia amerio	cana		Ligustrum ob	tusifolium				
	Fraxinus a	mericana		Tsuga cana	adensis		Ligustrum s	sinense				
	Liriodendror	n tulipifera		Ulmus ame	ericana							
	Magnolia a	acuminata										
		3	Species in	Group 1				1	Species in	Group 2		

	e Variables The four sul									n 25 feet fro	om each
10	V _{DETRITUS}	Average pe <36" long a				ner organic in r of the detr				ter and	15.00 %
			Left	Side			Right	Side		,	
		15	15	15		15	15	15			
11	V _{HERB}	Average pe	ercentage co	over of herb	aceous veo	etation (me	asure only i	f tree cover	is <20%). I	Do <i>not</i>	
	TIENS	include woo	ody stems a percentage:	t least 4" db	h and 36" t	all. Because accepted. I	there may	be several	layers of gro	ound cover	Not Used
			Left	Side			Right	Side		,	
			_		_						
-	e Variable 1										
12	V _{WLUSE}	Weighted A	verage of F	Runoff Score	e for waters	hed:					0.58
			Land	Use (Choos	e From Dro	p List)			Runoff Score	% in Catch- ment	Running Percent (not >100)
	Forest and n	ative range (5	0% to 75% g	round cover)				•	0.7	60	60
	Forest and n	ative range (<	50% ground	cover)				•	0.5	30	90
	Open space	(pasture, lawr	ns, parks, etc.)	, grass cover	<50%			-	0.1	10	100
								-			
								•			
								•			
								•			
								•			
	Su	mmary					No	tes:			
Va	ariable	Value	VSI								
Vc	CANOPY	37 %	0.32								
VE	MBED	3.8	1.00								
Vsı	UBSTRATE	0.25 in	0.13								
V _{BI}	ERO	0 %	1.00								
VL	WD	3.0	0.38								
V _{TI}	овн	12.4	1.00								
Vsi	NAG	2.0	1.00								
Vs	SD	Not Used	Not Used								
Vsi	RICH	1.80	0.86								
	ETRITUS	15.0 %	0.18								
	ERB	Not Used	Not Used								
V _w	LUSE	0.58	0.61								

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

STREAM NAME S-OP8	LOCATION Harrison County				
STATION # RIVERMILE	STREAM CLASS Ephemeral				
Lat <u>39.320961</u> Long <u>-80.526441</u>	RIVER BASIN Tenmile Cr	eek			
STORET#	AGENCY Tetra Tech				
INVESTIGATORS CV, RA					
FORM COMPLETED BY	DATE 11/06/2019	REASON FOR SURVEY			
C.Vileno	TIME 10:30 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		
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 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		
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.		
	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				
	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.			
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 ev	SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0			
s to l	SCORE 9 (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 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 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 84

A-8

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



Photograph Direction SW

Comments:

STREAM ID S-B79	STREAM NAME UNT to Big Elk Creek
LAT 39.423457 LONG -80.476453	DATE 05/31/2015
CLIENT MVP	PROJECT NAME MVP
INVESTIGATORS C. Ansari, M. Whitten, M. Br	ice
FLOW REGIME Perennial Intermittent Ephemeral	WATER TYPE TNW RPW NRPW <u>✓</u>

Perennial _	_ Intermitte	nt Ephem	eral TNW	RPW —	NRPW 💆	
			_			
			/leasurements k Width: <u>1.5</u> ft		Stream ErosionNone <u>✓</u> Moderate	Heavy
		Top of Ban	k Height:		Artificial, Modified or Char	nnelized
		LB <u>10.0</u>	in RB <u>10.0</u>	<u>in</u>	Yes _✓ No	menzed
CHANNEL FE	ATURES	Water Dep	th: 0.00 in		Dom Drosent Voc	4 No
		Water Widt	th: 0.0 ft		Dam PresentYes _	<u>_ NO</u>
		High Water	Mark: <u>4.0 in</u>		Sinuosity <u>v</u> Low	Medium High
		Flow Direct	tion: South		Gradient	
						<u>✓</u> Severe (10 ft/100 ft)
		Water Pres			Proportion of Reach Repre	esented by Stream
			r, stream bed dry		Morphology Types Riffle % Run	%
		Standing	bed moist g water		Pool %	70
FLOW CHARACTER	ISTICS	Flowing	•			
OHARAGIER	101100				Turbidity ClearSlightly	turbidTurbid
		Velocity Fast	Moderate		OpaqueStained	
		Slow			Other None	
INOR		STRATE CO	MPONENTS 0%)		RGANIC SUBSTRATE COM does not necessarily add u	
Substrate Type	Diame	ter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock				Detritus	sticks, wood, coarse	
Boulder	> 256	mm (10")		Delillus	plant materials (CPOM)	5
Cobble	64-256 m	1 (2.5"-10") 10		Muck-Mud	black, very fine organic	
Gravel		1 (0.1"-2.5")	10		(FPOM)	
Sand		nm (gritty)	20			
Silt		0.06 mm	40	Marl	grey, shell fragments	
Clay	< 0.004	mm (slick)	20 ant Surrounding Lan	duco	Indicate the dominant type	(Charles and
		Forest	Commer	rcial	Indicate the dominant type Trees Shrub	
		Field/P			Grasses V Herba	iceous
WATERSHED		Agricult Other:	tural Resident	tial	Floodplain Width	
FEATURES		Other.				rate 15-30ft
		Canopy Co	over		✓ Narrow <16ft	
		Partiy o		aded	Wetland PresentYes Wetland ID	<u>✓</u> No
					dominant species present	
AQUATIC VE	GETATION			Rooted subme		tingFree floating
		Floating	g algae	Attached algae	<u> </u>	
MACROINVER	RTEBRATES	;				
OR OTHER WILDLIFE						
OBSERVED/C						
NOTES	AILD					
		Ī				

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

JSACE FILE NO./ Project Name: v2.1, Sept 2015)		Moun	tain Valley Pipeline Project SWVM v2.1		COORDINATES: imal Degrees)	Lat.	39.423499	Lon.	-80.476392		WEATHER:	С	loudy, 70°		DATE:	June 2, 2016
IMPACT STREAM/SITE ID A (watershed size {acreage}, u			S-B79; UNT to Big Elk Form of Mitigati				MITIGATION STREAM CLASS./S (watershed size {acreage}								Comments:	No/low water flow at time of survey. Unable to sample water quality or WVSCI
TREAM IMPACT LENGTH:	60	FORM C			OORDINATES: imal Degrees)	Lat.		Lon.		PRECIPIT	TATION PAST 48 HRS:		0.75"		Mitigation Length:	
Column No. 1- Impact Existing	Condition (Deb	it)	Column No. 2- Mitigation Existing	Condition - Basel	ine (Credit)		Column No. 3- Mitigation Pro Post Completion		Years	Co	Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			Column No. 5- Mitigation Projected at Maturity (Credit)		
stream Classification:	Epher	meral	Stream Classification:	Eph	nemeral		Stream Classification:	Eş	phemeral	Stream Classit	fication:	Ephen	neral	Stream C	classification:	Ephemeral
Percent Stream Channel Slop	ре	9	Percent Stream Channel Si	оре			Percent Stream Channel Slo	ре	0	Pe	ercent Stream Channel Sl	оре	0		Percent Stream Channel SI	lope 0
HGM Score (attach dat	ta forms):		HGM Score (attach	data forms):			HGM Score (attach o	data forms):			HGM Score (attach da	ata forms):			HGM Score (attach da	ata forms):
	<u> </u>	Average			Average			- [- [-] -] -	Average	- [- [- [-] -]			Average		· · · · · · · · · · · · · · · · · · ·	Average
lydrology	0.42 0.28	0.056666667	Hydrology		0		Hydrology		0	Hydrology	al Cualina		0	Hydrolog		0
Biogeochemical Cycling Habitat	0.07	0.256666667	Biogeochemical Cycling Habitat		·		Biogeochemical Cycling Habitat			Biogeochemic Habitat			Ů	Habitat	nemical Cycling	
PART I - Physical, Chemical and B	Biological Indica	ators	PART I - Physical, Chemical at	nd Biological Ind	icators		PART I - Physical, Chemical and	d Biological In	dicators	PART	I - Physical, Chemical and	Biological Indica	ators		PART I - Physical, Chemical and	
	Points Scale Range	Site Score		Points Scale Range	Site Score			Points Scale Range	Site Score			Points Scale Range	Site Score	-:-:-		Points Scale Range Site Score
PHYSICAL INDICATOR (Applies to all streams of	classifications)		PHYSICAL INDICATOR (Applies to all stream	s classifications)			PHYSICAL INDICATOR (Applies to all streams	classifications)		PHYSICAL INC	DICATOR (Applies to all stream:	s classifications)		PHYSICA	L INDICATOR (Applies to all streams	s classifications)
JSEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				High Gradient Data Sheet)				BP (High Gradient Data Sheet)	
. Epifaunal Substrate/Available Cover	0-20	0	Epifaunal Substrate/Available Cover Embeddedness	0-20			Epifaunal Substrate/Available Cover Embadded assets	0-20				0-20			nal Substrate/Available Cover dedness	0-20
. Embeddedness . Velocity/ Depth Regime	0-20	0	Velocity/ Depth Regime	0-20 0-20			Embeddedness Velocity/ Depth Regime	0-20 0-20		 Embeddedne Velocity/ Dep 		0-20 0-20			y/ Depth Regime	0-20 0-20
. Sediment Deposition	0-20	1	Velocity/ Deptit Regime Sediment Deposition	0-20			Velocity/ Depth Regime Sediment Deposition	0-20		4. Sediment De		0-20			ent Deposition	0-20
. Channel Flow Status	0-20	0	Channel Flow Status	0-20			5. Channel Flow Status	0-20		5. Channel Flov		0-20			el Flow Status	0-20
. Channel Alteration	0-20 0-1	4	6. Channel Alteration	0-20 0-1			6. Channel Alteration	0-20 0-1		6. Channel Alte		0-20 0-1			el Alteration	0-20 0-1
. Frequency of Riffles (or bends)	0-20	0	7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			f Riffles (or bends)				ncy of Riffles (or bends)	
		6	8. Bank Stability (LB & RB)				8. Bank Stability (LB & RB)			8. Bank Stabilit		0-20			tability (LB & RB)	0-20
Bank Stability (LB & RB) Vegetative Protection (LB & RB)	0-20	8	9. Vegetative Protection (LB & RB)	0-20 0-20			9. Vegetative Protection (LB & RB)	0-20			rotection (LB & RB)	0-20			tive Protection (LB & RB)	0-20
Vegetative Protection (LB & RB) Riparian Vegetative Zone Width (LB & RB)	0-20	0	Negetative Protection (LB & RB) Riparian Vegetative Zone Width (LB & RB)	0-20			Vegetative Protection (LB & RB) Riparian Vegetative Zone Width (LB & RB)	0-20			rotection (LB & RB) etative Zone Width (LB & RB)	0-20			an Vegetative Zone Width (LB & RB)	0-20 0-20
otal RBP Score	Poor	27	Total RBP Score	Poor	0		Total RBP Score	Poor	0	Total RBP Scor		Poor	0	Total RBF		Poor 0
Sub-Total	FUUI	0.225	Sub-Total	FUUI	0		Sub-Total	FUUI	0	Sub-Total		FUUI	0	Sub-Tota		0
CHEMICAL INDICATOR (Applies to Intermittent	and Perennial Stre		CHEMICAL INDICATOR (Applies to Intermitte	nt and Perennial Str	•		CHEMICAL INDICATOR (Applies to Intermittent	and Perennial S			DICATOR (Applies to Intermitte	nt and Perennial Str			AL INDICATOR (Applies to Intermitter	
WDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General	`			WVDEP Water Quality Indicators (General)			MA/DED Weter	Quality Indicators (General	`		MAYDED I	Nater Quality Indicators (General	
specific Conductivity			Specific Conductivity)			Specific Conductivity			Specific Cond)			Conductivity	
peome conductivity			opeomo ochadenvity	T			opeonio conductivity	T		оресто сопа	uotivity	T		Орсошо	Conductivity	
100-199 - 85 points	0-90		nH	0-90			nH	0-90		Н		0-90		рH		0-90
	0-80			5-90 0-1				5-90 0-1	5.6			5-90 0-1				5-90 0-1
5.6-5.9 = 45 points			DO	1			DO			DO				DO		1
	10-30			10-30				10-30				10-30				10-30
Sub-Total	1		Sub-Total		0		Sub-Total		0	Sub-Total			0	Sub-Tota		
BIOLOGICAL INDICATOR (Applies to Intermitte	ent and Perennial	Streams)	BIOLOGICAL INDICATOR (Applies to Intermi	ttent and Perennial	Streams)		BIOLOGICAL INDICATOR (Applies to Intermi	ttent and Peren	nial Streams)	BIOLOGICAL I	INDICATOR (Applies to Intern	nittent and Perenn	ial Streams)	BIOLOGI	CAL INDICATOR (Applies to Interm	nittent and Perennial Streams)
VV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)			WV Stream Co	endition Index (WVSCI)			WV Strea	m Condition Index (WVSCI)	
0	0-100 0-1			0-100 0-1				0-100 0-1				0-100 0-1				0-100 0-1
ub-Total		0	Sub-Total	<u> </u>	0		Sub-Total	<u> </u>	0	Sub-Total			0	Sub-Tota		0
PART II - Index and Un	it 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
0.385	60	23.075	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)			
Temporal Loss-Construc	ion				Long	-term Protection		
*Note: Reflects duration of aquatic functional loss between the time of an				% Add. Mitigati	ion and Monitoring Period		-Term Protection (Years)	
mitigation (credit).								
Years	0							
Sub-Total	0							
							404	
Temporal Loss-Maturi *Note: Period between completion of compensatory mitigation measures				0 + 5/ ² Sub-Total	10 Year Monitoring		101 0	
function (i.e. maturity of tree stratum to provide organic matter and de				Sub-Total			<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	
				0.384583333	60	23.075	\$18,460.00)
							. ,	
0%	0							
Sub-Total Sub-Total	0							
	PART \	/- Comparison of U	nit Scores and Projecte	ed Balance				
		Parison C						
Final Unit Score (Debit)	Mitigation Existing		Mitigation Projected at		Mitigation Projected at Ten		Mitigation Projected At	
[No Net Loss Value] 23.075	Condition - Baseline		Five Years		Years		Maturity	
	(Credit)		Post Completion (Credit)	<mark>/</mark>	Post Completion (Credit)		(Credit)	
FINAL DROJECTED NET DALANCE								
FINAL PROJECTED NET BALANCE				0		0		0
	F	Part VI - Mitigation (Considerations (Incenti	ves)				
				T				
Extent of Stream					Extended	Upland Buffer Zon	e	
*Note1: Reference the Instructional handout to determin		roject		*Note ¹ : Referen	nce Instructional handout for the def	-		s (below)
*Note2: Place an "X" in the appro	oriate 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	n type	
			_					
Restoration Level 2				Buffer Width		Left Bani	K	
Restoration Level 3]		0.50		Name	
			J		0-50 51-150		None None	
				Buffer Width	J 17100	Right Ban		
			_		0-50		None	
Compensatory Mitigation Plan incorporates HUC 12-based				A	51-150		None	
*Note: HUC 12-based watershed approach required to obta	n Stream Restoration incentive	No		Average Buffer Width/Side	0			
		1	-	wiuti/Side				
211	Impact	Mitigation Unit				Stra	ight Preservation Ratio	
Site		Yield (Credit)					(v2.1, Sept 2015)	
	Unit Yield (Debit)	riela (Creait)					(*****, *******************************	
	Unit Yield (Debit)	Tiela (Creait)					(1211, 00pt 2010)	
S-B79	Unit Yield (Debit) 23.075	#DIV/0!			Final Mitigation Unit Yield		(12.11, 00pt 2010)	

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-B79 (Harrison County)

Sampling Date: 06/02/2016 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	0.42
Biogeochemical Cycling	0.28
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.	1.72	0.36
V _{SUBSTRATE}	Median stream channel substrate particle size.	0.08	0.04
V_{BERO}	Total percent of eroded stream channel bank.	160.00	0.22
V_{LWD}	Number of down woody stems per 100 feet of stream.	0.00	0.00
V_{TDBH}	Average dbh of trees.	Not Used	Not Used
V_{SNAG}	Number of snags per 100 feet of stream.	0.00	0.10
V _{SSD}	Number of saplings and shrubs per 100 feet of stream.	0.00	0.00
V _{SRICH}	Riparian vegetation species richness.	0.00	0.00
V _{DETRITUS}	Average percent cover of leaves, sticks, etc.	5.63	0.07
V_{HERB}	Average percent cover of herbaceous vegetation.	6.88	0.09
V _{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.77	0.81

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia Field Data Sheet and Calculator									a		
	Team:	C. Vileno,	J. McGuirk, A					Latitude/UT	M Northing:	39.423499	
Pro	oject Name:		·				L	.ongitude/U	ΓM Easting:	-80.476392	
	Location:	S-B79 (Har	rison Count	y)					pling Date:		
SA	AR Number:		Reach	Length (ft):	100	Stream Ty	/pe: Ephe	meral Stream			•
	Top Strata:	Sh	rub/Herb Str	rata	(determined	d from perce	ent calculate	d in V _{CCANOR}	_Y)		
Site and Timing: Project Site ■ Before Project ■ ■ Before Project											
Sample	e Variables										
1	equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%) Not U.								Not Used, <20%		
			neasuremer			_	_	_	_	_	I
	0	0	0	0	0	0	0	0	0	0	
_	\/	A	- -			Managemen	-1	11 00	ala la como acontalta d		
2	V _{EMBED}	along the s	tream. Sele	ct a particle	from the be	d. Before n	at no fewer noving it, de	termine the	percentage	of the	1.7
							y fine sedim composed of				
			bed is comp					Time Scanne	ino, use a i	atting score	
							les (rescale	d from Platt	s, Megahan	, and	
		Minshall 19	_	•		·	`				
		Rating	Rating Des	scription							
		5					buried by fir)	
		4					d, or buried b				
		2					ed, or buried ed, or buried				
		1					r buried by f			l surface)	
	List the rati	ngs at each	point below			,				,	
	2	2	2	2	2	2	2	2	2	2	
	2	2	2	2	2	2	2	2	2	2	
	1	1	1	1	1	1	1	1	2	2	
	2	2	2	2	2	2	2	2	2	2	
	2	2	2	2	1	1	1	1	1	1	
3	V _{SUBSTRATE}						it no fewer the ed in V _{EMBED}		nly equidista	ant points	0.08 in
	Enter partic	le size in in	ches to the r	nearest 0.1	inch at each	point below	/ (bedrock s	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	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
	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}		al percentag				re eroded, t				160 %
			Left Bank:	80) ft		Right Bank:	80) ft		

Sample	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}				ly if V _{CCANOP} tree DBHs i		ng cover is at	t least 20%)	. Trees are	at least 4	Not Used
		List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of									
		the stream				T		D: 1 (0: 1			ī
			Left Side					Right Side			ı
7	V _{SNAG}	Number of	snags (at le	ast 4" dbh a	nd 36" tall)	per 100 feet	t of stream.	Enter numb	er of snags	on each	
	SNAG		- '		t per 100 fee				or or orlage		0.0
			Left Side:		0		Right Side:		0	,	
8	V_{SSD}						es dbh) per s on each sid				0.0
			,	Il be calcula		anu sinubs	on each sid	ie oi trie str	zam, and m	aniouni	0.0
		•	Left Side:		0		Right Side:		0	'	
9	V_{SRICH}						m reach. Ch				0.00
							ve species p rom these da		Strata. Spe	cies	0.00
			ıp 1 = 1.0						2 (-1.0)		
Ш	Acer rubru	ım		Magnolia ti	ripetala	Ш	Ailanthus a	Itissima	Ш	Lonicera ja	ponica
	Acer sacci	harum		Nyssa sylv	atica		Albizia julib	orissin		Lonicera ta	tarica
Ш	Aesculus	flava		Oxydendrun	n arboreum		Alliaria peti	olata		Lotus corni	culatus
Ш	Asimina tr	iloba		Prunus sei	otina	☐ Alternanthera			Ш	Lythrum sa	licaria
	Betula alle	ghaniensis		Quercus a	lba		philoxeroides			Microstegium vimin	
Ш	Betula len	ta		Quercus co	occinea		Aster tataricus		Ш	Paulownia	
Ш	Carya alba	a	Ш	Quercus imbricaria		Cerastium fontanum		fontanum	Ш	Polygonum cuspidatur	
	Carya glal			Quercus p			Coronilla va	aria		Pueraria m	ontana
Ш	Carya ova		Ш	Quercus ru	ıbra	Ш	Elaeagnus u	mbellata	[./	Rosa multii	flora
	Carya ovata		Quercus ve			Lespedeza bicolor			Sorghum h	alepense	
	Cornus flo			Sassafras			Lespedeza			Verbena br	-
	Fagus gra			Tilia ameri			Ligustrum ob		_ _		
	Fraxinus a			Tsuga can			Ligustrum s				
	Liriodendro			Ulmus ame			J # 2 G				
	Magnolia a	•	_	Jias airie							
Ш	wayiiulia	uoummata									
		0	Species in	Group 1				1	Species in	Group 2	

	e Variables The four su								one within	25 feet fron	n each
10	V _{DETRITUS}				sticks, or other	•		•	<4" diamete	r and <36"	5.63 %
	Left Side Right Side]				
		10	5	5	5	5	5	5	5		
11	V_{HERB}	Average pe	rcentage co	ver of herb	aceous vege	station (mea	sure only if	tree cover is	<20%) Do	not.	
''	▼ HERB	include woo	ody stems a	t least 4" db	h and 36" ta	II. Because	there may b	e several la	yers of grou	und cover	7 %
vegetation percentages up through 200% are accepted. Enter the percent cover of ground each subplot.								f ground ve	getation at	7 70	
		саст заврк		Side			Righ	t Side] '	
		10	5	10	5	10	5	5	5		
					-						
_	e Variable 1										
12	V _{WLUSE}	Weighted A	verage of R	dunoff Score	e for watersh	ed:					0.77
			Land	Use (Choos	se From Dro	p List)			Runoff Score	% in Catch- ment	Running Percent
	Open space	(pasture, lawn	is, parks, etc.)	, grass cover	>75%			-	0.3	20	(not >100) 20
	Forest and n	ative range (>	75% ground	cover)				-	1	70	90
	0 00000 00000	districts, 1/4 -)			-	0.1	10	100
	- nesiderida e	21301003, 27	2/3 ac (30%)		46			-	0.1	10	100
								_			
	_							•			
								•			
	Su	ımmary					No	tes:			
V	/ariable	Value	VSI								
Vo	CANOPY	Not Used, <20%	Not Used								
VE	MBED	1.7	0.36								
Vs	SUBSTRATE	0.08 in	0.04								
V	BERO	160 %	0.22								
V _L	.WD	0.0	0.00								
V _T	ъ	Not Used	Not Used								
Vs	SNAG	0.0	0.10								
Vs	SSD	0.0	0.00								
Vs	SRICH	0.00	0.00								
V	DETRITUS	5.6 %	0.07								
V _F	IERB	7 %	0.09								
V _v	VLUSE	0.77	0.81								

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

STREAM NAME S-B79	LOCATION Harrison County			
STATION # RIVERMILE	STREAM CLASS Ephemeral			
LAT <u>39.423499</u> LONG <u>-80.476392</u>	RIVER BASIN West Fork			
STORET#	AGENCY Tetra Tech			
INVESTIGATORS C. Vileno, J. McGuirk, A	. Mengel			
FORM COMPLETED BY C. Vileno	DATE 06/02/2016 TIME 12:45	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).	bitat; well-suited for l colonization potential; equate habitat for intenance of pulations; presence of ditional substrate in the m of newfall, but not t prepared for lonization (may rate at				
	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 in 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.			
	SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0			
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).			
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 1	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									
	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 4	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	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.							
e eva	SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0							
to b	SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0							
Parameters to	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 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0							
	SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0							

Total Score 27

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