

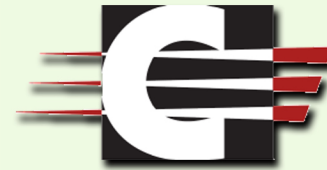
# West Virginia Stream & Wetland Valuation Metric 2.0

**Buffalo Mountain Surface Mine**

**WVDEP Permit No. S-5018-07**

**Hardee, Lee, and Tug River Districts**

**Mingo County, West Virginia**



**CONSOL of Kentucky Inc.**

1000 CONSOL Energy Drive  
Canonsburg, Pennsylvania 15317

**Revised**

**Addendum to**

**Compensatory Mitigation**

**& Stream Restoration**

**Plan**

**March, 2013**

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COMPENSATORY MITIGATION & STREAM RESTORATION PLAN  
FOR THE  
BUFFALO MOUNTAIN SURFACE MINE,  
WVDEP PERMIT NO. S-5018-07

REVISED ADDENDUM:  
WEST VIRGINIA  
STREAM AND WETLAND VALUATION METRIC 2.0

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## 1.0 INTRODUCTION

CONSOL of Kentucky Incorporated (CONSOL) has prepared a Compensatory Mitigation and Stream Restoration Plan ("CMP") to offset unavoidable structural and functional losses of waters of the United States (U.S.) from its proposed Buffalo Mountain Surface Mine (WVDEP Permit No. S-5018-07). The CMP was developed using the most current regulatory guidance and protocols available at the time of its development (2008-2009). In 2010, a new protocol has been implemented by a team of resource agency representatives including the U.S. Army Corps of Engineers (USACE), Huntington District. This new protocol is entitled the West Virginia Stream and Wetland Valuation Metric (SWVM) (WVIRT, 2010) and provides a method to account for losses of waters of the U.S. and to compensate for those losses in the state of West Virginia. This Supplemental Report provides results from the application of the SWVM to the Buffalo Mountain Surface Mine project.

The proposed mine permit area is located near the Town of Delbarton in central Mingo County, WV (Appendix A, Exhibit 1). The Buffalo Mountain Surface Mine proposes to extract bituminous coal reserves via a combined method of mining, including area, mountaintop, steep slope, contour, and limited auger/highwall mining, within its proposed 2,308-acre permit area. The proposed impact and mitigation stream reaches are located within the Miller Creek, Pigeon Creek, and Buffalo Creek watersheds in the Tug Fork River watershed (Hydrologic Unit Code 05070201) of the Big Sandy River basin, at approximately 34°44'07" latitude and 82°13'28" longitude.

According to the 2008 "Final Rule" for implementing the Clean Water Act (USEPA and USACE, 2008), an "appropriate assessment method or other suitable metric must be used to assess and describe the aquatic resource types that will be restored, established, enhanced and/or preserved." In February 2010, USACE issued a Public Notice for the SWVM. The SWVM was developed by West Virginia's Interagency Review Team (WVIRT), consisting of the USACE, Huntington and Pittsburgh Districts, U.S. Environmental Protection Agency (USEPA), U.S. Fish & Wildlife Service (USFWS), U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS), West Virginia Department of Environmental Protection (WVDEP), and the West Virginia Division of Natural Resources (WVDNR). The SWVM is to be used for calculating functional credits and debits in compensatory mitigation plans for losses of aquatic resources (WVIRT, 2010).

In addition to the SWVM, on July 30, 2010, the USACE's Engineer Research and Development Center (ERDC) published the Operational Draft of the Regional Guidebook for the Functional Assessment of High Gradient Ephemeral and Intermittent Streams in Western West Virginia and Eastern Kentucky (ERDC/EL TR-10-11, U.S. Army Engineer Research and Development Center, Vicksburg, MS). The guide book outlines the Hydrogeomorphic (HGM) Approach. The HGM approach is a collection of concepts and methods for developing functional indices and using them to assess the capacity of a wetland to perform functions relative to similar wetlands in a region. This approach has been incorporated into the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region, which is now utilized in this state and the surrounding region for wetland identification and delineation. While the HGM Approach was initially developed for the assessment of wetlands, the method can be applied to any ecosystem (ERDC/EL TR-10-11). Thus, the HGM approach has been adopted to assess the functions of high-gradient ephemeral and intermittent headwater streams of the Appalachian Mountain Region of eastern Kentucky and western West Virginia, including the Central Allegheny Plateau,

which includes the project area. On February 1st, 2011 the USACE issued Public Notice for the SWVM version 2.0 along with the implementation of the Hydrogeomorphic (HGM) Approach.

The following sections present a summary of the project's CMP (Section 2.0), the SWVM analysis methodology (Section 3.0), and the analysis results (Section 4.0). Section 4.3 provides a summary of debit and credit calculations and whether the CMP provides compensation for the resulting credit deficit.

## 2.0 SUMMARY OF PROPOSED MITIGATION

Use of the SWVM metric requires input of data describing existing conditions of the impacted streams and both existing and future conditions for the mitigation reaches. Therefore, this section provides a brief summary of the proposed impacts and mitigation.

The proposed Buffalo Mountain Surface Mine's total impact (permanent and temporary) to jurisdictional streams will be 51,866 linear feet (LF), including 41,651 LF of permanent impacts and 10,215 LF of temporary impacts. As detailed in the CMP (Baker, 2010), CONSOL proposes to use a combination of on- and off-site mitigation techniques, including establishment, restoration, enhancement, and preservation, as well as water quality improvements.<sup>1</sup>

As noted above, the CMP developed prior to the implementation of the SWVM used several techniques to assess functional loss and mitigation credits. With the exception of the USM protocol, each technique concluded that the proposed CMP would provide sufficient credits to offset aquatic resource losses. Regarding the USM, calculations resulted in a credit deficit of approximately 34 percent. To mitigate for this deficit, an extensive wastewater treatment plan was developed to improve water quality in the same watershed as other mitigation efforts to implement a complete watershed restoration approach. Like the USM, the SWVM analysis indicated a deficit in credits following implementation of the proposed CMP, as detailed in the following sections. The twenty-five percent deficit resulting from the SWVM protocol will also be compensated for by the implementation of the wastewater treatment plan and off-site stream restoration and enhancement included in the proposed CMP. This subject is detailed in Section 4.4.

## 3.0 METHODOLOGY

### 3.1 Sampling Locations

Based on the SWVM Instruction Document (WVIRT, 2010) and consultation with USACE Huntington District (personal communication with Michael Hatten, 2010), streams and stream segments were selected and assessed using the USACE's standard Rapanos-method of delineating streams, which involves delineating streams based on Strahler's (1952) stream order classification method.

Between May 19 and 21, 2010, professional stream biologists collected benthic macroinvertebrate and water quality samples on representative stream segments through each of the subwatersheds in the project area, including a minimum of one segment on each stream order and flow regime. Values were then

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<sup>1</sup> The water quality improvement component of the Mitigation Plan includes the construction of wastewater collection lines and tap-ins for all of the residents of Hell Creek's watershed and a three-mile long force main to the Delbarton, WV wastewater treatment plant. Raw sewage and other household wastes are currently being released into Hell Creek, a perennial stream. As detailed in the Mitigation Plan (Baker, 2010), fecal coliform levels - an indicator of raw sewage - in Hell Creek are above state recommended levels for aquatic life.

assigned to every stream in the analysis, using the results from the representative stream segments. Site locations are shown on Exhibits contained in Appendix A.

Habitat assessments were conducted as part of the Jurisdictional Determination (Baker, 2008) and the CMP process; however, in accordance with new SWVM guidance, additional habitat assessments were conducted in May, 2010. On every stream order and flow regime throughout the project area, habitat assessments were collected either one or two times depending on whether the stream reach was greater than 100 meters in length as prescribed by USEPA (Barbour et al., 1999). If the stream reach was greater than 100 meters, two habitat assessments were collected and averaged to obtain a more representative habitat score.

Assessments of the hydrologic, geomorphic, and biotic functions were also collected at representative areas as part of the CMP process. Portions of that data, including riparian assessments, pebble counts, large woody debris counts, species richness, and land use, were incorporated into the HGM assessment as stream assessment reaches (SARs) according to the USACE HGM approach guidance (USACE, 2010). In July 2011, additional data, such as embeddedness and diameter at breast height (DBH) measurements, were collected to complete the HGM assessment. Previous data were reviewed during this additional work, to confirm the quality and relevance of the representative assessments.

### 3.2 Stream & Wetland Valuation Metric (SWVM)

The SWVM is a Microsoft Excel file (<http://www.lrh.usace.army.mil/permits>) that uses project specific data to assess proposed impacts and compare them to proposed mitigation efforts. The data that are entered include: length of proposed impact/mitigation; hydrology, biogeochemical cycling, and habitat index scores from the USACE HGM, habitat scores from, USEPA habitat assessment score; specific conductivity; pH; dissolved oxygen; West Virginia Stream Condition Index (WVSCI) score; temporal loss impacts; length of long-term protection; and, when appropriate, wetland type, wetland impact/mitigation classification, and wetland acreage.

The SWVM uses the stream data to calculate an index score for each impact. This score is then multiplied by the length of proposed impact to determine the total unit score of the losses in the proposed project. The same parameters are measured at proposed mitigation sites to obtain a baseline index score. The proposed functional lifts from the CMP (establishment, restoration, enhancement, and preservation) are then entered into the SWVM. The total of the functional lifts is a score that should be equal to or greater than the total of losses for the project, as to comply with the policy of "no net loss."

For the predictions of future conditions within the mitigation reaches, only four parameters were changed for calculating credits: the USACE's Hydrogeomorphic (HGM) score, the USEPA's Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers (RBP) habitat assessment score, specific conductivity, and WVSCI score. Elements of the habitat assessment score and the HGM score, such as substrate and bank stability, were changed for the future conditions at certain mitigation streams in accordance with the physical improvements proposed as part of the restoration and enhancement activities. Specific conductivity was changed for the future conditions of mitigation streams that will be located below valley fills in accordance with the best available data for similar conditions in the region. CONSOL is currently mining in the Miller Creek watershed, adjacent to the proposed project area, as part of the Peg Fork Surface Mine (WVDEP Permit No. S-5018-06). Monitoring data results from the Peg Fork Surface Mine indicate that specific conductivity below valley fills has increased, as compared to the baseline condition



prior to mining. With similar geology and similar mining practices as those proposed for the Buffalo Mountain Surface Mine, the Peg Fork project scenario is the best predictor available for future conditions at the proposed project site in the Miller Creek and Pigeon Creek watersheds. A conservative increase to 500  $\mu\text{S}/\text{cm}$  was applied to all mitigation sites that will be located below valley fills. Similarly, WVSCI scores below valley fills were adjusted to a conservative score of 68. To account for temporal loss and long term protection, CONSOL has also applied the appropriate factors for each mitigation site (see Appendix D).

As stated in the USACE's Instruction Document, the SWVM is to be used along with other qualitative and quantitative methodologies to show functional lift of a project; it is not to be used as the sole tool for calculating credits and debits (WVIRT, 2010). The USACE Engineer Research and Development Center (EDRC) continue to develop a Comprehensive Stream Assessment Methodology, which may supersede the SWVM, and the WVDNR is working on a functional assessment methodology that may supersede the wetland portion of the SWVM. However, at this time, the SWVM is the most recent tool to use in the West Virginia region to assess impact and calculate total debit and credits for a project.

### 3.3 Benthic Macroinvertebrate & Water Quality Assessment

Stream water quality measurements (i.e., pH, specific conductivity, dissolved oxygen, and temperature) were conducted during the benthic macroinvertebrate sampling. Water quality data were collected using a YSI Model 556 MPS meter, which was calibrated before each sampling day.

Benthic macroinvertebrates were sampled following the USEPA's RBP for benthic macroinvertebrates (Barbour et al., 1999). At each sample location, a representative riffle area was sampled with a rectangular 500 $\mu\text{m}$  mesh D-frame net was used to capture organisms kicked up from substrate disturbance. All organisms and leafy debris captured in the nets were transferred to collection bottles and preserved with 70 percent ethanol.

In the laboratory, leafy debris contained in the samples was carefully picked for attached organisms and then all collected organisms were sorted and identified by a certified taxonomist to the genus level. All organisms in the Chironomidae (also known as the non-biting midge) Family were shipped overnight to Ecoanalysts, Inc. for genus identification. Identification followed Merritt and Cummings (1996) for larval insects and Pennak (1989) for crustaceans and annelids. Data analysis included calculation of additional USEPA RBP metrics: total taxa; Ephemeroptera/Plecoptera/Trichoptera (EPT) taxa; percent EPT; percent Chironomidae; percent two dominant taxa; and Hilsenhoff Biotic Index (HBI) (Table 1). The WVSCI values were calculated for each of the listed RBP metrics and averaged for a total WVSCI score (Gerritsen, et al., 2000). WVSCI scores range from 0 to 100 (Table 2).

**Table 1 Hilsenhoff Biotic Index Ranges**

Hilsenhoff Biotic Index (HBI)		
Family Biotic Index	Water Quality	Degree of Organic Pollution
0.00 – 3.75	Excellent	Organic pollution unlikely
3.76 – 4.25	Very Good	Possible slight organic pollution
4.26 – 5.00	Good	Some organic pollution probable
5.01 – 5.75	Fair	Fairly substantial pollution likely
5.76 – 6.50	Fairly Poor	Substantial pollution likely
6.51 – 7.25	Poor	Very substantial pollution likely
7.26 – 10.00	Very Poor	Severe organic pollution likely

Source: Mandaville, 2002

**Table 2 WVSCI Ranges**

WVSCI Ranking	
Range	Rank
78 to 100	"Very Good"
68 to 78	"Good"
61 to 68	"Gray Zone"
45 to 61	"Fair"
22 to 45	"Poor"
0 to 22	"Very Poor"

Source: Gerritsen et al., 2000; WVDEP, 2010

### 3.4 Habitat Assessment and Stream Channel Condition

Habitat assessments were conducted in accordance with USEPA's RBP for habitat (Barbour et al., 1999). The stream habitat assessment protocol qualitatively evaluates ten physical stream parameters as they relate to habitat for aquatic organisms. These parameters include: epifaunal substrate, embeddedness, velocity/depth regime, sediment deposition, channel flow status, channel alteration, riffle frequency, bank stability, vegetative protection, and riparian zone quality. The result is a Habitat Assessment Value (HAV) that ranges from 0 to 200; this value is referenced in the SWVM results more generally as the "RBP Score."

In addition to habitat assessments, stream channel condition was assessed qualitatively and quantitatively in order to gain additional baseline information on the subwatersheds in the project area. Qualitative surveys included a general morphology assessment and a visual organic and inorganic substrate assessment. Quantitative assessments included inorganic particle measurements, large woody debris counts, potential bank erosion, riparian species richness, canopy density, and land use. These data were incorporated, where appropriate, in the HGM assessment and score. Additional information, such as

embeddedness, riparian tree diameter, riparian snag density, and soil detritus, were later collected in the same reaches to complete the USACE's HGM approach.

Data were input into a "Field Data Sheet and Calculator," a formatted Microsoft Excel spreadsheet created by the USACE (<http://www.lrh.usace.army.mil/permits>) under the following categories:

- Channel Canopy Cover
- Channel Substrate Embeddedness
- Channel Substrate Size
- Potential Channel Bank Erosion
- Large Woody Debris
- Riparian/Buffer Zone Tree Diameter
- Riparian/Buffer Zone Snag Density
- Riparian/Buffer Zone Sapling/Shrub Density
- Riparian/Buffer Zone Species Richness
- Riparian/Buffer Zone Soil Detritus
- Riparian/Buffer Zone Herbaceous Cover
- Watershed Land-use

The categorized measurements calculate the Functional Capacity Indices (FCI) for Hydrology, Biogeochemical Cycling, and Habitat.

Hydrology is the capacity to dissipate energy and convey water, calculated from the roughness characteristic of the channel as described by embeddedness, substrate size, bank erosion, large woody debris, and land use. Biogeochemical cycling is the capacity for biotic and abiotic processes to cycle organic materials calculated by contribution of organic debris through large woody debris, riparian vegetation density, soil detritus, and land use, along with a minor consideration for hydrologic flow determined from embeddedness. Habitat is the capacity to provide life requisites for the wildlife community calculated from available canopy, substrate, large woody debris, riparian tree size, riparian species richness, and soil detritus, along with the limiting factor of embeddedness.

Each FCI is a value from 0.0 to 1.0, where an index of 1.0 indicates that the ecosystem is functioning at the highest sustainable capacity. The three values are collectively known as the "HGM Score" (Appendix B)

## 4.0 RESULTS

### 4.1 Brief Project Area Description

The proposed project area, including highlights of the proposed impact reaches, is shown in Appendix A, Exhibit 2. Proposed impacts and mitigation are located within the following subwatersheds of the Pigeon Creek watershed: Ruth Trace Branch (RTB), Right Fork of Conley Branch (RFCB), Left Fork of Conley Branch (LFCB), Right Fork of Hell Creek (RFHC), Left Fork of Hell Creek (LFHC), Hell Creek (HC), Pigeonroost Creek (PC), Unnamed Tributary of Pigeon Creek (UTPC), and an Unnamed Tributary of Stonecoal Branch (UTSB). Additional proposed impacts and mitigation are located within the Miller Creek watershed, specifically within the Unnamed Tributary 4 (UT4MC) and Unnamed Tributary 5 (UT5MC) subwatersheds. As detailed in Section 3.1, HAV scores were assessed for every impact and mitigation stream, while water quality and benthic macroinvertebrate data were collected at representative reaches throughout these subwatersheds (Appendix A, Exhibits 3 through 6). Similarly, habitat, geomorphology,

and hydrology measurements were collected at stream assessment reaches (SARs) in the intermittent and ephemeral stream portions as part of the HGM approach (Exhibits 4 through 6).

Average slopes in the proposed project area are steep and considered high gradient, ranging from 4 to 35 percent. The area is isolated and undeveloped, most likely because of existing topographic features. Past land uses of the proposed project area include timbering, gas exploration, underground and surface mining, and wildlife habitat. The forestland of the proposed project area is predominantly oak-hickory forest of mixed age, early successional, with occasional large-diameter trees. Bank vegetation was very disturbed in many of the reaches from channel bank erosion and incision.

Average stream widths ranged from 1.6 to 8.5 feet in the first order streams, from 2.8 to 14.1 feet in the second order streams, from 4.6 to 7.4 feet in the third order streams, and from 12.8 to 19.4 feet in the single fourth order stream evaluated.

## 4.2 Data Summary

The following sections summarize the benthic macroinvertebrate, water quality, and hydrogeomorphic data collected for the SWVM analysis. Individual field data summary sheets, including water quality data and HGM field data and calculation sheets are presented in Appendix B, and benthic macroinvertebrate individual count data are presented in Appendix C. Below, Section 4.2.1 presents results from representative stream reaches within the surface mining project area (“on-site”). On-site data were input into the SWVM for all of the proposed impact and on-site restoration mitigation streams. The SWVM results are summarized in Section 4.3.

### 4.2.1 On-Site Representative Reaches

#### Ruth Trace Branch

A total of five (5) representative benthic macroinvertebrate and water quality samples were collected in proposed impact reaches of the Ruth Trace Branch subwatershed (Appendix A, Exhibit 3). Samples included one (1) on a first order intermittent stream, one (1) on a second order intermittent stream, one (1) on a third order intermittent stream, and two (2) on a third order perennial stream. The data are summarized in Table 3.

**Table 3 Data Summary for Ruth Trace Branch**

Stream ID	Order	Flow Regime	WVSCI	Taxa (# of families)	EPT Taxa (# of families)	% EPT	Specific Conductivity ( $\mu\text{S}/\text{cm}$ )	pH
UT1 UT17 RTB	1st	Intermittent	78.48	13	7	63	30	7.87
RTB	2nd	Intermittent	69.8	8	5	67	34	8.36
RTB	3rd	Intermittent	92.23	19	13	66	29	8.41
RTB Temporary	3rd	Perennial	77.13	14	8	61	37	8.27
RTB Permanent	3rd	Perennial	74.31	9	7	85	36	8.29

Notes: UT = Unnamed Tributary, RTB = Ruth Trace Branch. “Permanent” and “Temporary” refer to the location along the stream segment; the permanent site is located where a permanent stream impact is proposed, and the temporary site is located where a temporary impact is proposed (where proposed mitigation includes stream restoration).

Regarding water quality (Appendix B), baseline levels of specific conductivity were low, with values between 29 and 37  $\mu\text{S}/\text{cm}$ . Levels of pH were within the normal range (pH of 6.0 to 9.0; Stumm and Morgan, 1996), but slightly alkaline, with levels above 8.00 at four (4) out of the six (6) sampling sites.

Dissolved oxygen levels were optimal and greater than 10.0 mg/L at each of the sampling sites (5 mg/L is the water quality standard for aquatic life in WV [47CSR2]).

Benthic macroinvertebrates (Appendix C) in this subwatershed had WVSCI scores between “good” (69.8) and “very good” (92.23). The total number of individuals ranged from 15 to 72, with third order perennial streams having the most. Of the taxa (families) present throughout the subwatershed, EPT taxa in the samples numbered from 5 to 13, while the total taxa in the subwatershed numbered from 8 to 19. The EPT taxa were moderately intolerant to organic pollution, with the lowest tolerance value being 0 out of 10. Moderately intolerant EPT taxa represented between 61 and 85 percent of the population samples. The HBI scores ranged from 3.1 to 3.9, indicating water quality ranged from “excellent” to “very good,” with the presence of organic pollution being “unlikely” to “slight.”

Three (3) stream assessment reaches (SARs) were surveyed within the subwatershed. SARs were collected in first order ephemeral and first and second order intermittent stream segments representing the available conditions. Stream reaches were similar in condition (Table 4), though the ephemeral reach, RTB U2 demonstrated poorer habitat. Biogeochemical cycling and hydrology remained similar among all samples regardless of flow regime or stream order (Table 4). Full HGM field data forms are available in Appendix B.

**Table 4 HGM FCI Summary for Ruth Trace Branch**

SAR	Order	Flow Regime	Hydrology	Biogeochemical Cycling	Habitat
RTB 1	2 <sup>nd</sup>	Intermittent	0.63	0.81	0.83
RTB U2	1 <sup>st</sup>	Ephemeral	0.68	0.84	0.74
RTB U3	1 <sup>st</sup>	Intermittent	0.69	0.82	0.86

### Conley Branch

A total of five (5) representative benthic macroinvertebrate and water quality samples were collected in proposed impact reaches of the Conley Branch subwatershed (Appendix A, Exhibit 4). Samples included collecting two (2) on first order intermittent streams, one (1) on a first order perennial stream, one (1) on a second order intermittent stream, and one (1) on a second order perennial stream. The data are summarized in Table 5.

**Table 5 Data Summary for Conley Branch**

Stream ID	Order	Flow Regime	WVSCI	Taxa (# of families)	EPT Taxa (# of families)	% EPT	Specific Conductivity (uS/cm)	pH
LFCB	1st	Intermittent	69.24	6	4	64	40	6.58
UT2 RFCB	1st	Intermittent	78.91	11	8	91	40	8.23
UT3 RFCB	1st	Perennial	64.52	10	4	45	41	7.13
UT1 RFCB	2nd	Intermittent	64.44	4	3	80	39	8.65
UT1 RFCB	2nd	Perennial	72.08	11	6	56	39	8.73

Notes: UT = Unnamed Tributary, LFCB = Left Fork of Conley Branch, RFCB = Right Fork of Conley Branch.

Regarding water quality (Appendix B), baseline levels of specific conductivity were low, with values between 39 and 41  $\mu$ S/cm. Levels of pH were within the normal range (pH of 6.0 to 9.0; Stumm and Morgan, 1996), but slightly alkaline, with levels above 8.00 at three (3) out of the five (5) sampling sites.

Dissolved oxygen levels were optimal and greater than 10.0 mg/L at each of the sampling sites (5 mg/L is the water quality standard for aquatic life in WV [47CSR2]).

Benthic macroinvertebrates (Appendix C) in this subwatershed had WVSCI scores between the “gray zone” (64.44) and “very good” (78.91). The total number of individuals ranged from 5 to 46, with first order intermittent streams having the highest number of individuals. Of the taxa present throughout the subwatershed, EPT taxa in the samples numbered from 3 to 8, while the total taxa in the subwatershed numbered from 4 to 11. The EPT taxa were moderately intolerant to organic pollution, with the lowest tolerance value being 0 out of 10. These EPT taxa represented between 45 and 91 percent of the population samples. The HBI scores ranged from 2.0 to 3.8, indicating water quality ranged from “excellent” to “very good,” with the presence of organic pollution being “unlikely” to “slight.”

Six (6) stream assessment reaches (SARs) were surveyed within the subwatershed. SARs were collected in first order ephemeral and first and second order intermittent stream segments representing the available conditions. Most stream reaches were similar in condition (Table 6), though the ephemeral reach, RFCB U4 demonstrated poorer hydrology. The first order stream portions demonstrated better biogeochemical cycling than second order streams, but habitat remained similar across stream order and flow regime. Full HGM field data forms are available in Appendix B.

**Table 6 HGM FCI Summary for Conley Branch**

SAR	Order	Flow Regime	Hydrology	Biogeochemical Cycling	Habitat
RFCB 1	2nd	Intermittent	0.75	0.78	0.89
RFCB U2	2nd	Intermittent	0.75	0.78	0.88
RFCB U3	1st	Intermittent	0.75	0.81	0.82
RFCB U4	1st	Ephemeral	0.61	0.84	0.83
LFCB 1	1st	Intermittent	0.75	0.84	0.89
LFCB 2	1st	Intermittent	0.75	0.86	0.86

## Hell Creek

### *Right Fork of Hell Creek*

A total of four representative benthic macroinvertebrate and water quality samples were collected in proposed impact reaches of the Right Fork of Hell Creek subwatershed (Appendix A, Exhibit 5). Samples included collecting two (2) on first order intermittent streams, one (1) on a second order intermittent stream, and one (1) on a second order perennial stream. The data are summarized in Table 7.

**Table 7 Data Summary for Right Fork of Hell Creek**

Stream ID	Order	Flow Regime	WVSCI	Taxa (# of families)	EPT Taxa (# of families)	% EPT	Specific Conductivity (uS/cm)	pH
UT7 RFHC	1st	Intermittent	68.77	7	4	63	41	7.58
UT3 UT4 RFHC	1st	Intermittent	66.64	10	4	55	44	6.77
UT4 RFHC	2nd	Intermittent	69.59	9	6	57	44	6.86
RFHC	2nd	Perennial	85.62	16	10	67	121	7.55

Notes: UT = Unnamed Tributary, RFHC = Right Fork of Hell Creek.

Regarding water quality (Appendix B), baseline levels of specific conductivity were low, with values between 41 and 121  $\mu\text{S}/\text{cm}$ . Levels of pH were within the normal range (pH of 6.0 to 9.0; Stumm and Morgan, 1996) and remained around the neutral level of 7.00 (+/-). Dissolved oxygen levels ranged from 9.52 to 10.25 mg/L (5 mg/L is the water quality standard for aquatic life in WV [47CSR2]).

Benthic macroinvertebrates (Appendix C) in this subwatershed had WVSCI scores between the "gray zone" (66.64) and "very good" (85.62). The total number of individuals ranged from 8 to 93, with second order perennial streams having the most. Of the taxa present throughout the subwatershed, EPT taxa in the samples ranged from 4 to 10, while the total taxa in the subwatershed ranged from 9 to 16. The EPT taxa were moderately intolerant to organic pollution, with the lowest tolerance value being 0 out of 10. These EPT taxa represented between 55 and 67 percent of the population samples. The HBI scores ranged from 3.1 to 3.6, indicating water quality was "excellent," with the presence of organic pollution being "unlikely."

Six (6) stream assessment reaches (SARs) were surveyed within the subwatershed. SARs were collected in first order ephemeral and first and second order intermittent stream segments representing the available conditions (Table 8). The ephemeral reach RFHC U4 demonstrated poorer habitat than other assessments. All of the ephemeral reaches demonstrated poorer biogeochemical cycling than the intermittent reaches. Hydrology remained similar across stream order and flow regime. Full HGM field data forms are available in Appendix B.

**Table 8 HGM FCI Summary for Right Fork of Hell Creek**

SAR	Order	Flow Regime	Hydrology	Biogeochemical Cycling	Habitat
RFHC 1	2nd	Intermittent	0.75	0.97	0.92
RFHC 2	1st	Ephemeral	0.75	0.88	0.92
RFHC U3	1st	Intermittent	0.75	0.97	0.89
RFHC U4	1st	Ephemeral	0.75	0.88	0.72
RFHC U5	2nd	Intermittent	0.75	0.97	0.95
RFHC U6	1st	Intermittent	0.74	1.00	0.81

### *Left Fork of Hell Creek*

A total of five (5) representative benthic macroinvertebrate and water quality samples were collected in proposed impact reaches of the Left Fork of Hell Creek subwatershed (Appendix A, Exhibit 6). Samples included collecting one (1) on a first order intermittent stream, one (1) on a first order perennial stream, one (1) on a second order intermittent stream, one (1) on a second order perennial stream, and one (1) on a third order perennial stream. The data are summarized in Table 9.

**Table 9 Data Summary for Left Fork of Hell Creek**

Stream ID	Order	Flow Regime	WVSCI	Taxa (# of families)	EPT Taxa (# of families)	% EPT	Specific Conductivity (uS/cm)	pH
UT11 LFHC	1st	Intermittent	64.53	11	7	42	55	8.64
UT11 LFHC	1st	Perennial	66.73	11	5	53	46	10.07
UT10 LFHC	2nd	Intermittent	33.69	3	0	0	42	7.99
LFHC Permanent	2nd	Perennial	70.73	9	6	58	19	9.12
LFHC Temporary	3rd	Perennial	53.63	7	1	18	43	10.15

Notes: UT = Unnamed Tributary, LFHC = Left Fork of Hell Creek. "Permanent" and "Temporary" refer to the location along the stream segment; the permanent site is located where a permanent stream impact is proposed, and the temporary site is located where a temporary impact is proposed (where proposed mitigation includes stream restoration).

Regarding water quality (Appendix B), baseline levels of specific conductivity were low, with values between 19 and 55  $\mu\text{S}/\text{cm}$ . Levels of pH varied, with two (2) streams within the normal range (pH of 6.0 to 9.0; Stumm and Morgan, 1996). Three (3) streams had alkaline pH levels of over 9.00. Dissolved oxygen levels were optimal and greater than 10.0 mg/L at each of the sampling sites (5 mg/L is the water quality standard for aquatic life in WV [47CSR2]).

Benthic macroinvertebrates (Appendix C) in this subwatershed had WVSCI scores between "poor" (33.69) and "good" (70.73). The total number of individuals ranged from 11 to 55, with first order intermittent streams having the most. Of the taxa present throughout the subwatershed, EPT taxa in the samples ranged from 0 to 7, while the total taxa in the subwatershed ranged from 3 to 11. The EPT taxa were moderately intolerant to organic pollution, with the lowest tolerance value being 1 out of 10. These EPT taxa represented between 0 and 58 percent of the population samples. The HBI scores ranged from 2.9 to 4.5, indicating water quality ranged from "excellent" to "good," with the presence of organic pollution being "unlikely" to "probable."

Five (5) stream assessment reaches (SARs) were surveyed within the subwatershed. SARs were collected in first and second order intermittent stream segments representing the available conditions. Most stream reaches were similar in condition (Table 10), though LFHC U3, a first order stream segment, demonstrated poorer hydrology and habitat. Full HGM field data forms are available in Appendix B.

**Table 10 HGM Summary for Left Fork of Hell Creek**

SAR	Order	Flow Regime	Hydrology	Biogeochemical Cycling	Habitat
LFHC 1	2nd	Intermittent	0.75	0.97	0.96
LFHC U2	2nd	Intermittent	0.71	0.95	0.95
LFHC U3	1st	Intermittent	0.63	0.93	0.87
LFHC U4	2nd	Intermittent	0.75	0.97	0.94
LFHC U5	1st	Intermittent	0.75	0.97	0.96

### Pigeonroost Creek

A total of two (2) representative benthic macroinvertebrate and water quality samples were collected in proposed impact reaches of the Pigeonroost Creek subwatershed (Appendix A, Exhibit 5). Samples



included a second order intermittent stream and a second order perennial stream. The data are summarized in Table 11.

**Table 11 Data Summary for Pigeonroost Creek**

Stream ID	Order	Flow Regime	WVSCI	Taxa (# of families)	EPT Taxa (# of families)	% EPT	Specific Conductivity (uS/cm)	pH
PRC	2nd	Intermittent	75.82	13	10	51	39	8.81
PRC	2nd	Perennial	78.58	15	10	49	38	6.53

Note: PRC = Pigeonroost Creek.

Regarding water quality (Appendix B), baseline levels of specific conductivity were low, with values between 38 and 39  $\mu\text{S}/\text{cm}$ . Levels of pH were within the normal range (pH of 6.0 to 9.0; Stumm and Morgan, 1996), and dissolved oxygen levels were optimal and greater than 10.0 mg/L at each of the sampling sites (5 mg/L is the water quality standard for aquatic life in WV [47CSR2]).

Benthic macroinvertebrates (Appendix C) in this subwatershed had WVSCI scores between "good" (75.82) and "very good" (78.58). The total number of individuals ranged from 43 to 49, with second order intermittent streams having the most. Of the taxa present throughout the subwatershed, EPT taxa in the samples comprised 10 of the families, while the total taxa in the subwatershed ranged from 13 to 15. The EPT taxa were moderately intolerant to organic pollution, with the lowest tolerance value being 0 out of 10. These EPT taxa represented between 49 and 51 percent of the population samples. The HBI scores ranged from 3.8 to 4.1, indicating "very good" water with a possibility of "slight" organic pollution.

Three (3) stream assessment reaches (SARs) were surveyed within the subwatershed. SARs were collected in first order ephemeral and first and second order intermittent stream segments representing the available conditions (Table 12). The first order reaches, PRC U2 and PRC U3 demonstrated poorer habitat than second order assessments. The first order stream portions demonstrated better biogeochemical cycling than second order streams, but habitat remained similar across stream order and flow regime. Full HGM field data forms are available in Appendix B.

**Table 12 HGM FCI Summary for Pigeonroost Creek**

SAR	Order	Flow Regime	Hydrology	Biogeochemical Cycling	Habitat
PRC 1	2nd	Intermittent	0.75	0.99	0.96
PRC U2	1st	Ephemeral	0.75	0.88	0.86
PRC U3	1st	Intermittent	0.72	0.96	0.77

### Unnamed Tributary of Pigeon Creek

A total of two (2) representative benthic macroinvertebrate and water quality samples were collected in proposed impact reaches of the UTPC subwatershed (Appendix A, Exhibit 4). Samples included collecting two (2) first order intermittent streams. The data are summarized in Table 13.

**Table 13 Data Summary for Unnamed Tributary of Pigeon Creek**

Stream ID	Order	Flow Regime	WVSCI	Taxa (# of families)	EPT Taxa (# of families)	% EPT	Specific Conductivity (uS/cm)	pH
UTPC Permanent	1st	Intermittent	79.67	12	8	71	45	6.59
UTPC Temporary	1st	Intermittent	82.72	21	11	47	44	6.66

Note: UTPC = Unnamed Tributary of Pigeon Creek. "Permanent" and "Temporary" refer to the location along the stream segment; the permanent site is located where a permanent stream impact is proposed, and the temporary site is located where a temporary impact is proposed (where proposed mitigation includes stream restoration).

Regarding water quality (Appendix B), baseline levels of specific conductivity were low, with values of 44 and 45  $\mu\text{S/cm}$ . Levels of pH were within the normal range (pH of 6.0 to 9.0; Stumm and Morgan, 1996). Dissolved oxygen levels were optimal and greater than 10.0 mg/L at both of the sampling sites (5 mg/L is the water quality standard for aquatic life in WV [47CSR2]).

Benthic macroinvertebrates (Appendix C) in this subwatershed had WVSCI scores of 79.67 and 82.72, indicating "very good" water quality. The total number of individuals ranged from 58 to 121. EPT taxa in the UTPC subwatershed ranged from 8 to 11, while the total taxa ranged from 12 to 21. The EPT taxa were moderately intolerant to organic pollution, with the lowest tolerance value being 0 out of 10. These EPT taxa represented between 47 and 71 percent of the population samples. The HBI score was 3.1 for both samples, indicating "excellent" water quality with "no" organic pollution.

Three (3) stream assessment reaches (SARs) were surveyed within the subwatershed. SARs were collected in first order ephemeral and first order intermittent stream segments representing the available conditions (Table 14). The ephemeral reach, UTPC 3, demonstrated poorer habitat and biogeochemical cycling. UTPC1, the lowest sample along the stream, demonstrated better hydrology than the other segments. Full HGM field data forms are available in Appendix B.

**Table 14 HGM FCI Summary for Unnamed Tributary of Pigeon Creek**

SAR	Order	Flow Regime	Hydrology	Biogeochemical Cycling	Habitat
UTPC 1	1st	Intermittent	0.72	0.98	0.96
UTPC 2	1st	Intermittent	0.67	0.97	0.90
UTPC 3	1st	Ephemeral	0.67	0.86	0.88

### Unnamed Tributaries of Miller Creek

A total of two (2) representative benthic macroinvertebrate and water quality samples were collected in proposed impact reaches of the Miller Creek subwatershed (Appendix A, Exhibit 4). Samples included collecting a first order intermittent stream and a first order perennial stream. The data are summarized in Table 15.

Table 15 Data Summary for UT5 of Miller Creek

Stream ID	Order	Flow Regime	WVSCI	Taxa (# of families)	EPT Taxa (# of families)	% EPT	Specific Conductivity (uS/cm)	pH
UT5 MC	1st	Intermittent	24.5	2	0	0	31	6.89
UT5 MC	1st	Perennial	45.46	2	1	50	34	6.29

Note: UT5MC = Unnamed Tributary 5 Miller Creek.

Regarding water quality (Appendix B), baseline levels of specific conductivity were low, with values of 31 and 34  $\mu\text{S}/\text{cm}$ . Levels of pH were within the normal range (pH of 6.0 to 9.0; Stumm and Morgan, 1996), and dissolved oxygen levels were optimal and greater than 10.0 mg/L at both of the sampling sites (5 mg/L is the water quality standard for aquatic life in WV [47CSR2]).

Benthic macroinvertebrates (Appendix C) from both sites had WVSCI scores of 24.5 and 45.46, indicating "poor" water quality. The total number of individuals ranged from 2 to 5. Of the taxa present throughout the subwatershed, there was only one (1) EPT taxon found, and only two (2) taxa were represented in both of the samples. The EPT taxon was intolerant to organic pollution, with the tolerance value being 1 out of 10. The HBI scores ranged from 2 to 7.2, indicating that water quality varied from "excellent" to "poor," with the presence of organic pollution being "unlikely" to "very substantial."

One (1) stream assessment reach (SAR) was surveyed within the subwatershed. The SAR was collected in first order intermittent stream segment representing the available conditions (Table 16). Full HGM field data forms are available in Appendix B.

Table 16 HGM FCI Summary for UT5 of Miller Creek

SAR	Order	Flow Regime	Hydrology	Biogeochemical Cycling	Habitat
MC U1	1st	Intermittent	0.75	0.97	0.87

### Unnamed Tributary of Stonecoal Branch

One (1) stream assessment reach (SAR) was surveyed within the subwatershed. The SAR was collected in first order intermittent stream segment representing the available conditions (Table 16). Full HGM field data forms are available in Appendix B.

Table 17 HGM FCI Summary for UT of Stonecoal Branch

SAR	Order	Flow Regime	Hydrology	Biogeochemical Cycling	Habitat
UTSB1	1st	Intermittent	0.66	0.94	0.86

## 4.3 SWVM Summary

As described above, data from representative sites were used to calculate an SWVM unit for each of the individual impact streams and mitigation streams. Also factored into the SWVM calculations are predictions for on- and off-site establishment reaches. Because the on- and off-site establishment streams are first order streams and are expected to have intermittent flow upon Phase II bond release, baseline conditions for these mitigation streams were derived from the average of all the first order intermittent streams collected throughout the project area.

Total SWVM debits and credits were determined for each subwatershed in the project area. Appendix D presents summary tables for each of the subwatersheds where impacts and on-site restoration mitigation is proposed, as well as for the proposed establishment reaches. Appendix D also presents the SWVM spreadsheets for each stream. Off-site preservation credit was determined as 10 percent of total preservation length (Table 18).

Overall, there were a total of 70,668 SWVM debits throughout the project area and a total of 52,929 SWVM credits, resulting in a total deficit of 17,759 SWVM units (Table 18). The deficit represents approximately twenty-five percent of the total debits throughout the project area.

**Table 18 SWVM Summary**

<b>SWVM Summary</b>	<b>Debit</b>	<b>Credit</b>
Ruth Trace Branch	11,714	1,007
Conley Branch	10,595	1,906
Right Fork of Hell Creek	17,895	2,258
Left Fork of Hell Creek	16,473	1,761
Pigeonroost Creek	7,788	1,181
Unnamed Tributary of Pigeon Creek	2,875	685
Unnamed Tributary of Stonecoal Branch	126	0
Unnamed Tributary 4 of Miller Creek	170	0
Unnamed Tributary 5 of Miller Creek	3,032	425
On- & Off-Site Establishment Mitigation	0	43,178
Off-Site Preservation*	0	528
<b>TOTAL</b>	<b>70,668</b>	<b>52,929</b>
<b>Deficit</b>	<b>- 17,759 (25.1%)</b>	

\* A total of 5,281 linear feet are proposed to be preserved. Mitigation credit was determined from 10% of the total preservation length.

The CMP concludes that structural and functional losses of waters of the U.S. will be offset by the proposed mitigation detailed in that plan (Baker 2010). The SWVM findings support this conclusion.

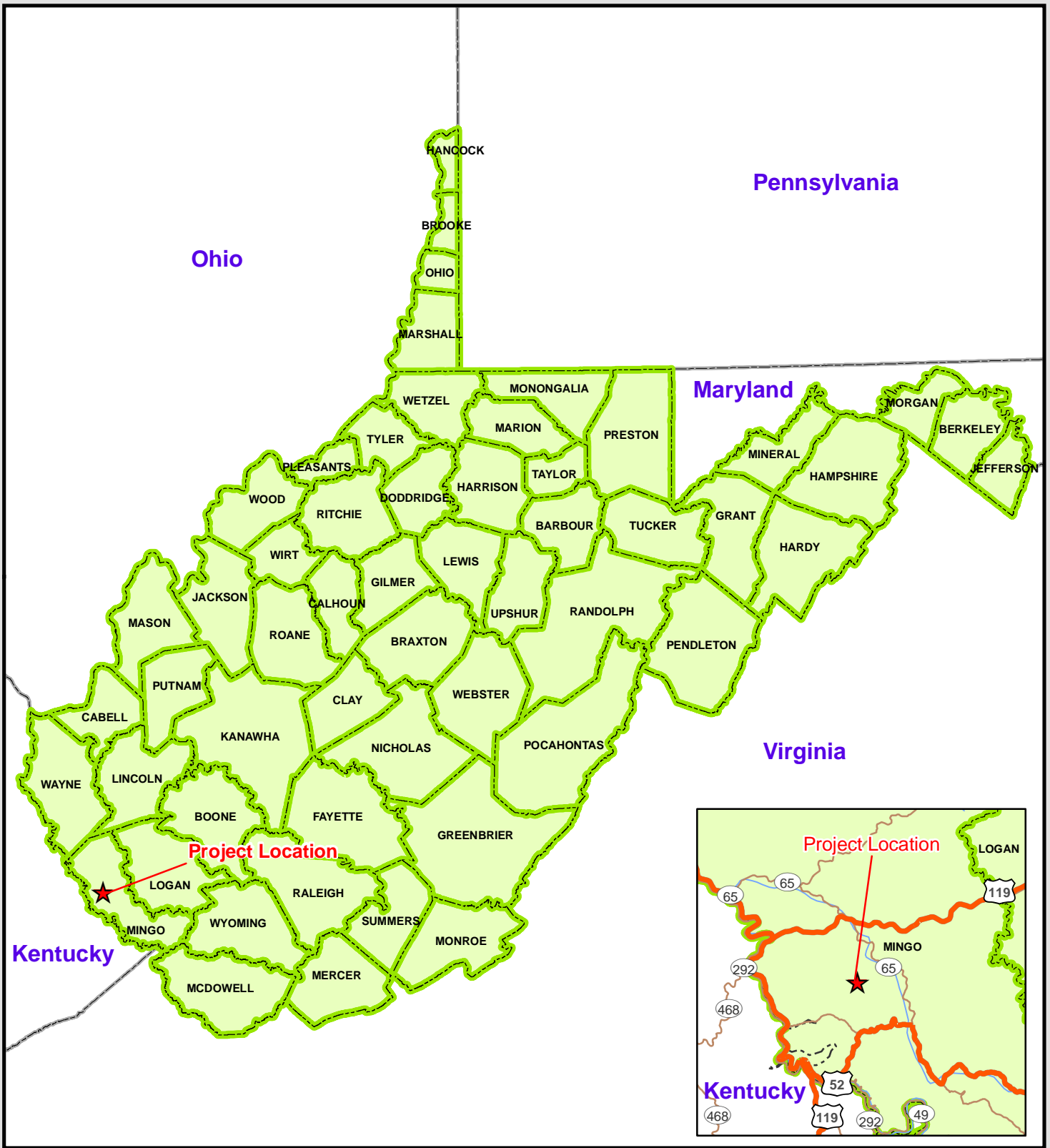
As summarized in Section 2.0 of this report, the CMP includes a water quality improvement component within one of the subwatersheds of the project area. This component was developed in order to compensate for any debits associated with any of the mitigation techniques to quantify functional losses and gains, along with providing a full watershed restoration scale approach. The SWVM analysis revealed an approximately twenty-five percent credit deficit without consideration of the proposed water quality improvements, off-site stream restoration, and enhancement activities; therefore, using the findings of the SWVM and the same basis for conclusion as in the CMP, CONSOL will offset the structural and functional losses of waters of the U.S. with the successful implementation of all planned mitigation activities including water quality improvement (i.e., wastewater treatment).

## 5.0 REFERENCES

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**APPENDIX A  
EXHIBITS**

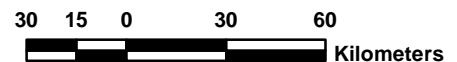
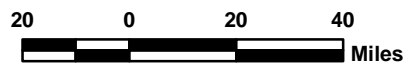
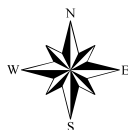




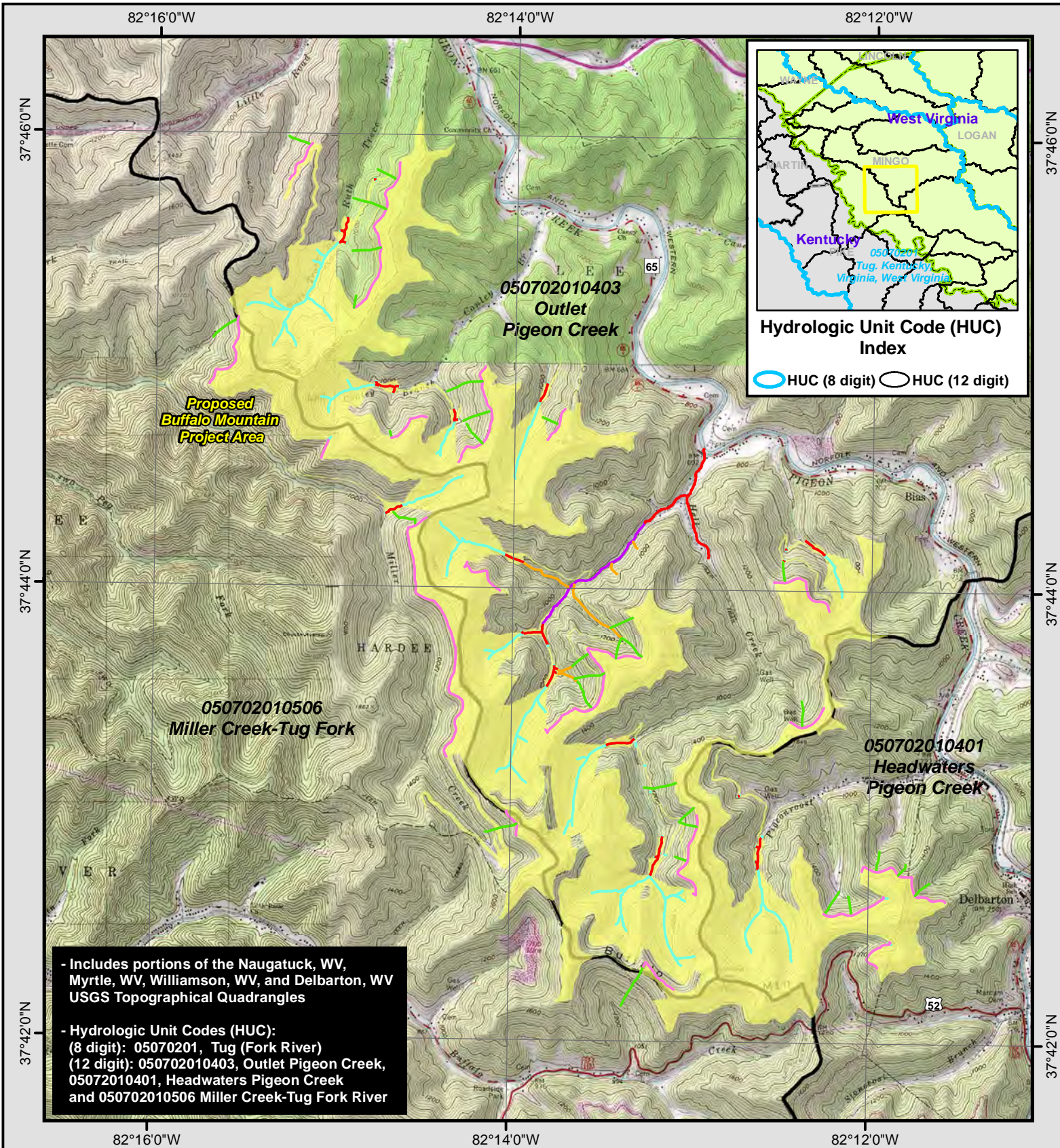
**EXHIBIT 1 - PROJECT LOCATION MAP**



**CONSOL of Kentucky Inc.**  
 1000 CONSOL Energy Drive  
 Canonsburg, PA 15317





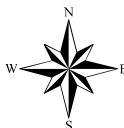


## EXHIBIT 2 - TOPOGRAPHICAL MAP OF PROJECT AREA



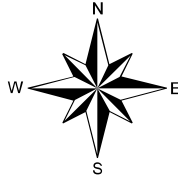
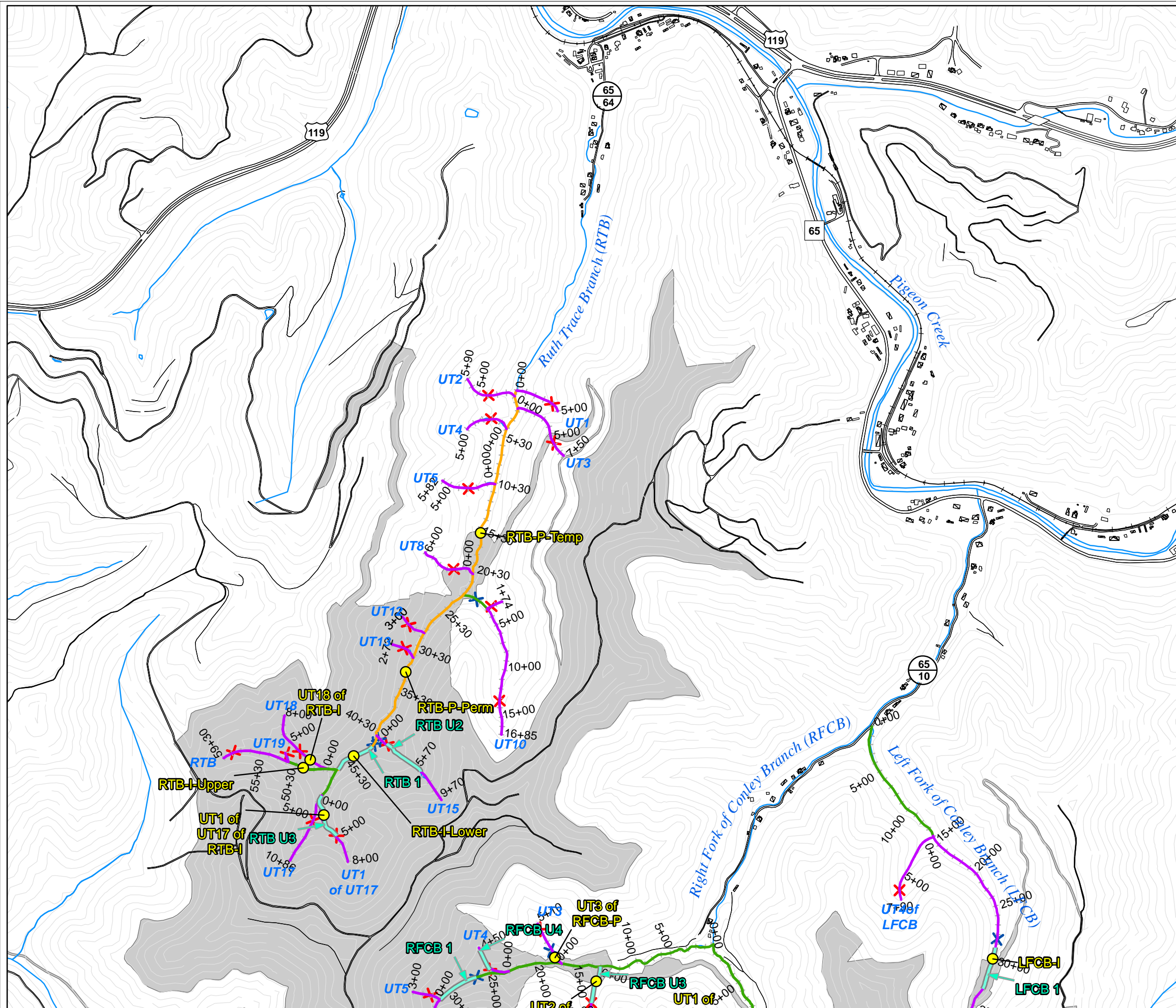
**CONSOL of Kentucky Inc.**

1000 CONSOL Energy Drive  
Canonsburg, PA 15317



Proposed Impact Reach  
○ 12 digit Hydrologic Unit Code (HUC-12)

3,500 1,750 0 3,500  
Feet



**Legend**

- Mineral Removal/Disturbed Area
- HGM Stream Assessment Reach (SAR)
- Benthic Macroinvertebrates & Water Quality Sampling Site

**Stream Classification**

- 1st Order Stream
- 2nd Order Stream
- 3rd Order Stream

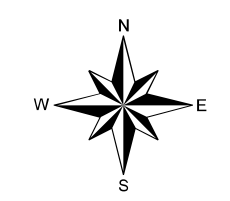
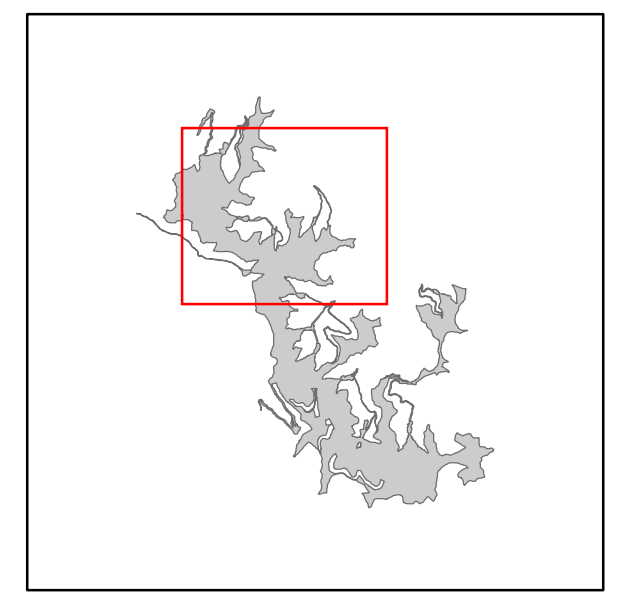
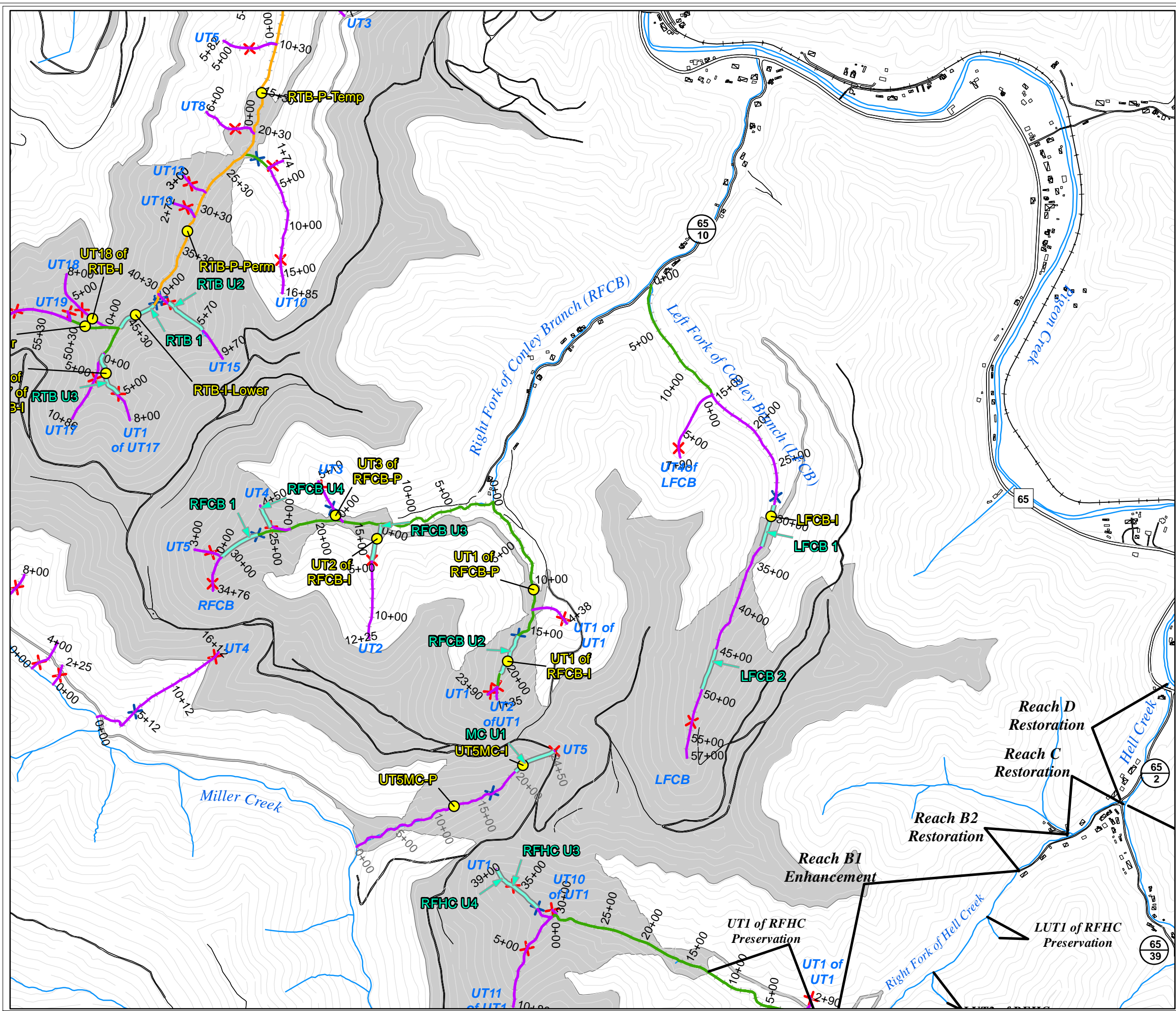
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- Perennial/Intermittent Transition Point

**Exhibit 3: Ruth Trace Branch Stream Classification, HGM Reaches, and Benthic Macroinvertebrate Sampling Sites**

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Feet

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**Legend**

- Mineral Removal/Disturbed Area
- HGM Stream Assessment Reach (SAR)
- Benthic Macroinvertebrates & Water Quality Sampling Site

**Stream Classification**

- 1st Order Stream
- 2nd Order Stream
- 3rd Order Stream

**Transition Points**

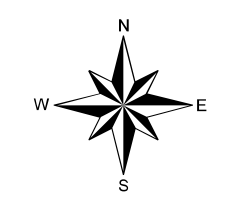
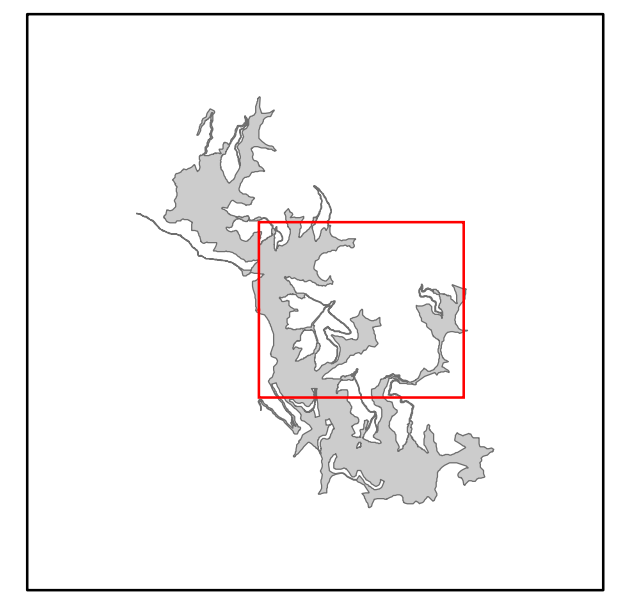
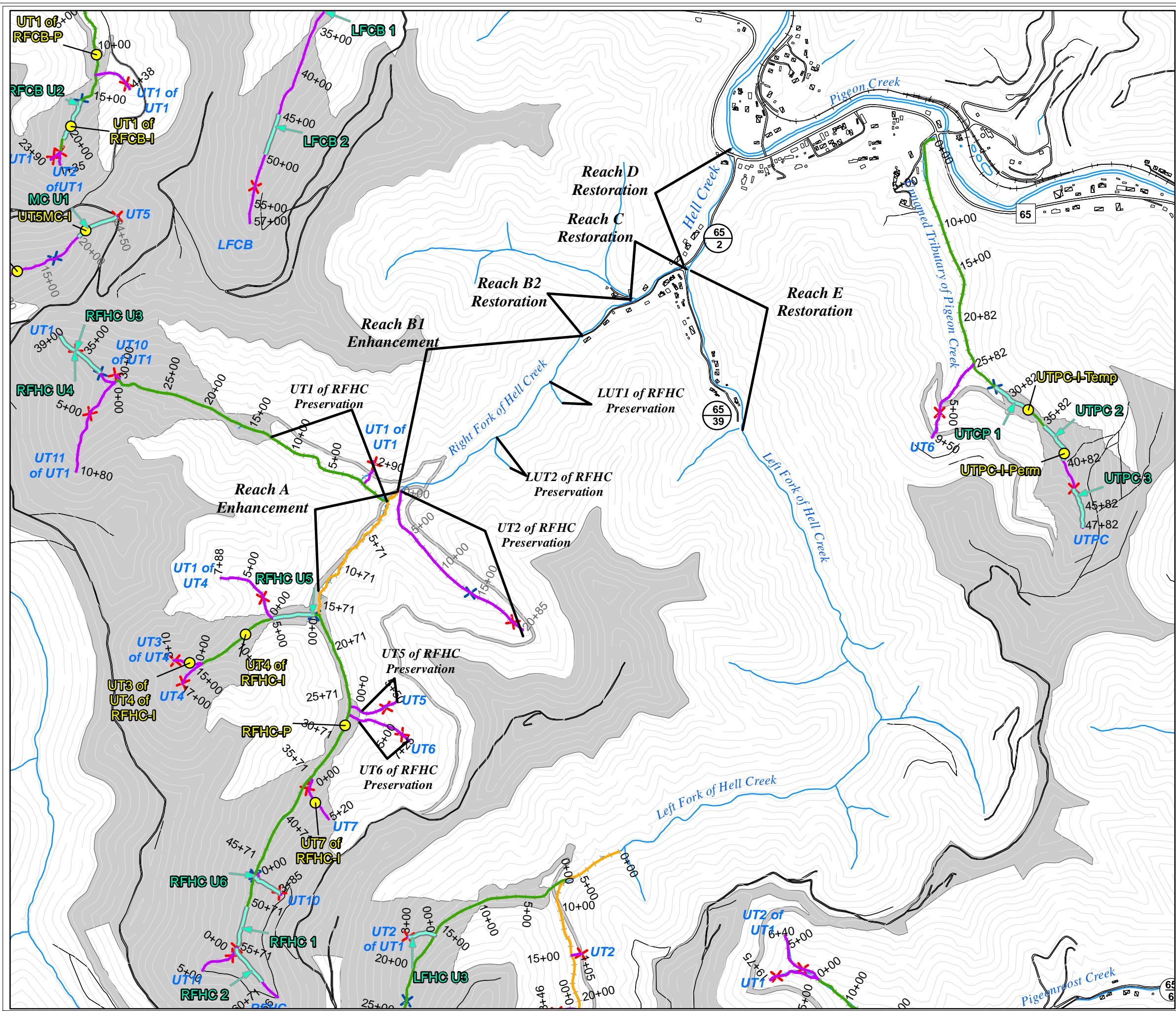
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- Perennial/Intermittent Transition Point

**Exhibit 4: Conley Branch and Unnamed Tributaries to Miller Creek Stream Classification, HGM Reaches, and Benthic Macroinvertebrate Sampling Sites**

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**Legend**

- Mineral Removal/Disturbed Area
- HGM Stream Assessment Reach (SAR)
- Benthic Macroinvertebrates & Water Quality Sampling Site

**Stream Classification**

- 1st Order Stream
- 2nd Order Stream
- 3rd Order Stream

**Transition Points**

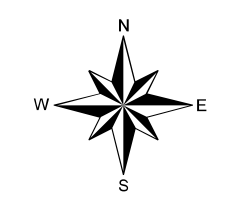
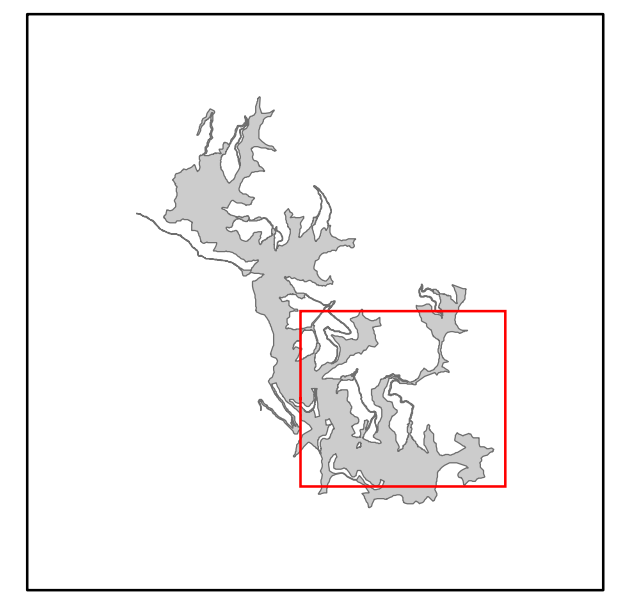
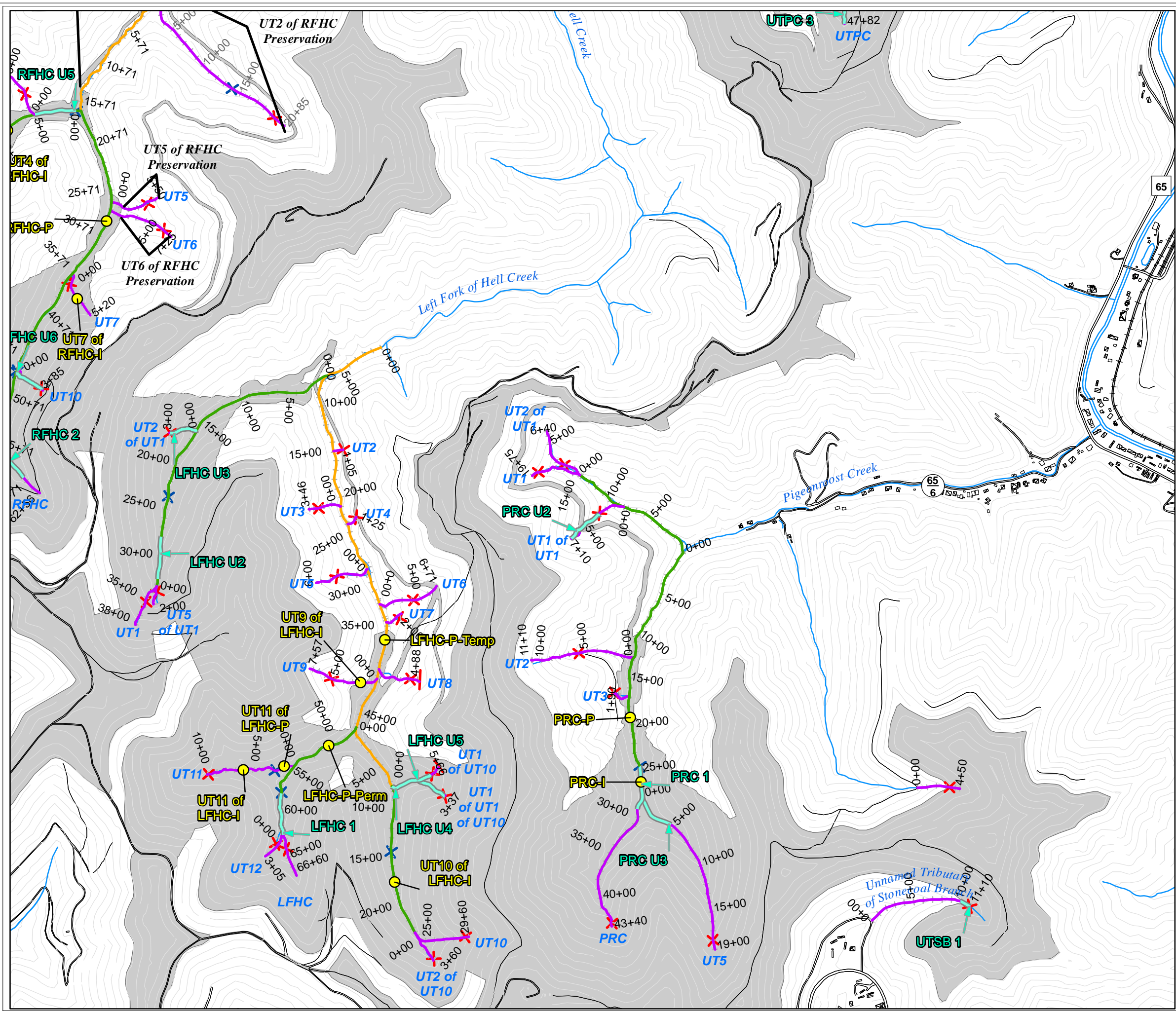
- Intermittent/Ephemeral Transition Point
- Perennial/Intermittent Transition Point

**Exhibit 5: Right Fork of Hell Creek and Unnamed Tributary to Pigeon Creek Stream Classification, HGM Reaches, and Benthic Macroinvertebrate Sampling Sites**

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Feet

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**Legend**

- Mineral Removal/Disturbed Area
- HGM Stream Assessment Reach (SAR)
- Benthic Macroinvertebrates & Water Quality Sampling Site

**Stream Classification**

- 1st Order Stream
- 2nd Order Stream
- 3rd Order Stream
- Intermittent/Ephemeral Transition Point
- Perennial/Intermittent Transition Point

**Exhibit 6: Left Fork of Hell Creek, Pigeonroost Creek, and Unnamed Tributary to Stonecoal Branch Stream Classification, HGM Reaches, and Benthic Macroinvertebrate Sampling Sites**

1,000      0      1,000  
 Feet

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**APPENDIX B  
FIELD DATA SHEETS**




## FIELD DATA SUMMARY SHEETS





## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10		STREAM NAME: Ruth Trace Branch	
SITE ID: RTB-P-Temp	RIVER BASIN: Tug Fork	STREAM ORDER: 3	
LOCATION:		STREAM CLASS:	STORET #:
LATITUDE: 37° 45' 34.27" N	LONGITUDE: 82° 14' 57.78" W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 6.2, 5.8 <b>Slope:</b> 5% <b>Weather:</b> 70°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/ SKETCH MAP</b>	Photo from Buffalo Mountain Surface Mine Preliminary Jurisdictional Determination Report (Baker 2008) 	
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: RTB-P-Temp	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>14.83</u> C  Specific Conductance <u>37</u> μS/cm  Dissolved Oxygen <u>10.73</u> mg/L  pH <u>8.27</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length <u>~400</u> ft  Channel Widths <u>    </u> ft  Water Width <u>    </u> ft  Right Bank Depth <u>    </u> ft Water Depth <u>    </u> ft  Left Bank Depth <u>    </u> ft Water Depth <u>    </u> ft  Max Bank Depth (thalweg) <u>    </u> ft Water Depth (thalweg) <u>    </u> ft  Surface Velocity (thalweg) <u>    </u> ft/sec  Discharge <u>    </u> cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>20</u> %   Run <u>60</u> %   Pool <u>20</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10		STREAM NAME: Ruth Trace Branch	
SITE ID: RTB-P-Perm	RIVER BASIN: Tug Fork	STREAM ORDER: 3	
LOCATION:		STREAM CLASS:	STORET #:
LATITUDE: 37° 45' 36.86"N	LONGITUDE: 82° 14' 57.58"W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 3.8, 4.6 <b>Slope:</b> 5% <b>Weather:</b> 75°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/ SKETCH MAP</b>	Photo from Buffalo Mountain Surface Mine Preliminary Jurisdictional Determination Report (Baker 2008) 	
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential
		<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: RTB-P-Perm	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>15.07</u> C  Specific Conductance <u>36</u> μS/cm  Dissolved Oxygen <u>10.70</u> mg/L  pH <u>8.29</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length <u>~400</u> ft  Channel Widths <u>    </u> ft  Water Width <u>    </u> ft  Right Bank Depth <u>    </u> ft Water Depth <u>    </u> ft  Left Bank Depth <u>    </u> ft Water Depth <u>    </u> ft  Max Bank Depth (thalweg) <u>    </u> ft Water Depth (thalweg) <u>    </u> ft  Surface Velocity (thalweg) <u>    </u> ft/sec  Discharge <u>    </u> cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>25</u> %   Run <u>60</u> %   Pool <u>15</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10		STREAM NAME: Ruth Trace Branch	
SITE ID: RTB-I-Lower	RIVER BASIN: Tug Fork	STREAM ORDER: 3	
LOCATION:		STREAM CLASS:	STORET #:
LATITUDE: 37° 45' 14.51" N	LONGITUDE: 82° 15' 13.03" W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: RE			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 6.2, 7.4 <b>Slope:</b> 9% <b>Weather:</b> 65°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/ SKETCH MAP</b>	Photo from Buffalo Mountain Surface Mine Preliminary Jurisdictional Determination Report (Baker 2008) 	
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: RTB-I-Lower	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>14.40</u> C  Specific Conductance <u>29</u> μS/cm  Dissolved Oxygen <u>10.44</u> mg/L  pH <u>8.41</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>45</u> %   Run <u>15</u> %   Pool <u>40</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: Ruth Trace Branch		
SITE ID: RTB-I-Upper	RIVER BASIN: Tug Fork	STREAM ORDER: 2	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 45' 16.74"	LONGITUDE: 82 15' 11.9"	ELEVATION:	
INVESTIGATORS: RE			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<u>Channel Widths:</u> 6.5, 7.0 <u>Slope:</u> 9% <u>Weather:</u> 65°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/SKETCH MAP</b>		
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy



## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: RTB-I-Upper	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>14.88</u> C  Specific Conductance <u>34</u> μS/cm  Dissolved Oxygen <u>10.95</u> mg/L  pH <u>8.36</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>60</u> %   Run <u>20</u> %   Pool <u>20</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: UT1 UT17 Ruth Trace Branch		
SITE ID: UT1 UT17 RTB I	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 45' 7.67"N	LONGITUDE: 82° 15' 17.04"W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 3.7, 4.9 <b>Slope:</b> 15% <b>Weather:</b> 65°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/SKETCH MAP</b>	Photo from Buffalo Mountain Surface Mine Preliminary Jurisdictional Determination Report (Baker 2008) 	
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: UT1 UT17 RTB I	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>13.87</u> C  Specific Conductance <u>30</u> μS/cm  Dissolved Oxygen <u>10.77</u> mg/L  pH <u>7.87</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>55</u> %   Run <u>10</u> %   Pool <u>35</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: UT18 Ruth Trace Branch		
SITE ID: UT18 RTB I	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 45' 14.26"N	LONGITUDE: 82° 15' 18.60"W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<u>Channel Widths:</u> 4.0, 4.8 <u>Slope:</u> 10% <u>Weather:</u> 65°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample – NOT ENOUGH FLOW FOR BENTHIC MACROINVERTEBRATE COLLECTION	
<b>SITE PHOTO/SKETCH MAP</b>		
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: UT18 RTB	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>14.49</u> C  Specific Conductance <u>34</u> μS/cm  Dissolved Oxygen <u>10.46</u> mg/L  pH <u>7.92</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>40</u> %   Run <u>20</u> %   Pool <u>40</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: Left Fork Conley Branch		
SITE ID: LFCB-I	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 44' 51.74" N	LONGITUDE: 82° 13' 50.14" W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 4.7, 5.3 <b>Slope:</b> 18% <b>Weather:</b> 60°, Cloudy	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/SKETCH MAP</b>	Photo from Buffalo Mountain Surface Mine Preliminary Jurisdictional Determination Report (Baker 2008) 	
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: LFCB-I	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>13.53</u> C  Specific Conductance <u>40</u> μS/cm  Dissolved Oxygen <u>10.26</u> mg/L  pH <u>6.58</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>25</u> %   Run <u>60</u> %   Pool <u>15</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: UT1 Right Fork Conley Branch		
SITE ID: UT1 RFCB-P	RIVER BASIN: Tug Fork	STREAM ORDER: 2	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 44' 45.62" N	LONGITUDE: 82° 14' 20.12" W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<b>Channel Widths:</b> 3.2, 4.0 <b>Slope:</b> 10% <b>Weather:</b> 60°, Cloudy	
SAMPLING METHODOLOGY	Single Habitat, riffle sample	
SITE PHOTO/ SKETCH MAP		
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy



## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: UT1 RFCB-P	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  Dominant Species <u>    Hemlock    </u>  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  Dominant Species _____  Portion of the Reach with Aquatic Vegetation <u>    0    </u> %	
<b>WATER QUALITY</b>	Temperature <u>    13.27    </u> C  Specific Conductance <u>    39    </u> μS/cm  Dissolved Oxygen <u>    10.78    </u> mg/L  pH <u>    8.73    </u>  Instrument Used <u>    YSI 556 MPS    </u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length <u>    ~400    </u> ft  Channel Widths <u>    </u> ft  Water Width <u>    </u> ft  Right Bank Depth <u>    </u> ft Water Depth <u>    </u> ft  Left Bank Depth <u>    </u> ft Water Depth <u>    </u> ft  Max Bank Depth (thalweg) <u>    </u> ft Water Depth (thalweg) <u>    </u> ft  Surface Velocity (thalweg) <u>    </u> ft/sec  Discharge <u>    </u> cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>    60    </u> %   Run <u>    20    </u> %   Pool <u>    20    </u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	5
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: UT1 Right Fork Conley Branch		
SITE ID: UT1 RFCB-I	RIVER BASIN: Tug Fork	STREAM ORDER: 2	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 44' 38.61" N	LONGITUDE: 82° 14' 23.96" W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 5.4, 6.1 <b>Slope:</b> 12% <b>Weather:</b> 62°, Cloudy	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/SKETCH MAP</b>		
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: UT1 RFCB-I	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ Maple _____  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> _____ 0 %	
<b>WATER QUALITY</b>	Temperature _____ 12.96 _____ C  Specific Conductance _____ 39 _____ μS/cm  Dissolved Oxygen _____ 11.02 _____ mg/L  pH _____ 8.65 _____  Instrument Used _____ YSI 556 MPS _____	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle _____ 65 %   Run _____ 10 %   Pool _____ 25 %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	5
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: UT2 Right Fork Conley Branch		
SITE ID: UT2 RFCB-I	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE:	LONGITUDE:	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 3.1, 3.8 <b>Slope:</b> 12% <b>Weather:</b> 55°, Cloudy	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/ SKETCH MAP</b>	Photo from Buffalo Mountain Surface Mine Preliminary Jurisdictional Determination Report (Baker 2008) 	
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: UT2 RFCB-I	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>12.98</u> C  Specific Conductance <u>40</u> μS/cm  Dissolved Oxygen <u>10.8</u> mg/L  pH <u>8.23</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>20</u> %   Run <u>70</u> %   Pool <u>10</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: UT3 Right Fork Conley Branch		
SITE ID: UT3 RFCB-P	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 44' 53.57" N	LONGITUDE: 82° 14' 46.27" W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<u>Channel Widths:</u> 2.8, 2.3 <u>Slope:</u> 18% <u>Weather:</u> 55°, Cloudy	
SAMPLING METHODOLOGY	Single Habitat, riffle sample	
SITE PHOTO/ SKETCH MAP		
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: UT3 RFCB-P	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input checked="" type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>13.81</u> C  Specific Conductance <u>41</u> μS/cm  Dissolved Oxygen <u>10.58</u> mg/L  pH <u>7.13</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>10</u> %   Run <u>75</u> %   Pool <u>5</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: Right Fork Hell Creek		
SITE ID: RFHC-P	RIVER BASIN: Tug Fork	STREAM ORDER: 2	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 43' 36.54" N	LONGITUDE: 82° 13' 46.55" W	ELEVATION:	
INVESTIGATORS: CS, AC			
FORM COMPLETED BY: AC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<u>Channel Widths: 5.2</u> <u>Slope: 5%</u> <u>Weather: 75°, Sunny</u>	
SAMPLING METHODOLOGY	Single Habitat, riffle sample	
SITE PHOTO/ SKETCH MAP		
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input checked="" type="checkbox"/> Other _____ gas _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy



## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: RFHC-P	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> <u>Beech, Christmas Fern, Ironwood</u>  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	<b>Temperature</b> <u>13.72</u> C  <b>Specific Conductance</b> <u>121</u> μS/cm  <b>Dissolved Oxygen</b> <u>9.95</u> mg/L  <b>pH</b> <u>7.55</u>  <b>Instrument Used</b> <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	<b>Reach Length</b> _____ ft  <b>Channel Widths</b> <u>18.6</u> ft  <b>Water Width</b> <u>5.2</u> ft  <b>Right Bank Depth</b> <u>2.1</u> ft <b>Water Depth</b> <u>0.1</u> ft  <b>Left Bank Depth</b> <u>2.6</u> ft <b>Water Depth</b> <u>0.2</u> ft  <b>Max Bank Depth (thalweg)</b> <u>3.1</u> ft <b>Water Depth (thalweg)</b> <u>2.5</u> ft  <b>Surface Velocity (thalweg)</b> _____ ft/sec  <b>Discharge</b> _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>80</u> %   Run _____ %   Pool <u>20</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input checked="" type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	15
Sand	0.062-2 mm	20			
Gravel	2-64 mm	10	Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm	5			
Boulder	256-2048 mm	5	Marl	grey, shell fragments	
Bedrock	>2048 mm	60			

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: UT4 Right Fork Hell Creek		
SITE ID: UT4 RFHC	RIVER BASIN: Tug Fork	STREAM ORDER: 3	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 43' 48.32"N	LONGITUDE: 82° 13' 56.85"W	ELEVATION:	
INVESTIGATORS: CF, AC			
FORM COMPLETED BY: AC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 5.2 <b>Slope:</b> 5% <b>Weather:</b> 70°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/SKETCH MAP</b>		
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input checked="" type="checkbox"/> Other <u>gas</u> <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: UT4 RFHC	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> <u>Beech, Nettle, C. Fern, Basswood</u>  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>13.22</u> C  Specific Conductance <u>44</u> μS/cm  Dissolved Oxygen <u>10.07</u> mg/L  pH <u>6.86</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length <u>300</u> ft  Channel Widths <u>9.1</u> ft  Water Width <u>6.4</u> ft  Right Bank Depth <u>1.1</u> ft Water Depth <u>0.1</u> ft  Left Bank Depth <u>1.3</u> ft Water Depth <u>0.2</u> ft  Max Bank Depth (thalweg) <u>1.8</u> ft Water Depth (thalweg) <u>4.3</u> ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>85</u> %   Run _____ %   Pool <u>15</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm	5	Detritus	sticks, wood, coarse plant materials (CPOM)	10
Sand	0.062-2 mm	10			
Gravel	2-64 mm	40	Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm	25			
Boulder	256-2048 mm	10	Marl	grey, shell fragments	
Bedrock	>2048 mm	10			

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: UT3 UT4 Right Fork Hell Creek		
SITE ID: UT3 UT4 RFHC	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 43' 43.97"N	LONGITUDE: 82° 14' 6.03"W	ELEVATION:	
INVESTIGATORS: CF, AC			
FORM COMPLETED BY: CF			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<b>Channel Widths: 5.2</b> <b>Slope: 15%</b> <b>Weather: 70°, Sunny</b>	
SAMPLING METHODOLOGY	Single Habitat, riffle sample	
SITE PHOTO/ SKETCH MAP		
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: UT3 UT4 RFHC	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> <u>Beech, C. Fern, Nettle, Cucumber Tree</u>  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	<b>Temperature</b> <u>13.48</u> C  <b>Specific Conductance</b> <u>44</u> µS/cm  <b>Dissolved Oxygen</b> <u>9.52</u> mg/L  <b>pH</b> <u>6.77</u>  <b>Instrument Used</b> <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	<b>Reach Length</b> <u>200</u> ft  <b>Channel Widths</b> <u>5.4</u> ft  <b>Water Width</b> <u>2.0</u> ft  <b>Right Bank Depth</b> <u>1.0</u> ft <b>Water Depth</b> <u>0.1</u> ft  <b>Left Bank Depth</b> <u>1.2</u> ft <b>Water Depth</b> <u>0.1</u> ft  <b>Max Bank Depth (thalweg)</b> <u>3.0</u> ft <b>Water Depth (thalweg)</b> <u>0.2</u> ft  <b>Surface Velocity (thalweg)</b> _____ ft/sec  <b>Discharge</b> _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>90</u> %   Run _____ %   Pool <u>10</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm	5	Detritus	sticks, wood, coarse plant materials (CPOM)	10
Sand	0.062-2 mm	5			
Gravel	2-64 mm	10	Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm	10			
Boulder	256-2048 mm	5	Marl	grey, shell fragments	
Bedrock	>2048 mm	65			

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: UT7 Right Fork Hell Creek		
SITE ID: UT7 RFHC	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 43' 30.31"N	LONGITUDE: 82° 13' 52.21"W	ELEVATION:	
INVESTIGATORS: CF, AC			
FORM COMPLETED BY: AC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 5.2 <b>Slope:</b> 15% <b>Weather:</b> 78°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/SKETCH MAP</b>		
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: UT7 RFHC	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> <u>Beech, Tulip Poplar, Ironwood, Nettle</u>  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>13.18</u> C  Specific Conductance <u>41</u> µS/cm  Dissolved Oxygen <u>10.25</u> mg/L  pH <u>7.58</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths <u>5.2</u> ft  Water Width <u>1.6</u> ft  Right Bank Depth <u>0.9</u> ft Water Depth <u>0</u> ft  Left Bank Depth <u>1.1</u> ft Water Depth <u>0.1</u> ft  Max Bank Depth (thalweg) <u>1.4</u> ft Water Depth (thalweg) <u>0.2</u> ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>90</u> %   Run _____ %   Pool <u>10</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm	5	Detritus	sticks, wood, coarse plant materials (CPOM)	5
Sand	0.062-2 mm	20			
Gravel	2-64 mm	10	Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm	10			
Boulder	256-2048 mm	5	Marl	grey, shell fragments	
Bedrock	>2048 mm	45			

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: Left Fork Hell Creek		
SITE ID: LFHC-P-Temp	RIVER BASIN: Tug Fork	STREAM ORDER: 3	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 42' 49.08" N	LONGITUDE: 82° 13' 10.26" W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<u>Channel Widths:</u> 6.2, 7.3 <u>Slope:</u> 4% <u>Weather:</u> 65°, Sunny	
SAMPLING METHODOLOGY	Single Habitat, riffle sample	
SITE PHOTO/ SKETCH MAP		
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy



## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: LFHC-P-Temp	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input checked="" type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>13.24</u> C  Specific Conductance <u>43</u> μS/cm  Dissolved Oxygen <u>11.17</u> mg/L  pH <u>10.15</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>20</u> %   Run <u>60</u> %   Pool <u>20</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: Left Fork Hell Creek		
SITE ID: LFHC-P-Perm	RIVER BASIN: Tug Fork	STREAM ORDER: 3	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 43' 53.05"N	LONGITUDE: 82° 13' 10.02"W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 4.6, 3.2 <b>Slope:</b> 6% <b>Weather:</b> 65°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/SKETCH MAP</b>		
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: LFHC-P-Perm	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>14.85</u> C  Specific Conductance <u>19</u> μS/cm  Dissolved Oxygen <u>10.65</u> mg/L  pH <u>9.12</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>45</u> %   Run <u>35</u> %   Pool <u>20</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: UT9 Left Fork Hell Creek		
SITE ID: UT9 LFHC-I	RIVER BASIN: Tug Fork	STREAM ORDER: 2	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 42' 49.03" N	LONGITUDE: 82° 13' 10.59" W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 2.8, 3.7 <b>Slope:</b> 15% <b>Weather:</b> 65°, Sunny No Flow for macroinvertebrate sample	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample – NOT ENOUGH FLOW FOR BENTHIC MACROINVERTEBRATE COLLECTION	
<b>SITE PHOTO/ SKETCH MAP</b>	Photo from Buffalo Mountain Surface Mine Preliminary Jurisdictional Determination Report (Baker 2008) 	
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal *based on USGS 7.5' topographic quadrangles  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: UT9 LFHC-I	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input checked="" type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>12.66</u> C  Specific Conductance <u>38</u> μS/cm  Dissolved Oxygen <u>10.87</u> mg/L  pH <u>9.37</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>5</u> %   Run <u>90</u> %   Pool <u>5</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: UT10 Left Fork Hell Creek		
SITE ID: UT10 LFHC-I	RIVER BASIN: Tug Fork	STREAM ORDER: 2	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 42' 29.21"N	LONGITUDE: 82° 13' 7.99"W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<b>Channel Widths:</b> 2.8, 3.2 <b>Slope:</b> 7% <b>Weather:</b> 65°, Sunny	
SAMPLING METHODOLOGY	Single Habitat, riffle sample	
SITE PHOTO/ SKETCH MAP		
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: UT10 LFHC-I	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>12.55</u> C  Specific Conductance <u>42</u> μS/cm  Dissolved Oxygen <u>10.73</u> mg/L  pH <u>7.99</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>20</u> %   Run <u>60</u> %   Pool <u>20</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: UT11 Left Fork Hell Creek		
SITE ID: UT11 LFHC-P	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 42' 40.76"N	LONGITUDE: 82° 13' 22.77"W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 5.1, 4.6 <b>Slope:</b> 6% <b>Weather:</b> 65°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/ SKETCH MAP</b>	Photo from Buffalo Mountain Surface Mine Preliminary Jurisdictional Determination Report (Baker 2008) 	
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy



## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: UT11 LFHC-P	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>14.38</u> C  Specific Conductance <u>46</u> μS/cm  Dissolved Oxygen <u>10.48</u> mg/L  pH <u>10.07</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>20</u> %   Run <u>60</u> %   Pool <u>20</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/20/10	STREAM NAME: UT11 Left Fork Hell Creek		
SITE ID: UT11 LFHC-I	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 42' 40.38"N	LONGITUDE: 82° 13' 27.91"W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 2.5, 2.8 <b>Slope:</b> 8% <b>Weather:</b> 70°, Sunny	
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample	
<b>SITE PHOTO/SKETCH MAP</b>		
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-20-10	SITE ID: UT11 LFHC-I	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	<b>Temperature</b> <u>14.40</u> C  <b>Specific Conductance</b> <u>55</u> μS/cm  <b>Dissolved Oxygen</b> <u>10.67</u> mg/L  <b>pH</b> <u>8.64</u>  <b>Instrument Used</b> <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	<b>Reach Length</b> _____ ft  <b>Channel Widths</b> _____ ft  <b>Water Width</b> _____ ft  <b>Right Bank Depth</b> _____ ft <b>Water Depth</b> _____ ft  <b>Left Bank Depth</b> _____ ft <b>Water Depth</b> _____ ft  <b>Max Bank Depth (thalweg)</b> _____ ft <b>Water Depth (thalweg)</b> _____ ft  <b>Surface Velocity (thalweg)</b> _____ ft/sec  <b>Discharge</b> _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>15</u> %   Run <u>70</u> %   Pool <u>10</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: Unnamed Tributary of Pigeon Creek		
SITE ID: UTPC I_Temp	RIVER BASIN: Tug Fork	STREAM ORDER: 2	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 44' 11.45" N	LONGITUDE: 82° 12' 19.23" W	ELEVATION:	
INVESTIGATORS: AC, CF			
FORM COMPLETED BY: CF			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<b>Channel Widths:</b> 15.0 <b>Slope:</b> 20% <b>Weather:</b> 60°, Cloudy	
SAMPLING METHODOLOGY	Single Habitat, riffle sample	
SITE PHOTO/ SKETCH MAP		
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: UTPC I_Temp	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> <u>Umbrella Mag, C. Fern, Beech, Buckeye</u>  <b>Canopy Cover</b> <input type="checkbox"/> Open <input checked="" type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	<b>Temperature</b> <u>12.79</u> C  <b>Specific Conductance</b> <u>44</u> μS/cm  <b>Dissolved Oxygen</b> <u>10.28</u> mg/L  <b>pH</b> <u>6.66</u>  <b>Instrument Used</b> <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	<b>Reach Length</b> <u>300</u> ft  <b>Channel Widths</b> <u>15.0</u> ft  <b>Water Width</b> <u>8.5</u> ft  <b>Right Bank Depth</b> <u>1.0</u> ft <b>Water Depth</b> <u>0.3</u> ft  <b>Left Bank Depth</b> <u>1.1</u> ft <b>Water Depth</b> <u>0.2</u> ft  <b>Max Bank Depth (thalweg)</b> <u>2.0</u> ft <b>Water Depth (thalweg)</b> <u>0.4</u> ft  <b>Surface Velocity (thalweg)</b> _____ ft/sec  <b>Discharge</b> _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>80</u> %   Run _____ %   Pool <u>20</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	10
Sand	0.062-2 mm	5			
Gravel	2-64 mm	25	Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm	40			
Boulder	256-2048 mm	10	Marl	grey, shell fragments	
Bedrock	>2048 mm	20			

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: Unnamed Tributary of Pigeon Creek		
SITE ID: UTPC I_Upper	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE:	LONGITUDE:	ELEVATION:	
INVESTIGATORS: AC, CF			
FORM COMPLETED BY: AC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 14.0 <b>Slope:</b> 6% <b>Weather:</b> 60°, Cloudy		
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample		
<b>SITE PHOTO/SKETCH MAP</b>			
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>		<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater
	<b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____		<b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential		<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: UTPC I_Upper	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> <u>Beech, C. Fern, Umbrella Mag.</u>  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	<b>Temperature</b> <u>12.12</u> C  <b>Specific Conductance</b> <u>45</u> μS/cm  <b>Dissolved Oxygen</b> <u>10.45</u> mg/L  <b>pH</b> <u>6.59</u>  <b>Instrument Used</b> <u>YSI 556 MPS</u>  <b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
<b>CHANNEL FEATURES</b>	<b>Reach Length</b> <u>300</u> ft  <b>Channel Widths</b> <u>14</u> ft  <b>Water Width</b> <u>8</u> ft  <b>Right Bank Depth</b> <u>1.9</u> ft <b>Water Depth</b> <u>0.3</u> ft  <b>Left Bank Depth</b> <u>1.1</u> ft <b>Water Depth</b> <u>0.1</u> ft  <b>Max Bank Depth (thalweg)</b> <u>2.1</u> ft <b>Water Depth (thalweg)</b> <u>0.4</u> ft  <b>Surface Velocity (thalweg)</b> _____ ft/sec  <b>Discharge</b> _____ cfs  <b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>85</u> %   Run _____ %   Pool <u>15</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<b>SEDIMENT/ SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse  <b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	18
Sand	0.062-2 mm	5			
Gravel	2-64 mm	5	Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm	25			
Boulder	256-2048 mm	15	Marl	grey, shell fragments	
Bedrock	>2048 mm	50			

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: Unnamed Tributary of Pigeon Creek		
SITE ID: UTPC I_Perm	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 44' 12.62"N	LONGITUDE: 82° 12' 21.22"W	ELEVATION:	
INVESTIGATORS: AC, CF			
FORM COMPLETED BY: AC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

<b>WEATHER CONDITIONS/NOTES</b>	<b>Channel Widths:</b> 14.0 <b>Slope:</b> 6% <b>Weather:</b> 60°, Cloudy		
<b>SAMPLING METHODOLOGY</b>	Single Habitat, riffle sample		
<b>SITE PHOTO/ SKETCH MAP</b>			
<b>STREAM CHARACTERIZATION</b>	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>		<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater
	<b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____		<b>Drainage Area</b> _____
<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential		<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy



## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: UTPC I_Perm	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> <u>Beech, C. Fern, Umbrella Mag.</u>  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input checked="" type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	<b>Temperature</b> <u>12.12</u> C <b>Specific Conductance</b> <u>45</u> μS/cm <b>Dissolved Oxygen</b> <u>10.45</u> mg/L <b>pH</b> <u>6.59</u> <b>Instrument Used</b> <u>YSI 556 MPS</u>  <b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____	
<b>CHANNEL FEATURES</b>	<b>Reach Length</b> <u>300</u> ft <b>Channel Widths</b> <u>14</u> ft <b>Water Width</b> <u>8</u> ft <b>Right Bank Depth</b> <u>1.9</u> ft <b>Water Depth</b> <u>0.3</u> ft <b>Left Bank Depth</b> <u>1.1</u> ft <b>Water Depth</b> <u>0.1</u> ft <b>Max Bank Depth (thalweg)</b> <u>2.1</u> ft <b>Water Depth (thalweg)</b> <u>0.4</u> ft <b>Surface Velocity (thalweg)</b> _____ ft/sec <b>Discharge</b> _____ cfs  <b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>85</u> %   Run _____ %   Pool <u>15</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <b>Undercut Banks</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<b>SEDIMENT/ SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse  <b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	18
Sand	0.062-2 mm	5			
Gravel	2-64 mm	5	Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm	25			
Boulder	256-2048 mm	15	Marl	grey, shell fragments	
Bedrock	>2048 mm	50			

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: Pigeonroost Creek		
SITE ID: PRC-P	RIVER BASIN: Tug Fork	STREAM ORDER: 2	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 42' 55.14"N	LONGITUDE: 82° 12' 36.15"W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: RE, WC			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<u>Channel Widths:</u> 12.5, 14.1 <u>Slope:</u> 6% <u>Weather:</u> 65°, Sunny		
SAMPLING METHODOLOGY	Single Habitat, riffle sample		
SITE PHOTO/ SKETCH MAP			
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater	<b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources	
		<b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy	

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: PRC-P	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>13.7</u> C  Specific Conductance <u>38</u> μS/cm  Dissolved Oxygen <u>10.81</u> mg/L  pH <u>6.53</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>45</u> %   Run <u>35</u> %   Pool <u>20</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: Pigeonroost Creek		
SITE ID: PRC-I	RIVER BASIN: Tug Fork	STREAM ORDER: 2	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 42' 37.14"N	LONGITUDE: 82° 12' 35.53"W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: WC and RE			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<u>Channel Widths:</u> 5.8, 3.5 <u>Slope:</u> 9% <u>Weather:</u> 65°, Sunny	
SAMPLING METHODOLOGY	Single Habitat, riffle sample	
SITE PHOTO/ SKETCH MAP		
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: PRC-I	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____  <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>13.68</u> C  Specific Conductance <u>39</u> μS/cm  Dissolved Oxygen <u>13.68</u> mg/L  pH <u>8.81</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>45</u> %   Run <u>35</u> %   Pool <u>20</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: Unnamed 5 Tributary of Miller Creek		
SITE ID: UT5MC-P	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 44' 24.42"	LONGITUDE: 82 14' 27.51"	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: RE			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<u>Channel Widths:</u> 3.1, 4.7 <u>Slope:</u> 12% <u>Weather:</u> 60°, Cloudy	
SAMPLING METHODOLOGY	Single Habitat, riffle sample	
SITE PHOTO/ SKETCH MAP		
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy

## FIELD DATA SUMMARY SHEET (BACK)


DATE: 5-19-10	SITE ID: UT5MC-P	STREAM NAME:
---------------	------------------	--------------

<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>13.65</u> C  Specific Conductance <u>34</u> μS/cm  Dissolved Oxygen <u>10.36</u> mg/L  pH <u>6.29</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>65</u> %   Run <u>10</u> %   Pool <u>25</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## FIELD DATA SUMMARY SHEET (FRONT)

DATE: 5/19/10	STREAM NAME: Unnamed Tributary 5 Miller Creek		
SITE ID: UT5MC-I	RIVER BASIN: Tug Fork	STREAM ORDER: 1	
LOCATION:	STREAM CLASS:	STORET #:	
LATITUDE: 37° 44' 29.13"N	LONGITUDE: 82° 14' 19.42"W	ELEVATION:	
INVESTIGATORS: RE, WC			
FORM COMPLETED BY: RE			
REASON FOR SURVEY: Baseline survey for SWVM			
AGENCY/COMPANY: CONSOL			

WEATHER CONDITIONS/NOTES	<b>Channel Widths:</b> 2.2, 3.4 <b>Slope:</b> 20% <b>Weather:</b> 60°, Cloudy	
SAMPLING METHODOLOGY	Single Habitat, riffle sample	
SITE PHOTO/ SKETCH MAP		
STREAM CHARACTERIZATION	<b>Flow Regime*</b> <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Tidal <small>*based on USGS 7.5' topographic quadrangles</small>  <b>Stream Origin</b> <input type="checkbox"/> Glacial <input checked="" type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____	<b>Fishery Type</b> <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater  <b>Drainage Area</b> _____
WATERSHED FEATURES	<b>Predominant Surrounding Landuse</b> <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	<b>Local Watershed NPS Pollution</b> <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  <b>Local Watershed Erosion</b> <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy



## FIELD DATA SUMMARY SHEET (BACK)

DATE: 5-19-10	SITE ID: UT5MC-I	STREAM NAME:
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<b>RIPARIAN VEGETATION</b>	<b>Dominant Vegetation Type</b> <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous  <b>Dominant Species</b> _____ <b>Canopy Cover</b> <input type="checkbox"/> Open <input type="checkbox"/> Partly Open <input type="checkbox"/> Partly Shaded <input type="checkbox"/> Shaded	
<b>AQUATIC VEGETATION</b>	<b>Dominant Vegetation Type</b> <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae  <b>Dominant Species</b> _____  <b>Portion of the Reach with Aquatic Vegetation</b> <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>14.17</u> C  Specific Conductance <u>31</u> μS/cm  Dissolved Oxygen <u>10.2</u> mg/L  pH <u>6.89</u>  Instrument Used <u>YSI 556 MPS</u>	<b>Water Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____  <b>Water Surface Oils</b> <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____  <b>Turbidity</b> <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____
<b>CHANNEL FEATURES</b>	Reach Length _____ ft  Channel Widths _____ ft  Water Width _____ ft  Right Bank Depth _____ ft Water Depth _____ ft  Left Bank Depth _____ ft Water Depth _____ ft  Max Bank Depth (thalweg) _____ ft Water Depth (thalweg) _____ ft  Surface Velocity (thalweg) _____ ft/sec  Discharge _____ cfs	<b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle <u>65</u> %   Run <u>10</u> %   Pool <u>25</u> %  <b>Channelized</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Dam Present</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  <b>Large Woody Debris</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <b>Undercut Banks</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> Other _____  <b>Oils</b> <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse	<b>Deposits</b> <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____  <b>Undersides of stones black in color?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (may not add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Silt/Clay	<0.062 mm		Detritus	sticks, wood, coarse plant materials (CPOM)	
Sand	0.062-2 mm				
Gravel	2-64 mm		Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm				
Boulder	256-2048 mm		Marl	grey, shell fragments	
Bedrock	>2048 mm				

## HGM FIELD DATA SHEETS



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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** Ruth Trace Branch  
**Sampling Date:** 27-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      RTB 1

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.63
Biogeochemical Cycling	0.81
Habitat	0.83

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	98.80	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.80	0.75
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	2.50	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	4.22	0.53
$V_{TDBH}$	Average dbh of trees.	7.10	0.69
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.22	0.43
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	83.13	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.75402683</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.25362814</b>
Location: <b>Ruth Trace Branch</b>	Sampling Date: <b>27-July-11</b>
SAR Number: <b>RTB 1</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>Before Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 98.8 %

List the percent cover measurements at each point below:

100	100	94	100	100	100	94	100	100	100
-----	-----	----	-----	-----	-----	----	-----	-----	-----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.8

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

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

List the ratings at each point below:

1	2	1	3	4	3	3	4	4	3
2	1	3	3	3	4	4	4	5	4
3	3	1	2	1	1	3	3	4	2
2	3	2	3	4	2	2	1	1	2
3	3	3	4	4	5	4	3	4	1

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 2.50 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.22	0.31
0.44	0.44	0.63	0.89	0.89	1.26	1.26	1.26	1.26	1.26
1.26	1.77	1.77	2.50	2.50	2.50	2.50	2.50	2.50	2.50
3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	5.00	5.00
5.00	5.00	5.00	5.00	5.00	5.00	7.10	7.10	7.10	10.10

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	4.2
Number of downed woody stems: <span style="background-color: yellow;">19</span>			

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.1
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Left Side					Right Side				
9.2	5.5	15.8	4.9	8	5.5	5	5.6	8.6	4.1
5	8								

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.2
Left Side: <span style="background-color: yellow;"></span> Right Side: <span style="background-color: yellow;">1</span>			

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color: yellow;"></span> Right Side: <span style="background-color: yellow;"></span>			

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
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Group 1 = 1.0			Group 2 (-1.0)		
<input checked="" type="checkbox"/> <i>Acer rubrum</i>	<input type="checkbox"/> <i>Magnolia tripetala</i>	<input type="checkbox"/> <i>Ailanthus altissima</i>	<input type="checkbox"/> <i>Lonicera japonica</i>		
<input type="checkbox"/> <i>Acer saccharum</i>	<input type="checkbox"/> <i>Nyssa sylvatica</i>	<input type="checkbox"/> <i>Albizia julibrissin</i>	<input type="checkbox"/> <i>Lonicera tatarica</i>		
<input type="checkbox"/> <i>Aesculus flava</i>	<input type="checkbox"/> <i>Oxydendrum arboreum</i>	<input type="checkbox"/> <i>Alliaria petiolata</i>	<input type="checkbox"/> <i>Lotus corniculatus</i>		
<input type="checkbox"/> <i>Asimina triloba</i>	<input type="checkbox"/> <i>Prunus serotina</i>	<input type="checkbox"/> <i>Alternanthera philoxeroides</i>	<input type="checkbox"/> <i>Lythrum salicaria</i>		
<input type="checkbox"/> <i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/> <i>Quercus alba</i>	<input type="checkbox"/> <i>Aster tataricus</i>	<input type="checkbox"/> <i>Microstegium vimineum</i>		
<input type="checkbox"/> <i>Betula lenta</i>	<input type="checkbox"/> <i>Quercus coccinea</i>	<input type="checkbox"/> <i>Cerastium fontanum</i>	<input type="checkbox"/> <i>Paulownia tomentosa</i>		
<input type="checkbox"/> <i>Carya alba</i>	<input type="checkbox"/> <i>Quercus imbricaria</i>	<input type="checkbox"/> <i>Coronilla varia</i>	<input type="checkbox"/> <i>Polygonum cuspidatum</i>		
<input type="checkbox"/> <i>Carya glabra</i>	<input type="checkbox"/> <i>Quercus prinus</i>	<input type="checkbox"/> <i>Elaeagnus umbellata</i>	<input type="checkbox"/> <i>Pueraria montana</i>		
<i>Carya ovalis</i>	<i>Quercus rubra</i>	<i>Lespedeza bicolor</i>	<i>Rosa multiflora</i>		
<i>Carya ovata</i>	<i>Quercus velutina</i>	<i>Lespedeza cuneata</i>	<i>Sorghum halepense</i>		
<i>Cornus florida</i>	<i>Sassafras albidum</i>	<i>Ligustrum obtusifolium</i>	<i>Verbena brasiliensis</i>		
<i>Fagus grandifolia</i>	<i>Tilia americana</i>	<i>Ligustrum sinense</i>			
<i>Fraxinus americana</i>	<i>Tsuga canadensis</i>				
<i>Liriodendron tulipifera</i>	<i>Ulmus americana</i>				
<i>Magnolia acuminata</i>					
7	Species in Group 1	0	Species in Group 2		

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	83.13 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>65</td> <td>75</td> <td>90</td> <td>85</td> <td>90</td> <td>95</td> <td>80</td> <td>85</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				65	75	90	85	90	95	80	85									
Left Side				Right Side																							
65	75	90	85	90	95	80	85																				
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
▼																																			
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RTB 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	99 %	1.00	
V <sub>EMBED</sub>	2.8	0.75	
V <sub>SUBSTRATE</sub>	2.50 in	1.00	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	4.2	0.53	
V <sub>TDBH</sub>	7.1	0.69	
V <sub>SNAG</sub>	0.2	0.43	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	83.1 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT1 of UT17 of Ruth Trace Branch  
**Sampling Date:** 27-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      RTB U3

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.69
Biogeochemical Cycling	0.82
Habitat	0.86

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	97.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.80	0.75
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.00	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	6.00	0.75
$V_{TDBH}$	Average dbh of trees.	7.10	0.69
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.22	0.43
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	88.13	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.75225394</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.25466109</b>
Location: <b>UT1 of UT17 of Ruth Trace Branch</b>	Sampling Date: <b>27-July-11</b>
SAR Number: <b>RTB U3</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>Before Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 97.0 %

List the percent cover measurements at each point below:

100	100	94	100	94	94	100	94	100	94
100	100	100	88						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.8

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

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

List the ratings at each point below:

1	2	1	3	4	3	3	4	4	3
2	1	3	3	3	4	4	4	5	4
3	3	1	2	1	1	3	3	4	2
2	3	2	3	4	2	2	1	1	2
3	3	3	4	4	5	4	3	4	1

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.00 in

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

0.08	0.89	0.89	1.26	1.26	1.26	1.26	1.77	1.77	1.77
1.77	1.77	1.77	1.77	2.50	2.50	2.50	2.50	2.50	2.50
2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50	3.50	3.50
3.50	5.00	5.00	5.00	5.00	5.00	5.00	5.00	7.10	7.10
7.10	7.10	7.10	7.10	10.10	10.10	10.10	20.00	1.77	3.50

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	6.0
Number of downed woody stems: <span style="background-color:#ffff00; padding: 2px;">27</span>			

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.1
---	-------------------	--	-----

Left Side					Right Side				
9.2	5.5	15.8	4.9	8	5.5	5	5.6	8.6	4.1
5	8								

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.2
Left Side: <span style="background-color:#ffff00; padding: 2px;"></span> Right Side: <span style="background-color:#ffff00; padding: 2px;">1</span>			

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color:#ffff00; padding: 2px;"></span> Right Side: <span style="background-color:#ffff00; padding: 2px;"></span>			

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	--------------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	88.13 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>75</td> <td>90</td> <td>95</td> <td>90</td> <td>90</td> <td>100</td> <td>85</td> <td>80</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				75	90	95	90	90	100	85	80									
Left Side				Right Side																							
75	90	95	90	90	100	85	80																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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RTB U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	97 %	1.00	
V <sub>EMBED</sub>	2.8	0.75	
V <sub>SUBSTRATE</sub>	3.00 in	1.00	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	6.0	0.75	
V <sub>TDBH</sub>	7.1	0.69	
V <sub>SNAG</sub>	0.2	0.43	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	88.1 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT1 of UT17 of Ruth Trace Branch  
**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Shrub/Herb Strata

**SAR number:**      RTB U3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.68
Biogeochemical Cycling	0.50
Habitat	0.57

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	2.80	0.75
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.00	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	4.62	0.58
$V_{TDBH}$	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.	52.31	0.80
$V_{SRICH}$	Riparian vegetation species richness.	7.69	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.75225394</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.25466109</b>
Location: <b>UT1 of UT17 of Ruth Trace Branch</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>RTB U3</b>	Reach Length (ft): <b>65</b>
Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Shrub/Herb Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0									
---	--	--	--	--	--	--	--	--	--

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.8

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

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

List the ratings at each point below:

1	2	1	3	4	3	3	4	4	3
2	1	3	3	3	4	4	4	5	4
3	3	1	2	1	1	3	3	4	2
2	3	2	3	4	2	2	1	1	2
3	3	3	4	4	5	4	3	4	1

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.00 in

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

0.08	0.89	0.89	1.26	1.26	1.26	1.26	1.77	1.77	1.77
1.77	1.77	1.77	1.77	2.50	2.50	2.50	2.50	2.50	2.50
2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50	3.50	3.50
3.50	5.00	5.00	5.00	5.00	5.00	5.00	5.00	7.10	7.10
7.10	7.10	7.10	7.10	10.10	10.10	10.10	20.00	1.77	3.50

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **13 ft**                      Right Bank: **13 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">3</span>	4.6
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	------------	---	----------

Left Side					Right Side				

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">17</span> Right Side: <span style="background-color: yellow; padding: 2px;">17</span>	52.3
---	-----------	---	------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	7.69
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.66																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				▼				
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RTB U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	2.8	0.75	
V <sub>SUBSTRATE</sub>	3.00 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	4.6	0.58	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	52.3	0.80	
V <sub>SRICH</sub>	7.69	1.00	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT17 of Ruth Trace Branch

**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RTB U3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.68
Biogeochemical Cycling	0.69
Habitat	0.63

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	2.80	0.75
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.00	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	4.62	0.58
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	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.	7.69	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	65.00	0.79
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.75225394</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.25466109</b>
Location: <b>UT1 of UT17 of Ruth Trace Branch</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>RTB U3</b>	Reach Length (ft): <b>65</b>
Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.8

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

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

List the ratings at each point below:

1	2	1	3	4	3	3	4	4	3
2	1	3	3	3	4	4	4	5	4
3	3	1	2	1	1	3	3	4	2
2	3	2	3	4	2	2	1	1	2
3	3	3	4	4	5	4	3	4	1

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.00 in

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

0.08	0.89	0.89	1.26	1.26	1.26	1.26	1.77	1.77	1.77
1.77	1.77	1.77	1.77	2.50	2.50	2.50	2.50	2.50	2.50
2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50	3.50	3.50
3.50	5.00	5.00	5.00	5.00	5.00	5.00	5.00	7.10	7.10
7.10	7.10	7.10	7.10	10.10	10.10	10.10	20.00	1.77	3.50

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **13 ft**

Right Bank: **13 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">3</span>	4.6
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	------------	---	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.0
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8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <span style="background-color: yellow; padding: 2px;"> </span> Right Side: <span style="background-color: yellow; padding: 2px;"> </span>	Not Used
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9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	7.69
---	-------------	---	------

Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
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<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
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<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
	<i>Cornus florida</i>		<i>Sassafras albidum</i>		<i>Ligustrum obtusifolium</i>		<i>Verbena brasiliensis</i>
	<i>Fagus grandifolia</i>		<i>Tilia americana</i>		<i>Ligustrum sinense</i>		
	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
5 Species in Group 1				0 Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	65.00 %																								
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**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																				
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RTB U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	2.8	0.75	
V <sub>SUBSTRATE</sub>	3.00 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	4.6	0.58	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	7.69	1.00	
V <sub>DETRITUS</sub>	65.0 %	0.79	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT17 of Ruth Trace Branch

**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RTB U3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.74
Biogeochemical Cycling	0.79
Habitat	0.87

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.80	0.75
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.00	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	6.15	0.77
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	1.54	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	7.69	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.75225394</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.25466109</b>
Location: <b>UT1 of UT17 of Ruth Trace Branch</b>	Sampling Date: <b>Maturity</b>
SAR Number: <b>RTB U3</b> Reach Length (ft): <b>65</b>	Stream Type: <b>Intermittent Stream</b> ▼
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼	<b>After Project</b> ▼

### Sample Variables 1-4 in stream channel

1	$V_{CCANOPY}$	Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.)	95.0 %
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List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95
----	----	----	----	----	----	----	----	----	----

2	$V_{EMBED}$	Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5.	2.8
---	-------------	--	-----

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

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

List the ratings at each point below:

1	2	1	3	4	3	3	4	4	3
2	1	3	3	3	4	4	4	5	4
3	3	1	2	1	1	3	3	4	2
2	3	2	3	4	2	2	1	1	2
3	3	3	4	4	5	4	3	4	1

3	$V_{SUBSTRATE}$	Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in $V_{EMBED}$ .	3.00 in
---	-----------------	--	---------

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

0.08	0.89	0.89	1.26	1.26	1.26	1.26	1.77	1.77	1.77
1.77	1.77	1.77	1.77	2.50	2.50	2.50	2.50	2.50	2.50
2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50	3.50	3.50
3.50	5.00	5.00	5.00	5.00	5.00	5.00	5.00	7.10	7.10
7.10	7.10	7.10	7.10	10.10	10.10	10.10	20.00	1.77	3.50

4	$V_{BERO}$	Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%.	40 %
---	------------	--	------

Left Bank: **13 ft**

Right Bank: **13 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">4</span>	6.2
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">1</span>	1.5
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <span style="background-color: yellow; padding: 2px;"> </span> Right Side: <span style="background-color: yellow; padding: 2px;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	7.69
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>85</td><td>85</td><td>85</td><td>85</td> <td>85</td><td>85</td><td>85</td><td>85</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				85	85	85	85	85	85	85	85									
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85	85	85	85	85	85	85	85																				
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
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RTB U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	2.8	0.75	
V <sub>SUBSTRATE</sub>	3.00 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	6.2	0.77	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	1.5	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	7.69	1.00	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT15 of Ruth Trace Branch

**Sampling Date:** 27-July-11

Project Site      Before Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RTB U2

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.68
Biogeochemical Cycling	0.84
Habitat	0.74

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	93.64	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.90	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.44	0.22
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.68	0.71
$V_{TDBH}$	Average dbh of trees.	7.10	0.69
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.54	0.91
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.89	0.90
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	89.38	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.75399844</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.25181648</b>
Location: <b>UT15 of Ruth Trace Branch</b>	Sampling Date: <b>27-July-11</b>
SAR Number: <b>RTB U2</b>	Reach Length (ft): <b>370</b>
Stream Type: <b>Ephemeral Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>Before Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 93.6 %

List the percent cover measurements at each point below:

88	100	94	88	100	77	100	88	100	88
100	88	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	5	5	3	1	3	3	1	3	5
4	2	1	4	1	1	3	4	5	3
5	1	1	3	4	5	1	3	4	4
3	1	4	3	3	3	5	3	5	1
1	4	4	3	1	3	4	1	1	3

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 0.44 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.22	0.22	0.31	0.31	0.44	0.44	0.44	0.63	0.63	0.63
0.63	0.89	0.89	1.26	1.26	1.26	1.26	1.26	1.77	1.77
1.77	1.77	1.77	2.50	2.50	3.50	3.50	5.00	5.00	7.10

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

Left Bank: **370 ft**

Right Bank: **370 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <span style="background-color: yellow;">21</span>	5.7
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.1
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Left Side					Right Side				
9.2	5.5	15.8	4.9	8	5.5	5	5.6	8.6	4.1
5	8								

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <span style="background-color: yellow;"></span> Right Side: <span style="background-color: yellow;">2</span>	0.5
---	------------	---	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <span style="background-color: yellow;"></span> Right Side: <span style="background-color: yellow;"></span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.89
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	89.38 %																								
		<table border="1"> <thead> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> </thead> <tbody> <tr> <td>85</td> <td>90</td> <td>85</td> <td>95</td> <td>90</td> <td>100</td> <td>80</td> <td>90</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Left Side				Right Side				85	90	85	95	90	100	80	90									
Left Side				Right Side																							
85	90	85	95	90	100	80	90																				
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <thead> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
▼																																			
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▼																																			
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RTB U2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	94 %	1.00	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	0.44 in	0.22	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	5.7	0.71	
V <sub>TDBH</sub>	7.1	0.69	
V <sub>SNAG</sub>	0.5	0.91	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.89	0.90	
V <sub>DETRITUS</sub>	89.4 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** Left Fork of Conley Branch

**Sampling Date:** 25-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      LFCB 1

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.84
Habitat	0.89

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	97.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.70	0.71
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	8.22	1.00
$V_{TDBH}$	Average dbh of trees.	12.66	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.22	0.43
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	77.50	0.95
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74815991</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23250709</b>
Location: <b>Left Fork of Conley Branch</b>	Sampling Date: <b>25-July-11</b>
SAR Number: <b>LFCB 1</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 97.0 %

List the percent cover measurements at each point below:

88	94	100	100	100	94	100	100	94	100
94	100	94	100						

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.7

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

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

List the ratings at each point below:

1	1	1	1	1	1	1	1	1	2
2	2	2	2	2	2	2	3	3	3
3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3
3	4	4	4	4	4	4	4	5	5

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.22
0.22	0.44	0.44	0.44	0.44	0.63	0.63	0.63	0.63	0.89
0.89	1.26	1.77	1.77	1.77	1.77	1.77	1.77	2.50	2.50
3.50	3.50	5.00	7.10	7.10	7.10	7.10	7.10	10.10	10.10
10.10	14.30	14.30	20.00	40.00	80.00	99.00	99.00	99.00	99.00

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

Left Bank: **450 ft** Right Bank: **450 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">37</span>	8.2
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6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	12.7
---	-------------------	--	------

Left Side					Right Side				
13.5	5.3	6	28.5	11.6	17.5	15.1	9.5	13.8	5.7
16.8	6.5				10	17.5			

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">1</span> Right Side: <span style="background-color: yellow;">0</span>	0.2
---	-------------------	--	-----

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	------------------	---	----------

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	--------------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	77.50 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>65</td> <td>90</td> <td>95</td> <td>80</td> <td>50</td> <td>95</td> <td>75</td> <td>70</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				65	90	95	80	50	95	75	70									
Left Side				Right Side																							
65	90	95	80	50	95	75	70																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
▼																																			
▼																																			
▼																																			
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LFCB 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	97 %	1.00	
V <sub>EMBED</sub>	2.7	0.71	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	8.2	1.00	
V <sub>TDBH</sub>	12.7	1.00	
V <sub>SNAG</sub>	0.2	0.43	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	77.5 %	0.95	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** Left Fork of Conley Branch  
**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Shrub/Herb Strata

**SAR number:**      LFCB 1

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.65
Biogeochemical Cycling	0.49
Habitat	0.54

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	2.70	0.71
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	4.00	0.50
$V_{TDBH}$	Average dbh of trees.	Not Used	Not Used
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.00	0.10
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	52.00	0.80
$V_{SRICH}$	Riparian vegetation species richness.	1.11	0.53
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74815991</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23250709</b>
Location: <b>Left Fork of Conley Branch</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>LFCB 1</b> Reach Length (ft): <b>450</b> Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Shrub/Herb Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼	<b>After Project</b> ▼

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0									
---	--	--	--	--	--	--	--	--	--

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.7

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

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

List the ratings at each point below:

1	1	1	1	1	1	1	1	1	2
2	2	2	2	2	2	2	3	3	3
3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3
3	4	4	4	4	4	4	4	5	5

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.22
0.22	0.44	0.44	0.44	0.44	0.63	0.63	0.63	0.63	0.89
0.89	1.26	1.77	1.77	1.77	1.77	1.77	1.77	2.50	2.50
3.50	3.50	5.00	7.10	7.10	7.10	7.10	7.10	10.10	10.10
10.10	14.30	14.30	20.00	40.00	80.00	99.00	99.00	99.00	99.00

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **90 ft**      Right Bank: **90 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">18</span>	4.0
---	------------------	--	-----

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	-------------------	--	----------

Left Side					Right Side				

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	0.0
---	-------------------	--	-----

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;">117</span> Right Side: <span style="background-color: yellow;">117</span>	52.0
---	------------------	---	------

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.11
---	--------------------	---	------

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

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

10	$V_{\text{DETRITUS}}$	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	$V_{\text{HERB}}$	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
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Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	$V_{\text{WLUSE}}$	Weighted Average of Runoff Score for watershed:	0.66																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>45</td> </tr> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	45	Forest and native range (>75% ground cover) ▼	1	50	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				▼				
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LFCB 1			Notes:
Variable	Value	VSI	
$V_{\text{CCANOPY}}$	Not Used, <20%	Not Used	
$V_{\text{EMBED}}$	2.7	0.71	
$V_{\text{SUBSTRATE}}$	1.77 in	0.89	
$V_{\text{BERO}}$	40 %	0.86	
$V_{\text{LWD}}$	4.0	0.50	
$V_{\text{TDBH}}$	Not Used	Not Used	
$V_{\text{SNAG}}$	0.0	0.10	
$V_{\text{SSD}}$	52.0	0.80	
$V_{\text{SRICH}}$	1.11	0.53	
$V_{\text{DETRITUS}}$	50.0 %	0.61	
$V_{\text{HERB}}$	50 %	0.67	
$V_{\text{WLUSE}}$	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** Left Fork of Conley Branch

**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      LFCB 1

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.69
Biogeochemical Cycling	0.67
Habitat	0.61

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	2.70	0.71
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.11	0.64
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.00	0.10
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.11	0.53
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	65.00	0.79
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74815991</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23250709</b>
Location: <b>Left Fork of Conley Branch</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>LFCB 1</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.7

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

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

List the ratings at each point below:

1	1	1	1	1	1	1	1	1	2
2	2	2	2	2	2	2	3	3	3
3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3
3	4	4	4	4	4	4	4	5	5

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.22
0.22	0.44	0.44	0.44	0.44	0.63	0.63	0.63	0.63	0.89
0.89	1.26	1.77	1.77	1.77	1.77	1.77	1.77	2.50	2.50
3.50	3.50	5.00	7.10	7.10	7.10	7.10	7.10	10.10	10.10
10.10	14.30	14.30	20.00	40.00	80.00	99.00	99.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **90 ft**

Right Bank: **90 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	5.1
Number of downed woody stems: <span style="background-color:#ffff00; padding: 2px;">23</span>			

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	-------------------	--	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.0
Left Side: <span style="background-color:#ffff00; padding: 2px;">0</span> Right Side: <span style="background-color:#ffff00; padding: 2px;">0</span>			

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color:#ffff00; padding: 2px;"> </span> Right Side: <span style="background-color:#ffff00; padding: 2px;"> </span>			

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.11
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Group 1 = 1.0			Group 2 (-1.0)		
<input checked="" type="checkbox"/> <i>Acer rubrum</i>	<input type="checkbox"/> <i>Magnolia tripetala</i>	<input type="checkbox"/> <i>Ailanthus altissima</i>	<input type="checkbox"/> <i>Lonicera japonica</i>		
<input type="checkbox"/> <i>Acer saccharum</i>	<input type="checkbox"/> <i>Nyssa sylvatica</i>	<input type="checkbox"/> <i>Albizia julibrissin</i>	<input type="checkbox"/> <i>Lonicera tatarica</i>		
<input type="checkbox"/> <i>Aesculus flava</i>	<input type="checkbox"/> <i>Oxydendrum arboreum</i>	<input type="checkbox"/> <i>Alliaria petiolata</i>	<input type="checkbox"/> <i>Lotus corniculatus</i>		
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<input type="checkbox"/> <i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/> <i>Quercus alba</i>	<input type="checkbox"/> <i>Aster tataricus</i>	<input type="checkbox"/> <i>Microstegium vimineum</i>		
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<input type="checkbox"/> <i>Carya glabra</i>	<input type="checkbox"/> <i>Quercus prinus</i>	<input type="checkbox"/> <i>Elaeagnus umbellata</i>	<input type="checkbox"/> <i>Pueraria montana</i>		
<i>Carya ovalis</i>	<i>Quercus rubra</i>	<i>Lespedeza bicolor</i>	<i>Rosa multiflora</i>		
<i>Carya ovata</i>	<i>Quercus velutina</i>	<i>Lespedeza cuneata</i>	<i>Sorghum halepense</i>		
<i>Cornus florida</i>	<i>Sassafras albidum</i>	<i>Ligustrum obtusifolium</i>	<i>Verbena brasiliensis</i>		
<i>Fagus grandifolia</i>	<i>Tilia americana</i>	<i>Ligustrum sinense</i>			
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<i>Liriodendron tulipifera</i>	<i>Ulmus americana</i>				
<i>Magnolia acuminata</i>					
5	Species in Group 1	0	Species in Group 2		

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	65.00 %																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																				
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LFCB 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	2.7	0.71	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.1	0.64	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.11	0.53	
V <sub>DETRITUS</sub>	65.0 %	0.79	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** Left Fork of Conley Branch

**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:** LFCB 1

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.84
Habitat	0.85

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.14	0.87
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.56	0.69
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.22	0.43
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.11	0.53
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74815991</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23250709</b>
Location: <b>Left Fork of Conley Branch</b>	Sampling Date: <b>Maturity</b>
SAR Number: <b>LFCB 1</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>After Project</b>
	▼

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.0 %

List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.1

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

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

List the ratings at each point below:

1	1	1	1	1	1	1	1	1	2
2	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3
3	3	4	4	4	4	4	4	4	4
4	5	5	5	5	5	5	5	5	5

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.22
0.22	0.44	0.44	0.44	0.44	0.63	0.63	0.63	0.63	0.89
0.89	1.26	1.77	1.77	1.77	1.77	1.77	1.77	2.50	2.50
3.50	3.50	5.00	7.10	7.10	7.10	7.10	7.10	10.10	10.10
10.10	14.30	14.30	20.00	40.00	80.00	99.00	99.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **90 ft**

Right Bank: **90 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">25</span>	5.6
---	-----------	--	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">1</span> Right Side: <span style="background-color: yellow;">0</span>	0.2
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.11
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>85</td><td>85</td><td>85</td><td>85</td> <td>85</td><td>85</td><td>85</td><td>85</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				85	85	85	85	85	85	85	85									
Left Side				Right Side																							
85	85	85	85	85	85	85	85																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
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LFCB 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	3.1	0.87	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.6	0.69	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	0.2	0.43	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.11	0.53	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** Left Fork of Conley Branch

**Sampling Date:** 25-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      LFCB 2

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.86
Habitat	0.86

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.71	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.80	0.75
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.08	0.54
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	8.00	1.00
$V_{TDBH}$	Average dbh of trees.	12.66	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	88.75	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74397153</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23043021</b>
Location: <b>Left Fork of Conley Branch</b>	Sampling Date: <b>25-July-11</b>
SAR Number: <b>LFCB 2</b> Reach Length (ft): <b>450</b> Stream Type: Intermittent Stream ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼	<b>Before Project</b> ▼

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.7 %

List the percent cover measurements at each point below:

88	82	94	94	100	94	100	94	100	100
100	100	94	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.8

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

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

List the ratings at each point below:

3	1	4	4	3	3	4	3	4	3
3	3	2	3	1	1	1	3	3	3
2	2	3	3	1	3	2	3	5	3
5	1	1	3	3	4	2	3	4	3
1	4	4	3	3	4	3	2	2	3

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.08 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.16	0.16	0.22
0.31	0.31	0.31	0.31	0.31	0.31	0.44	0.44	0.44	0.63
0.63	0.63	0.89	0.89	0.89	1.26	1.77	1.77	1.77	1.77
1.77	2.50	2.50	2.50	2.50	2.50	2.50	3.50	3.50	3.50
5.00	7.10	10.10	14.30	20.00	40.00	80.00	99.00	99.00	99.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5  $V_{LWD}$  Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. 8.0

Number of downed woody stems: 36

6  $V_{TDBH}$  Average dbh of trees (measure only if  $V_{CCANOPY}$  tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. 12.7

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

Left Side					Right Side				
13.5	5.3	6	28.5	11.6	17.5	15.1	9.5	13.8	5.7
16.8	6.5				10	17.5			

7  $V_{SNAG}$  Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. 0.4

Left Side: 1 Right Side: 1

8  $V_{SSD}$  Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Not Used

Left Side:   Right Side:  

9  $V_{SRICH}$  Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data. 1.56

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

7 Species in Group 1

0 Species in Group 2

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	88.75 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>100</td> <td>95</td> <td>95</td> <td>90</td> <td>80</td> <td>75</td> <td>90</td> <td>85</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				100	95	95	90	80	75	90	85									
Left Side				Right Side																							
100	95	95	90	80	75	90	85																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do <i>not</i> include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
Forest and native range (>75% ground cover) ▼	1	100	100																																				
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LFCB 2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	96 %	1.00	
V <sub>EMBED</sub>	2.8	0.75	
V <sub>SUBSTRATE</sub>	1.08 in	0.54	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	8.0	1.00	
V <sub>TDBH</sub>	12.7	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	88.8 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** Right Fork of Conley Branch

**Sampling Date:** 25-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFCB 1

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.78
Habitat	0.89

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	92.29	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.42	0.61
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.50	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	8.22	1.00
$V_{TDBH}$	Average dbh of trees.	10.21	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.89	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	82.50	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74744384</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.24975234</b>
Location: <b>Right Fork of Conley Branch</b>	Sampling Date: <b>25-July-11</b>
SAR Number: <b>RFCB 1</b> Reach Length (ft): <b>450</b> Stream Type: Intermittent Stream ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼      Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 92.3 %

List the percent cover measurements at each point below:

76	88	82	76	100	88	100	94	100	100
100	100	100	88						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.4

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

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

List the ratings at each point below:

1	1	2	1	1	1	3	2	1	2
2	2	4	4	3	3	1	1	2	4
2	3	3	5	5	5	1	1	1	4
2	2	2	3	3	3	3	4	1	3
3	3	2	2	2	4	2	2	3	1

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.50 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.22	0.31
0.44	0.63	0.89	0.89	0.89	0.89	1.26	1.77	1.77	2.50
2.50	2.50	2.50	3.50	3.50	3.50	3.50	3.50	5.00	5.00
5.00	5.00	7.10	7.10	7.10	7.10	10.10	10.10	10.10	10.10
10.10	10.10	14.30	14.30	20.00	40.00	40.00	80.00	99.00	99.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">37</span>	8.2
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.2
---	------------	---	------

Left Side					Right Side				
13	8	8	9		12	8	9	6	7
13.3	5	17.1	14.8	5.4	13.2	5.4	7.7	21.7	13
7.5									

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">1</span> Right Side: <span style="background-color: yellow;">3</span>	0.9
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;"></span> Right Side: <span style="background-color: yellow;"></span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
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Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
<input type="checkbox"/>	<i>Acer saccharum</i>	<input type="checkbox"/>	<i>Nyssa sylvatica</i>	<input type="checkbox"/>	<i>Albizia julibrissin</i>	<input type="checkbox"/>	<i>Lonicera tatarica</i>
<input type="checkbox"/>	<i>Aesculus flava</i>	<input type="checkbox"/>	<i>Oxydendrum arboreum</i>	<input type="checkbox"/>	<i>Alliaria petiolata</i>	<input type="checkbox"/>	<i>Lotus corniculatus</i>
<input type="checkbox"/>	<i>Asimina triloba</i>	<input type="checkbox"/>	<i>Prunus serotina</i>	<input type="checkbox"/>	<i>Alternanthera philoxeroides</i>	<input type="checkbox"/>	<i>Lythrum salicaria</i>
<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
<input type="checkbox"/>	<i>Betula lenta</i>	<input type="checkbox"/>	<i>Quercus coccinea</i>	<input type="checkbox"/>	<i>Cerastium fontanum</i>	<input type="checkbox"/>	<i>Paulownia tomentosa</i>
<input type="checkbox"/>	<i>Carya alba</i>	<input type="checkbox"/>	<i>Quercus imbricaria</i>	<input type="checkbox"/>	<i>Coronilla varia</i>	<input type="checkbox"/>	<i>Polygonum cuspidatum</i>
<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
	<i>Cornus florida</i>		<i>Sassafras albidum</i>		<i>Ligustrum obtusifolium</i>		<i>Verbena brasiliensis</i>
	<i>Fagus grandifolia</i>		<i>Tilia americana</i>		<i>Ligustrum sinense</i>		
	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
7 Species in Group 1				0 Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	82.50 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>60</td> <td>80</td> <td>90</td> <td>100</td> <td>75</td> <td>75</td> <td>85</td> <td>95</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				60	80	90	100	75	75	85	95									
Left Side				Right Side																							
60	80	90	100	75	75	85	95																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
▼																																			
▼																																			
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RFCB 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	92 %	1.00	
V <sub>EMBED</sub>	2.4	0.61	
V <sub>SUBSTRATE</sub>	3.50 in	1.00	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	8.2	1.00	
V <sub>TDBH</sub>	10.2	1.00	
V <sub>SNAG</sub>	0.9	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	82.5 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of Right Fork of Conley Branch

**Sampling Date:** 25-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFCB U2

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.78
Habitat	0.88

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	94.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.42	0.61
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.26	0.63
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	10.67	1.00
$V_{TDBH}$	Average dbh of trees.	10.21	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	80.63	0.98
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74430704</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23979706</b>
Location: <b>UT1 of Right Fork of Conley Branch</b>	Sampling Date: <b>25-July-11</b>
SAR Number: <b>RFCB U2</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>Before Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 94.0 %

List the percent cover measurements at each point below:

94	100	94	100	100	88	88	100	100	100
82	88	94	88						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.4

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

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

List the ratings at each point below:

1	1	2	1	1	1	3	2	1	2
2	2	4	4	3	3	1	1	2	4
2	3	3	5	5	5	1	1	1	4
2	2	2	3	3	3	3	4	1	3
3	3	2	2	2	4	2	2	3	1

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.26 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.16
0.22	0.22	0.31	0.31	0.44	0.63	0.63	0.63	0.89	0.89
1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.77	1.77	1.77
1.77	1.77	1.77	1.77	2.50	2.50	2.50	3.50	3.50	3.50
5.00	5.00	7.10	10.10	14.30	14.30	20.00	20.00	40.00	80.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	10.7
Number of downed woody stems: <span style="background-color: yellow;">48</span>			

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.2
---	------------	---	------

Left Side					Right Side				
13	8	8	9		12	8	9	6	7
13.3	5	17.1	14.8	5.4	13.2	5.4	7.7	21.7	13
7.5									

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.4
Left Side: <span style="background-color: yellow;">1</span> Right Side: <span style="background-color: yellow;">1</span>			

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color: yellow;"></span> Right Side: <span style="background-color: yellow;"></span>			

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	-------------	---	------

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

7 Species in Group 1	0 Species in Group 2
----------------------	----------------------

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	80.63 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>60</td> <td>80</td> <td>95</td> <td>90</td> <td>70</td> <td>75</td> <td>85</td> <td>90</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				60	80	95	90	70	75	85	90									
Left Side				Right Side																							
60	80	95	90	70	75	85	90																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
▼																																			
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RFCB U2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	94 %	1.00	
V <sub>EMBED</sub>	2.4	0.61	
V <sub>SUBSTRATE</sub>	1.26 in	0.63	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	10.7	1.00	
V <sub>TDBH</sub>	10.2	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	80.6 %	0.98	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT2 of Right Fork of Conley Branch

**Sampling Date:** 25-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFCB U3

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.81
Habitat	0.82

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	99.14	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.56	0.66
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.89	0.45
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	8.33	1.00
$V_{TDBH}$	Average dbh of trees.	10.21	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.	3.89	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	88.75	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74754153</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23909957</b>
Location: <b>UT2 of Right Fork of Conley Branch</b>	Sampling Date: <b>25-July-11</b>
SAR Number: <b>RFCB U3</b>	Reach Length (ft): <b>180</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>Before Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 99.1 %

List the percent cover measurements at each point below:

100	100	100	100	100	100	100	94	100	100
100	100	100	94						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.6

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

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

List the ratings at each point below:

1	1	1	1	1	1	1	1	2	2
2	2	4	4	3	3	2	2	2	4
3	3	3	2	3	2	2	2	2	4
2	2	2	3	3	3	3	4	2	3
3	3	2	3	3	4	2	5	5	5

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 0.89 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.22
0.22	0.22	0.22	0.31	0.31	0.31	0.44	0.63	0.63	0.63
0.63	0.89	0.89	0.89	0.89	0.89	1.26	1.26	1.26	1.26
1.26	1.77	1.77	1.77	1.77	2.50	2.50	2.50	3.50	3.50
3.50	3.50	3.50	5.00	80.00	7.10	10.10	14.30	20.00	40.00

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

Left Bank: **180 ft**

Right Bank: **180 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <span style="background-color: yellow;">15</span>	8.3
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.2
---	------------	---	------

Left Side					Right Side				
13	8	8	9		12	8	9	6	7
13.3	5	17.1	14.8	5.4	13.2	5.4	7.7	21.7	13

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	3.89
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	88.75 %																								
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11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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RFCB U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	99 %	1.00	
V <sub>EMBED</sub>	2.6	0.66	
V <sub>SUBSTRATE</sub>	0.89 in	0.45	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	8.3	1.00	
V <sub>TDBH</sub>	10.2	1.00	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	3.89	1.00	
V <sub>DETRITUS</sub>	88.8 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT2 of Right Fork of Conley Branch  
**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Shrub/Herb Strata

**SAR number:**      RFCB U3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.58
Biogeochemical Cycling	0.47
Habitat	0.43

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	2.56	0.66
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.89	0.45
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	3.89	0.49
$V_{TDBH}$	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.	52.22	0.80
$V_{SRICH}$	Riparian vegetation species richness.	2.78	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74754153</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23909957</b>
Location: <b>UT2 of Right Fork of Conley Branch</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>RFCB U3</b>	Reach Length (ft): <b>180</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Shrub/Herb Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>After Project</b>

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0									
---	--	--	--	--	--	--	--	--	--

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.6

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

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

List the ratings at each point below:

1	1	1	1	1	1	1	1	2	2
2	2	4	4	3	3	2	2	2	4
3	3	3	2	3	2	2	2	2	4
2	2	2	3	3	3	3	4	2	3
3	3	2	3	3	4	2	5	5	5

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 0.89 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.22
0.22	0.22	0.22	0.31	0.31	0.31	0.44	0.63	0.63	0.63
0.63	0.89	0.89	0.89	0.89	0.89	1.26	1.26	1.26	1.26
1.26	1.77	1.77	1.77	1.77	2.50	2.50	2.50	3.50	3.50
3.50	3.50	3.50	5.00	80.00	7.10	10.10	14.30	20.00	40.00

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **36 ft**                      Right Bank: **36 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">7</span>	3.9
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	------------	---	----------

Left Side					Right Side				

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;">47</span> Right Side: <span style="background-color: yellow;">47</span>	52.2
---	-----------	---	------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.78
---	-------------	---	------

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

5 Species in Group 1	0 Species in Group 2
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**Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.**

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.66																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				▼				
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RFCB U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	2.6	0.66	
V <sub>SUBSTRATE</sub>	0.89 in	0.45	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	3.9	0.49	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	52.2	0.80	
V <sub>SRICH</sub>	2.78	1.00	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT2 of Right Fork of Conley Branch

**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFCB U3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.62
Biogeochemical Cycling	0.65
Habitat	0.55

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	2.56	0.66
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.89	0.45
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.00	0.63
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	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.	2.78	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	65.00	0.79
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74754153</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23909957</b>
Location: <b>UT2 of Right Fork of Conley Branch</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>RFCB U3</b>	Reach Length (ft): <b>180</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>After Project</b>
	▼

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.6

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

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

List the ratings at each point below:

1	1	1	1	1	1	1	1	2	2
2	2	4	4	3	3	2	2	2	4
3	3	3	2	3	2	2	2	2	4
2	2	2	3	3	3	3	4	2	3
3	3	2	3	3	4	2	5	5	5

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 0.89 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.22
0.22	0.22	0.22	0.31	0.31	0.31	0.44	0.63	0.63	0.63
0.63	0.89	0.89	0.89	0.89	0.89	1.26	1.26	1.26	1.26
1.26	1.77	1.77	1.77	1.77	2.50	2.50	2.50	3.50	3.50
3.50	3.50	3.50	5.00	80.00	7.10	10.10	14.30	20.00	40.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **36 ft**

Right Bank: **36 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">9</span>	5.0
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	------------	---	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.0
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8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;"> </span> Right Side: <span style="background-color: yellow; padding: 2px;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.78
---	-------------	---	------

Group 1 = 1.0			Group 2 (-1.0)		
<input checked="" type="checkbox"/> <i>Acer rubrum</i>	<input type="checkbox"/> <i>Magnolia tripetala</i>	<input type="checkbox"/> <i>Ailanthus altissima</i>	<input type="checkbox"/> <i>Lonicera japonica</i>		
<input type="checkbox"/> <i>Acer saccharum</i>	<input type="checkbox"/> <i>Nyssa sylvatica</i>	<input type="checkbox"/> <i>Albizia julibrissin</i>	<input type="checkbox"/> <i>Lonicera tatarica</i>		
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<i>Liriodendron tulipifera</i>	<i>Ulmus americana</i>				
<i>Magnolia acuminata</i>					
5	Species in Group 1	0	Species in Group 2		

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	65.00 %																								
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**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																				
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Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95																																				
Forest and native range (50% to 75% ground cover) ▼	0.7	5	100																																				
▼																																							
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RFCB U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	2.6	0.66	
V <sub>SUBSTRATE</sub>	0.89 in	0.45	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.0	0.63	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	2.78	1.00	
V <sub>DETRITUS</sub>	65.0 %	0.79	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT2 of Right Fork of Conley Branch  
**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      RFCB U3

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

Function	Functional Capacity Index
Hydrology	0.71
Biogeochemical Cycling	0.75
Habitat	0.78

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.56	0.66
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.89	0.45
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	26.11	0.92
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.00	0.10
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	2.78	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74754153</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23909957</b>
Location: <b>UT2 of Right Fork of Conley Branch</b>	Sampling Date: <b>Maturity</b>
SAR Number: <b>RFCB U3</b>	Reach Length (ft): <b>180</b>
Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.0 %

List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95
----	----	----	----	----	----	----	----	----	----

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.6

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

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

List the ratings at each point below:

1	1	1	1	1	1	1	1	2	2
2	2	4	4	3	3	2	2	2	4
3	3	3	2	3	2	2	2	2	4
2	2	2	3	3	3	3	4	2	3
3	3	2	3	3	4	2	5	5	5

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 0.89 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.22
0.22	0.22	0.22	0.31	0.31	0.31	0.44	0.63	0.63	0.63
0.63	0.89	0.89	0.89	0.89	0.89	1.26	1.26	1.26	1.26
1.26	1.77	1.77	1.77	1.77	2.50	2.50	2.50	3.50	3.50
3.50	3.50	3.50	5.00	80.00	7.10	10.10	14.30	20.00	40.00

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **36 ft**      Right Bank: **36 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">47</span>	26.1
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
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9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.78
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																																
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>85</td><td>85</td><td>85</td><td>85</td> <td>85</td><td>85</td><td>85</td><td>85</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				85	85	85	85	85	85	85	85																	
Left Side				Right Side																															
85	85	85	85	85	85	85	85																												
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																																
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side																												
Left Side				Right Side																															

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
Forest and native range (>75% ground cover) ▼	1	55	55																																				
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RFCB U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	2.6	0.66	
V <sub>SUBSTRATE</sub>	0.89 in	0.45	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	26.1	0.92	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	2.78	1.00	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT4 of Right Fork of Conley Branch

**Sampling Date:** 25-July-11

Project Site      Before Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFCB U4

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.61
Biogeochemical Cycling	0.84
Habitat	0.83

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	97.86	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.26	0.63
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	3.60	0.45
$V_{TDBH}$	Average dbh of trees.	10.57	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.40	0.70
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	2.80	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	83.75	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74819908</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.2399322</b>
Location: <b>UT4 of Right Fork of Conley Branch</b>	Sampling Date: <b>25-July-11</b>
SAR Number: <b>RFCB U4</b>	Reach Length (ft): <b>250</b>
Stream Type: <b>Ephemeral Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>Before Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 97.9 %

List the percent cover measurements at each point below:

100	100	100	88	100	94	100	88	100	100
100	100	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.26 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.08	0.08	0.08	0.08	0.16	0.16	0.16	0.22	0.31	0.44
0.44	0.44	0.63	0.89	1.26	1.26	1.26	1.77	1.77	1.77
2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50	3.50	3.50
3.50	5.00	7.10	7.10	10.10	14.30	20.00	40.00	80.00	20.00

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

Left Bank: **250 ft**

Right Bank: **250 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">9</span>	3.6
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.6
---	------------	---	------

Left Side					Right Side				
5	4	15.3	16.5	5.1	11	7	10	18	14
					13	16	12	7	9
					9.5	11.5	7.8	9.2	

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <span style="background-color: yellow; padding: 2px;">1</span> Right Side: <span style="background-color: yellow; padding: 2px;"></span>	0.4
---	------------	---	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <span style="background-color: yellow; padding: 2px;"></span> Right Side: <span style="background-color: yellow; padding: 2px;"></span>	Not Used
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9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.80
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Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
<input type="checkbox"/>	<i>Acer saccharum</i>	<input type="checkbox"/>	<i>Nyssa sylvatica</i>	<input type="checkbox"/>	<i>Albizia julibrissin</i>	<input type="checkbox"/>	<i>Lonicera tatarica</i>
<input type="checkbox"/>	<i>Aesculus flava</i>	<input type="checkbox"/>	<i>Oxydendrum arboreum</i>	<input type="checkbox"/>	<i>Alliaria petiolata</i>	<input type="checkbox"/>	<i>Lotus corniculatus</i>
<input type="checkbox"/>	<i>Asimina triloba</i>	<input type="checkbox"/>	<i>Prunus serotina</i>	<input type="checkbox"/>	<i>Alternanthera philoxeroides</i>	<input type="checkbox"/>	<i>Lythrum salicaria</i>
<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
<input type="checkbox"/>	<i>Betula lenta</i>	<input type="checkbox"/>	<i>Quercus coccinea</i>	<input type="checkbox"/>	<i>Cerastium fontanum</i>	<input type="checkbox"/>	<i>Paulownia tomentosa</i>
<input type="checkbox"/>	<i>Carya alba</i>	<input type="checkbox"/>	<i>Quercus imbricaria</i>	<input type="checkbox"/>	<i>Coronilla varia</i>	<input type="checkbox"/>	<i>Polygonum cuspidatum</i>
<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
	<i>Cornus florida</i>		<i>Sassafras albidum</i>		<i>Ligustrum obtusifolium</i>		<i>Verbena brasiliensis</i>
	<i>Fagus grandifolia</i>		<i>Tilia americana</i>		<i>Ligustrum sinense</i>		
	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
7 Species in Group 1				0 Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	83.75 %																								
		<table border="1"> <thead> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> </thead> <tbody> <tr> <td>75</td> <td>100</td> <td>55</td> <td>100</td> <td>100</td> <td>80</td> <td>65</td> <td>95</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Left Side				Right Side				75	100	55	100	100	80	65	95									
Left Side				Right Side																							
75	100	55	100	100	80	65	95																				
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <thead> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Left Side				Right Side																				
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**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
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RFCB U4			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	98 %	1.00	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	1.26 in	0.63	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	3.6	0.45	
V <sub>TDBH</sub>	10.6	1.00	
V <sub>SNAG</sub>	0.4	0.70	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	2.80	1.00	
V <sub>DETRITUS</sub>	83.8 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** Right Fork of Hell Creek

**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFHC 1

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.97
Habitat	0.92

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	97.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.52	0.76
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	11.56	1.00
$V_{TDBH}$	Average dbh of trees.	9.30	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	90.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.72101409</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23323568</b>
Location: <b>Right Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>RFHC 1</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 97.0 %

List the percent cover measurements at each point below:

94	94	100	100	100	100	100	100	100	94
100	88	100	88						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.52 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16
0.16	0.22	0.22	0.31	0.44	0.44	0.63	0.63	0.89	1.26
1.26	1.26	1.26	1.26	1.26	1.77	1.77	1.77	1.77	1.77
2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	3.50	3.50
3.50	3.50	3.50	5.00	7.10	10.10	14.30	20.00	99.00	99.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	11.6
Number of downed woody stems: <span style="background-color:#ffff00; padding: 2px;">52</span>			

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
---	-------------------	--	-----

Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.4
Left Side: <span style="background-color:#ffff00; padding: 2px;">2</span> Right Side: <span style="background-color:#ffff00; padding: 2px;">0</span>			

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color:#ffff00; padding: 2px;"> </span> Right Side: <span style="background-color:#ffff00; padding: 2px;"> </span>			

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	--------------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	90.00 %																								
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Left Side				Right Side																							
70	90	95	95	90	95	90	95																				
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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RFHC 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	97 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.52 in	0.76	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	11.6	1.00	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	90.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** Right Fork of Hell Creek

**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFHC 2

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.88
Habitat	0.92

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	98.71	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.00	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	13.33	1.00
$V_{TDBH}$	Average dbh of trees.	10.57	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	91.88	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.7198827</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23298092</b>
Location: <b>Right Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>RFHC 2</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Ephemeral Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>Before Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 98.7 %

List the percent cover measurements at each point below:

94	100	100	94	100	94	100	100	100	100
100	100	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.00 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.22
0.22	0.31	0.44	0.44	0.44	0.63	0.89	0.89	0.89	0.89
1.26	1.77	1.77	1.77	2.50	3.50	3.50	3.50	3.50	3.50
3.50	3.50	5.00	5.00	5.00	5.00	7.10	7.10	7.10	10.10
14.30	14.30	14.30	14.30	20.00	40.00	40.00	80.00	99.00	99.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">60</span>	13.3
---	-----------	--	------

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.6
---	------------	---	------

Left Side					Right Side				
5	4	15.3	16.5	5.1	11	7	10	18	14
					13	16	12	7	9
					9.5	11.5	7.8	9.2	

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">1</span> Right Side: <span style="background-color: yellow; padding: 2px;">1</span>	0.4
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;"></span> Right Side: <span style="background-color: yellow; padding: 2px;"></span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	91.88 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>90</td> <td>95</td> <td>90</td> <td>95</td> <td>95</td> <td>90</td> <td>95</td> <td>85</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				90	95	90	95	95	90	95	85									
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11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
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RFHC 2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	99 %	1.00	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	3.00 in	1.00	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	13.3	1.00	
V <sub>TDBH</sub>	10.6	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	91.9 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of Right Fork of Hell Creek

**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFHC U3

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.97
Habitat	0.89

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	91.86	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.26	0.63
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	13.78	1.00
$V_{TDBH}$	Average dbh of trees.	9.30	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.32	0.58
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	2.24	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	89.38	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73732508</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23909957</b>
Location: <b>UT1 of Right Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>RFHC U3</b>	Reach Length (ft): <b>312</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 91.9 %

List the percent cover measurements at each point below:

94	94	94	94	94	88	88	94	88	94
94	94	82	94						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.26 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.31	0.44
0.44	0.44	0.44	0.63	0.63	0.63	0.63	0.89	0.89	0.89
1.26	1.26	1.26	1.26	1.26	1.77	1.77	1.77	1.77	1.77
1.77	2.50	2.50	2.50	2.50	2.50	2.50	3.50	3.50	3.50
3.50	3.50	5.00	5.00	5.00	7.10	1.26	14.30	14.30	14.30

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

Left Bank: **312 ft**

Right Bank: **312 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">43</span>	13.8
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
---	------------	---	-----

Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">1</span> Right Side: <span style="background-color: yellow;">0</span>	0.3
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.24
---	-------------	---	------

Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
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	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
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	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
7 Species in Group 1				0 Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	89.38 %																								
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11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
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RFHC U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	92 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.26 in	0.63	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	13.8	1.00	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	0.3	0.58	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	2.24	1.00	
V <sub>DETRITUS</sub>	89.4 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of Right Fork of Hell Creek

**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFHC U4

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.88
Habitat	0.72

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	96.57	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.08	0.04
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	12.40	1.00
$V_{TDBH}$	Average dbh of trees.	10.57	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.80	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	2.80	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	90.63	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>-82.2399322</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>37.73780905</b>
Location: <b>UT1 of Right Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>RFHC U4</b>	Reach Length (ft): <b>250</b>
Stream Type: <b>Ephemeral Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>Before Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 96.6 %

List the percent cover measurements at each point below:

94	94	100	94	94	94	100	100	100	94
94	100	100	94						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 0.08 in

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

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
0.08	0.08	0.08	0.08	0.08	0.16	0.16	0.22	0.22	0.22
0.22	3.50	3.50	5.00	7.10	10.10	14.30	20.00	20.00	40.00

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

Left Bank: **250 ft**

Right Bank: **250 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">31</span>	12.4
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.6
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Left Side					Right Side				
5	4	15.3	16.5	5.1	11	7	10	18	14
					13	16	12	7	9
					9.5	11.5	7.8	9.2	

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">2</span>	0.8
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8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;"> </span> Right Side: <span style="background-color: yellow; padding: 2px;"> </span>	Not Used
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9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.80
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Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
<input type="checkbox"/>	<i>Acer saccharum</i>	<input type="checkbox"/>	<i>Nyssa sylvatica</i>	<input type="checkbox"/>	<i>Albizia julibrissin</i>	<input type="checkbox"/>	<i>Lonicera tatarica</i>
<input type="checkbox"/>	<i>Aesculus flava</i>	<input type="checkbox"/>	<i>Oxydendrum arboreum</i>	<input type="checkbox"/>	<i>Alliaria petiolata</i>	<input type="checkbox"/>	<i>Lotus corniculatus</i>
<input type="checkbox"/>	<i>Asimina triloba</i>	<input type="checkbox"/>	<i>Prunus serotina</i>	<input type="checkbox"/>	<i>Alternanthera philoxeroides</i>	<input type="checkbox"/>	<i>Lythrum salicaria</i>
<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
<input type="checkbox"/>	<i>Betula lenta</i>	<input type="checkbox"/>	<i>Quercus coccinea</i>	<input type="checkbox"/>	<i>Cerastium fontanum</i>	<input type="checkbox"/>	<i>Paulownia tomentosa</i>
<input type="checkbox"/>	<i>Carya alba</i>	<input type="checkbox"/>	<i>Quercus imbricaria</i>	<input type="checkbox"/>	<i>Coronilla varia</i>	<input type="checkbox"/>	<i>Polygonum cuspidatum</i>
<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
	<i>Cornus florida</i>		<i>Sassafras albidum</i>		<i>Ligustrum obtusifolium</i>		<i>Verbena brasiliensis</i>
	<i>Fagus grandifolia</i>		<i>Tilia americana</i>		<i>Ligustrum sinense</i>		
	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
7 Species in Group 1				0 Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	90.63 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>90</td> <td>95</td> <td>90</td> <td>90</td> <td>95</td> <td>90</td> <td>85</td> <td>90</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				90	95	90	90	95	90	85	90									
Left Side				Right Side																							
90	95	90	90	95	90	85	90																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
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RFHC U4			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	97 %	1.00	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	0.08 in	0.04	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	12.4	1.00	
V <sub>TDBH</sub>	10.6	1.00	
V <sub>SNAG</sub>	0.8	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	2.80	1.00	
V <sub>DETRITUS</sub>	90.6 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT4 of Right Fork of Hell Creek

**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFHC U5

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.97
Habitat	0.95

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	88.43	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	13.78	1.00
$V_{TDBH}$	Average dbh of trees.	9.30	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	87.50	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73004829</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23149662</b>
Location: <b>UT4 of Right Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>RFHC U5</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 88.4 %

List the percent cover measurements at each point below:

82	88	82	82	94	88	100	88	88	88
88	88	94	88						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.31	0.44
0.44	0.63	0.63	0.63	0.89	0.89	0.89	0.89	0.89	1.26
1.26	1.26	1.26	1.77	1.77	1.77	1.77	1.77	1.77	1.77
2.50	2.50	2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50
3.50	5.00	5.00	5.00	5.00	7.10	7.10	7.10	14.30	20.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	13.8
Number of downed woody stems: <span style="background-color: yellow;">62</span>			

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
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Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.4
Left Side: <span style="background-color: yellow;">1</span> Right Side: <span style="background-color: yellow;">1</span>			

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>			

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
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Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/> <i>Acer rubrum</i>	<input type="checkbox"/> <i>Magnolia tripetala</i>	<input type="checkbox"/> <i>Ailanthus altissima</i>	<input type="checkbox"/> <i>Lonicera japonica</i>				
<input type="checkbox"/> <i>Acer saccharum</i>	<input type="checkbox"/> <i>Nyssa sylvatica</i>	<input type="checkbox"/> <i>Albizia julibrissin</i>	<input type="checkbox"/> <i>Lonicera tatarica</i>				
<input type="checkbox"/> <i>Aesculus flava</i>	<input type="checkbox"/> <i>Oxydendrum arboreum</i>	<input type="checkbox"/> <i>Alliaria petiolata</i>	<input type="checkbox"/> <i>Lotus corniculatus</i>				
<input type="checkbox"/> <i>Asimina triloba</i>	<input type="checkbox"/> <i>Prunus serotina</i>	<input type="checkbox"/> <i>Alternanthera philoxeroides</i>	<input type="checkbox"/> <i>Lythrum salicaria</i>				
<input type="checkbox"/> <i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/> <i>Quercus alba</i>	<input type="checkbox"/> <i>Aster tataricus</i>	<input type="checkbox"/> <i>Microstegium vimineum</i>				
<input type="checkbox"/> <i>Betula lenta</i>	<input type="checkbox"/> <i>Quercus coccinea</i>	<input type="checkbox"/> <i>Cerastium fontanum</i>	<input type="checkbox"/> <i>Paulownia tomentosa</i>				
<input type="checkbox"/> <i>Carya alba</i>	<input type="checkbox"/> <i>Quercus imbricaria</i>	<input type="checkbox"/> <i>Coronilla varia</i>	<input type="checkbox"/> <i>Polygonum cuspidatum</i>				
<input type="checkbox"/> <i>Carya glabra</i>	<input type="checkbox"/> <i>Quercus prinus</i>	<input type="checkbox"/> <i>Elaeagnus umbellata</i>	<input type="checkbox"/> <i>Pueraria montana</i>				
<i>Carya ovalis</i>	<i>Quercus rubra</i>	<i>Lespedeza bicolor</i>	<i>Rosa multiflora</i>				
<i>Carya ovata</i>	<i>Quercus velutina</i>	<i>Lespedeza cuneata</i>	<i>Sorghum halepense</i>				
<i>Cornus florida</i>	<i>Sassafras albidum</i>	<i>Ligustrum obtusifolium</i>	<i>Verbena brasiliensis</i>				
<i>Fagus grandifolia</i>	<i>Tilia americana</i>	<i>Ligustrum sinense</i>					
<i>Fraxinus americana</i>	<i>Tsuga canadensis</i>						
<i>Liriodendron tulipifera</i>	<i>Ulmus americana</i>						
<i>Magnolia acuminata</i>							
7	Species in Group 1	0	Species in Group 2				

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	87.50 %																								
		<table border="1"> <thead> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>95</td> <td>90</td> <td>65</td> <td>95</td> <td>90</td> <td>90</td> <td>95</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Left Side				Right Side				80	95	90	65	95	90	90	95									
Left Side				Right Side																							
80	95	90	65	95	90	90	95																				
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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RFHC U5			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	88 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	13.8	1.00	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	87.5 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT4 of Right Fork of Hell Creek

**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Shrub/Herb Strata

**SAR number:**      RFHC U5

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.69
Biogeochemical Cycling	0.56
Habitat	0.60

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	4.00	0.50
$V_{TDBH}$	Average dbh of trees.	Not Used	Not Used
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.00	0.10
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	52.00	0.80
$V_{SRICH}$	Riparian vegetation species richness.	1.11	0.53
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73004829</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23149662</b>
Location: <b>UT4 of Right Fork of Hell Creek</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>RFHC U5</b> Reach Length (ft): <b>450</b> Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Shrub/Herb Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼	<b>After Project</b> ▼

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0									
---	--	--	--	--	--	--	--	--	--

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.31	0.44
0.44	0.63	0.63	0.63	0.89	0.89	0.89	0.89	0.89	1.26
1.26	1.26	1.26	1.77	1.77	1.77	1.77	1.77	1.77	1.77
2.50	2.50	2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50
3.50	5.00	5.00	5.00	5.00	7.10	7.10	7.10	14.30	20.00

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **90 ft**      Right Bank: **90 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">18</span>	4.0
---	-----------	--	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	------------	---	----------

Left Side					Right Side				

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;">117</span> Right Side: <span style="background-color: yellow;">117</span>	52.0
---	-----------	---	------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.11
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
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Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
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Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.66																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
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RFHC U5			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	4.0	0.50	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	52.0	0.80	
V <sub>SRICH</sub>	1.11	0.53	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT4 of Right Fork of Hell Creek

**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFHC U5

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.73
Biogeochemical Cycling	0.78
Habitat	0.65

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.11	0.64
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.00	0.10
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.11	0.53
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	65.00	0.79
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73004829</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23149662</b>
Location: <b>UT4 of Right Fork of Hell Creek</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>RFHC U5</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>After Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.31	0.44
0.44	0.63	0.63	0.63	0.89	0.89	0.89	0.89	0.89	1.26
1.26	1.26	1.26	1.77	1.77	1.77	1.77	1.77	1.77	1.77
2.50	2.50	2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50
3.50	5.00	5.00	5.00	5.00	7.10	7.10	7.10	14.30	20.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **90 ft**

Right Bank: **90 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	5.1
Number of downed woody stems: <span style="background-color:yellow;">23</span>			

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	-------------------	--	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.0
Left Side: <span style="background-color:yellow;">0</span> Right Side: <span style="background-color:yellow;">0</span>			

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color:yellow;"> </span> Right Side: <span style="background-color:yellow;"> </span>			

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.11
---	--------------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	65.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>65</td> <td>65</td> <td>65</td> <td>65</td> <td>65</td> <td>65</td> <td>65</td> <td>65</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				65	65	65	65	65	65	65	65									
Left Side				Right Side																							
65	65	65	65	65	65	65	65																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (50% to 75% ground cover) ▼</td> <td>0.7</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (50% to 75% ground cover) ▼	0.7	5	100	▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
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RFHC U5			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.1	0.64	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.11	0.53	
V <sub>DETRITUS</sub>	65.0 %	0.79	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT4 of Right Fork of Hell Creek

**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFHC U5

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.77
Biogeochemical Cycling	0.88
Habitat	0.87

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	6.00	0.75
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.11	0.53
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73004829</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23149662</b>
Location: <b>UT4 of Right Fork of Hell Creek</b>	Sampling Date: <b>Maturity</b>
SAR Number: <b>RFHC U5</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.0 %

List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.31	0.44
0.44	0.63	0.63	0.63	0.89	0.89	0.89	0.89	0.89	1.26
1.26	1.26	1.26	1.77	1.77	1.77	1.77	1.77	1.77	1.77
2.50	2.50	2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50
3.50	5.00	5.00	5.00	5.00	7.10	7.10	7.10	14.30	20.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **90 ft**

Right Bank: **90 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <span style="background-color: yellow;">27</span>	6.0
---	-----------	--	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <span style="background-color: yellow;">1</span> Right Side: <span style="background-color: yellow;">1</span>	0.4
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.11
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																								
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85	85	85	85	85	85	85	85																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
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RFHC U5			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	6.0	0.75	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.11	0.53	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT10 of Right Fork of Hell Creek

**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      RFHC U6

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.74
Biogeochemical Cycling	1.00
Habitat	0.81

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	93.57	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.62	1.00
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.89	0.45
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	7.76	0.97
$V_{TDBH}$	Average dbh of trees.	9.30	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.	2.09	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	91.88	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.72221982</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23234733</b>
Location: <b>UT10 of Right Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>RFHC U6</b>	Reach Length (ft): <b>335</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>Before Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 93.6 %

List the percent cover measurements at each point below:

88	94	88	88	94	88	100	88	100	94
100	94	94	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.6

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	3	4	3
4	4	4	4	3	4	3	4	4	3
5	4	4	4	4	4	4	4	4	3
5	4	3	3	5	4	4	3	4	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 0.89 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.22	0.22
0.31	0.31	0.31	0.31	0.31	0.31	0.44	0.44	0.44	0.44
0.44	0.63	0.63	0.89	0.89	0.89	0.89	1.26	1.26	1.77
1.77	1.77	1.77	3.50	3.50	3.50	3.50	3.50	5.00	7.10
7.10	7.10	7.10	7.10	10.10	10.10	14.30	20.00	20.00	40.00

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

Left Bank: **335 ft**

Right Bank: **335 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">26</span>	7.8
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6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
---	-------------------	--	-----

Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	0.0
---	-------------------	--	-----

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	------------------	---	----------

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.09
---	--------------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	91.88 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>85</td> <td>95</td> <td>90</td> <td>95</td> <td>90</td> <td>90</td> <td>100</td> <td>90</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				85	95	90	95	90	90	100	90									
Left Side				Right Side																							
85	95	90	95	90	90	100	90																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
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RFHC U6			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	94 %	1.00	
V <sub>EMBED</sub>	3.6	1.00	
V <sub>SUBSTRATE</sub>	0.89 in	0.45	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	7.8	0.97	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	2.09	1.00	
V <sub>DETRITUS</sub>	91.9 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** Left Fork of Hell Creek  
**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      LFHC 1

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.97
Habitat	0.96

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	97.43	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.00	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	10.00	1.00
$V_{TDBH}$	Average dbh of trees.	9.30	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	81.25	0.99
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.70975377</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.22291066</b>
Location: <b>Left Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>LFHC 1</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 97.4 %

List the percent cover measurements at each point below:

100	100	94	100	88	94	100	100	100	88
100	100	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.00 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.16	0.22
0.31	0.31	0.44	0.44	0.63	0.89	0.89	0.89	0.89	0.89
0.89	1.26	1.77	2.50	2.50	3.50	3.50	3.50	3.50	5.00
5.00	5.00	5.00	5.00	5.00	7.10	7.10	7.10	7.10	10.10
10.10	14.30	14.30	14.30	14.30	20.00	40.00	80.00	80.00	80.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	10.0
Number of downed woody stems: <span style="background-color:#ffff00; padding: 2px;">45</span>			

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
---	------------	---	-----

Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.4
Left Side: <span style="background-color:#ffff00; padding: 2px;">2</span> Right Side: <span style="background-color:#ffff00; padding: 2px;">0</span>			

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color:#ffff00; padding: 2px;"> </span> Right Side: <span style="background-color:#ffff00; padding: 2px;"> </span>			

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
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Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
<input type="checkbox"/>	<i>Acer saccharum</i>	<input type="checkbox"/>	<i>Nyssa sylvatica</i>	<input type="checkbox"/>	<i>Albizia julibrissin</i>	<input type="checkbox"/>	<i>Lonicera tatarica</i>
<input type="checkbox"/>	<i>Aesculus flava</i>	<input type="checkbox"/>	<i>Oxydendrum arboreum</i>	<input type="checkbox"/>	<i>Alliaria petiolata</i>	<input type="checkbox"/>	<i>Lotus corniculatus</i>
<input type="checkbox"/>	<i>Asimina triloba</i>	<input type="checkbox"/>	<i>Prunus serotina</i>	<input type="checkbox"/>	<i>Alternanthera philoxeroides</i>	<input type="checkbox"/>	<i>Lythrum salicaria</i>
<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
<input type="checkbox"/>	<i>Betula lenta</i>	<input type="checkbox"/>	<i>Quercus coccinea</i>	<input type="checkbox"/>	<i>Cerastium fontanum</i>	<input type="checkbox"/>	<i>Paulownia tomentosa</i>
<input type="checkbox"/>	<i>Carya alba</i>	<input type="checkbox"/>	<i>Quercus imbricaria</i>	<input type="checkbox"/>	<i>Coronilla varia</i>	<input type="checkbox"/>	<i>Polygonum cuspidatum</i>
<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
	<i>Cornus florida</i>		<i>Sassafras albidum</i>		<i>Ligustrum obtusifolium</i>		<i>Verbena brasiliensis</i>
	<i>Fagus grandifolia</i>		<i>Tilia americana</i>		<i>Ligustrum sinense</i>		
	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
7    Species in Group 1				0    Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	81.25 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>60</td> <td>75</td> <td>85</td> <td>90</td> <td>90</td> <td>90</td> <td>95</td> <td>65</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				60	75	85	90	90	90	95	65									
Left Side				Right Side																							
60	75	85	90	90	90	95	65																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
▼																																			
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LFHC 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	97 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	3.00 in	1.00	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	10.0	1.00	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	81.3 %	0.99	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of Left Fork of Hell Creek

**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:** LFHC U2

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.71
Biogeochemical Cycling	0.95
Habitat	0.95

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	100.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	2.14	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	6.67	0.83
$V_{TDBH}$	Average dbh of trees.	9.30	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.67	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	79.38	0.97
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.71713564</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.22746361</b>
Location: <b>UT1 of Left Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>LFHC U2</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 100.0 %

List the percent cover measurements at each point below:

100	100	100	100	100	100	100	100	100	100
100	100	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 2.14 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.22	0.22
0.22	0.31	0.44	0.63	0.89	1.26	1.26	1.26	1.26	1.26
1.26	1.77	1.77	1.77	1.77	2.50	2.50	2.50	3.50	3.50
3.50	3.50	3.50	3.50	3.50	3.50	5.00	5.00	5.00	5.00
7.10	10.10	10.10	14.30	14.30	14.30	14.30	20.00	40.00	80.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	6.7
Number of downed woody stems: <span style="background-color:#ffff00; padding: 2px;">30</span>			

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
---	-------------------	--	-----

Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.7
Left Side: <span style="background-color:#ffff00; padding: 2px;">2</span> Right Side: <span style="background-color:#ffff00; padding: 2px;">1</span>			

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color:#ffff00; padding: 2px;"> </span> Right Side: <span style="background-color:#ffff00; padding: 2px;"> </span>			

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	--------------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	79.38 %																								
		<table border="1"> <thead> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> </thead> <tbody> <tr> <td>50</td> <td>70</td> <td>75</td> <td>90</td> <td>90</td> <td>85</td> <td>90</td> <td>85</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Left Side				Right Side				50	70	75	90	90	85	90	85									
Left Side				Right Side																							
50	70	75	90	90	85	90	85																				
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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LFHC U2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	100 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	2.14 in	1.00	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	6.7	0.83	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	0.7	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	79.4 %	0.97	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT2 of UT1 of Left Fork of Hell Creek

**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      LFHC U3

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.63
Biogeochemical Cycling	0.93
Habitat	0.87

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	100.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.52	0.76
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	4.22	0.53
$V_{TDBH}$	Average dbh of trees.	9.30	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.67	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	86.25	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.7208742</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.22667281</b>
Location: <b>UT2 of UT1 of Left Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>LFHC U3</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 100.0 %

List the percent cover measurements at each point below:

100	100	100	100	100	100	100	100	100	100
100	100	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.52 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16
0.16	0.22	0.31	0.44	0.44	0.44	0.44	0.44	0.63	0.63
0.63	0.63	0.89	0.89	1.26	1.77	2.50	2.50	2.50	2.50
3.50	3.50	3.50	5.00	5.00	5.00	5.00	5.00	5.00	5.00
5.00	7.10	7.10	7.10	7.10	7.10	7.10	10.10	10.10	14.30

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	4.2
Number of downed woody stems: <span style="background-color: yellow;">19</span>			

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
---	-------------------	--	-----

Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.7
Left Side: <span style="background-color: yellow;">2</span> Right Side: <span style="background-color: yellow;">1</span>			

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>			

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	--------------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	86.25 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>75</td> <td>95</td> <td>90</td> <td>70</td> <td>85</td> <td>95</td> <td>95</td> <td>85</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				75	95	90	70	85	95	95	85									
Left Side				Right Side																							
75	95	90	70	85	95	95	85																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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LFHC U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	100 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.52 in	0.76	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	4.2	0.53	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	0.7	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	86.3 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT10 of Left Fork of Hell Creek

**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:** LFHC U4

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.97
Habitat	0.94

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	99.14	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	10.00	1.00
$V_{TDBH}$	Average dbh of trees.	9.30	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.22	0.43
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	89.38	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.71077365</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21820726</b>
Location: <b>UT1 of UT10 of Left Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>LFHC U4</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>Before Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 99.1 %

List the percent cover measurements at each point below:

100	100	100	100	100	100	100	94	100	94
100	100	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.22
0.22	0.22	0.22	0.31	0.31	0.44	0.44	0.63	0.63	0.63
0.89	0.89	1.26	1.77	1.77	1.77	2.50	2.50	3.50	3.50
3.50	3.50	3.50	3.50	5.00	7.10	7.10	10.10	14.30	14.30
14.30	14.30	14.30	14.30	20.00	40.00	40.00	99.00	99.00	99.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	10.0
Number of downed woody stems: <span style="background-color: yellow;">45</span>			

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
---	------------	---	-----

Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.2
Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">1</span>			

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>			

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	89.38 %																								
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11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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LFHC U4			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	99 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	10.0	1.00	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	0.2	0.43	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	89.4 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT10 of Left Fork of Hell Creek

**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Shrub/Herb Strata

**SAR number:**      LFHC U4

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.70
Biogeochemical Cycling	0.56
Habitat	0.62

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	4.35	0.54
$V_{TDBH}$	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.	52.17	0.80
$V_{SRICH}$	Riparian vegetation species richness.	4.35	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.71077365</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21820726</b>
Location: <b>UT1 of UT10 of Left Fork of Hell Creek</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>LFHC U4</b> Reach Length (ft): <b>115</b> Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Shrub/Herb Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼	<b>After Project</b> ▼

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0									
---	--	--	--	--	--	--	--	--	--

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.22
0.22	0.22	0.22	0.31	0.31	0.44	0.44	0.63	0.63	0.63
0.89	0.89	1.26	1.77	1.77	1.77	2.50	2.50	3.50	3.50
3.50	3.50	3.50	3.50	5.00	7.10	7.10	10.10	14.30	14.30
14.30	14.30	14.30	14.30	20.00	40.00	40.00	99.00	99.00	99.00

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **23 ft**      Right Bank: **23 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">5</span>	4.3
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	------------	---	----------

Left Side					Right Side				

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">30</span> Right Side: <span style="background-color: yellow; padding: 2px;">30</span>	52.2
---	-----------	---	------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	4.35
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.66																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				▼				
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LFHC U4			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	4.3	0.54	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	52.2	0.80	
V <sub>SRICH</sub>	4.35	1.00	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT10 of Left Fork of Hell Creek

**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      LFHC U4

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.73
Biogeochemical Cycling	0.78
Habitat	0.67

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.22	0.65
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	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.	4.35	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	65.00	0.79
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.71077365</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21820726</b>
Location: <b>UT1 of UT10 of Left Fork of Hell Creek</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>LFHC U4</b>	Reach Length (ft): <b>115</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>After Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.22
0.22	0.22	0.22	0.31	0.31	0.44	0.44	0.63	0.63	0.63
0.89	0.89	1.26	1.77	1.77	1.77	2.50	2.50	3.50	3.50
3.50	3.50	3.50	3.50	5.00	7.10	7.10	10.10	14.30	14.30
14.30	14.30	14.30	14.30	20.00	40.00	40.00	99.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **23 ft**

Right Bank: **23 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <span style="background-color: yellow;">6</span>	5.2
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	------------	---	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	0.0
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8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	4.35
---	-------------	---	------

Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
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<input type="checkbox"/>	<i>Aesculus flava</i>	<input type="checkbox"/>	<i>Oxydendrum arboreum</i>	<input type="checkbox"/>	<i>Alliaria petiolata</i>	<input type="checkbox"/>	<i>Lotus corniculatus</i>
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<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
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<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
<input type="checkbox"/>	<i>Carya ovalis</i>	<input type="checkbox"/>	<i>Quercus rubra</i>	<input type="checkbox"/>	<i>Lespedeza bicolor</i>	<input type="checkbox"/>	<i>Rosa multiflora</i>
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<input type="checkbox"/>	<i>Fraxinus americana</i>	<input type="checkbox"/>	<i>Tsuga canadensis</i>				
<input type="checkbox"/>	<i>Liriodendron tulipifera</i>	<input type="checkbox"/>	<i>Ulmus americana</i>				
<input type="checkbox"/>	<i>Magnolia acuminata</i>						
5 Species in Group 1				0 Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	65.00 %																								
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65	65	65	65	65	65	65	65																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (50% to 75% ground cover) ▼</td> <td>0.7</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (50% to 75% ground cover) ▼	0.7	5	100	▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
Forest and native range (>75% ground cover) ▼	1	50	50																																				
Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95																																				
Forest and native range (50% to 75% ground cover) ▼	0.7	5	100																																				
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LFHC U4			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.2	0.65	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	4.35	1.00	
V <sub>DETRITUS</sub>	65.0 %	0.79	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT10 of Left Fork of Hell Creek

**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:** LFHC U4

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.77
Biogeochemical Cycling	0.88
Habitat	0.91

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	6.09	0.76
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.87	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	4.35	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.71077365</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21820726</b>
Location: <b>UT1 of UT10 of Left Fork of Hell Creek</b>	Sampling Date: <b>Maturity</b>
SAR Number: <b>LFHC U4</b>	Reach Length (ft): <b>115</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>After Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.0 %

List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.22
0.22	0.22	0.22	0.31	0.31	0.44	0.44	0.63	0.63	0.63
0.89	0.89	1.26	1.77	1.77	1.77	2.50	2.50	3.50	3.50
3.50	3.50	3.50	3.50	5.00	7.10	7.10	10.10	14.30	14.30
14.30	14.30	14.30	14.30	20.00	40.00	40.00	99.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **23 ft**

Right Bank: **23 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <span style="background-color: yellow;">7</span>	6.1
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">1</span>	0.9
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	4.35
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																																
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>85</td><td>85</td><td>85</td><td>85</td> <td>85</td><td>85</td><td>85</td><td>85</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				85	85	85	85	85	85	85	85																	
Left Side				Right Side																															
85	85	85	85	85	85	85	85																												
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																																
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side																												
Left Side				Right Side																															

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
Forest and native range (>75% ground cover) ▼	1	55	55																																				
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LFHC U4			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	6.1	0.76	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	0.9	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	4.35	1.00	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT1 of UT10 of Left Fork of Hell Creek

**Sampling Date:** 26-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      LFHC U5

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.97
Habitat	0.96

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	100.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	8.01	1.00
$V_{TDBH}$	Average dbh of trees.	9.30	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	1.19	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.78	0.85
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	89.38	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.7208742</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21743147</b>
Location: <b>UT1 of UT1 of UT10 of Left Fork of Hell Creek</b>	Sampling Date: <b>26-July-11</b>
SAR Number: <b>LFHC U5</b>	Reach Length (ft): <b>337</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 100.0 %

List the percent cover measurements at each point below:

100	100	100	100	100	100	100	100	100	100
100	100	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.22	0.22	0.22	0.22	0.31	0.31	0.44	0.44	0.63	0.63
0.63	0.89	0.89	1.26	1.77	1.77	1.77	2.50	2.50	3.50
3.50	3.50	3.50	3.50	5.00	5.00	7.10	10.10	10.10	14.30
14.30	14.30	14.30	14.30	20.00	40.00	40.00	80.00	99.00	99.00

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

Left Bank: **337 ft**

Right Bank: **337 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">27</span>	8.0
---	-----------	--	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
---	------------	---	-----

Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">3</span> Right Side: <span style="background-color: yellow; padding: 2px;">1</span>	1.2
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;"> </span> Right Side: <span style="background-color: yellow; padding: 2px;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.78
---	-------------	---	------

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

6 Species in Group 1	0 Species in Group 2
----------------------	----------------------

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	89.38 %																								
		<table border="1"> <thead> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> </thead> <tbody> <tr> <td>90</td> <td>95</td> <td>80</td> <td>100</td> <td>80</td> <td>85</td> <td>90</td> <td>95</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Left Side				Right Side				90	95	80	100	80	85	90	95									
Left Side				Right Side																							
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11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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LFHC U5			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	100 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	8.0	1.00	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	1.2	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.78	0.85	
V <sub>DETRITUS</sub>	89.4 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT1 of UT10 of Left Fork of Hell Creek

**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Shrub/Herb Strata

**SAR number:** LFHC U5

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.70
Biogeochemical Cycling	0.56
Habitat	0.62

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	4.44	0.56
$V_{TDBH}$	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.	51.85	0.80
$V_{SRICH}$	Riparian vegetation species richness.	2.74	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.7208742</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21743147</b>
Location: <b>UT1 of UT1 of UT10 of Left Fork of Hell Creek</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>LFHC U5</b>	Reach Length (ft): <b>135</b>
Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Shrub/Herb Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0									
---	--	--	--	--	--	--	--	--	--

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.22	0.22	0.22	0.22	0.31	0.31	0.44	0.44	0.63	0.63
0.63	0.89	0.89	1.26	1.77	1.77	1.77	2.50	2.50	3.50
3.50	3.50	3.50	3.50	5.00	5.00	7.10	10.10	10.10	14.30
14.30	14.30	14.30	14.30	20.00	40.00	40.00	80.00	99.00	99.00

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **27 ft**      Right Bank: **27 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">6</span>	4.4
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	------------	---	----------

Left Side					Right Side				

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">35</span> Right Side: <span style="background-color: yellow; padding: 2px;">35</span>	51.9
---	-----------	---	------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.74
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
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Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
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Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.66																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				▼				
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LFHC U5			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	4.4	0.56	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	51.9	0.80	
V <sub>SRICH</sub>	2.74	1.00	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT1 of UT10 of Left Fork of Hell Creek

**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:** LFHC U5

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.73
Biogeochemical Cycling	0.78
Habitat	0.67

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.19	0.65
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	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.	2.74	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	65.00	0.79
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.7208742</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21743147</b>
Location: <b>UT1 of UT1 of UT10 of Left Fork of Hell Creek</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>LFHC U5</b>	Reach Length (ft): <b>135</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>After Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.22	0.22	0.22	0.22	0.31	0.31	0.44	0.44	0.63	0.63
0.63	0.89	0.89	1.26	1.77	1.77	1.77	2.50	2.50	3.50
3.50	3.50	3.50	3.50	5.00	5.00	7.10	10.10	10.10	14.30
14.30	14.30	14.30	14.30	20.00	40.00	40.00	80.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **27 ft**

Right Bank: **27 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">7</span>	5.2
---	------------------	---	-----

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	-------------------	--	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	0.0
---	-------------------	--	-----

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	------------------	---	----------

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.74
---	--------------------	---	------

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

5 Species in Group 1	1 Species in Group 2
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**Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.**

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	65.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>65</td> <td>65</td> <td>65</td> <td>65</td> <td>65</td> <td>65</td> <td>65</td> <td>65</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				65	65	65	65	65	65	65	65									
Left Side				Right Side																							
65	65	65	65	65	65	65	65																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (50% to 75% ground cover) ▼</td> <td>0.7</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (50% to 75% ground cover) ▼	0.7	5	100	▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
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LFHC U5			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.2	0.65	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	2.74	1.00	
V <sub>DETRITUS</sub>	65.0 %	0.79	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT1 of UT10 of Left Fork of Hell Creek

**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:** LFHC U5

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.76
Biogeochemical Cycling	0.88
Habitat	0.90

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.77	0.89
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.93	0.74
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	2.96	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	2.74	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.7208742</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21743147</b>
Location: <b>UT1 of UT1 of UT10 of Left Fork of Hell Creek</b>	Sampling Date: <b>Maturity</b>
SAR Number: <b>LFHC U5</b>	Reach Length (ft): <b>135</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ After Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.0 %

List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.77 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.22	0.22	0.22	0.22	0.31	0.31	0.44	0.44	0.63	0.63
0.63	0.89	0.89	1.26	1.77	1.77	1.77	2.50	2.50	3.50
3.50	3.50	3.50	3.50	5.00	5.00	7.10	10.10	10.10	14.30
14.30	14.30	14.30	14.30	20.00	40.00	40.00	80.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **27 ft**

Right Bank: **27 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">8</span>	5.9
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">3</span> Right Side: <span style="background-color: yellow; padding: 2px;">1</span>	3.0
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8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;"> </span> Right Side: <span style="background-color: yellow; padding: 2px;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.74
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																																
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85	85	85	85	85	85	85	85																												
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																																
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Left Side				Right Side																															

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
Forest and native range (>75% ground cover) ▼	1	55	55																																				
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LFHC U5			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.77 in	0.89	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.9	0.74	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	3.0	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	2.74	1.00	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** 27-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      UTPC 1

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.72
Biogeochemical Cycling	0.98
Habitat	0.96

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	96.57	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.46	0.99
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.50	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	7.11	0.89
$V_{TDBH}$	Average dbh of trees.	9.96	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	78.13	0.95
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73654567</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20542078</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>27-July-11</b>
SAR Number: <b>UTPC 1</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 96.6 %

List the percent cover measurements at each point below:

100	94	100	100	94	88	100	88	100	94
100	94	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.5

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	4	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.50 in

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

0.08	0.08	0.08	0.08	0.08	0.31	0.44	0.89	1.26	1.26
1.77	1.77	1.77	1.77	2.50	2.50	2.50	2.50	3.50	3.50
3.50	3.50	3.50	3.50	3.50	3.50	5.00	5.00	5.00	5.00
5.00	5.00	5.00	5.00	5.00	7.10	7.10	7.10	7.10	7.10
7.10	7.10	7.10	10.10	10.10	10.10	14.30	20.00	99.00	99.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">32</span>	7.1
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
8	7	15.5	10	10.5	5.5	7	11.1	15	

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">2</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.4
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;"> </span> Right Side: <span style="background-color: yellow; padding: 2px;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	78.13 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>70</td> <td>50</td> <td>100</td> <td>95</td> <td>95</td> <td>95</td> <td>45</td> <td>75</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				70	50	100	95	95	95	45	75									
Left Side				Right Side																							
70	50	100	95	95	95	45	75																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
▼																																			
▼																																			
▼																																			
▼																																			
▼																																			
▼																																			

UTPC 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	97 %	1.00	
V <sub>EMBED</sub>	3.5	0.99	
V <sub>SUBSTRATE</sub>	3.50 in	1.00	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	7.1	0.89	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	78.1 %	0.95	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Shrub/Herb Strata

**SAR number:**      UTPC 1

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.69
Biogeochemical Cycling	0.57
Habitat	0.63

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	3.46	0.99
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.50	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	4.00	0.50
$V_{TDBH}$	Average dbh of trees.	Not Used	Not Used
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.00	0.10
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	52.00	0.80
$V_{SRICH}$	Riparian vegetation species richness.	1.11	0.53
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73654567</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20542078</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>UTPC 1</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Shrub/Herb Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

1	$V_{CCANOPY}$	Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.)	Not Used, <20%
---	---------------	---	-------------------

List the percent cover measurements at each point below:

0									
---	--	--	--	--	--	--	--	--	--

2	$V_{EMBED}$	Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5.	3.5
---	-------------	--	-----

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	4	4

3	$V_{SUBSTRATE}$	Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in $V_{EMBED}$ .	3.50 in
---	-----------------	--	---------

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

0.08	0.08	0.08	0.08	0.08	0.31	0.44	0.89	1.26	1.26
1.77	1.77	1.77	1.77	2.50	2.50	2.50	2.50	3.50	3.50
3.50	3.50	3.50	3.50	3.50	3.50	5.00	5.00	5.00	5.00
5.00	5.00	5.00	5.00	5.00	7.10	7.10	7.10	7.10	7.10
7.10	7.10	7.10	10.10	10.10	10.10	14.30	20.00	99.00	99.00

4	$V_{BERO}$	Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%.	40 %
---	------------	--	------

Left Bank: **90 ft**                      Right Bank: **90 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	4.0
Number of downed woody stems: <span style="background-color: yellow;">18</span>			

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	------------	---	----------

Left Side					Right Side				

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.0
Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>			

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	52.0
Left Side: <span style="background-color: yellow;">117</span> Right Side: <span style="background-color: yellow;">117</span>			

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.11
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.66																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
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UTPC 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	3.5	0.99	
V <sub>SUBSTRATE</sub>	3.50 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	4.0	0.50	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	52.0	0.80	
V <sub>SRICH</sub>	1.11	0.53	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      UTPC 1

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.73
Biogeochemical Cycling	0.80
Habitat	0.68

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	3.46	0.99
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.50	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.11	0.64
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.00	0.10
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.11	0.53
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	70.00	0.85
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73654567</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20542078</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>UTPC 1</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ After Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.5

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	4	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.50 in

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

0.08	0.08	0.08	0.08	0.08	0.31	0.44	0.89	1.26	1.26
1.77	1.77	1.77	1.77	2.50	2.50	2.50	2.50	3.50	3.50
3.50	3.50	3.50	3.50	3.50	3.50	5.00	5.00	5.00	5.00
5.00	5.00	5.00	5.00	5.00	7.10	7.10	7.10	7.10	7.10
7.10	7.10	7.10	10.10	10.10	10.10	14.30	20.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **90 ft**

Right Bank: **90 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	5.1
Number of downed woody stems: <span style="background-color:#ffff00; padding: 2px;">23</span>			

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	-------------------	--	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.0
Left Side: <span style="background-color:#ffff00; padding: 2px;">0</span> Right Side: <span style="background-color:#ffff00; padding: 2px;">0</span>			

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color:#ffff00; padding: 2px;">0</span> Right Side: <span style="background-color:#ffff00; padding: 2px;">0</span>			

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.11
---	--------------------	---	------

Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
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<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
<input type="checkbox"/>	<i>Betula lenta</i>	<input type="checkbox"/>	<i>Quercus coccinea</i>	<input type="checkbox"/>	<i>Cerastium fontanum</i>	<input type="checkbox"/>	<i>Paulownia tomentosa</i>
<input type="checkbox"/>	<i>Carya alba</i>	<input type="checkbox"/>	<i>Quercus imbricaria</i>	<input type="checkbox"/>	<i>Coronilla varia</i>	<input type="checkbox"/>	<i>Polygonum cuspidatum</i>
<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
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	<i>Fagus grandifolia</i>		<i>Tilia americana</i>		<i>Ligustrum sinense</i>		
	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
5    Species in Group 1				0    Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	70.00 %																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (50% to 75% ground cover) ▼</td> <td>0.7</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (50% to 75% ground cover) ▼	0.7	5	100	▼				▼				▼				▼				▼				
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UTPC 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	3.5	0.99	
V <sub>SUBSTRATE</sub>	3.50 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.1	0.64	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.11	0.53	
V <sub>DETRITUS</sub>	70.0 %	0.85	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      UTPC 1

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.78
Biogeochemical Cycling	0.90
Habitat	0.89

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.46	0.99
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.50	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	6.44	0.81
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.22	0.43
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.11	0.53
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73654567</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20542078</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>Maturity</b>
SAR Number: <b>UTPC 1</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ After Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.0 %

List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.5

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	4	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.50 in

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

0.08	0.08	0.08	0.08	0.08	0.31	0.44	0.89	1.26	1.26
1.77	1.77	1.77	1.77	2.50	2.50	2.50	2.50	3.50	3.50
3.50	3.50	3.50	3.50	3.50	3.50	5.00	5.00	5.00	5.00
5.00	5.00	5.00	5.00	5.00	7.10	7.10	7.10	7.10	7.10
7.10	7.10	7.10	10.10	10.10	10.10	14.30	20.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **90 ft**

Right Bank: **90 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">29</span>	6.4
---	------------------	--	-----

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	-------------------	--	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">1</span> Right Side: <span style="background-color: yellow;">0</span>	0.2
---	-------------------	--	-----

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	Not Used
---	------------------	---	----------

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.11
---	--------------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																								
		<table border="1"> <thead> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> </thead> <tbody> <tr> <td>85</td><td>85</td><td>85</td><td>85</td> <td>85</td><td>85</td><td>85</td><td>85</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </tbody> </table>	Left Side				Right Side				85	85	85	85	85	85	85	85									
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11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
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UTPC 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	3.5	0.99	
V <sub>SUBSTRATE</sub>	3.50 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	6.4	0.81	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	0.2	0.43	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.11	0.53	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** 27-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      UTPC 2

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.67
Biogeochemical Cycling	0.97
Habitat	0.90

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.71	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.46	0.99
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.50	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.56	0.69
$V_{TDBH}$	Average dbh of trees.	9.96	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.00	0.10
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	80.00	0.98
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.7353602</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20368831</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>27-July-11</b>
SAR Number: <b>UTPC 2</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.7 %

List the percent cover measurements at each point below:

100	100	88	88	100	88	100	100	88	100
100	94	94	100						

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.5

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	4	4

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.50 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.44
0.44	0.44	0.89	0.89	0.89	0.89	0.89	0.89	1.77	1.77
2.50	2.50	2.50	3.50	3.50	3.50	5.00	5.00	5.00	5.00
5.00	7.10	10.10	10.10	10.10	14.30	20.00	40.00	80.00	80.00
80.00	80.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

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

Left Bank: **450 ft** Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	5.6
Number of downed woody stems: <span style="background-color: yellow;">25</span>			

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
8	7	15.5	10	10.5	5.5	7	11.1	15	

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.0
Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>			

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>			

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	-------------	---	------

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

7    Species in Group 1	0    Species in Group 2
-------------------------	-------------------------

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	80.00 %																								
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80	80	100	65	85	70	85	75																				
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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UTPC 2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	96 %	1.00	
V <sub>EMBED</sub>	3.5	0.99	
V <sub>SUBSTRATE</sub>	3.50 in	1.00	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	5.6	0.69	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	80.0 %	0.98	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Shrub/Herb Strata

**SAR number:**      UTPC 2

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.68
Biogeochemical Cycling	0.57
Habitat	0.63

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	3.46	0.99
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.50	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	3.64	0.45
$V_{TDBH}$	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.	47.27	0.73
$V_{SRICH}$	Riparian vegetation species richness.	9.09	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.7353602</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20368831</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>UTPC 2</b>	Reach Length (ft): <b>55</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Shrub/Herb Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ After Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0									
---	--	--	--	--	--	--	--	--	--

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.5

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	4	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.50 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.44
0.44	0.44	0.89	0.89	0.89	0.89	0.89	0.89	1.77	1.77
2.50	2.50	2.50	3.50	3.50	3.50	5.00	5.00	5.00	5.00
5.00	7.10	10.10	10.10	10.10	14.30	20.00	40.00	80.00	80.00
80.00	80.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **11 ft**

Right Bank: **11 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <input style="width: 100px;" type="text" value="2"/>	3.6
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	------------	---	----------

Left Side					Right Side				

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <input style="width: 100px;" type="text" value="0"/> Right Side: <input style="width: 100px;" type="text" value="0"/>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <input style="width: 100px;" type="text" value="13"/> Right Side: <input style="width: 100px;" type="text" value="13"/>	47.3
---	-----------	---	------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	9.09
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
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Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.66																																								
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																								
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UTPC 2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	3.5	0.99	
V <sub>SUBSTRATE</sub>	3.50 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	3.6	0.45	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	47.3	0.73	
V <sub>SRICH</sub>	9.09	1.00	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      UTPC 2

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.74
Biogeochemical Cycling	0.80
Habitat	0.71

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	3.46	0.99
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.50	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.45	0.68
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	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.	9.09	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	70.00	0.85
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.7353602</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20368831</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>UTPC 2</b>	Reach Length (ft): <b>55</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ After Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.5

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	4	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.50 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.44
0.44	0.44	0.89	0.89	0.89	0.89	0.89	0.89	1.77	1.77
2.50	2.50	2.50	3.50	3.50	3.50	5.00	5.00	5.00	5.00
5.00	7.10	10.10	10.10	10.10	14.30	20.00	40.00	80.00	80.00
80.00	80.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **11 ft**

Right Bank: **11 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">3</span>	5.5
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	------------	---	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	9.09
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	70.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>70</td> <td>70</td> <td>70</td> <td>70</td> <td>70</td> <td>70</td> <td>70</td> <td>70</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				70	70	70	70	70	70	70	70									
Left Side				Right Side																							
70	70	70	70	70	70	70	70																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (50% to 75% ground cover) ▼</td> <td>0.7</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (50% to 75% ground cover) ▼	0.7	5	100	▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
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UTPC 2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	3.5	0.99	
V <sub>SUBSTRATE</sub>	3.50 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.5	0.68	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	9.09	1.00	
V <sub>DETRITUS</sub>	70.0 %	0.85	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      UTPC 2

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.81
Biogeochemical Cycling	0.91
Habitat	0.95

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.46	0.99
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.50	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	7.27	0.91
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	1.82	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	9.09	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.7353602</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20368831</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>Maturity</b>
SAR Number: <b>UTPC 2</b>	Reach Length (ft): <b>55</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ After Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.0 %

List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.5

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	4	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 3.50 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.44
0.44	0.44	0.89	0.89	0.89	0.89	0.89	0.89	1.77	1.77
2.50	2.50	2.50	3.50	3.50	3.50	5.00	5.00	5.00	5.00
5.00	7.10	10.10	10.10	10.10	14.30	20.00	40.00	80.00	80.00
80.00	80.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **11 ft**

Right Bank: **11 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">4</span>	7.3
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6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	-------------------	--	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">1</span>	1.8
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8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	Not Used
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9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	9.09
---	--------------------	---	------

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

5 Species in Group 1	0 Species in Group 2
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**Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.**

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																								
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Left Side				Right Side																							
85	85	85	85	85	85	85	85																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
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UTPC 2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	3.5	0.99	
V <sub>SUBSTRATE</sub>	3.50 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	7.3	0.91	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	1.8	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	9.09	1.00	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** 27-July-11

Project Site      Before Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      UTPC 3

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.67
Biogeochemical Cycling	0.86
Habitat	0.88

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	94.43	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	5.00	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.33	0.67
$V_{TDBH}$	Average dbh of trees.	10.57	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	80.63	0.98
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73347304</b>	
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20280051</b>	
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>27-July-11</b>	
SAR Number: <b>UTPC 3</b>	Reach Length (ft): <b>450</b>	Stream Type: <b>Ephemeral Stream</b> ▼
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )		
Site and Timing: <b>Project Site</b> ▼ <b>Before Project</b> ▼		

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 94.4 %

List the percent cover measurements at each point below:

100	94	94	100	94	100	88	88	88	88
94	94	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 5.00 in

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

0.08	0.08	0.44	0.44	0.44	0.89	0.89	0.89	0.89	1.77
1.77	1.77	1.77	1.77	2.50	2.50	2.50	3.50	3.50	3.50
3.50	3.50	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
5.00	5.00	7.10	10.10	10.10	10.10	10.10	10.10	10.10	14.30
14.30	14.30	40.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">24</span>	5.3
---	-----------	--	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.6
---	------------	---	------

Left Side					Right Side				
5	4	15.3	16.5	5.1	11	7	10	18	14
					13	16	12	7	9
					9.5	11.5	7.8	9.2	

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;"></span> Right Side: <span style="background-color: yellow; padding: 2px;">2</span>	0.4
---	------------	---	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;"></span> Right Side: <span style="background-color: yellow; padding: 2px;"></span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	80.63 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>80</td> <td>90</td> <td>75</td> <td>60</td> <td>90</td> <td>100</td> <td>75</td> <td>75</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				80	90	75	60	90	100	75	75									
Left Side				Right Side																							
80	90	75	60	90	100	75	75																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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▼																																			
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UTPC 3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	94 %	1.00	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	5.00 in	1.00	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	5.3	0.67	
V <sub>TDBH</sub>	10.6	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	80.6 %	0.98	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**

Shrub/Herb Strata

**SAR number:**      UTPC 3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.70
Biogeochemical Cycling	0.52
Habitat	0.59

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	5.00	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.00	0.63
$V_{TDBH}$	Average dbh of trees.	Not Used	Not Used
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.00	0.10
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	55.00	0.85
$V_{SRICH}$	Riparian vegetation species richness.	12.50	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73347304</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20280051</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>UTPC 3</b>	Reach Length (ft): <b>40</b>
Stream Type: <b>Ephemeral Stream</b> ▼	
Top Strata: <b>Shrub/Herb Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0									
---	--	--	--	--	--	--	--	--	--

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 5.00 in

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

0.08	0.08	0.44	0.44	0.44	0.89	0.89	0.89	0.89	1.77
1.77	1.77	1.77	1.77	2.50	2.50	2.50	3.50	3.50	3.50
3.50	3.50	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
5.00	5.00	7.10	10.10	10.10	10.10	10.10	10.10	10.10	14.30
14.30	14.30	40.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **8 ft**                      Right Bank: **8 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	5.0
Number of downed woody stems: <span style="background-color: yellow;">2</span>			

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	------------	---	----------

Left Side					Right Side				

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.0
Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>			

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	55.0
Left Side: <span style="background-color: yellow;">11</span> Right Side: <span style="background-color: yellow;">11</span>			

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	12.50
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Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
<input type="checkbox"/>	<i>Acer saccharum</i>	<input type="checkbox"/>	<i>Nyssa sylvatica</i>	<input type="checkbox"/>	<i>Albizia julibrissin</i>	<input type="checkbox"/>	<i>Lonicera tatarica</i>
<input type="checkbox"/>	<i>Aesculus flava</i>	<input type="checkbox"/>	<i>Oxydendrum arboreum</i>	<input type="checkbox"/>	<i>Alliaria petiolata</i>	<input type="checkbox"/>	<i>Lotus corniculatus</i>
<input type="checkbox"/>	<i>Asimina triloba</i>	<input type="checkbox"/>	<i>Prunus serotina</i>	<input type="checkbox"/>	<i>Alternanthera philoxeroides</i>	<input type="checkbox"/>	<i>Lythrum salicaria</i>
<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
<input type="checkbox"/>	<i>Betula lenta</i>	<input type="checkbox"/>	<i>Quercus coccinea</i>	<input type="checkbox"/>	<i>Cerastium fontanum</i>	<input type="checkbox"/>	<i>Paulownia tomentosa</i>
<input type="checkbox"/>	<i>Carya alba</i>	<input type="checkbox"/>	<i>Quercus imbricaria</i>	<input type="checkbox"/>	<i>Coronilla varia</i>	<input type="checkbox"/>	<i>Polygonum cuspidatum</i>
<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
	<i>Cornus florida</i>		<i>Sassafras albidum</i>		<i>Ligustrum obtusifolium</i>		<i>Verbena brasiliensis</i>
	<i>Fagus grandifolia</i>		<i>Tilia americana</i>		<i>Ligustrum sinense</i>		
	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
5    Species in Group 1				0    Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
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Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.66																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
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UTPC 3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	5.00 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.0	0.63	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	55.0	0.85	
V <sub>SRICH</sub>	12.50	1.00	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      UTPC 3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.78
Biogeochemical Cycling	0.74
Habitat	0.69

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	5.00	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	7.50	0.94
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	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.	12.50	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	70.00	0.85
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73347304</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20280051</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>UTPC 3</b>	Reach Length (ft): <b>40</b>
Stream Type: <b>Ephemeral Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 5.00 in

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

0.08	0.08	0.44	0.44	0.44	0.89	0.89	0.89	0.89	1.77
1.77	1.77	1.77	1.77	2.50	2.50	2.50	3.50	3.50	3.50
3.50	3.50	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
5.00	5.00	7.10	10.10	10.10	10.10	10.10	10.10	10.10	14.30
14.30	14.30	40.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **8 ft**

Right Bank: **8 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">3</span>	7.5
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	------------	---	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	12.50
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Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
<input type="checkbox"/>	<i>Acer saccharum</i>	<input type="checkbox"/>	<i>Nyssa sylvatica</i>	<input type="checkbox"/>	<i>Albizia julibrissin</i>	<input type="checkbox"/>	<i>Lonicera tatarica</i>
<input type="checkbox"/>	<i>Aesculus flava</i>	<input type="checkbox"/>	<i>Oxydendrum arboreum</i>	<input type="checkbox"/>	<i>Alliaria petiolata</i>	<input type="checkbox"/>	<i>Lotus corniculatus</i>
<input type="checkbox"/>	<i>Asimina triloba</i>	<input type="checkbox"/>	<i>Prunus serotina</i>	<input type="checkbox"/>	<i>Alternanthera philoxeroides</i>	<input type="checkbox"/>	<i>Lythrum salicaria</i>
<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
<input type="checkbox"/>	<i>Betula lenta</i>	<input type="checkbox"/>	<i>Quercus coccinea</i>	<input type="checkbox"/>	<i>Cerastium fontanum</i>	<input type="checkbox"/>	<i>Paulownia tomentosa</i>
<input type="checkbox"/>	<i>Carya alba</i>	<input type="checkbox"/>	<i>Quercus imbricaria</i>	<input type="checkbox"/>	<i>Coronilla varia</i>	<input type="checkbox"/>	<i>Polygonum cuspidatum</i>
<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
	<i>Cornus florida</i>		<i>Sassafras albidum</i>		<i>Ligustrum obtusifolium</i>		<i>Verbena brasiliensis</i>
	<i>Fagus grandifolia</i>		<i>Tilia americana</i>		<i>Ligustrum sinense</i>		
	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
5 Species in Group 1				0 Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	70.00 %																																
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>70</td><td>70</td><td>70</td><td>70</td> <td>70</td><td>70</td><td>70</td><td>70</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				70	70	70	70	70	70	70	70																	
Left Side				Right Side																															
70	70	70	70	70	70	70	70																												
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																																
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side																												
Left Side				Right Side																															

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																								
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (50% to 75% ground cover) ▼</td> <td>0.7</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (50% to 75% ground cover) ▼	0.7	5	100	▼				▼				▼				▼				▼				▼				
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UTPC 3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	5.00 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	7.5	0.94	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	12.50	1.00	
V <sub>DETRITUS</sub>	70.0 %	0.85	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Pigeon Creek  
**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      UTPC 3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.79
Biogeochemical Cycling	0.81
Habitat	0.90

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	5.00	1.00
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	7.50	0.94
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	2.50	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	12.50	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.73347304</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20280051</b>
Location: <b>UT of Pigeon Creek</b>	Sampling Date: <b>Maturity</b>
SAR Number: <b>UTPC 3</b>	Reach Length (ft): <b>40</b>
Stream Type: <b>Ephemeral Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

1	$V_{CCANOPY}$	Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.)	95.0 %
---	---------------	---	--------

List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95
----	----	----	----	----	----	----	----	----	----

2	$V_{EMBED}$	Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5.	2.9
---	-------------	--	-----

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

3	$V_{SUBSTRATE}$	Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in $V_{EMBED}$ .	5.00 in
---	-----------------	--	---------

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

0.08	0.08	0.44	0.44	0.44	0.89	0.89	0.89	0.89	1.77
1.77	1.77	1.77	1.77	2.50	2.50	2.50	3.50	3.50	3.50
3.50	3.50	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
5.00	5.00	7.10	10.10	10.10	10.10	10.10	10.10	10.10	14.30
14.30	14.30	40.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00

4	$V_{BERO}$	Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%.	40 %
---	------------	--	------

Left Bank: **8 ft**

Right Bank: **8 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">3</span>	7.5
---	------------------	---	-----

6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	-------------------	--	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">1</span>	2.5
---	-------------------	--	-----

8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	Not Used
---	------------------	---	----------

9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	12.50
---	--------------------	---	-------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>85</td><td>85</td><td>85</td><td>85</td> <td>85</td><td>85</td><td>85</td><td>85</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				85	85	85	85	85	85	85	85									
Left Side				Right Side																							
85	85	85	85	85	85	85	85																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
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UTPC 3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	5.00 in	1.00	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	7.5	0.94	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	2.5	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	12.50	1.00	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** Pigeonroost Creek  
**Sampling Date:** 25-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      PRC 1

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.99
Habitat	0.96

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	89.71	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.46	0.99
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	7.10	0.93
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	14.89	1.00
$V_{TDBH}$	Average dbh of trees.	9.96	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	83.75	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.710635</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.209784</b>
Location: <b>Pigeonroost Creek</b>	Sampling Date: <b>25-July-11</b>
SAR Number: <b>PRC 1</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>Before Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 89.7 %

List the percent cover measurements at each point below:

88	82	94	94	88	94	88	94	94	88
88	82	94	88						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.5

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	4	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 7.10 in

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

0.50	1.00	1.00	1.00	0.89	1.26	1.26	1.77	1.77	1.77
1.77	2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50	5.00
5.00	5.00	5.00	7.10	7.10	7.10	7.10	10.10	14.30	20.00
99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5  $V_{LWD}$  Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. 14.9

Number of downed woody stems: 67

6  $V_{TDBH}$  Average dbh of trees (measure only if  $V_{CCANOPY}$  tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. 10.0

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

Left Side					Right Side				
8	7	15.5	10	10.5	5.5	7	11.1	15	

7  $V_{SNAG}$  Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. 0.4

Left Side: 1 Right Side: 1

8  $V_{SSD}$  Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Not Used

Left Side:   Right Side:  

9  $V_{SRICH}$  Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data. 1.56

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	83.75 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>80</td> <td>95</td> <td>60</td> <td>80</td> <td>95</td> <td>75</td> <td>90</td> <td>95</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				80	95	60	80	95	75	90	95									
Left Side				Right Side																							
80	95	60	80	95	75	90	95																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
▼																																			
▼																																			
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PRC 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	90 %	1.00	
V <sub>EMBED</sub>	3.5	0.99	
V <sub>SUBSTRATE</sub>	7.10 in	0.93	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	14.9	1.00	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	83.8 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT1 of Pigeonroost Creek

**Sampling Date:** 25-July-11

Project Site      Before Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      PRC U2

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.88
Habitat	0.86

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	97.43	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	14.30	0.47
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	12.00	1.00
$V_{TDBH}$	Average dbh of trees.	10.57	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	1.00	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	7.00	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.71823949</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21199316</b>
Location: <b>UT1 of UT1 of Pigeonroost Creek</b>	Sampling Date: <b>25-July-11</b>
SAR Number: <b>PRC U2</b> Reach Length (ft): <b>100</b> Stream Type: <b>Ephemeral Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>Before Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 97.4 %

List the percent cover measurements at each point below:

88	100	100	82	100	100	100	100	94	100
100	100	100	100						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 14.30 in

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

0.08	0.08	0.44	0.89	1.77	3.50	3.50	3.50	5.00	5.00
5.00	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	10.10
10.10	14.30	14.30	14.30	14.30	14.30	20.00	20.00	20.00	20.00
20.00	20.00	20.00	20.00	40.00	40.00	40.00	40.00	40.00	40.00
40.00	40.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00

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

Left Bank: **100 ft**

Right Bank: **100 ft**

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

5  $V_{LWD}$  Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. 12.0

Number of downed woody stems: 12

6  $V_{TDBH}$  Average dbh of trees (measure only if  $V_{CCANOPY}$  tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. 10.6

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

Left Side					Right Side				
5	4	15.3	16.5	5.1	11	7	10	18	14
					13	16	12	7	9
					9.5	11.5	7.8	9.2	

7  $V_{SNAG}$  Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. 1.0

Left Side: 0 Right Side: 1

8  $V_{SSD}$  Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Not Used

Left Side:  Right Side:

9  $V_{SRICH}$  Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data. 7.00

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>85</td> <td>75</td> <td>80</td> <td>85</td> <td>90</td> <td>95</td> <td>90</td> <td>80</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				85	75	80	85	90	95	90	80									
Left Side				Right Side																							
85	75	80	85	90	95	90	80																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
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PRC U2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	97 %	1.00	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	14.30 in	0.47	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	12.0	1.00	
V <sub>TDBH</sub>	10.6	1.00	
V <sub>SNAG</sub>	1.0	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	7.00	1.00	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT1 of UT1 of Pigeonroost Creek  
**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**

Shrub/Herb Strata

**SAR number:**      PRC U2

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.58
Biogeochemical Cycling	0.51
Habitat	0.44

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	14.30	0.47
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	3.64	0.45
$V_{TDBH}$	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.	50.91	0.78
$V_{SRICH}$	Riparian vegetation species richness.	9.09	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.71823949</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21199316</b>
Location: <b>UT1 of UT1 of Pigeonroost Creek</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>PRC U2</b>	Reach Length (ft): <b>55</b>
Stream Type: <b>Ephemeral Stream</b> ▼	
Top Strata: <b>Shrub/Herb Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0									

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 14.30 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.08	0.44	0.44	0.44	0.44	0.89	0.89	0.89	7.10	7.10
7.10	10.10	10.10	10.10	14.30	14.30	14.30	20.00	20.00	20.00
20.00	20.00	20.00	20.00	40.00	40.00	40.00	40.00	40.00	40.00
40.00	40.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **11 ft**

Right Bank: **11 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <span style="background-color: yellow;">2</span>	3.6
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	------------	---	----------

Left Side					Right Side				

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	0.0
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8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <span style="background-color: yellow;">14</span> Right Side: <span style="background-color: yellow;">14</span>	50.9
---	-----------	---	------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	9.09
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Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
<input type="checkbox"/>	<i>Acer saccharum</i>	<input type="checkbox"/>	<i>Nyssa sylvatica</i>	<input type="checkbox"/>	<i>Albizia julibrissin</i>	<input type="checkbox"/>	<i>Lonicera tatarica</i>
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<input type="checkbox"/>	<i>Asimina triloba</i>	<input type="checkbox"/>	<i>Prunus serotina</i>	<input type="checkbox"/>	<i>Alternanthera philoxeroides</i>	<input type="checkbox"/>	<i>Lythrum salicaria</i>
<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
<input type="checkbox"/>	<i>Betula lenta</i>	<input type="checkbox"/>	<i>Quercus coccinea</i>	<input type="checkbox"/>	<i>Cerastium fontanum</i>	<input type="checkbox"/>	<i>Paulownia tomentosa</i>
<input type="checkbox"/>	<i>Carya alba</i>	<input type="checkbox"/>	<i>Quercus imbricaria</i>	<input type="checkbox"/>	<i>Coronilla varia</i>	<input type="checkbox"/>	<i>Polygonum cuspidatum</i>
<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
	<i>Cornus florida</i>		<i>Sassafras albidum</i>		<i>Ligustrum obtusifolium</i>		<i>Verbena brasiliensis</i>
	<i>Fagus grandifolia</i>		<i>Tilia americana</i>		<i>Ligustrum sinense</i>		
	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
5 Species in Group 1				0 Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
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Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
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Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.66																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
Forest and native range (>75% ground cover) ▼	1	50	50																																				
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PRC U2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	14.30 in	0.47	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	3.6	0.45	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	50.9	0.78	
V <sub>SRICH</sub>	9.09	1.00	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT1 of UT1 of Pigeonroost Creek  
**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      PRC U2

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

Function	Functional Capacity Index
Hydrology	0.64
Biogeochemical Cycling	0.71
Habitat	0.57

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	14.30	0.47
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.45	0.68
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	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.	9.09	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	70.00	0.85
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.71823949</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.21199316</b>
Location: <b>UT1 of UT1 of Pigeonroost Creek</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>PRC U2</b> Reach Length (ft): <b>55</b>	Stream Type: <b>Ephemeral Stream</b> ▼
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 14.30 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.08	0.44	0.44	0.44	0.44	0.89	0.89	0.89	7.10	7.10
7.10	10.10	10.10	10.10	14.30	14.30	14.30	20.00	20.00	20.00
20.00	20.00	20.00	20.00	40.00	40.00	40.00	40.00	40.00	40.00
40.00	40.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **11 ft**      Right Bank: **11 ft**

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

5	V <sub>LWD</sub>	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">3</span>	5.5
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6	V <sub>TDBH</sub>	Average dbh of trees (measure only if V <sub>CCANOPY</sub> tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	-------------------	--	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5

7	V <sub>SNAG</sub>	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.0
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8	V <sub>SSD</sub>	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	Not Used
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9	V <sub>SRICH</sub>	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	9.09
---	--------------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	70.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>70</td> <td>70</td> <td>70</td> <td>70</td> <td>70</td> <td>70</td> <td>70</td> <td>70</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				70	70	70	70	70	70	70	70									
Left Side				Right Side																							
70	70	70	70	70	70	70	70																				
11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (50% to 75% ground cover) ▼</td> <td>0.7</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (50% to 75% ground cover) ▼	0.7	5	100	▼				▼				▼				▼				▼				
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PRC U2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	14.30 in	0.47	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.5	0.68	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	9.09	1.00	
V <sub>DETRITUS</sub>	70.0 %	0.85	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT1 of UT1 of Pigeonroost Creek

**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Ephemeral Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      PRC U2

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.71
Biogeochemical Cycling	0.81
Habitat	0.82

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	2.88	0.78
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	14.30	0.47
$V_{BERO}$	Total percent of eroded stream channel bank.	40.00	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	7.27	0.91
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	1.82	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	9.09	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73

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

Team: AC AG	Latitude/UTM Northing: 37.71823949
Project Name: Buffalo Mountain	Longitude/UTM Easting: -82.21199316
Location: UT1 of UT1 of Pigeonroost Creek	Sampling Date: Maturity
SAR Number: PRC U2      Reach Length (ft): 55	Stream Type: Ephemeral Stream ▼
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼	After Project ▼

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.0 %

List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 2.9

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

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

List the ratings at each point below:

1	2	2	3	4	4	1	5	1	1
3	3	4	3	3	4	1	4	2	2
3	3	3	4	4	4	3	3	4	4
5	5	4	1	4	2	2	1	4	4
3	3	3	1	2	1	1	3	3	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 14.30 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.08	0.44	0.44	0.44	0.44	0.89	0.89	0.89	7.10	7.10
7.10	10.10	10.10	10.10	14.30	14.30	14.30	20.00	20.00	20.00
20.00	20.00	20.00	20.00	40.00	40.00	40.00	40.00	40.00	40.00
40.00	40.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: 11 ft

Right Bank: 11 ft

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: <span style="background-color: yellow;">4</span>	7.3
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">1</span>	1.8
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	9.09
---	-------------	---	------

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

5 Species in Group 1	0 Species in Group 2
----------------------	----------------------

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>85</td><td>85</td><td>85</td><td>85</td> <td>85</td><td>85</td><td>85</td><td>85</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				85	85	85	85	85	85	85	85									
Left Side				Right Side																							
85	85	85	85	85	85	85	85																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
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PRC U2			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	2.9	0.78	
V <sub>SUBSTRATE</sub>	14.30 in	0.47	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	7.3	0.91	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	1.8	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	9.09	1.00	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain

**Location:** UT5 of Pigeonroost Creek

**Sampling Date:** 25-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**

Tree/Sapling Strata

**SAR number:**      PRC U3

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.72
Biogeochemical Cycling	0.96
Habitat	0.77

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	90.14	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	17.15	0.28
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	7.11	0.89
$V_{TDBH}$	Average dbh of trees.	9.96	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.44	0.77
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	82.50	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.70984862</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20942056</b>
Location: <b>UT5 of Pigeonroost Creek</b>	Sampling Date: <b>25-July-11</b>
SAR Number: <b>PRC U3</b>	Reach Length (ft): <b>450</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 90.1 %

List the percent cover measurements at each point below:

94	82	94	88	94	88	94	94	94	94
94	82	88	82						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	1	1

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 17.15 in

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

0.08	0.08	0.08	0.08	0.44	0.63	0.89	0.89	0.89	1.26
1.77	1.77	3.50	5.00	5.00	7.10	7.10	7.10	10.10	10.10
14.30	14.30	14.30	14.30	14.30	20.00	20.00	99.00	40.00	40.00
40.00	40.00	80.00	80.00	80.00	80.00	99.00	99.00	99.00	99.00
99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">32</span>	7.1
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
8	7	15.5	10	10.5	5.5	7	11.1	15	

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">2</span>	0.4
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
---	-------------	---	------

Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/> <i>Acer rubrum</i>	<input type="checkbox"/> <i>Magnolia tripetala</i>	<input type="checkbox"/> <i>Ailanthus altissima</i>	<input type="checkbox"/> <i>Lonicera japonica</i>				
<input type="checkbox"/> <i>Acer saccharum</i>	<input type="checkbox"/> <i>Nyssa sylvatica</i>	<input type="checkbox"/> <i>Albizia julibrissin</i>	<input type="checkbox"/> <i>Lonicera tatarica</i>				
<input type="checkbox"/> <i>Aesculus flava</i>	<input type="checkbox"/> <i>Oxydendrum arboreum</i>	<input type="checkbox"/> <i>Alliaria petiolata</i>	<input type="checkbox"/> <i>Lotus corniculatus</i>				
<input type="checkbox"/> <i>Asimina triloba</i>	<input type="checkbox"/> <i>Prunus serotina</i>	<input type="checkbox"/> <i>Alternanthera philoxeroides</i>	<input type="checkbox"/> <i>Lythrum salicaria</i>				
<input type="checkbox"/> <i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/> <i>Quercus alba</i>	<input type="checkbox"/> <i>Aster tataricus</i>	<input type="checkbox"/> <i>Microstegium vimineum</i>				
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<i>Carya ovalis</i>	<i>Quercus rubra</i>	<i>Lespedeza bicolor</i>	<i>Rosa multiflora</i>				
<i>Carya ovata</i>	<i>Quercus velutina</i>	<i>Lespedeza cuneata</i>	<i>Sorghum halepense</i>				
<i>Cornus florida</i>	<i>Sassafras albidum</i>	<i>Ligustrum obtusifolium</i>	<i>Verbena brasiliensis</i>				
<i>Fagus grandifolia</i>	<i>Tilia americana</i>	<i>Ligustrum sinense</i>					
<i>Fraxinus americana</i>	<i>Tsuga canadensis</i>						
<i>Liriodendron tulipifera</i>	<i>Ulmus americana</i>						
<i>Magnolia acuminata</i>							

7 Species in Group 1	0 Species in Group 2
----------------------	----------------------

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	82.50 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>80</td> <td>75</td> <td>85</td> <td>90</td> <td>60</td> <td>95</td> <td>90</td> <td>85</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				80	75	85	90	60	95	90	85									
Left Side				Right Side																							
80	75	85	90	60	95	90	85																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>100</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	100	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																
Forest and native range (>75% ground cover) ▼	1	100	100																																
▼																																			
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PRC U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	90 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	17.15 in	0.28	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	7.1	0.89	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	0.4	0.77	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	82.5 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT5 of Pigeonroost Creek  
**Sampling Date:** Post-5 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Shrub/Herb Strata

**SAR number:**      PRC U3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.54
Biogeochemical Cycling	0.56
Habitat	0.34

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	Not Used, <20%	Not Used
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	17.15	0.28
$V_{BERO}$	Total percent of eroded stream channel bank.	40.25	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	3.77	0.47
$V_{TDBH}$	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.	51.57	0.79
$V_{SRICH}$	Riparian vegetation species richness.	3.14	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
$V_{HERB}$	Average percent cover of herbaceous vegetation.	50.00	0.67
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.66	0.69

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.70984862</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20942056</b>
Location: <b>UT5 of Pigeonroost Creek</b>	Sampling Date: <b>Post-5 Year</b>
SAR Number: <b>PRC U3</b>	Reach Length (ft): <b>159</b>
Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Shrub/Herb Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼ <b>After Project</b> ▼	

### Sample Variables 1-4 in stream channel

1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) Not Used, <20%

List the percent cover measurements at each point below:

0									
---	--	--	--	--	--	--	--	--	--

2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	1	1

3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 17.15 in

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

0.08	0.08	0.08	0.08	0.44	0.63	0.89	0.89	0.89	1.26
1.77	1.77	3.50	5.00	5.00	7.10	7.10	7.10	10.10	10.10
14.30	14.30	14.30	14.30	14.30	20.00	20.00	99.00	40.00	40.00
40.00	40.00	80.00	80.00	80.00	80.00	99.00	99.00	99.00	99.00
99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **32 ft**                      Right Bank: **32 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">6</span>	3.8
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	Not Used
---	------------	---	----------

Left Side					Right Side				

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>	0.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;">41</span> Right Side: <span style="background-color: yellow;">41</span>	51.6
---	-----------	---	------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	3.14
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	50 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>50</td><td>50</td><td>50</td><td>50</td> <td>50</td><td>50</td><td>50</td><td>50</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				50	50	50	50	50	50	50	50									
Left Side				Right Side																							
50	50	50	50	50	50	50	50																				

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.66																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (&lt;50% ground cover) ▼</td> <td>0.5</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (<50% ground cover) ▼	0.5	5	100	▼				▼				▼				▼				▼				
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PRC U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	Not Used, <20%	Not Used	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	17.15 in	0.28	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	3.8	0.47	
V <sub>TDBH</sub>	Not Used	Not Used	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	51.6	0.79	
V <sub>SRICH</sub>	3.14	1.00	
V <sub>DETRITUS</sub>	50.0 %	0.61	
V <sub>HERB</sub>	50 %	0.67	
V <sub>WLUSE</sub>	0.66	0.69	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT5 of Pigeonroost Creek  
**Sampling Date:** Post-10 Year

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      PRC U3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.58
Biogeochemical Cycling	0.78
Habitat	0.51

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	50.00	0.50
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	17.15	0.28
$V_{BERO}$	Total percent of eroded stream channel bank.	40.25	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.03	0.63
$V_{TDBH}$	Average dbh of trees.	5.00	0.29
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.00	0.10
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	3.14	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	70.00	0.85
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.67	0.71



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.70984862</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20942056</b>
Location: <b>UT5 of Pigeonroost Creek</b>	Sampling Date: <b>Post-10 Year</b>
SAR Number: <b>PRC U3</b> Reach Length (ft): <b>159</b> Stream Type: <b>Intermittent Stream</b> ▼	
Top Strata: <b>Tree/Sapling Strata</b> (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: <b>Project Site</b> ▼	<b>After Project</b> ▼

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 50.0 %

List the percent cover measurements at each point below:

50	50	50	50	50	50	50	50	50	50
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	1	1

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 17.15 in

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

0.08	0.08	0.08	0.08	0.44	0.63	0.89	0.89	0.89	1.26
1.77	1.77	3.50	5.00	5.00	7.10	7.10	7.10	10.10	10.10
14.30	14.30	14.30	14.30	14.30	20.00	20.00	99.00	40.00	40.00
40.00	40.00	80.00	80.00	80.00	80.00	99.00	99.00	99.00	99.00
99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **32 ft**

Right Bank: **32 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.	5.0
Number of downed woody stems: <span style="background-color: yellow;">8</span>			

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	5.0
---	------------	---	-----

Left Side					Right Side				
5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.	0.0
Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>			

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.	Not Used
Left Side: <span style="background-color: yellow;">0</span> Right Side: <span style="background-color: yellow;">0</span>			

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	3.14
---	-------------	---	------

Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
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<input type="checkbox"/>	<i>Aesculus flava</i>	<input type="checkbox"/>	<i>Oxydendrum arboreum</i>	<input type="checkbox"/>	<i>Alliaria petiolata</i>	<input type="checkbox"/>	<i>Lotus corniculatus</i>
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<input type="checkbox"/>	<i>Betula alleghaniensis</i>	<input checked="" type="checkbox"/>	<i>Quercus alba</i>	<input type="checkbox"/>	<i>Aster tataricus</i>	<input type="checkbox"/>	<i>Microstegium vimineum</i>
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<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
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	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
5 Species in Group 1				0 Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	70.00 %																								
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70	70	70	70	70	70	70	70																				
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**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.67																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>50</td> <td>50</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>95</td> </tr> <tr> <td>Forest and native range (50% to 75% ground cover) ▼</td> <td>0.7</td> <td>5</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	50	50	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	95	Forest and native range (50% to 75% ground cover) ▼	0.7	5	100	▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
Forest and native range (>75% ground cover) ▼	1	50	50																																				
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PRC U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	50 %	0.50	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	17.15 in	0.28	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	5.0	0.63	
V <sub>TDBH</sub>	5.0	0.29	
V <sub>SNAG</sub>	0.0	0.10	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	3.14	1.00	
V <sub>DETRITUS</sub>	70.0 %	0.85	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.67	0.71	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT5 of Pigeonroost Creek  
**Sampling Date:** Maturity

Project Site      After Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      PRC U3

**Functional Results Summary:**

Enter Results in Section B of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.65
Biogeochemical Cycling	0.89
Habitat	0.76

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.00	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	17.15	0.28
$V_{BERO}$	Total percent of eroded stream channel bank.	40.25	0.86
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	6.92	0.86
$V_{TDBH}$	Average dbh of trees.	10.00	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.63	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	3.14	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	0.69	0.73

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.70984862</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.20942056</b>
Location: <b>UT5 of Pigeonroost Creek</b>	Sampling Date: <b>Maturity</b>
SAR Number: <b>PRC U3</b>	Reach Length (ft): <b>159</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>After Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.0 %

List the percent cover measurements at each point below:

95	95	95	95	95	95	95	95	95	95
----	----	----	----	----	----	----	----	----	----

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

2	3	2	3	3	2	2	3	4	5
4	3	4	3	4	4	1	4	4	3
4	4	3	2	3	2	4	4	5	4
5	3	4	4	4	3	4	5	2	3
4	5	4	2	4	3	4	4	1	1

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 17.15 in

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

0.08	0.08	0.08	0.08	0.44	0.63	0.89	0.89	0.89	1.26
1.77	1.77	3.50	5.00	5.00	7.10	7.10	7.10	10.10	10.10
14.30	14.30	14.30	14.30	14.30	20.00	20.00	99.00	40.00	40.00
40.00	40.00	80.00	80.00	80.00	80.00	99.00	99.00	99.00	99.00
99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

- 4  $V_{BERO}$  Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated. If both banks are eroded, total erosion for the stream may be up to 200%. 40 %

Left Bank: **32 ft**

Right Bank: **32 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">11</span>	6.9
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.0
---	------------	---	------

Left Side					Right Side				
10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">1</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.6
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">0</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	3.14
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	85.00 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>85</td><td>85</td><td>85</td><td>85</td> <td>85</td><td>85</td><td>85</td><td>85</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side				85	85	85	85	85	85	85	85									
Left Side				Right Side																							
85	85	85	85	85	85	85	85																				

11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> </tr> </table>	Left Side				Right Side																				
Left Side				Right Side																							

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

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	0.69																																				
		<table border="1"> <thead> <tr> <th>Land Use (Choose From Drop List)</th> <th>Runoff Score</th> <th>% in Catchment</th> <th>Running Percent (not &gt;100)</th> </tr> </thead> <tbody> <tr> <td>Forest and native range (&gt;75% ground cover) ▼</td> <td>1</td> <td>55</td> <td>55</td> </tr> <tr> <td>Open space (pasture, lawns, parks, etc.), grass cover &gt;75% ▼</td> <td>0.3</td> <td>45</td> <td>100</td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> <tr> <td>▼</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)	Forest and native range (>75% ground cover) ▼	1	55	55	Open space (pasture, lawns, parks, etc.), grass cover >75% ▼	0.3	45	100	▼				▼				▼				▼				▼				▼				
Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)																																				
Forest and native range (>75% ground cover) ▼	1	55	55																																				
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PRC U3			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	95 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	17.15 in	0.28	
V <sub>BERO</sub>	40 %	0.86	
V <sub>LWD</sub>	6.9	0.86	
V <sub>TDBH</sub>	10.0	1.00	
V <sub>SNAG</sub>	0.6	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	3.14	1.00	
V <sub>DETRITUS</sub>	85.0 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	0.69	0.73	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT of Stonecoal Branch  
**Sampling Date:** 27-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      UTSB 1

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.66
Biogeochemical Cycling	0.94
Habitat	0.86

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.71	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.26	0.63
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	5.00	0.63
$V_{TDBH}$	Average dbh of trees.	9.30	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	1.00	1.00
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	7.00	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	91.88	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00



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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.707416</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.197925</b>
Location: <b>UT of Stonecoal Branch</b>	Sampling Date: <b>27-July-11</b>
SAR Number: <b>UTSB 1</b>	Reach Length (ft): <b>100</b>
Stream Type: Intermittent Stream ▼	
Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$ )	
Site and Timing: Project Site ▼ Before Project ▼	

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.7 %

List the percent cover measurements at each point below:

94	88	100	88	94	94	100	100	100	94
100	94	100	94						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.26 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16
0.16	0.16	0.16	0.16	0.22	0.22	0.22	0.22	0.22	0.22
0.31	0.44	0.44	0.89	1.26	1.26	1.26	1.26	1.26	1.26
1.26	1.77	1.77	2.50	2.50	3.50	3.50	3.50	5.00	5.00
7.10	7.10	10.10	10.10	10.10	10.10	14.30	14.30	20.00	80.00

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

Left Bank: **100 ft**

Right Bank: **100 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow;">5</span>	5.0
---	-----------	---	-----

6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
---	------------	---	-----

Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow;">1</span> Right Side: <span style="background-color: yellow;">0</span>	1.0
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow;"> </span> Right Side: <span style="background-color: yellow;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	7.00
---	-------------	---	------

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

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	91.88 %																								
		<table border="1"> <tr> <th colspan="4">Left Side</th> <th colspan="4">Right Side</th> </tr> <tr> <td>80</td> <td>100</td> <td>95</td> <td>90</td> <td>95</td> <td>85</td> <td>100</td> <td>90</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Left Side				Right Side				80	100	95	90	95	85	100	90									
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11	V <sub>HERB</sub>	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do not include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used																								
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**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
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UTSB 1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	96 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.26 in	0.63	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	5.0	0.63	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	1.0	1.00	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	7.00	1.00	
V <sub>DETRITUS</sub>	91.9 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

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

To ensure accurate calculations, the **UPPERMOST STRATUM** of the plant community is determined based on the calculated value for  $V_{CCANOPY}$  ( $\geq 20\%$  cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

**Project Name:** Buffalo Mountain  
**Location:** UT5 of Miller Creek  
**Sampling Date:** 27-July-11

Project Site      Before Project

**Subclass for this SAR:**

Intermittent Stream

**Uppermost stratum present at this SAR:**  
 Tree/Sapling Strata

**SAR number:**      MC U1

**Functional Results Summary:**

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.97
Habitat	0.87

**Variable Measure and Subindex Summary:**

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canopy over channel.	95.71	1.00
$V_{EMBED}$	Average embeddedness of channel.	3.34	0.94
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.26	0.63
$V_{BERO}$	Total percent of eroded stream channel bank.	200.00	0.00
$V_{LWD}$	Number of down woody stems per 100 feet of stream.	12.67	1.00
$V_{TDBH}$	Average dbh of trees.	9.30	1.00
$V_{SNAG}$	Number of snags per 100 feet of stream.	0.22	0.43
$V_{SSD}$	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
$V_{SRICH}$	Riparian vegetation species richness.	1.56	0.74
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	86.88	1.00
$V_{HERB}$	Average percent cover of herbaceous vegetation.	Not Used	Not Used
$V_{WLUSE}$	Weighted Average of Runoff Score for Catchment.	1.00	1.00

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

Team: <b>AC AG</b>	Latitude/UTM Northing: <b>37.74129846</b>
Project Name: <b>Buffalo Mountain</b>	Longitude/UTM Easting: <b>-82.23889397</b>
Location: <b>UT5 of Miller Creek</b>	Sampling Date: <b>27-July-11</b>
SAR Number: <b>MC U1</b>	Reach Length (ft): <b>450</b>
Stream Type: <b>Intermittent Stream</b>	▼
Top Strata: <b>Tree/Sapling Strata</b>	(determined from percent calculated in $V_{CCANOPY}$ )
Site and Timing: <b>Project Site</b>	▼
	<b>Before Project</b>

### Sample Variables 1-4 in stream channel

- 1  $V_{CCANOPY}$  Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) 95.7 %

List the percent cover measurements at each point below:

94	88	100	88	94	94	100	100	100	94
100	94	100	94						

- 2  $V_{EMBED}$  Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. 3.3

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

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

List the ratings at each point below:

4	4	2	4	3	4	4	3	3	4
4	4	3	2	4	1	2	1	4	3
4	4	4	4	3	4	3	4	4	3
5	1	4	4	1	4	4	4	4	3
5	4	3	3	5	1	4	3	1	4

- 3  $V_{SUBSTRATE}$  Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in  $V_{EMBED}$ . 1.26 in

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

0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16
0.16	0.16	0.16	0.16	0.22	0.22	0.22	0.22	0.22	0.22
0.31	0.44	0.44	0.89	1.26	1.26	1.26	1.26	1.26	1.26
1.26	1.77	1.77	2.50	2.50	3.50	3.50	3.50	5.00	5.00
7.10	7.10	10.10	10.10	10.10	10.10	14.30	14.30	20.00	80.00

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

Left Bank: **450 ft**

Right Bank: **450 ft**

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

5	$V_{LWD}$	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated.  Number of downed woody stems: <span style="background-color: yellow; padding: 2px;">57</span>	12.7
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6	$V_{TDBH}$	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches.  List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
---	------------	---	-----

Left Side					Right Side				
10.6	9.5	14	5.2	4.4	6	4.1	15.5	12.5	11.2

7	$V_{SNAG}$	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;">1</span> Right Side: <span style="background-color: yellow; padding: 2px;">0</span>	0.2
---	------------	--	-----

8	$V_{SSD}$	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated.  Left Side: <span style="background-color: yellow; padding: 2px;"> </span> Right Side: <span style="background-color: yellow; padding: 2px;"> </span>	Not Used
---	-----------	---	----------

9	$V_{SRICH}$	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.56
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Group 1 = 1.0				Group 2 (-1.0)			
<input checked="" type="checkbox"/>	<i>Acer rubrum</i>	<input type="checkbox"/>	<i>Magnolia tripetala</i>	<input type="checkbox"/>	<i>Ailanthus altissima</i>	<input type="checkbox"/>	<i>Lonicera japonica</i>
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<input type="checkbox"/>	<i>Carya glabra</i>	<input type="checkbox"/>	<i>Quercus prinus</i>	<input type="checkbox"/>	<i>Elaeagnus umbellata</i>	<input type="checkbox"/>	<i>Pueraria montana</i>
	<i>Carya ovalis</i>		<i>Quercus rubra</i>		<i>Lespedeza bicolor</i>		<i>Rosa multiflora</i>
	<i>Carya ovata</i>		<i>Quercus velutina</i>		<i>Lespedeza cuneata</i>		<i>Sorghum halepense</i>
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	<i>Fraxinus americana</i>		<i>Tsuga canadensis</i>				
	<i>Liriodendron tulipifera</i>		<i>Ulmus americana</i>				
	<i>Magnolia acuminata</i>						
7 Species in Group 1				0 Species in Group 2			

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

10	V <sub>DETRITUS</sub>	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	86.88 %																								
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**Sample Variable 12 within the entire catchment of the stream.**

12	V <sub>WLUSE</sub>	Weighted Average of Runoff Score for watershed:	1.00																																
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MC U1			Notes:
Variable	Value	VSI	
V <sub>CCANOPY</sub>	96 %	1.00	
V <sub>EMBED</sub>	3.3	0.94	
V <sub>SUBSTRATE</sub>	1.26 in	0.63	
V <sub>BERO</sub>	200 %	0.00	
V <sub>LWD</sub>	12.7	1.00	
V <sub>TDBH</sub>	9.3	1.00	
V <sub>SNAG</sub>	0.2	0.43	
V <sub>SSD</sub>	Not Used	Not Used	
V <sub>SRICH</sub>	1.56	0.74	
V <sub>DETRITUS</sub>	86.9 %	1.00	
V <sub>HERB</sub>	Not Used	Not Used	
V <sub>WLUSE</sub>	1	1.00	

**APPENDIX C**  
**BENTHIC MACROINVERTEBRATE TABLES**





Table 1: Impact Benthic Macroinvertebrate Individual Count Data –Ruth Trace Branch Watershed, May 2010

ORDER	FAMILY	GENUS	FUNCTIONAL FEEDING GROUP	TV	RTB Temporary	RTB Permanent	RTB Intermittent 3 <sup>rd</sup> Order	RTB Intermittent 2 <sup>nd</sup> Order	UT1 UT17 RTB
Ephemeroptera	Ameletidae	<i>Ameletus</i>	Scraper	0		1			
	Baetidae	<i>Barbaetis</i>	Collector-Gatherer	4			3		1
	Ephemerellidae	<i>Drunella</i>	Scraper	3	15	3			
		<i>Ephemerella</i>	Collector-Gatherer	3	1	2	1		1
	Ephemeridae	<i>Ephemerella</i>	Collector-Gatherer	4	1		1		
	Heptageniidae	<i>Stenacron</i>	Collector-Gatherer	4			1		
		<i>Stenonema</i>	Scraper	4	6				1
	Leptophlebiidae	<i>Habrophlebiodes</i>	Scraper	2				2	5
<i>Leptophlebia</i>		Collector-Gatherer	2			3			
	Siphonuridae	<i>Siphonurus</i>	Collector-Gatherer	7			1		
Plecoptera	Chloroperlidae	<i>Utaperla</i>	Predator	1	1		10		
	Nemouridae	<i>Amphinemura</i>	Shredder	2				1	1
	Peltoperlidae	<i>Viehopera</i>	Shredder	2			1	1	
		Perlidae	<i>Acroneuria</i>	Predator	1			2	
			<i>Eccoptura</i>	Predator	1	1	2		
		Pteronarcyidae	<i>Pteronarcys</i>	Shredder	0		1		
Trichoptera	Apataniidae	<i>Apatania</i>	Scraper	4	2		3		
	Brachycentridae	<i>Micrasema</i>	Piercer-Herbivore	1		2			
	Hydropsychidae	<i>Ceratopsyche</i>	Collector-Filterer	5	13	10	3	4	
		<i>Cheumatopsyche</i>	Collector-Filterer	5	3	1			
	Lepidostomatidae	<i>Lepidostoma</i>	Shredder	1				2	4
	Polycentropodidae	<i>Neureclipsis</i>	Collector-Filterer	6	1		1		2
	Rhyacophilidae	<i>Rhyacophila</i>	Predator	3		1	1		
Diptera	Ceratopogonidae	<i>Bezzia</i>	Predator	6				1	1
	Chironomidae	<i>Nilotanypus</i>	Predator	6					1
		<i>Thienemannimyia</i>	Predator	6	2		1	1	
		<i>Tvetenia</i>	Collector-Gatherer	6	1				
	Dixidae	<i>Dixa</i>	Collector-Gatherer	1	1				
	Empididae	<i>Chellifera</i>	Predator	6	1				
	Tipulidae	<i>Dicranota</i>	Predator	3	1			3	
		<i>Hexatoma</i>	Predator	3	4				
<i>Pedicia</i>		Predator	3	4	1			3	
	<i>Tipula</i>	Shredder	3	1		7			
Coleoptera	Elmidae	<i>Optioservus</i>	Scraper	4			1		1
	Psephenidae	<i>Ectopria</i>	Scraper	4			1		
Odonata	Gomphidae	<i>Lanthus</i>	Predator	3		3	1		
		<i>Stylogomphus</i>	Predator	3	7		2		
Megaloptera	Corydalidae	<i>Nigronia</i>	Predator	5					1
Decapoda	Cambaridae	<i>Orconectes</i>	Shredder; Collector-Gatherer	5	6		3		2

Table 2: Impact Benthic Macroinvertebrate Individual Count Data – Conley Branch Watershed, May 2010

ORDER	FAMILY	GENUS	FUNCTIONAL FEEDING GROUP	TV	UT1 RFCB Perennial	UT1 RFCB Intermittent	UT2 RFCB	UT3 RFCB	LFCB
Ephemeroptera	Ameletidae	<i>Ameletus</i>	Scraper	0	1		1		
	Baetidae	<i>Barbaetis</i>	Collector-Gatherer	4					2
	Ephemerellidae	<i>Drunella</i>	Scraper	3					1
		<i>Ephemerella</i>	Collector-Gatherer	3	1	1			1
	Ephemeridae	<i>Ephemera</i>	Collector-Gatherer	4	1				
	Heptageniidae	<i>Stenonema</i>	Scraper	4			1		2
	Leptophlebiidae	<i>Leptophlebia</i>	Collector-Gatherer	2			1		
Plecoptera	Chloroperlidae	<i>Utaperla</i>	Predator	1			22	2	
	Nemouridae	<i>Amphinemura</i>	Shredder	2	4		4	3	1
	Peltoperlidae	<i>Peltoperla</i>	Shredder	2			1		
		<i>Tallaperla</i>	Shredder	2			2		
	Perlodidae	<i>Isoperla</i>	Predator	2	2				
Trichoptera	Hydropsychidae	<i>Ceratopsyche</i>	Collector-Filterer	5	6	2	5		
		<i>Cheumatopsyche</i>	Collector-Filterer	5			1		
	Lepidostomatidae	<i>Lepidostoma</i>	Shredder	1			4	5	
	Odontoceridae	<i>Psilotreta</i>	Scraper	0		1			
	Rhyacophilidae	<i>Rhyacophila</i>	Predator	3				3	
Diptera	Ceratopogonidae	<i>Bezzia</i>	Predator	6	1			1	
	Chironomidae	<i>Nilotanypus</i>	Predator	6				1	
		<i>Thienemannimyia</i>	Predator	6	3		1	6	
	Tipulidae	<i>Dicranota</i>	Predator	3		1			1
		<i>Hexatoma</i>	Predator	3	3			3	1
		<i>Pedicia</i>	Predator	3	1			2	
Coleoptera	Elmidae	<i>Macronychus</i>	Collector-Gatherer	4				1	
Odonata	Cordulegastridae	<i>Cordulegaster</i>	Predator	3			2		
	Gomphidae	<i>Hagenius</i>	Predator	3	1				
		<i>Stylogomphus</i>	Predator	3				1	
Decapoda	Cambaridae	<i>Orconectes</i>	Shredder; Collector-Gatherer	5	3		1	1	2

Table 3: Impact Benthic Macroinvertebrate Individual Count Data – Right Fork of Hell Creek, May 2010

ORDER	FAMILY	GENUS	FUNCTIONAL FEEDING GROUP	TV	RFHC	UT4 RFHC	UT3 UT4 RFHC	UT7 RFHC
Ephemeroptera	Ameletidae	<i>Ameletus</i>	Scraper	0	1			
	Ephemerellidae	<i>Drunella</i>	Scraper	3	8	1		
		<i>Ephemerella</i>	Collector-Gatherer	3	10	1		
	Leptophlebiidae	<i>Leptophlebia</i>	Collector-Gatherer	2	3			2
Plecoptera	Chloroperlidae	<i>Utaperla</i>	Predator	1	6	3	9	1
	Nemouridae	<i>Amphinemura</i>	Shredder	2	5	4		
		<i>Paranemoura</i>	Shredder	2	2	3		
	Peltoperlidae	<i>Peltoperla</i>	Shredder	2			2	
		<i>Tallaperla</i>	Shredder	2		1	2	
		<i>Viehopera</i>	Shredder	2			1	
	Perlidae	<i>Acroneuria</i>	Predator	1	3			
		<i>Beloneuria</i>	Predator	1	1			
Trichoptera	Apataniidae	<i>Apatania</i>	Scraper	4				1
	Hydropsychidae	<i>Ceratopsyche</i>	Collector-Filterer	5	13	2		
		<i>Parapsyche</i>	Predator	5	1			
	Lepidostomatidae	<i>Lepidostoma</i>	Shredder	1	4	2		1
	Limnephilidae	<i>Limnephilus</i>	Shredder	4			3	
		<i>Pycnopsyche</i>	Shredder	4			1	
	Odontoceridae	<i>Psilotreta</i>	Scraper	0	3			
Psychomyiidae	<i>Psychomyia</i>	Collector-Gatherer	2	2		3		

Table 3: Impact Benthic Macroinvertebrate Individual Count Data – Right Fork of Hell Creek, May 2010

ORDER	FAMILY	GENUS	FUNCTIONAL FEEDING GROUP	TV	RFHC	UT4 RFHC	UT3 UT4 RFHC	UT7 RFHC
Diptera	Chironomidae	<i>Larsia</i>	Predator	6			1	
		<i>Natarsia</i>	Predator	6		1		
		<i>Parachaetocladius</i>	Collector-Gatherer	6			1	
		<i>Parametricnemus</i>	Collector-Gatherer	6			1	
		<i>Paraphaenocladus</i>	Collector-Gatherer	6			1	
		<i>Psilometricnemus</i>	Collector-Gatherer	6		1	1	1
		<i>Rheotanytarsus</i>	Collector-Filterer	6		1		
		<i>Stempellina</i>	Collector-Gatherer	6	1			
		<i>Tanytarsus</i>	Collector-Filterer	6	1		2	
		<i>Thienemannimyia</i>	Predator	6		1	1	
	<i>Tvetenia</i>	Collector-Gatherer	6	1				
	Dixidae	<i>Dixa</i>	Collector-Gatherer	1			1	1
		<i>Dixella</i>	Collector-Gatherer	1			1	
	Empididae	<i>Chelifera</i>	Predator	6	8			
	Tipulidae	<i>Dicranota</i>	Predator	3	3	2		
		<i>Hexatoma</i>	Predator	3	1		1	
		<i>Molophilus</i>	Shredder	3		1		
		<i>Pedicia</i>	Predator	3		1	2	
		<i>Tipula</i>	Shredder	3		3	1	
Coleoptera	Dytiscidae	<i>Rhantus</i>	Predator	5			1	
	Elmidae	<i>Optioservus</i>	Scraper	4	11			
	Psephenidae	<i>Ectopria</i>	Scraper	4	4			
	Ptilodactylidae	<i>Anchytarsus</i>	Shredder	5	1			
Collembola	Isotomidae	<i>Isotoma</i>	Collector-Gatherer	9				1
Lepidoptera	Pyrilidae	<i>Pyrilidae</i>	Shredder	5			1	
Decapoda	Cambaridae	<i>Orconectes</i>	Shredder; Collector-Gatherer	5		2	1	

Table 4: Impact Benthic Macroinvertebrate Individual Count Data – Left Fork of Hell Creek, May 2010

ORDER	FAMILY	GENUS	FUNCTIONAL FEEDING GROUP	TV	LFHC Temporary	LFHC Permanent	UT10 LFHC	UT11 LFHC Perennial	UT11 LFHC Intermittent	
Ephemeroptera	Baetidae	<i>Barbaetis</i>	Collector-Gatherer	4					1	
	Ephemerellidae	<i>Drunella</i>	Scraper	3		1			1	
		<i>Ephemerella</i>	Collector-Gatherer	3					3	
	Heptageniidae	<i>Stenonema</i>	Scraper	4		1			1	
	Leptophlebiidae	<i>Leptophlebia</i>	Collector-Gatherer	2	2	2		13	4	
Siphonuridae	<i>Siphonurus</i>	Collector-Gatherer	7		1					
Plecoptera	Chloroperlidae	<i>Alloperla</i>	Predator	1		1				
		<i>Utaperla</i>	Predator	1					6	
	Nemouridae	<i>Amphinemura</i>	Shredder	2				2		
Trichoptera	Hydropsychidae	<i>Ceratopsyche</i>	Collector-Filterer	5		1		1	5	
	Lepidostomatidae	<i>Lepidostoma</i>	Shredder	1				1		
	Limnephilidae	<i>Hydatophylax</i>	Shredder	4				1		
	Polycentropodidae	<i>Neureclipsis</i>	Collector-Filterer	6					2	
Diptera	Ceratopogonidae	<i>Bezzia</i>	Predator	6			2			
		<i>Stilobezzia</i>	Predator	6			2			
	Chironomidae	<i>Brillia</i>	Shredder	6	1					1
		<i>Corynoneura</i>	Collector-Gatherer	6		1				
		<i>Heleniella</i>	Collector-Gatherer	6						1
		<i>Tanytarsus</i>	Collector-Filterer	6				2		3
		<i>Thienemannimyia</i>	Predator	6				1	2	6
		<i>Tvetenia</i>	Collector-Gatherer	6						2
	Empididae	<i>Chellifera</i>	Predator	6	1					
	Tabanidae	<i>Tabanus</i>	Predator	6					1	
	Tipulidae	<i>Hexatoma</i>	Predator	3	3	3	4	8	7	
		<i>Limnophila</i>	Predator	3					5	
		<i>Molophilus</i>	Shredder	3			1			
<i>Pedicia</i>		Predator	3			2				
<i>Tipula</i>		Shredder	3					4		
Coleoptera	Dytiscidae	<i>Agabetes</i>	Predator	5				1		
	Elmidae	<i>Optioservus</i>	Scraper	4				1	2	
	Psephenidae	<i>Ectopria</i>	Scraper	4				2		
Odonata	Cordulegastridae	<i>Cordulegaster</i>	Predator	3	1					
	Gomphidae	<i>Gomphidae</i>	Predator	3				2		
Megaloptera	Corydalidae	<i>Chauliodes</i>	Predator	5	1					
Decapoda	Cambaridae	<i>Orconectes</i>	Shredder; Collector-Gatherer	5	2	1				

Table 5: Impact Benthic Macroinvertebrate Individual Count Data – Unnamed Tributary of Pigeon Creek, Pigeonroost Creek, and Unnamed Tributary 5 of Miller Creek, May 2010

ORDER	FAMILY	GENUS	FUNCTIONAL FEEDING GROUP	TV	PRC Perennial	PRC Intermittent	UTPC Temporary	UTPC Permanent	UT5 MC Perennial	UT5 MC Intermittent
Ephemeroptera	Ameletidae	<i>Ameletus</i>	Scraper	0		1				
	Baetidae	<i>Barbaetis</i>	Collector-Gatherer	4	3	1		2		
	Ephemerellidae	<i>Attenella</i>	Collector-Gatherer	3			2			
		<i>Drunella</i>	Scraper	3	2	1				
		<i>Ephemerella</i>	Collector-Gatherer	3		1				
	Ephemeridae	<i>Ephemerella</i>	Collector-Gatherer	4		6	1			
	Heptageniidae	<i>Stenacron</i>	Collector-Gatherer	4	2		1			
		<i>Stenonema</i>	Scraper	4	1	1	1			
Leptophlebiidae	<i>Leptophlebia</i>	Collector-Gatherer	2	3		12	12			
Siphonuridae	<i>Siphonurus</i>	Collector-Gatherer	7	1	5					
Plecoptera	Chloroperlidae	<i>Utaperla</i>	Predator	1	3		25	6		
	Nemouridae	<i>Amphinemura</i>	Shredder	2		1		2		
	Peltoperlidae	<i>Tallaperla</i>	Shredder	2				11		
		<i>Viehopera</i>	Shredder	2			4			
	Perlidae	<i>Eccopectura</i>	Predator	1					1	1
	Perlodidae	<i>Isoperla</i>	Predator	2			1	1		
Trichoptera	Hydropsychidae	<i>Ceratopsyche</i>	Collector-Filterer	5	2	2		1		
		<i>Parapsyche</i>	Predator	5			1	3		
	Leptoceridae	<i>Oecetis</i>	Predator	4	1					
	Limnephilidae	<i>Hydatophylax</i>	Shredder	4		5				
	Molannidae	<i>Molanna</i>	Scraper	6	1					
	Odontoceridae	<i>Psilotreta</i>	Scraper	0			4			
	Polycentropodidae	<i>Neureclipsis</i>	Collector-Filterer	6	2		1	3		
		<i>Polycentropus</i>	Predator	6			3			
Rhyacophilidae	<i>Rhyacophila</i>	Predator	3		1	1				

Table 5: Impact Benthic Macroinvertebrate Individual Count Data – Unnamed Tributary of Pigeon Creek, Pigeonroost Creek, and Unnamed Tributary 5 of Miller Creek, May 2010

ORDER	FAMILY	GENUS	FUNCTIONAL FEEDING GROUP	TV	PRC Perennial	PRC Intermittent	UTPC Temporary	UTPC Permanent	UT5 MC Perennial	UT5 MC Intermittent	
Diptera	Ceratopogonidae	<i>Bezzia</i>	Predator	6			1				
	Chironomidae	<i>Demicryptochironomus</i>	Collector-Gatherer	6			1				
		<i>Microtendipes</i>	Collector-Filterer	6			1	1			
		<i>Paraboreochlus</i>	Collector-Gatherer	6			3				
		<i>Parachaetocladius</i>	Collector-Gatherer	6			2				
		<i>Pentaneura</i>	Predator	6	1						
		<i>Polypedilum</i>	Shredder	6	1						
		<i>Stempellina</i>	Collector-Gatherer	6			1				
		<i>Tanytarsus</i>	Collector-Filterer	6			4				
		<i>Thienemannimyia</i>	Predator	6	1	5	6	1			
		<i>Zavrelia</i>	Collector-Gatherer	6				3			
	<i>Zavrelimyia</i>	Predator	6			1					
	Dixidae	<i>Dixa</i>	Collector-Gatherer	1			2				
		<i>Dixella</i>	Collector-Gatherer	1			1				
	Empididae	<i>Chelifera</i>	Predator	6	1		1				
	Tabanidae	<i>Tabanus</i>	Predator	6			1				
	Tipulidae	<i>Antocha</i>	Collector-Gatherer	3						1	1
		<i>Dicranota</i>	Predator	3							2
		<i>Hexatoma</i>	Predator	3	2	13	10	4			
		<i>Molophilus</i>	Shredder	3			1				
<i>Pedicia</i>		Predator	3	11		12					
<i>Pilaria</i>		Predator	3		2		1				
<i>Prionocera</i>		Shredder	3			7					
<i>Tipula</i>	Shredder	3	2		2	1					
Coleoptera	Elmidae	<i>Optioservus</i>	Scraper	4				3			
	Hydrophilidae	<i>Hydrophilus</i>	Predator	5			1				
	Ptilodactylidae	<i>Anchytarsus</i>	Shredder	5			1				
Megaloptera	Corydalidae	<i>Chauliodes</i>	Predator	5	1		1	3			
Odonata	Gomphidae	<i>Stylogomphus</i>	Predator	3		2					
Decapoda	Cambaridae	<i>Orconectes</i>	Shredder; Collector-Gatherer	5	2	4	4				
Annelida	Tubificidae	<i>Tubificidae</i>	Collector-Gatherer	10						3	



**APPENDIX D**  
**SWMM SPREADSHEETS**



## **SWVM SUMMARY RESULTS TABLES**













# West Virginia Stream and Wetland Valuation Metric

UT to Pigeon Creek Summary

Multiple Stream Site Unit Comparison				
Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)	Sub-Totals	Running Balance (Debit or Credit)
UTPC, Temporary Intermittent	841.7494	596.16	-245.5894	-245.5894
UTPC, Permanent Intermittent	1343.01725	0	-1343.017246	-1588.606646
UTPC, Ephemeral	562.903375	0	-562.903375	-2151.510021
UT6 UTPC, Temporary Intermittent	79.7896458	59.585625	-20.20402083	-2171.714042
UT6 UTPC, Temporary Ephemeral	47.2591667	28.845	-18.41416667	-2190.128208
			0	-2190.128208
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			0	-2190.128208
			0	-2190.128208
			0	-2190.128208
			0	-2190.128208
			0	-2190.128208
<b>Sub-Totals</b>				
	2874.718833	684.590625		-2190.128208
<b>TOTAL NET</b>				

# West Virginia Stream and Wetland Valuation Metric

Pigeonroost Creek

<b>Multiple Stream Site Unit Comparison</b>				
<b>Site</b>	<b>Impact Unit Yield (Debit)</b>	<b>Mitigation Unit Yield (Credit)</b>	<b>Sub-Totals</b>	<b>Running Balance (Debit or Credit)</b>
<b>PRC, Temporary Perennial</b>	<b>1299.36378</b>	<b>870.6555</b>	-428.70828	-428.70828
<b>PRC, Permanent Perennial</b>	<b>362.74356</b>	<b>0</b>	-362.74356	-791.45184
<b>PRC, Intermittent</b>	<b>2715.1635</b>	<b>0</b>	-2715.1635	-3506.61534
<b>PRC, Ephemeral</b>	<b>43.9971875</b>	<b>0</b>	-43.9971875	-3550.612528
<b>LFPRC, Intermittent</b>	<b>44.9235</b>	<b>0</b>	-44.9235	-3595.536028
<b>LFPRC, Ephemeral</b>	<b>139.205</b>	<b>0</b>	-139.205	-3734.741028
<b>JT1 of UT1 of PRC, Temporary Ephemera</b>	<b>65.4259375</b>	<b>37.9603125</b>	-27.465625	-3762.206653
<b>UT2 of PRC, Temporary Intermittent</b>	<b>229.6808</b>	<b>157.231125</b>	-72.449675	-3834.656328
<b>UT3 of PRC, Temporary Intermittent</b>	<b>162.024525</b>	<b>114.908625</b>	-47.1159	-3881.772228
<b>UT5 of PRC, Intermittent</b>	<b>2600.16</b>	<b>0</b>	-2600.16	-6481.932228
<b>UT5 of PRC, Ephemeral</b>	<b>125.425</b>	<b>0</b>	-125.425	-6607.357228
			0	-6607.357228
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			0	-6607.357228
<b>Sub-Totals</b>		<b>7788.11279</b>	<b>1180.755563</b>	
<b>TOTAL NET</b>				<b>-6607.357228</b>







**SWVM WORKSHEETS -  
PROPOSED IMPACT AND ON-SITE RESTORATION CHANNELS**



# West Virginia Stream and Wetland Valuation Metric

RTB, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 34.27" N	Lon.	82° 14' 57.78" W	WEATHER:	75 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			RTB - Ruth Trace Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		Same (Mitigation is restoration of temporary impacts)		
STREAM IMPACT LENGTH:	744	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 34.27" N	Lon.	82° 14' 57.78" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	744

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	7
2. Embeddedness	0-20		6
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		6
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		12
7. Frequency of Riffles (or bends)	0-20		10
8. Bank Stability (LB & RB)	0-20		13
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		111
Sub-Total			0.555
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	37
pH			
8.1-9.0 = 45 points	0-80		8.27
DO			
	10-30		10.73
Sub-Total			0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Very Good	0-100	0-1	77.13
Sub-Total			0.7713

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	
pH			
8.1-9.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		12
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		115
Sub-Total			0.575
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	0-80		8.27
DO			
>5.0 = 30 points	10-30		10.73
Sub-Total			0.375
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		15
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		132
Sub-Total			0.66
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	0-80		8.27
DO			
>5.0 = 30 points	10-30		10.73
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		150
Sub-Total			0.75
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	0-80		8.27
DO			
>5.0 = 30 points	10-30		10.73
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7171	744	533.5224

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	744	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.54333333	744	404.24

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.655	744	487.32

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.685	744	509.64



# West Virginia Stream and Wetland Valuation Metric

RTB, Temporary Perennial (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.322695
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.28684

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

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.326635	744	987.01644	\$789,613.15

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	987.01644	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	404.24	Mitigation Projected at Ten Years Post Completion (Credit)	487.32	Mitigation Projected At Maturity (Credit)	509.64
<b>FINAL PROJECTED NET BALANCE</b>					404.24		487.32		509.64

## Part VI - Mitigation Considerations (Incentives)

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

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
50	0-50	Preservation and Re-vegetation
	51-150	
Buffer Width	Right Bank	
50	0-50	Preservation and Re-vegetation
	51-150	
Average Buffer Width/Side	50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RTB, Temporary Perennial	987.01644	688.014

# West Virginia Stream and Wetland Valuation Metric

RTB, Permanent Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 36.86"	Lon.	82° 14' 57.58"	WEATHER:	75 Sunny	DATE:	May 20, 2010		
STREAM CLASSIFICATION:	Perennial		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			RTB - Ruth Trace Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	1870	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)			Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)					
HGM Score (attach data forms):		Average			
Hydrology					
Biogeochemical Cycling			0		
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	8		
2. Embeddedness	0-20		7		
3. Velocity/ Depth Regime	0-20		10		
4. Sediment Deposition	0-20		7		
5. Channel Flow Status	0-20		10		
6. Channel Alteration	0-20		13		
7. Frequency of Riffles (or bends)	0-20		11		
8. Bank Stability (LB & RB)	0-20		14		
9. Vegetative Protection (LB & RB)	0-20		15		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18		
Total RBP Score	Suboptimal		113		
Sub-Total			0.565		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
<=99 - 90 points	0-90			36.5	
pH				0-1	
8.1-9.0 = 45 points	0-80				
DO		0-1			
	10-30			10.72	
Sub-Total			0.825		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
Good		0-100	0-1		
Sub-Total			74.31		
Sub-Total			0.7431		

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.711033333	1870	1329.63233

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

RTB, Permanent Perennial (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.319965
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.284413333

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

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.315411667	1870	2459.819817	\$1,967,855.85

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	2459.819817	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

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

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RTB, Permanent Perennial	2459.819817	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

RTB, Intermittent 3rd Order

(1 of 2)

USACE FILE NO./Project Name:		LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)		Lat.	37° 45' 14.51"	Lon.	82° 15' 13.03"	WEATHER:		75 Sunny		DATE:		May 20, 2010							
STREAM CLASSIFICATION:		Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				RTB - Ruth Trace Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree				MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)											
STREAM IMPACT LENGTH:		493		FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)		Lat.		Lon.		PRECIPITATION PAST 48 HRS:		0		Mitigation Length:							
Column No. 1- Impact Existing Condition (Debit)				Column No. 2- Mitigation Existing Condition - Baseline (Credit)				Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				Column No. 5- Mitigation Projected At Maturity (Credit)							
HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):							
Average				Average				Average				Average				Average							
Hydrology		0.63		Hydrology				Hydrology				Hydrology				Hydrology							
Biogeochemical Cycling		0.81		Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling							
Habitat		0.83		Habitat				Habitat				Habitat				Habitat							
PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators							
Points Scale				Points Scale				Points Scale				Points Scale				Points Scale							
Range				Range				Range				Range				Range							
Site Score				Site Score				Site Score				Site Score				Site Score							
PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)							
USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)							
1. Epifaunal Substrate/Available Cover		0-20		1. Epifaunal Substrate/Available Cover		0-20		1. Epifaunal Substrate/Available Cover		0-20		1. Epifaunal Substrate/Available Cover		0-20		1. Epifaunal Substrate/Available Cover		0-20					
2. Embeddedness		0-20		2. Embeddedness		0-20		2. Embeddedness		0-20		2. Embeddedness		0-20		2. Embeddedness		0-20					
3. Velocity/ Depth Regime		0-20		3. Velocity/ Depth Regime		0-20		3. Velocity/ Depth Regime		0-20		3. Velocity/ Depth Regime		0-20		3. Velocity/ Depth Regime		0-20					
4. Sediment Deposition		0-20		4. Sediment Deposition		0-20		4. Sediment Deposition		0-20		4. Sediment Deposition		0-20		4. Sediment Deposition		0-20					
5. Channel Flow Status		0-20		5. Channel Flow Status		0-20		5. Channel Flow Status		0-20		5. Channel Flow Status		0-20		5. Channel Flow Status		0-20					
6. Channel Alteration		0-20		6. Channel Alteration		0-20		6. Channel Alteration		0-20		6. Channel Alteration		0-20		6. Channel Alteration		0-20					
7. Frequency of Riffles (or bends)		0-20		7. Frequency of Riffles (or bends)		0-20		7. Frequency of Riffles (or bends)		0-20		7. Frequency of Riffles (or bends)		0-20		7. Frequency of Riffles (or bends)		0-20					
8. Bank Stability (LB & RB)		0-20		8. Bank Stability (LB & RB)		0-20		8. Bank Stability (LB & RB)		0-20		8. Bank Stability (LB & RB)		0-20		8. Bank Stability (LB & RB)		0-20					
9. Vegetative Protection (LB & RB)		0-20		9. Vegetative Protection (LB & RB)		0-20		9. Vegetative Protection (LB & RB)		0-20		9. Vegetative Protection (LB & RB)		0-20		9. Vegetative Protection (LB & RB)		0-20					
10. Riparian Vegetative Zone Width (LB & RB)		0-20		10. Riparian Vegetative Zone Width (LB & RB)		0-20		10. Riparian Vegetative Zone Width (LB & RB)		0-20		10. Riparian Vegetative Zone Width (LB & RB)		0-20		10. Riparian Vegetative Zone Width (LB & RB)		0-20					
Total RBP Score		Suboptimal		Total RBP Score		Poor		Total RBP Score		Poor		Total RBP Score		Poor		Total RBP Score		Poor					
Sub-Total		0.6		Sub-Total		0		Sub-Total		0		Sub-Total		0		Sub-Total		0					
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)							
WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)							
Specific Conductivity		0-90		Specific Conductivity		0-90		Specific Conductivity		0-90		Specific Conductivity		0-90		Specific Conductivity		0-90					
<=99 - 90 points				pH		0-1		pH		0-1		pH		0-1		pH		0-1					
8.1-9.0 = 45 points		0-80		DO		10-30		DO		10-30		DO		10-30		DO		10-30					
Sub-Total		0.825		Sub-Total		0		Sub-Total		0		Sub-Total		0		Sub-Total		0					
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)							
WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)							
Very Good		0-100		Sub-Total		0		Sub-Total		0		Sub-Total		0		Sub-Total		0					
Sub-Total		1		Sub-Total		0		Sub-Total		0		Sub-Total		0		Sub-Total		0					
PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score							
Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score	
0.7825		493		385.7725		0		0		0		0		0		0		0		0		0	

# West Virginia Stream and Wetland Valuation Metric

RTB, Intermittent 3rd Order  
(2 of 2)

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

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.352125
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.323333333

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.457958333	493	718.7734583	\$575,018.77

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	718.7734583	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

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

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RTB, Intermittent (3rd Order)	718.7734583	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

RTB, Intermittent 1st/2nd Order

(1 of 2)

USACE FILE NO./Project Name:		LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)		Lat.	37° 45' 16.74"	Lon.	82° 15' 11.90"	WEATHER:		75 Sunny		DATE:		May 20, 2010			
STREAM CLASSIFICATION:		Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				RTB - Ruth Trace Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree				MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)							
STREAM IMPACT LENGTH:		1107		FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)		Lat.		Lon.		PRECIPITATION PAST 48 HRS:		0		Mitigation Length:			
Column No. 1- Impact Existing Condition (Debit)				Column No. 2- Mitigation Existing Condition - Baseline (Credit)				Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):			
Average				Average				Average				Average				Average			
Hydrology		0.63		Hydrology				Hydrology				Hydrology				Hydrology			
Biogeochemical Cycling		0.81		Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling			
Habitat		0.83		Habitat				Habitat				Habitat				Habitat			
PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators			
Points Scale		Range		Points Scale		Range		Points Scale		Range		Points Scale		Range		Points Scale		Range	
Site Score				Site Score				Site Score				Site Score				Site Score			
PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover		0-20		1. Epifaunal Substrate/Available Cover		0-20		1. Epifaunal Substrate/Available Cover		0-20		1. Epifaunal Substrate/Available Cover		0-20		1. Epifaunal Substrate/Available Cover		0-20	
2. Embeddedness		0-20		2. Embeddedness		0-20		2. Embeddedness		0-20		2. Embeddedness		0-20		2. Embeddedness		0-20	
3. Velocity/ Depth Regime		0-20		3. Velocity/ Depth Regime		0-20		3. Velocity/ Depth Regime		0-20		3. Velocity/ Depth Regime		0-20		3. Velocity/ Depth Regime		0-20	
4. Sediment Deposition		0-20		4. Sediment Deposition		0-20		4. Sediment Deposition		0-20		4. Sediment Deposition		0-20		4. Sediment Deposition		0-20	
5. Channel Flow Status		0-20		5. Channel Flow Status		0-20		5. Channel Flow Status		0-20		5. Channel Flow Status		0-20		5. Channel Flow Status		0-20	
6. Channel Alteration		0-20		6. Channel Alteration		0-20		6. Channel Alteration		0-20		6. Channel Alteration		0-20		6. Channel Alteration		0-20	
7. Frequency of Riffles (or bends)		0-20		7. Frequency of Riffles (or bends)		0-20		7. Frequency of Riffles (or bends)		0-20		7. Frequency of Riffles (or bends)		0-20		7. Frequency of Riffles (or bends)		0-20	
8. Bank Stability (LB & RB)		0-20		8. Bank Stability (LB & RB)		0-20		8. Bank Stability (LB & RB)		0-20		8. Bank Stability (LB & RB)		0-20		8. Bank Stability (LB & RB)		0-20	
9. Vegetative Protection (LB & RB)		0-20		9. Vegetative Protection (LB & RB)		0-20		9. Vegetative Protection (LB & RB)		0-20		9. Vegetative Protection (LB & RB)		0-20		9. Vegetative Protection (LB & RB)		0-20	
10. Riparian Vegetative Zone Width (LB & RB)		0-20		10. Riparian Vegetative Zone Width (LB & RB)		0-20		10. Riparian Vegetative Zone Width (LB & RB)		0-20		10. Riparian Vegetative Zone Width (LB & RB)		0-20		10. Riparian Vegetative Zone Width (LB & RB)		0-20	
Total RBP Score		Marginal		Total RBP Score		Poor		Total RBP Score		Poor		Total RBP Score		Poor		Total RBP Score		Poor	
Sub-Total		0.505		Sub-Total		0		Sub-Total		0		Sub-Total		0		Sub-Total		0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90		Specific Conductivity		0-90		Specific Conductivity		0-90		Specific Conductivity		0-90		Specific Conductivity		0-90	
<=99 - 90 points				pH		0-1		pH		0-1		pH		0-1		pH		0-1	
8.1-9.0 = 45 points		0-80		DO		10-30		DO		10-30		DO		10-30		DO		10-30	
Sub-Total		0.825		Sub-Total		0		Sub-Total		0		Sub-Total		0		Sub-Total		0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)			
Good		0-100		Sub-Total		0		Sub-Total		0		Sub-Total		0		Sub-Total		0	
Sub-Total		0.698		Sub-Total		0		Sub-Total		0		Sub-Total		0		Sub-Total		0	
PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score			
Index		Linear Feet		Index		Linear Feet		Index		Linear Feet		Index		Linear Feet		Index		Linear Feet	
Unit Score				Unit Score				Unit Score				Unit Score				Unit Score			
0.716333333		1107		0		0		0		0		0		0		0		0	
792.981				0		0		0		0		0		0		0		0	

# West Virginia Stream and Wetland Valuation Metric

RTB, Intermittent 1st/2nd Order  
(2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.32235		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.2704		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.309083333	1107	1449.15525	\$1,159,324.20

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1449.15525	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RTB, Intermittent (1st and 2nd Order)	1449.15525	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

RTB, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 13.88"	Lon.	82° 15' 29.96"	WEATHER:	75 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			RTB - Ruth Trace Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	130	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0		Mitigation Length:		

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):				Average
Hydrology	0.68			0.75333333
Biogeochemical Cycling	0.84			
Habitat	0.74			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		16	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		14	
9. Vegetative Protection (LB & RB)	0-20		14	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Marginal		93	
Sub-Total			0.465	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity	100-199 = 85 points		0-1	
pH	5.6-6.0 = 45 points			
DO	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
0	0-100	0-1	0	
Sub-Total			0	

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.655416667	130	85.2041667

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

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

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

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



# West Virginia Stream and Wetland Valuation Metric

RTB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.2949375		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.223		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.173354167	130	152.5360417	\$122,028.83

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	152.5360417	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RTB, Ephemeral	152.5360417	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT3 of RTB, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 48.01" N	Lon.	82° 14' 47.86" W	WEATHER:	75 Sunny	DATE:	May 20, 2010							
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				UT3 of RTB - 3rd Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)					
STREAM IMPACT LENGTH:	65	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 48.01" N	Lon.	82° 14' 47.86" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	65					
Column No. 1- Impact Existing Condition (Debit)			Column No. 2- Mitigation Existing Condition - Baseline (Credit)			Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			Column No. 5- Mitigation Projected At Maturity (Credit)					
HGM Score (attach data forms):			HGM Score (attach data forms):			HGM Score (attach data forms):			HGM Score (attach data forms):			HGM Score (attach data forms):					
Average			Average			Average			Average			Average					
Hydrology			Hydrology			Hydrology			Hydrology			Hydrology					
0.69						0.68			0.68			0.74					
Biogeochemical Cycling			Biogeochemical Cycling			Biogeochemical Cycling			Biogeochemical Cycling			Biogeochemical Cycling					
0.82						0.5			0.69			0.79					
Habitat			Habitat			Habitat			Habitat			Habitat					
0.86						0.57			0.63			0.87					
PART I - Physical, Chemical and Biological Indicators																	
Points			Points			Points			Points			Points					
Range			Range			Range			Range			Range					
Site Score			Site Score			Site Score			Site Score			Site Score					
PHYSICAL INDICATOR (Applies to all streams classifications)																	
USEPA RBP (High Gradient Data Sheet)																	
1. Epifaunal Substrate/Available Cover 0-20																	
5																	
2. Embeddedness 0-20																	
11																	
3. Velocity/ Depth Regime 0-20																	
8																	
4. Sediment Deposition 0-20																	
11																	
5. Channel Flow Status 0-20																	
1																	
6. Channel Alteration 0-20																	
17																	
7. Frequency of Riffles (or bends) 0-20																	
15																	
8. Bank Stability (LB & RB) 0-20																	
9																	
9. Vegetative Protection (LB & RB) 0-20																	
16																	
10. Riparian Vegetative Zone Width (LB & RB) 0-20																	
20																	
Total RBP Score Suboptimal																	
113																	
Sub-Total																	
0.565																	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)																	
WVDEP Water Quality Indicators (General)																	
Specific Conductivity																	
<=99 - 90 points 0-90																	
30																	
pH																	
6.0-8.0 = 80 points 0-80																	
7.87																	
DO																	
>5.0 = 30 points 10-30																	
10.77																	
Sub-Total																	
1																	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)																	
WV Stream Condition Index (WVSCI)																	
Very Good 0-100 0-1																	
78.48																	
Sub-Total																	
0.7848																	
PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score					
Index			Index			Index			Index			Index					
Linear Feet			Linear Feet			Linear Feet			Linear Feet			Linear Feet					
Unit Score			Unit Score			Unit Score			Unit Score			Unit Score					
0.78663333			65			51.1311667			0			65			0		
0.59333333			65			38.5666667			0.69166667			65			44.9583333		
0.77166667			65			50.1583333											

# West Virginia Stream and Wetland Valuation Metric

UT3 of RTB, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.353985		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.313306667		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.453925	65	94.505125	\$75,604.10

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	94.505125	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	38.56666667	Mitigation Projected at Ten Years Post Completion (Credit)	44.95833333	Mitigation Projected At Maturity (Credit)	50.15833333
<b>FINAL PROJECTED NET BALANCE</b>					38.56666667	44.95833333			

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
50	50	Average Buffer Width/Side	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT3 RTB, Temporary Intermittent	94.505125	67.71375

# West Virginia Stream and Wetland Valuation Metric

UT8 of RTB, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 34.14" N	Lon.	82° 14' 58.34" W	WEATHER:	75 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	UT8 of RTB - 8th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		Same (Mitigation is restoration of temporary impacts)			
STREAM IMPACT LENGTH:	130	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 34.14" N	Lon.	82° 14' 58.34" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	130

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.69	0.79		
Biogeochemical Cycling	0.82			
Habitat	0.86			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	4	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		3	
4. Sediment Deposition	0-20		11	
5. Channel Flow Status	0-20		3	
6. Channel Alteration	0-20		18	
7. Frequency of Riffles (or bends)	0-20		8	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		14	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Marginal		106	
Sub-Total			0.53	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	30	
pH				
6.0-8.0 = 80 points	0-80		7.87	
DO				
	10-30		10.77	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Very Good	0-100	0-1	78.48	
Sub-Total			0.7848	

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

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.68	0.5833333		
Biogeochemical Cycling	0.5			
Habitat	0.57			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	11	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		11	
5. Channel Flow Status	0-20		8	
6. Channel Alteration	0-20		18	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		6	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6	
Total RBP Score	Suboptimal		117	
Sub-Total			0.585	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	5-90		7.87	
DO				
>5.0 = 30 points	10-30		10.77	
Sub-Total			0.55	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.68	0.6666667		
Biogeochemical Cycling	0.69			
Habitat	0.63			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	13	
2. Embeddedness	0-20		13	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		13	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		18	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		11	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11	
Total RBP Score	Suboptimal		135	
Sub-Total			0.675	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	5-90		7.87	
DO				
>5.0 = 30 points	10-30		10.77	
Sub-Total			0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.74	0.8		
Biogeochemical Cycling	0.79			
Habitat	0.87			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	15	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		15	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		18	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	
Total RBP Score	Suboptimal		151	
Sub-Total			0.755	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	5-90		7.87	
DO				
>5.0 = 30 points	10-30		10.77	
Sub-Total			0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7808	130	101.504

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	130	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.59416667	130	77.241667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.6925	130	90.025

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7725	130	100.425

# West Virginia Stream and Wetland Valuation Metric

UT8 of RTB, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.35136		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.30864		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.4408	130	187.304	\$149,843.20

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	187.304	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	77.24166667	Mitigation Projected at Ten Years Post Completion (Credit)	90.025	Mitigation Projected At Maturity (Credit)	100.425
<b>FINAL PROJECTED NET BALANCE</b>					77.24166667		90.025		100.425

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration		<b>Buffer Width</b>	<b>Left Bank</b>
Level II Restoration		50	0-50 51-150
Level III Restoration		<b>Buffer Width</b>	<b>Right Bank</b>
		50	0-50 51-150
		<b>Average Buffer Width/Side</b>	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT8 RTB, Temporary Intermittent	187.304	135.57375

# West Virginia Stream and Wetland Valuation Metric

UT10 of RTB, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 31.29" N	Lon.	82° 14' 58.18" W	WEATHER:	75 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT10 of RTB - 10th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		Same (Mitigation is restoration of temporary impacts)		
STREAM IMPACT LENGTH:	125	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 31.29" N	Lon.	82° 14' 58.18" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	125

Column No. 1- Impact Existing Condition (Debit)		
HGM Score (attach data forms):	Average	
Hydrology		
Biogeochemical Cycling	0	
Habitat		
PART I - Physical, Chemical and Biological Indicators		
	Points Scale	Range
		Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)		
USEPA RBP (High Gradient Data Sheet)		
1. Epifaunal Substrate/Available Cover	0-20	13
2. Embeddedness	0-20	14
3. Velocity/ Depth Regime	0-20	12
4. Sediment Deposition	0-20	14
5. Channel Flow Status	0-20	17
6. Channel Alteration	0-20	16
7. Frequency of Riffles (or bends)	0-20	15
8. Bank Stability (LB & RB)	0-20	11
9. Vegetative Protection (LB & RB)	0-20	15
10. Riparian Vegetative Zone Width (LB & RB)	0-20	18
Total RBP Score	Suboptimal	145
Sub-Total		0.725
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)		
WVDEP Water Quality Indicators (General)		
Specific Conductivity		
<=99 - 90 points	0-90	34
pH		
8.1-9.0 = 45 points	0-80	8.36
DO		
	10-30	10.95
Sub-Total		0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)		
WV Stream Condition Index (WVSCI)		
Good	0-100	0-1
Sub-Total		69.8
Sub-Total		0.698

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

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)		
HGM Score (attach data forms):	Average	
Hydrology		
Biogeochemical Cycling	0	
Habitat		
PART I - Physical, Chemical and Biological Indicators		
	Points Scale	Range
		Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)		
USEPA RBP (High Gradient Data Sheet)		
1. Epifaunal Substrate/Available Cover	0-20	11
2. Embeddedness	0-20	11
3. Velocity/ Depth Regime	0-20	13
4. Sediment Deposition	0-20	11
5. Channel Flow Status	0-20	8
6. Channel Alteration	0-20	17
7. Frequency of Riffles (or bends)	0-20	15
8. Bank Stability (LB & RB)	0-20	18
9. Vegetative Protection (LB & RB)	0-20	6
10. Riparian Vegetative Zone Width (LB & RB)	0-20	6
Total RBP Score	Suboptimal	116
Sub-Total		0.58
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)		
WVDEP Water Quality Indicators (General)		
Specific Conductivity		
500-599 - 50 points	0-90	500
pH		
8.1-9.0 = 45 points	5-90	8.36
DO		
>5.0 = 30 points	10-30	10.95
Sub-Total		0.375
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)		
WV Stream Condition Index (WVSCI)		
Good	0-100	0-1
Sub-Total		68
Sub-Total		0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)		
HGM Score (attach data forms):	Average	
Hydrology		
Biogeochemical Cycling	0	
Habitat		
PART I - Physical, Chemical and Biological Indicators		
	Points Scale	Range
		Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)		
USEPA RBP (High Gradient Data Sheet)		
1. Epifaunal Substrate/Available Cover	0-20	13
2. Embeddedness	0-20	13
3. Velocity/ Depth Regime	0-20	13
4. Sediment Deposition	0-20	13
5. Channel Flow Status	0-20	10
6. Channel Alteration	0-20	17
7. Frequency of Riffles (or bends)	0-20	15
8. Bank Stability (LB & RB)	0-20	18
9. Vegetative Protection (LB & RB)	0-20	11
10. Riparian Vegetative Zone Width (LB & RB)	0-20	11
Total RBP Score	Suboptimal	134
Sub-Total		0.67
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)		
WVDEP Water Quality Indicators (General)		
Specific Conductivity		
500-599 - 50 points	0-90	500
pH		
8.1-9.0 = 45 points	5-90	8.36
DO		
>5.0 = 30 points	10-30	10.95
Sub-Total		0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)		
WV Stream Condition Index (WVSCI)		
Good	0-100	0-1
Sub-Total		68
Sub-Total		0.68

Column No. 5- Mitigation Projected At Maturity (Credit)		
HGM Score (attach data forms):	Average	
Hydrology		
Biogeochemical Cycling	0	
Habitat		
PART I - Physical, Chemical and Biological Indicators		
	Points Scale	Range
		Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)		
USEPA RBP (High Gradient Data Sheet)		
1. Epifaunal Substrate/Available Cover	0-20	15
2. Embeddedness	0-20	15
3. Velocity/ Depth Regime	0-20	13
4. Sediment Deposition	0-20	15
5. Channel Flow Status	0-20	10
6. Channel Alteration	0-20	17
7. Frequency of Riffles (or bends)	0-20	15
8. Bank Stability (LB & RB)	0-20	18
9. Vegetative Protection (LB & RB)	0-20	16
10. Riparian Vegetative Zone Width (LB & RB)	0-20	16
Total RBP Score	Suboptimal	150
Sub-Total		0.75
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)		
WVDEP Water Quality Indicators (General)		
Specific Conductivity		
500-599 - 50 points	0-90	500
pH		
8.1-9.0 = 45 points	5-90	8.36
DO		
>5.0 = 30 points	10-30	10.95
Sub-Total		0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)		
WV Stream Condition Index (WVSCI)		
Good	0-100	0-1
Sub-Total		68
Sub-Total		0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.749333333	125	93.6666667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	125	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.545	125	68.125

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.658333333	125	82.2916667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.685	125	85.625

# West Virginia Stream and Wetland Valuation Metric

UT10 of RTB, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3372		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.299733333		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.386266667	125	173.2833333	\$138,626.67

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	173.2833333	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	68.125	Mitigation Projected at Ten Years Post Completion (Credit)	82.29166667	Mitigation Projected At Maturity (Credit)	85.625
<b>FINAL PROJECTED NET BALANCE</b>					68.125		82.29166667		85.625

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
50	50	Average Buffer Width/Side	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT10 of RTB, Temporary Perennial	173.2833333	115.59375

# West Virginia Stream and Wetland Valuation Metric

UT12 of RTB, Intermittent (1 of 2)

USACE FILE NO./Project Name:		LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)		Lat.		37° 45' 28.79"		Lon.		82° 15' 3.03"		WEATHER:		75 Sunny		DATE:		May 20, 2010									
STREAM CLASSIFICATION:		Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				UT12 of RTB - 12th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree				MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)																	
STREAM IMPACT LENGTH:		190		FORM OF MITIGATION:				MIT COORDINATES: (in Decimal Degrees)		Lat.				Lon.		PRECIPITATION PAST 48 HRS:		0		Mitigation Length:									
<b>Column No. 1- Impact Existing Condition (Debit)</b>						<b>Column No. 2- Mitigation Existing Condition - Baseline (Credit)</b>						<b>Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)</b>						<b>Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)</b>						<b>Column No. 5- Mitigation Projected At Maturity (Credit)</b>					
HGM Score (attach data forms):						HGM Score (attach data forms):						HGM Score (attach data forms):						HGM Score (attach data forms):						HGM Score (attach data forms):					
Average						Average						Average						Average						Average					
Hydrology		0.69				0				0				0				0				0							
Biogeochemical Cycling		0.82				0				0				0				0				0							
Habitat		0.86				0				0				0				0				0							
PART I - Physical, Chemical and Biological Indicators						PART I - Physical, Chemical and Biological Indicators						PART I - Physical, Chemical and Biological Indicators						PART I - Physical, Chemical and Biological Indicators						PART I - Physical, Chemical and Biological Indicators					
		Points Scale		Range		Site Score				Points Scale		Range		Site Score				Points Scale		Range		Site Score							
PHYSICAL INDICATOR (Applies to all streams classifications)						PHYSICAL INDICATOR (Applies to all streams classifications)						PHYSICAL INDICATOR (Applies to all streams classifications)						PHYSICAL INDICATOR (Applies to all streams classifications)						PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)						USEPA RBP (High Gradient Data Sheet)						USEPA RBP (High Gradient Data Sheet)						USEPA RBP (High Gradient Data Sheet)						USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover		0-20		0-1		3		0-20		0-1		0		0-20		0-1		0		0-20		0-1		0					
2. Embeddedness		0-20		0-1		2		0-20		0-1		0		0-20		0-1		0		0-20		0-1		0					
3. Velocity/ Depth Regime		0-20		0-1		2		0-20		0-1		0		0-20		0-1		0		0-20		0-1		0					
4. Sediment Deposition		0-20		0-1		2		0-20		0-1		0		0-20		0-1		0		0-20		0-1		0					
5. Channel Flow Status		0-20		0-1		1		0-20		0-1		0		0-20		0-1		0		0-20		0-1		0					
6. Channel Alteration		0-20		0-1		14		0-20		0-1		0		0-20		0-1		0		0-20		0-1		0					
7. Frequency of Riffles (or bends)		0-20		0-1		2		0-20		0-1		0		0-20		0-1		0		0-20		0-1		0					
8. Bank Stability (LB & RB)		0-20		0-1		15		0-20		0-1		0		0-20		0-1		0		0-20		0-1		0					
9. Vegetative Protection (LB & RB)		0-20		0-1		16		0-20		0-1		0		0-20		0-1		0		0-20		0-1		0					
10. Riparian Vegetative Zone Width (LB & RB)		0-20		0-1		18		0-20		0-1		0		0-20		0-1		0		0-20		0-1		0					
Total RBP Score		Marginal				75		Poor				0		Poor				0		Poor				0					
Sub-Total						0.375						0						0						0					
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)						CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)						CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)						CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)						CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)						WVDEP Water Quality Indicators (General)						WVDEP Water Quality Indicators (General)						WVDEP Water Quality Indicators (General)						WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-90		0-1		30		0-90		0-1		0		0-90		0-1		0		0-90		0-1		0					
pH		6.0-8.0 = 80 points		0-80		7.87		5-90		0-1		0		5-90		0-1		0		5-90		0-1		0					
DO		10-30		0-1		10.77		10-30		0-1		0		10-30		0-1		0		10-30		0-1		0					
Sub-Total						1						0						0						0					
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)						BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)						BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)						BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)						BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)						WV Stream Condition Index (WVSCI)						WV Stream Condition Index (WVSCI)						WV Stream Condition Index (WVSCI)						WV Stream Condition Index (WVSCI)					
Very Good		0-100		0-1		78.48		0-100		0-1		0		0-100		0-1		0		0-100		0-1		0					
Sub-Total						0.7848						0						0						0					
PART II - Index and Unit Score						PART II - Index and Unit Score						PART II - Index and Unit Score						PART II - Index and Unit Score						PART II - Index and Unit Score					
Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score		Index					
0.754966667		190		143.443667		0		0		0		0		0		0		0		0		0		0					



# West Virginia Stream and Wetland Valuation Metric

UT12 of RTB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.339735		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.287973333		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.382675	190	262.70825	\$210,166.60

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	262.70825	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT12 of RTB, Intermittent	262.70825	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT12 of RTB, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 30.65"	Lon.	82° 15' 4.59"	WEATHER:	75 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT12 of RTB - 12th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	110	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.68	0.75333333		
Biogeochemical Cycling	0.84			
Habitat	0.74			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		16	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		14	
9. Vegetative Protection (LB & RB)	0-20		14	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20	
Total RBP Score	Marginal	95		
Sub-Total	0.475			
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
100-199 - 85 points	0-90			
pH				
5.6-6.0 = 45 points	0-80			
DO		10-30		
Sub-Total	0			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
0		0-100	0-1	
Sub-Total	0			

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.657916667	110	72.3708333

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT12 of RTB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.2960625		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.225		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.178979167	110	129.6877083	\$103,750.17

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	129.6877083	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
Buffer Width	Left Bank		
0-50	51-150		
Buffer Width	Right Bank		
0-50	51-150		
Average Buffer Width/Side	0		

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT12 of RTB, Ephemeral	129.6877083	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT13 of RTB, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 28.04"	Lon.	82° 15' 4.92"	WEATHER:	75 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		UT13 of RTB - 13th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	150	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)		Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.69	0.79		
Biogeochemical Cycling	0.82			
Habitat	0.86			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	3	
2. Embeddedness	0-20		3	
3. Velocity/ Depth Regime	0-20		1	
4. Sediment Deposition	0-20		3	
5. Channel Flow Status	0-20		1	
6. Channel Alteration	0-20		15	
7. Frequency of Riffles (or bends)	0-20		4	
8. Bank Stability (LB & RB)	0-20		13	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Marginal		77	
Sub-Total			0.385	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	30	
<=99 - 90 points				0-90
pH				
6.0-8.0 = 80 points		0-80	7.87	
DO				
		10-30	10.77	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Very Good		0-100	0-1	
			78.48	
Sub-Total			0.7848	

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.756633333	150	113.495

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT13 of RTB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.340485		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.289306667		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.386425	150	207.96375	\$166,371.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	207.96375	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT13 of RTB, Intermittent	207.96375	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT13 of RTB, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 28.77"	Lon.	82° 15' 5.25"	WEATHER:	75 Sunny	DATE:	May 20, 2010		
STREAM CLASSIFICATION:	Ephemeral		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT13 of RTB - 13th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	122	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)			Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.68	0.75333333		
Biogeochemical Cycling	0.84			
Habitat	0.74			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		10	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		16	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		15	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	
Total RBP Score	Marginal		89	
Sub-Total			0.445	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
100-199 - 85 points	0-90	0-1		
pH				
5.6-6.0 = 45 points	0-80			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
0	0-100	0-1		
Sub-Total			0	

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.650416667	122	79.3508333

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT13 of RTB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.2926875		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.219		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.162104167	122	141.7767083	\$113,421.37

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	141.7767083	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT13 of RTB, Ephemeral	141.7767083	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT15 of RTB, Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 17.61"	Lon.	82° 15' 10.04"	WEATHER:	75 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT15 of RTB - 15th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	50	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)			PRECIPITATION PAST 48 HRS:	0	Mitigation Length:		

Column No. 1- Impact Existing Condition (Debit)	Column No. 2- Mitigation Existing Condition - Baseline (Credit)	Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)	Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)	Column No. 5- Mitigation Projected At Maturity (Credit)																																																																																																																																																																																																																																																
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PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.713266667	50	35.6633333

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

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Index	Linear Feet	Unit Score	
0	0	0	

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Index	Linear Feet	Unit Score	
0	0	0	



# West Virginia Stream and Wetland Valuation Metric

UT15 of RTB, Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.32097		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.285306667		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.319543333	50	65.97716667	\$52,781.73

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	65.97716667	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT15 of RTB, Perennial	65.97716667	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT15 of RTB, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 16.24"	Lon.	82° 15' 8.63"	WEATHER:	75 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				UT15 of RTB - 15th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree				MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	
STREAM IMPACT LENGTH:	100	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)		Lat.	Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.69	0.79		
Biogeochemical Cycling	0.82			
Habitat	0.86			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	14	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		8	
4. Sediment Deposition	0-20		13	
5. Channel Flow Status	0-20		12	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		5	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		14	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20	
Total RBP Score	Suboptimal		129	
Sub-Total			0.645	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
<=99 - 90 points	0-90			30
pH				0-1
6.0-8.0 = 80 points	0-80	7.87		
DO		0-1		
	10-30			10.77
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Very Good		0-100	0-1	78.48
Sub-Total				0.7848

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.799966667	100	79.9966667

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT15 of RTB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.359985		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.323973333		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.483925	100	148.3925	\$118,714.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	148.3925	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT15 of RTB, Intermittent	148.3925	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT15 of RTB, Ephemeral

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 15.13"	Lon.	82° 15' 6.61"	WEATHER:	75 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Ephemeral		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		UT15 of RTB - 15th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	820	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)		Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.68	0.75333333	
Biogeochemical Cycling	0.84		
Habitat	0.74		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		12
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		9
9. Vegetative Protection (LB & RB)	0-20		10
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		76
Sub-Total			0.38
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
100-199 - 85 points	0-90		
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.634166667	820	520.016667

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT15 of RTB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.285375		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.206		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.125541667	820	922.9441667	\$738,355.33

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	922.9441667	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT15 of RTB, Ephemeral	922.9441667	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT17 of RTB, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 9.54"	Lon.	82° 15' 17.82"	WEATHER:	65 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT17 of RTB - 17th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	600	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.63	0.75666667		
Biogeochemical Cycling	0.81			
Habitat	0.83			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	17	
2. Embeddedness	0-20		12	
3. Velocity/ Depth Regime	0-20		11	
4. Sediment Deposition	0-20		13	
5. Channel Flow Status	0-20		14	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		6	
8. Bank Stability (LB & RB)	0-20		12	
9. Vegetative Protection (LB & RB)	0-20		12	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		131	
Sub-Total			0.655	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	34	
<=99 - 90 points	0-90			
pH			8.36	
8.1-9.0 = 45 points		0-80		
DO		10-30	10.95	
Sub-Total			0.825	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good		0-100	0-1	69.8
Sub-Total				0.698

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.741333333	600	444.8

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT17 of RTB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3336		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.2904		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.365333333	600	819.2	\$655,360.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	819.2	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		<b>Buffer Width</b>	<b>Left Bank</b>
Level II Restoration			0-50
Level III Restoration			51-150
		<b>Buffer Width</b>	<b>Right Bank</b>
			0-50
			51-150
		<b>Average Buffer Width/Side</b>	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT17 of RTB, Intermittent	819.2	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT17 of RTB, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 5.19"	Lon.	82° 15' 20.62"	WEATHER:	65 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT17 of RTB - 17th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	486	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):			Average	
Hydrology	0.68		0.75333333	
Biogeochemical Cycling	0.84			
Habitat	0.74			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		13	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		8	
9. Vegetative Protection (LB & RB)	0-20		9	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Marginal		79	
Sub-Total			0.395	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
100-199 - 85 points	0-90			
pH				
5.6-6.0 = 45 points	0-80			
DO		10-30		
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
0				
Sub-Total				0

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.637916667	486	310.0275

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

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

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

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



# West Virginia Stream and Wetland Valuation Metric

UT17 of RTB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.2870625		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.209		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.133979167	486	551.113875	\$440,891.10

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	551.113875	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT17 of RTB, Ephemeral	551.113875	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT17 RTB, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 7.67"	Lon.	82° 15' 17.04"	WEATHER:	65 Sunny	DATE:	May 20, 2010
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		UT1 of UT17 of RTB - 1st UNT of 17th UNT of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	500	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)		Lat.		Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.69	0.79	
Biogeochemical Cycling	0.82		
Habitat	0.86		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		9
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		9
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		6
8. Bank Stability (LB & RB)	0-20		7
9. Vegetative Protection (LB & RB)	0-20		9
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		120
Sub-Total			0.6
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	30
<=99 - 90 points	0-90		
pH			7.87
6.0-8.0 = 80 points	0-80		
DO			10.77
	10-30		
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Very Good	0-100	0-1	78.48
Sub-Total			0.7848

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.792466667	500	396.233333

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT17 RTB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.35661		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.317973333		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.46705	500	733.525	\$586,820.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	733.525	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of UT17 of RTB, Intermittent	733.525	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT17 RTB, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 2.58"	Lon.	82° 15' 12.84"	WEATHER:	65 Sunny	DATE:	May 20, 2010		
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1 of UT17 of RTB - 1st UNT of 17th UNT of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	300	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)					Column No. 2- Mitigation Existing Condition - Baseline (Credit)					Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)					Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)					Column No. 5- Mitigation Projected At Maturity (Credit)													
<b>HGM Score (attach data forms):</b>					<b>HGM Score (attach data forms):</b>					<b>HGM Score (attach data forms):</b>					<b>HGM Score (attach data forms):</b>					<b>HGM Score (attach data forms):</b>													
				Average					Average					Average					Average					Average									
Hydrology		0.68		0.75333333	Hydrology				0	Hydrology				0	Hydrology				0	Hydrology				0	Hydrology				0				
Biogeochemical Cycling		0.84			Biogeochemical Cycling					Biogeochemical Cycling					Biogeochemical Cycling					Biogeochemical Cycling					Biogeochemical Cycling					Biogeochemical Cycling			
Habitat		0.74			Habitat					Habitat					Habitat					Habitat					Habitat					Habitat			
PART I - Physical, Chemical and Biological Indicators					PART I - Physical, Chemical and Biological Indicators					PART I - Physical, Chemical and Biological Indicators					PART I - Physical, Chemical and Biological Indicators					PART I - Physical, Chemical and Biological Indicators													
		Points Scale	Range	Site Score			Points Scale	Range	Site Score			Points Scale	Range	Site Score			Points Scale	Range	Site Score			Points Scale	Range	Site Score			Points Scale	Range	Site Score				
PHYSICAL INDICATOR (Applies to all streams classifications)					PHYSICAL INDICATOR (Applies to all streams classifications)					PHYSICAL INDICATOR (Applies to all streams classifications)					PHYSICAL INDICATOR (Applies to all streams classifications)					PHYSICAL INDICATOR (Applies to all streams classifications)													
USEPA RBP (High Gradient Data Sheet)					USEPA RBP (High Gradient Data Sheet)					USEPA RBP (High Gradient Data Sheet)					USEPA RBP (High Gradient Data Sheet)					USEPA RBP (High Gradient Data Sheet)													
1. Epifaunal Substrate/Available Cover		0-20		0-1	1. Epifaunal Substrate/Available Cover		0-20		0-1	1. Epifaunal Substrate/Available Cover		0-20		0-1	1. Epifaunal Substrate/Available Cover		0-20		0-1	1. Epifaunal Substrate/Available Cover		0-20		0-1	1. Epifaunal Substrate/Available Cover		0-20		0-1				
2. Embeddedness		0-20			2. Embeddedness		0-20			2. Embeddedness		0-20			2. Embeddedness		0-20			2. Embeddedness		0-20			2. Embeddedness		0-20			2. Embeddedness		0-20	
3. Velocity/ Depth Regime		0-20			3. Velocity/ Depth Regime		0-20			3. Velocity/ Depth Regime		0-20			3. Velocity/ Depth Regime		0-20			3. Velocity/ Depth Regime		0-20			3. Velocity/ Depth Regime		0-20			3. Velocity/ Depth Regime		0-20	
4. Sediment Deposition		0-20			4. Sediment Deposition		0-20			4. Sediment Deposition		0-20			4. Sediment Deposition		0-20			4. Sediment Deposition		0-20			4. Sediment Deposition		0-20			4. Sediment Deposition		0-20	
5. Channel Flow Status		0-20			5. Channel Flow Status		0-20			5. Channel Flow Status		0-20			5. Channel Flow Status		0-20			5. Channel Flow Status		0-20			5. Channel Flow Status		0-20			5. Channel Flow Status		0-20	
6. Channel Alteration		0-20			6. Channel Alteration		0-20			6. Channel Alteration		0-20			6. Channel Alteration		0-20			6. Channel Alteration		0-20			6. Channel Alteration		0-20			6. Channel Alteration		0-20	
7. Frequency of Riffles (or bends)		0-20			7. Frequency of Riffles (or bends)		0-20			7. Frequency of Riffles (or bends)		0-20			7. Frequency of Riffles (or bends)		0-20			7. Frequency of Riffles (or bends)		0-20			7. Frequency of Riffles (or bends)		0-20			7. Frequency of Riffles (or bends)		0-20	
8. Bank Stability (LB & RB)		0-20			8. Bank Stability (LB & RB)		0-20			8. Bank Stability (LB & RB)		0-20			8. Bank Stability (LB & RB)		0-20			8. Bank Stability (LB & RB)		0-20			8. Bank Stability (LB & RB)		0-20			8. Bank Stability (LB & RB)		0-20	
9. Vegetative Protection (LB & RB)		0-20			9. Vegetative Protection (LB & RB)		0-20			9. Vegetative Protection (LB & RB)		0-20			9. Vegetative Protection (LB & RB)		0-20			9. Vegetative Protection (LB & RB)		0-20			9. Vegetative Protection (LB & RB)		0-20			9. Vegetative Protection (LB & RB)		0-20	
10. Riparian Vegetative Zone Width (LB & RB)		0-20			10. Riparian Vegetative Zone Width (LB & RB)		0-20			10. Riparian Vegetative Zone Width (LB & RB)		0-20			10. Riparian Vegetative Zone Width (LB & RB)		0-20			10. Riparian Vegetative Zone Width (LB & RB)		0-20			10. Riparian Vegetative Zone Width (LB & RB)		0-20			10. Riparian Vegetative Zone Width (LB & RB)		0-20	
Total RBP Score		Marginal		66		Total RBP Score		Poor		0		Total RBP Score		Poor		0		Total RBP Score		Poor		0		Total RBP Score		Poor		0					
Sub-Total				0.33		Sub-Total				0		Sub-Total				0		Sub-Total				0		Sub-Total				0					
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)													
WVDEP Water Quality Indicators (General)					WVDEP Water Quality Indicators (General)					WVDEP Water Quality Indicators (General)					WVDEP Water Quality Indicators (General)					WVDEP Water Quality Indicators (General)													
Specific Conductivity		100-199 - 85 points		0-1	Specific Conductivity		0-90		0-1	Specific Conductivity		0-90		0-1	Specific Conductivity		0-90		0-1	Specific Conductivity		0-90		0-1	Specific Conductivity		0-90		0-1				
pH		5.6-6.0 = 45 points			pH		5-90			pH		5-90			pH		5-90			pH		5-90			pH		5-90			pH		5-90	
DO		10-30			DO		10-30			DO		10-30			DO		10-30			DO		10-30			DO		10-30			DO		10-30	
Sub-Total					Sub-Total		0			Sub-Total		0			Sub-Total		0			Sub-Total		0			Sub-Total		0			Sub-Total		0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)													
WV Stream Condition Index (WVSCI)					WV Stream Condition Index (WVSCI)					WV Stream Condition Index (WVSCI)					WV Stream Condition Index (WVSCI)					WV Stream Condition Index (WVSCI)													
0		0-100		0-1	0		0-100		0-1	0		0-100		0-1	0		0-100		0-1	0		0-100		0-1	0		0-100		0-1				
Sub-Total					0		Sub-Total			0		Sub-Total			0		Sub-Total			0		Sub-Total			0		Sub-Total			0		Sub-Total	

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0.621666667	300	186.5		
0	0	0		
0	0	0		
0	0	0		
0	0	0		

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT17 RTB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.27975		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.196		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.097416667	300	329.225	\$263,380.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	329.225	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of UT17 of RTB, Ephemeral	329.225	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT18 of RTB, Intermittent (1 of 2)

USACE FILE NO./Project Name:		LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 14.26"	Lon.	82° 15' 18.60"	WEATHER:	65 Sunny	DATE:	May 20, 2010
STREAM CLASSIFICATION:		Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT18 of RTB - 18th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		
STREAM IMPACT LENGTH:		350	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)			Lat.	Lon.	PRECIPITATION PAST 48 HRS:		0	Mitigation Length:

Column No. 1- Impact Existing Condition (Debit)				Column No. 2- Mitigation Existing Condition - Baseline (Credit)				Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				Column No. 5- Mitigation Projected At Maturity (Credit)								
HGM Score (attach data forms):			Average	HGM Score (attach data forms):			Average	HGM Score (attach data forms):			Average	HGM Score (attach data forms):			Average	HGM Score (attach data forms):			Average					
Hydrology	0.69		0.79	Hydrology			0	Hydrology			0	Hydrology			0	Hydrology			0					
Biogeochemical Cycling	0.82			Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling				
Habitat	0.86			Habitat				Habitat				Habitat				Habitat				Habitat				
PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators								
	Points Scale	Range	Site Score		Points Scale	Range	Site Score		Points Scale	Range	Site Score		Points Scale	Range	Site Score		Points Scale	Range	Site Score					
PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)								
USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)								
1. Epifaunal Substrate/Available Cover	0-20	0-1	15	1. Epifaunal Substrate/Available Cover	0-20	0-1		1. Epifaunal Substrate/Available Cover	0-20	0-1		1. Epifaunal Substrate/Available Cover	0-20	0-1		1. Epifaunal Substrate/Available Cover	0-20	0-1						
2. Embeddedness	0-20		11	2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20		10	3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20		11	4. Sediment Deposition	0-20			4. Sediment Deposition	0-20			4. Sediment Deposition	0-20			4. Sediment Deposition	0-20			4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20		7	5. Channel Flow Status	0-20			5. Channel Flow Status	0-20			5. Channel Flow Status	0-20			5. Channel Flow Status	0-20			5. Channel Flow Status	0-20			
6. Channel Alteration	0-20		16	6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20		5	7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20		11	8. Bank Stability (LB & RB)	0-20			8. Bank Stability (LB & RB)	0-20			8. Bank Stability (LB & RB)	0-20			8. Bank Stability (LB & RB)	0-20			8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20		12	9. Vegetative Protection (LB & RB)	0-20			9. Vegetative Protection (LB & RB)	0-20			9. Vegetative Protection (LB & RB)	0-20			9. Vegetative Protection (LB & RB)	0-20			9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Suboptimal		116	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0	Total RBP Score	Poor		0					
Sub-Total				Sub-Total				Sub-Total				Sub-Total				Sub-Total								
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)								
WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)								
Specific Conductivity				Specific Conductivity				Specific Conductivity				Specific Conductivity				Specific Conductivity								
<=99 - 90 points	0-90	0-1	34	<=99 - 90 points	0-90	0-1		<=99 - 90 points	0-90	0-1		<=99 - 90 points	0-90	0-1		<=99 - 90 points	0-90	0-1						
pH				pH				pH				pH				pH								
6.0-8.0 = 80 points	0-80		7.92	6.0-8.0 = 80 points	0-80			6.0-8.0 = 80 points	0-80			6.0-8.0 = 80 points	0-80			6.0-8.0 = 80 points	0-80			6.0-8.0 = 80 points	0-80			
DO				DO				DO				DO				DO								
Sub-Total			1	Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0					
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)								
WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)								
Very Good			0-100	0-1	78.48	Very Good			0-100	0-1		Very Good			0-100	0-1		Very Good			0-100	0-1		
Sub-Total				Sub-Total				Sub-Total				Sub-Total				Sub-Total								

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.789133333	350	276.196667

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT18 of RTB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.35511		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.315306667		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.45955	350	510.8425	\$408,674.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	510.8425	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT18 of RTB, Intermittent	510.8425	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT18 of RTB, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 17.24"	Lon.	82° 15' 22.02"	WEATHER:	65 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT18 of RTB - 18th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	450	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.68	0.75333333	
Biogeochemical Cycling	0.84		
Habitat	0.74		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		17
9. Vegetative Protection (LB & RB)	0-20		17
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		100
Sub-Total			0.5
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
100-199 - 85 points	0-90	0-1	
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.664166667	450	298.875

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

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

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

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



# West Virginia Stream and Wetland Valuation Metric

UT18 of RTB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.298875		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.23		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.193041667	450	536.86875	\$429,495.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	536.86875	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT18 of RTB, Ephemeral	536.86875	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT19 of RTB, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 14.38"	Lon.	82° 15' 22.18"	WEATHER:	65 Sunny	DATE:	May 20, 2010	
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		UT19 of RTB - 19th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	85	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)		Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.69	0.79		
Biogeochemical Cycling	0.82			
Habitat	0.86			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	13	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		5	
4. Sediment Deposition	0-20		10	
5. Channel Flow Status	0-20		13	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		5	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		12	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		123	
Sub-Total			0.615	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	30	
<=99 - 90 points	0-90			
pH				
>9.1 = 10 points	0-80	9.87		
DO		10-30	10.77	
Sub-Total			0.65	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Very Good		0-100	0-1	78.48
Sub-Total				0.7848

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.736633333	85	62.6138333

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT19 of RTB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.331485		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.273306667		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.341425	85	114.021125	\$91,216.90

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	114.021125	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration			0-50
Level III Restoration			51-150
		Buffer Width	Right Bank
			0-50
			51-150
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT19 of RTB, Intermittent	114.021125	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT19 of RTB, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 45' 15.2"	Lon.	82° 15' 22.36"	WEATHER:	65 Sunny	DATE:	May 20, 2010		
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT19 of RTB - 19th Unnamed Tributary of RTB of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)					
STREAM IMPACT LENGTH:	15	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)			Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.68	0.75333333	
Biogeochemical Cycling	0.84		
Habitat	0.74		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		10
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		16
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		87
Sub-Total			0.435
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
100-199 - 85 points	0-90		
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.647916667	15	9.71875

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT19 of RTB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.2915625		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.217		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.156479167	15	17.3471875	\$13,877.75

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	17.3471875	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration			0-50
Level III Restoration			51-150
		Buffer Width	Right Bank
			0-50
			51-150
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT19 of RTB, Ephemeral	17.3471875	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

LFCB Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 51.74" N	Lon.	82° 13' 50.14" W	WEATHER:	70 Sunny	DATE:	19-May-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Left Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree		MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		Same (Mitigation is restoration of temporary impacts)			
STREAM IMPACT LENGTH:	585	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 51.74" N	Lon.	82° 13' 50.14" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	585

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.82333333	
Biogeochemical Cycling	0.86		
Habitat	0.86		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	14
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		8
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		15
7. Frequency of Riffles (or bends)	0-20		5
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		126
Sub-Total			0.63
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	40
pH			
6.0-8.0 = 80 points	0-80		6.58
DO			
	10-30		10.26
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	69.21
Sub-Total			0.6921

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

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.63	0.54333333	
Biogeochemical Cycling	0.48		
Habitat	0.52		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		118
Sub-Total			0.59
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		6.58
DO			
>5.0 = 30 points	10-30		10.26
Sub-Total			0.55
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.69	0.65666667	
Biogeochemical Cycling	0.67		
Habitat	0.61		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		134
Sub-Total			0.67
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		6.58
DO			
>5.0 = 30 points	10-30		10.26
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.81333333	
Biogeochemical Cycling	0.84		
Habitat	0.85		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		150
Sub-Total			0.75
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		6.58
DO			
>5.0 = 30 points	10-30		10.26
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.798683333	585	467.22975

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	585	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.575	585	336.375

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.686666667	585	401.7

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.778333333	585	455.325

# West Virginia Stream and Wetland Valuation Metric

LFCB Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3594075		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.309613333		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.467704167	585	858.6069375	\$686,885.55

PART V- Comparison of Unit Scores and Projected Balance										
Final Unit Score (Debit) [No Net Loss Value]	858.6069375	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	336.375	Mitigation Projected at Ten Years Post Completion (Credit)	401.7	Mitigation Projected At Maturity (Credit)	455.325	
<b>FINAL PROJECTED NET BALANCE</b>					336.375		401.7		455.325	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		<b>Buffer Width</b>	<b>Left Bank</b>
Level II Restoration		50	0-50 51-150
Level III Restoration		<b>Buffer Width</b>	<b>Right Bank</b>
		50	0-50 51-150
		<b>Average Buffer Width/Side</b>	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
LFCB Temporary Intermittent	858.6069375	614.68875

# West Virginia Stream and Wetland Valuation Metric

LFCB Permanent Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 56.24"	Lon.	82° 13' 49.25"	WEATHER:	70 Sunny	DATE:	19-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Left Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Same (Mitigation is restoration of temporary impacts)				
STREAM IMPACT LENGTH:	1762	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):	Average			
Hydrology	0.75	0.82333333		
Biogeochemical Cycling	0.86			
Habitat	0.86			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	10	
2. Embeddedness	0-20		10	
3. Velocity/ Depth Regime	0-20		7	
4. Sediment Deposition	0-20		12	
5. Channel Flow Status	0-20		8	
6. Channel Alteration	0-20		15	
7. Frequency of Riffles (or bends)	0-20		6	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		118	
Sub-Total			0.59	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	40	
pH	<=99 - 90 points		0-90	
DO	6.0-8.0 = 80 points	0-80	6.58	
		10-30	10.26	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	Good	0-100	0-1	
			69.21	
Sub-Total			0.6921	

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.792016667	1762	1395.53337

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

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

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

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



# West Virginia Stream and Wetland Valuation Metric

LFCB Permanent Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3564075		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.30428		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.452704167	1762	2559.664742	\$2,047,731.79

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	2559.664742	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
LFCB Permanent Intermittent	2559.664742	#DIV/0!



# West Virginia Stream and Wetland Valuation Metric

LFCB Ephemeral (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

PART III - Impact Factors			
(See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>		<b>Long-term Protection</b>	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).		% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
Years	15	0 + 5/10 Year Monitoring	101
Sub-Total	0.295875		
<b>Temporal Loss-Maturity</b>		<b>PART IV - Index to Unit Score Conversion</b>	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).		Final Index Score (Debit)	ILF Costs (Offsetting Debit Units)
% Add. Mitigation	Temporal Loss-Maturity (Years)	Linear Feet	Unit Score (Debit)
30%	25	390	458.39625
Sub-Total	0.222	<b>FINAL PROJECTED NET BALANCE</b>	

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	458.39625	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)	0	0	0	0
<b>FINAL PROJECTED NET BALANCE</b>						0	0	0	0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <small>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</small> <small>*Note2: Place an "X" in the appropriate category (only select one).</small>		<b>Extended Upland Buffer Zone</b> <small>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</small> <small>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</small> <small>*Note<sup>3</sup>: Select the appropriate mitigation type</small>	
Level I Restoration		<b>Buffer Width</b>	<b>Left Bank</b>
Level II Restoration		0-50	
Level III Restoration		51-150	
		<b>Buffer Width</b>	<b>Right Bank</b>
		0-50	
		51-150	
		<b>Average Buffer Width/Side</b>	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
LFCB Ephemeral	458.39625	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

RFCB Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 52.99" N	Lon.	82° 14' 42.84" W	WEATHER:	70 Sunny	DATE:	19-May-10		
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		RFCB - Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree		MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		Same (Mitigation is restoration of temporary impacts)				
STREAM IMPACT LENGTH:	680	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 52.99" N	Lon.	82° 14' 42.84" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	680

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		10
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		6
8. Bank Stability (LB & RB)	0-20		16
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		135
Sub-Total			0.675
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	39
<=99 - 90 points	0-90		
pH			8.73
8.1-9.0 = 45 points	0-80		
DO		10-30	10.78
Sub-Total			0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	72.08
Sub-Total			0.7208

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

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		120
Sub-Total			0.6
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	500
500-599 - 50 points	0-90		
pH			8.73
8.1-9.0 = 45 points	5-90		
DO		10-30	10.78
>5.0 = 30 points	10-30		
Sub-Total			0.375
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		136
Sub-Total			0.68
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	500
500-599 - 50 points	0-90		
pH			8.73
8.1-9.0 = 45 points	5-90		
DO		10-30	10.78
>5.0 = 30 points	10-30		
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		152
Sub-Total			0.76
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	500
500-599 - 50 points	0-90		
pH			8.73
8.1-9.0 = 45 points	5-90		
DO		10-30	10.78
>5.0 = 30 points	10-30		
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.740266667	680	503.381333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	680	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.551666667	680	375.13333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.661666667	680	449.933333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.688333333	680	468.06667

# West Virginia Stream and Wetland Valuation Metric

RFCB Temporary Perennial (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.33312
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.296106667

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

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.369493333	680	931.2554667	\$745,004.37

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	931.2554667	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	375.1333333	Mitigation Projected at Ten Years Post Completion (Credit)	449.9333333	Mitigation Projected At Maturity (Credit)	468.0666667
<b>FINAL PROJECTED NET BALANCE</b>					375.1333333		449.9333333		468.0666667

## Part VI - Mitigation Considerations (Incentives)

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

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
50	0-50	Preservation and Re-vegetation
	51-150	Preservation and Re-vegetation
Buffer Width	Right Bank	
	0-50	Preservation and Re-vegetation
	51-150	Preservation and Re-vegetation
Average Buffer Width/Side	25	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RFCB Temporary Perennial	931.2554667	549.9783333

# West Virginia Stream and Wetland Valuation Metric

RFCB Permanent Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 53.64"	Lon.	82° 14' 41.86"	WEATHER:	70 Sunny	DATE:	19-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	RFCB - Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Same (Mitigation is restoration of temporary impacts)				
STREAM IMPACT LENGTH:	790	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		8
3. Velocity/ Depth Regime	0-20		9
4. Sediment Deposition	0-20		10
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		7
8. Bank Stability (LB & RB)	0-20		12
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		15
Total RBP Score	Suboptimal		115
Sub-Total			0.575
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			39
pH			8.73
DO			10.78
Sub-Total			0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	72.08
Sub-Total			0.7208

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.706933333	790	558.477333

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

RFCB Permanent Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.31812		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.282773333		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.307826667	790	1033.183067	\$826,546.45

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1033.183067	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RFCB Permanent Perennial	1033.183067	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

RFCB Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 52.02"	Lon.	82° 14' 56.64"	WEATHER:	70 Sunny	DATE:	19-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			RFCB - Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	760	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75	0.80666667		
Biogeochemical Cycling	0.78			
Habitat	0.89			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	12	
2. Embeddedness	0-20		8	
3. Velocity/ Depth Regime	0-20		9	
4. Sediment Deposition	0-20		10	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		6	
8. Bank Stability (LB & RB)	0-20		12	
9. Vegetative Protection (LB & RB)	0-20		12	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		113	
Sub-Total			0.565	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	39	
<=99 - 90 points				0-90
pH				
8.1-9.0 = 45 points		0-80	8.65	
DO		10-30	11.02	
Sub-Total			0.825	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Grey Zone		0-100	0-1	64.44
Sub-Total			0.6444	

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7424	760	564.224

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

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

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

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



# West Virginia Stream and Wetland Valuation Metric

RFCB Intermittent (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.33408
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.271253333

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

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.347733333	760	1024.277333	\$819,421.87

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	1024.277333	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

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

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RFCB Intermittent	1024.277333	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

RFCB Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 44.32"	Lon.	82° 15' 2.40"	WEATHER:	70 Sunny	DATE:	19-May-10		
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			RFCB - Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	66	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.61	0.76	
Biogeochemical Cycling	0.84		
Habitat	0.83		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		7
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		18
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		8
9. Vegetative Protection (LB & RB)	0-20		10
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		77
Sub-Total			0.385
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	100-199 = 85 points	0-1	
pH	5.6-6.0 = 45 points		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	0
Sub-Total			0

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.63875	66	42.1575

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

RFCB Ephemeral (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.2874375
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.207

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

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.1331875	66	74.790375	\$59,832.30

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	74.790375	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

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

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RFCB Ephemeral	74.790375	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 RFCB, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 45.62" N	Lon.	82° 14' 20.12" W	WEATHER:	70 Sunny	DATE:	19-May-10		
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	350	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 45.62" N	Lon.	82° 14' 20.12" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	350

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		13
6. Channel Alteration	0-20		19
7. Frequency of Riffles (or bends)	0-20		8
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Suboptimal		146
Sub-Total			0.73
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	39
pH			
8.1-9.0 = 45 points	0-80		8.73
DO			
	10-30		10.78
Sub-Total			0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good			72.08
Sub-Total			0.7208

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

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		13
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		122
Sub-Total			0.61
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.73
DO			
>5.0 = 30 points	10-30		10.78
Sub-Total			0.375
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good			68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		13
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		138
Sub-Total			0.69
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.73
DO			
>5.0 = 30 points	10-30		10.78
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good			68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		13
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		154
Sub-Total			0.77
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.73
DO			
>5.0 = 30 points	10-30		10.78
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good			68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7586	350	265.51

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	350	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.555	350	194.25

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.665	350	232.75

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.691666667	350	242.08333

# West Virginia Stream and Wetland Valuation Metric

UT1 RFCB, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.34137		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.30344		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.40341	350	491.1935	\$392,954.80

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	491.1935	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	194.25	Mitigation Projected at Ten Years Post Completion (Credit)	232.75	Mitigation Projected At Maturity (Credit)	242.0833333
<b>FINAL PROJECTED NET BALANCE</b>					194.25	232.75			

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
50	50	Average Buffer Width/Side	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 RFCB, Temporary Perennial	491.1935	326.8125

# West Virginia Stream and Wetland Valuation Metric

UT1 RFCB, Permanent Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 47.55"	Lon.	82° 14' 20.54"	WEATHER:	70 Sunny	DATE:	19-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)
STREAM IMPACT LENGTH:	320	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)			PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		14
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		13
6. Channel Alteration	0-20		19
7. Frequency of Riffles (or bends)	0-20		7
8. Bank Stability (LB & RB)	0-20		13
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Suboptimal		141
Sub-Total			0.705
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			39
pH			8.73
DO			10.78
Sub-Total			0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	72.08
Sub-Total			0.7208

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.750266667	320	240.085333

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT1 RFCB, Permanent Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.33762		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.300106667		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.387993333	320	444.1578667	\$355,326.29

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	444.1578667	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 RFCB, Permanent Perennial	444.1578667	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of RFCB, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 38.61"	Lon.	82° 14' 23.96"	WEATHER:	70 Sunny	DATE:	19-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	700	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75	0.80333333		
Biogeochemical Cycling	0.78			
Habitat	0.88			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	17	
2. Embeddedness	0-20		12	
3. Velocity/ Depth Regime	0-20		7	
4. Sediment Deposition	0-20		12	
5. Channel Flow Status	0-20		7	
6. Channel Alteration	0-20		14	
7. Frequency of Riffles (or bends)	0-20		6	
8. Bank Stability (LB & RB)	0-20		14	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		10	
Total RBP Score	Suboptimal	115		
Sub-Total		0.575		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	39	
pH			8.65	
DO			11.02	
Sub-Total		0.825		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Grey Zone		0-100	0-1	64.44
Sub-Total		0.6444		

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7424	700	519.68

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

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

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

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



# West Virginia Stream and Wetland Valuation Metric

UT1 of RFCB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.33408		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.272586667		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.349066667	700	944.3466667	\$755,477.33

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	944.3466667	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of RFCB, Intermittent	944.3466667	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of RFCB Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 35.38"	Lon.	82° 14' 25.52"	WEATHER:	70 Sunny	DATE:	19-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	40	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.61	0.76	
Biogeochemical Cycling	0.84		
Habitat	0.83		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		18
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		16
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Marginal		101
Sub-Total			0.505
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	100-199 - 85 points	0-90	
pH			
	5.6-6.0 = 45 points	0-80	
DO			
		10-30	
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.66875	40	26.75

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT1 of RFCB Ephemeral (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.3009375
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.231

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

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.2006875	40	48.0275	\$38,422.00

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	48.0275	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

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

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of RFCB, Ephemeral	48.0275	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT1 of RFCB, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 44.38" N	Lon.	82° 14' 19.74" W	WEATHER:	70 Sunny	DATE:	19-May-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1 of UT1 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	100	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 44.38" N	Lon.	82° 14' 19.74" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	100

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):	Average			
Hydrology	0.75	0.79333333		
Biogeochemical Cycling	0.81			
Habitat	0.82			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	15	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		10	
4. Sediment Deposition	0-20		15	
5. Channel Flow Status	0-20		15	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		147	
Sub-Total			0.735	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	40	
pH				
6.0-8.0 = 80 points	0-80		7.41	
DO				
	10-30		10.53	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	74.1	
Sub-Total			0.741	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.809333333	100	80.9333333

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	100	0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):	Average			
Hydrology	0.58	0.493333333		
Biogeochemical Cycling	0.47			
Habitat	0.43			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	11	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		11	
5. Channel Flow Status	0-20		15	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		6	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6	
Total RBP Score	Suboptimal		123	
Sub-Total			0.615	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	5-90		7.41	
DO				
>5.0 = 30 points	10-30		10.53	
Sub-Total			0.55	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.554166667	100	55.4166667

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):	Average			
Hydrology	0.62	0.60666667		
Biogeochemical Cycling	0.65			
Habitat	0.55			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	13	
2. Embeddedness	0-20		13	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		13	
5. Channel Flow Status	0-20		15	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		11	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11	
Total RBP Score	Suboptimal		139	
Sub-Total			0.695	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	5-90		7.41	
DO				
>5.0 = 30 points	10-30		10.53	
Sub-Total			0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.665833333	100	66.5833333

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):	Average			
Hydrology	0.71	0.7466667		
Biogeochemical Cycling	0.75			
Habitat	0.78			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	15	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		15	
5. Channel Flow Status	0-20		15	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	
Total RBP Score	Suboptimal		155	
Sub-Total			0.775	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	5-90		7.41	
DO				
>5.0 = 30 points	10-30		10.53	
Sub-Total			0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.749166667	100	74.916667

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT1 of RFCB, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3642		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.330133333		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.503666667	100	150.3666667	\$120,293.33

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	150.3666667	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	55.41666667	Mitigation Projected at Ten Years Post Completion (Credit)	66.58333333	Mitigation Projected At Maturity (Credit)	74.91666667
<b>FINAL PROJECTED NET BALANCE</b>					55.41666667		66.58333333		74.91666667

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
50	50	50	50
Average Buffer Width/Side		50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of UT1 of RFCB, Temporary Intermittent	150.3666667	101.1375

# West Virginia Stream and Wetland Valuation Metric

UT2 of UT1 of RFCB, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 36.37"	Lon.	82° 14' 26.14"	WEATHER:	70 Sunny	DATE:	19-May-10		
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT2 of UT1 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	2	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)			Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75	0.79333333		
Biogeochemical Cycling	0.81			
Habitat	0.82			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	15	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		10	
4. Sediment Deposition	0-20		15	
5. Channel Flow Status	0-20		15	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		147	
Sub-Total			0.735	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	40	
pH				
6.0-8.0 = 80 points	0-80		7.41	
DO				
	10-30		10.53	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	74.1	
Sub-Total			0.741	

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.809333333	2	1.61866667

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT2 of UT1 of RFCB, Intermittent (2 of 2)

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

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.3642
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.330133333

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.503666667	2	3.007333333	\$2,405.87

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	3.007333333	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

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

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT2 of UT1 of RFCB, Intermittent	3.007333333	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT2 of UT1 of RFCB, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 37.11"	Lon.	82° 14' 26.54"	WEATHER:	70 Sunny	DATE:	19-May-10
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	UT2 of UT1 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	133	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:		0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):				Average
Hydrology	0.61			0.76
Biogeochemical Cycling	0.84			
Habitat	0.83			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	0
2. Embeddedness	0-20		16	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		15	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20	
Total RBP Score	Marginal		99	
Sub-Total			0.495	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		0
100-199 - 85 points	0-90			
pH				
5.6-6.0 = 45 points	0-80			
DO		10-30		0
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0	0-100	0-1	0
Sub-Total				0

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.66625	133	88.61125

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

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

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

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



# West Virginia Stream and Wetland Valuation Metric

UT2 of UT1 of RFCB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
Temporal Loss-Construction		Long-term Protection	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).			
Years	15	% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
Sub-Total	0.2998125		101
<b>Temporal Loss-Maturity</b>		0 + 5/10 Year Monitoring	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).			
% Add. Mitigation	Temporal Loss-Maturity (Years)	Sub-Total	0
30%	25		
Sub-Total	0.229		

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.1950625	133	158.9433125	\$127,154.65

PART V- Comparison of Unit Scores and Projected Balance										
Final Unit Score (Debit) [No Net Loss Value]	158.9433125	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)		
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0		

Part VI - Mitigation Considerations (Incentives)			
Extent of Stream Restoration		Extended Upland Buffer Zone	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).			
Level I Restoration		*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note2: Enter the buffer width for each channel side (Left Bank and Right Bank) *Note3: Select the appropriate mitigation type	
Level II Restoration		Buffer Width	Left Bank
Level III Restoration		0-50	
		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT2 of UT1 of RFCB, Ephemeral	158.9433125	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT2 of RFCB, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 52.12" N	Lon.	82° 14' 40.55" W	WEATHER:	70 Sunny	DATE:	19-May-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT2 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	180	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 52.12" N	Lon.	82° 14' 40.55" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	180

Column No. 1- Impact Existing Condition (Debit)	Column No. 2- Mitigation Existing Condition - Baseline (Credit)	Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)	Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)	Column No. 5- Mitigation Projected At Maturity (Credit)
<b>HGM Score (attach data forms):</b>	<b>HGM Score (attach data forms):</b>	<b>HGM Score (attach data forms):</b>	<b>HGM Score (attach data forms):</b>	<b>HGM Score (attach data forms):</b>
Hydrology	Hydrology	Hydrology	Hydrology	Hydrology
Biogeochemical Cycling	Biogeochemical Cycling	Biogeochemical Cycling	Biogeochemical Cycling	Biogeochemical Cycling
Habitat	Habitat	Habitat	Habitat	Habitat
<b>PART I - Physical, Chemical and Biological Indicators</b>				
Points Scale    Range    Site Score				
<b>PHYSICAL INDICATOR (Applies to all streams classifications)</b>				
<b>USEPA RBP (High Gradient Data Sheet)</b>				
1. Epifaunal Substrate/Available Cover	1. Epifaunal Substrate/Available Cover	1. Epifaunal Substrate/Available Cover	1. Epifaunal Substrate/Available Cover	1. Epifaunal Substrate/Available Cover
2. Embeddedness	2. Embeddedness	2. Embeddedness	2. Embeddedness	2. Embeddedness
3. Velocity/ Depth Regime	3. Velocity/ Depth Regime	3. Velocity/ Depth Regime	3. Velocity/ Depth Regime	3. Velocity/ Depth Regime
4. Sediment Deposition	4. Sediment Deposition	4. Sediment Deposition	4. Sediment Deposition	4. Sediment Deposition
5. Channel Flow Status	5. Channel Flow Status	5. Channel Flow Status	5. Channel Flow Status	5. Channel Flow Status
6. Channel Alteration	6. Channel Alteration	6. Channel Alteration	6. Channel Alteration	6. Channel Alteration
7. Frequency of Riffles (or bends)	7. Frequency of Riffles (or bends)	7. Frequency of Riffles (or bends)	7. Frequency of Riffles (or bends)	7. Frequency of Riffles (or bends)
8. Bank Stability (LB & RB)	8. Bank Stability (LB & RB)	8. Bank Stability (LB & RB)	8. Bank Stability (LB & RB)	8. Bank Stability (LB & RB)
9. Vegetative Protection (LB & RB)	9. Vegetative Protection (LB & RB)	9. Vegetative Protection (LB & RB)	9. Vegetative Protection (LB & RB)	9. Vegetative Protection (LB & RB)
10. Riparian Vegetative Zone Width (LB & RB)	10. Riparian Vegetative Zone Width (LB & RB)	10. Riparian Vegetative Zone Width (LB & RB)	10. Riparian Vegetative Zone Width (LB & RB)	10. Riparian Vegetative Zone Width (LB & RB)
Total RBP Score	Total RBP Score	Total RBP Score	Total RBP Score	Total RBP Score
Sub-Total	Sub-Total	Sub-Total	Sub-Total	Sub-Total
<b>CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)</b>				
<b>WVDEP Water Quality Indicators (General)</b>				
<b>Specific Conductivity</b>				
<=99 - 90 points	<=99 - 90 points	500-599 - 50 points	500-599 - 50 points	500-599 - 50 points
<b>pH</b>				
8.1-9.0 = 45 points	8.1-9.0 = 45 points	8.1-9.0 = 45 points	8.1-9.0 = 45 points	8.1-9.0 = 45 points
<b>DO</b>				
>5.0 = 30 points	>5.0 = 30 points	>5.0 = 30 points	>5.0 = 30 points	>5.0 = 30 points
Sub-Total	Sub-Total	Sub-Total	Sub-Total	Sub-Total
<b>BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)</b>				
<b>WV Stream Condition Index (WVSCI)</b>				
Very Good	Very Good	Good	Good	Good
Sub-Total	Sub-Total	Sub-Total	Sub-Total	Sub-Total

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0.764016667	180	137.523		
0	180	0		
0.5225	180	94.05		
0.634166667	180	114.15		
0.7175	180	129.15		

# West Virginia Stream and Wetland Valuation Metric

UT2 of RFCB, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3438075		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.29388		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.401704167	180	252.30675	\$201,845.40

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	252.30675	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	94.05	Mitigation Projected at Ten Years Post Completion (Credit)	114.15	Mitigation Projected At Maturity (Credit)	129.15
<b>FINAL PROJECTED NET BALANCE</b>					94.05		114.15		129.15

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		50	0-50 51-150
Level III Restoration		Buffer Width	Right Bank
		50	0-50 51-150
		Average Buffer Width/Side	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT2 of RFCB, Temporary Intermittent	252.30675	174.3525

# West Virginia Stream and Wetland Valuation Metric

UT3 of RFCB, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 53.57" N	Lon.	82° 14' 46.27" W	WEATHER:	70 Sunny	DATE:	19-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	UT3 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree				MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Same (Mitigation is restoration of temporary impacts)			
STREAM IMPACT LENGTH:	140	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 53.57" N	Lon.	82° 14' 46.27" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	140

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):			Average
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	10
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		7
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		18
7. Frequency of Riffles (or bends)	0-20		10
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		137
Sub-Total			0.685
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	41
pH			
6.0-8.0 = 80 points	0-80		7.13
DO			
	10-30		10.58
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Grey Zone	0-100	0-1	64.52
Sub-Total			0.6452

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):			Average
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
6.0-8.0 = 80 points	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):			Average
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		18
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		121
Sub-Total			0.605
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		7.13
DO			
	10-30		10.58
Sub-Total			0.55
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Grey Zone	0-100	0-1	64.52
Sub-Total			0.6452

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):			Average
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		18
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		137
Sub-Total			0.685
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		7.13
DO			
	10-30		10.58
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Grey Zone	0-100	0-1	64.52
Sub-Total			0.6452

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):			Average
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		18
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		153
Sub-Total			0.765
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		7.13
DO			
	10-30		10.58
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Grey Zone	0-100	0-1	64.52
Sub-Total			0.6452

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.776733333	140	108.742667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	140	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.600066667	140	84.0093333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.710066667	140	99.4093333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.736733333	140	103.14267

# West Virginia Stream and Wetland Valuation Metric

UT3 of RFCB, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.34953		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.310693333		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.436956667	140	201.1739333	\$160,939.15

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	201.1739333	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	84.00933333	Mitigation Projected at Ten Years Post Completion (Credit)	99.40933333	Mitigation Projected At Maturity (Credit)	103.1426667
<b>FINAL PROJECTED NET BALANCE</b>					84.00933333		99.40933333		103.1426667

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
50	50	50	50
Average Buffer Width/Side		50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT3 of RFCB, Temporary Perennial	201.1739333	139.2426

# West Virginia Stream and Wetland Valuation Metric

UT4 of RFCB, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 52.89"	Lon.	82° 14' 52.75"	WEATHER:	70 Sunny	DATE:	19-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				UT4 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree		MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	220	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)	Column No. 2- Mitigation Existing Condition - Baseline (Credit)	Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)	Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)	Column No. 5- Mitigation Projected At Maturity (Credit)																																																																																																																								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">HGM Score (attach data forms):</td> <td colspan="2">Average</td> </tr> <tr> <td>Hydrology</td> <td>0.75</td> <td colspan="2">0.79333333</td> </tr> <tr> <td>Biogeochemical Cycling</td> <td>0.81</td> <td colspan="2"></td> </tr> <tr> <td>Habitat</td> <td>0.82</td> <td colspan="2"></td> </tr> <tr> <td colspan="4" style="text-align: center;"><b>PART I - Physical, Chemical and Biological Indicators</b></td> </tr> <tr> <td></td> <td>Points Scale</td> <td>Range</td> <td>Site Score</td> </tr> <tr> <td colspan="4">PHYSICAL INDICATOR (Applies to all streams classifications)</td> </tr> <tr> <td colspan="4">USEPA RBP (High Gradient Data Sheet)</td> </tr> <tr> <td>1. Epifaunal Substrate/Available Cover</td> <td>0-20</td> <td rowspan="10" style="text-align: center; vertical-align: middle;">0-1</td> <td>10</td> </tr> <tr> <td>2. Embeddedness</td> <td>0-20</td> <td>10</td> </tr> <tr> <td>3. Velocity/ Depth Regime</td> <td>0-20</td> <td>8</td> </tr> <tr> <td>4. Sediment Deposition</td> <td>0-20</td> <td>15</td> </tr> <tr> <td>5. Channel Flow Status</td> <td>0-20</td> <td>7</td> </tr> <tr> <td>6. Channel Alteration</td> <td>0-20</td> <td>16</td> </tr> <tr> <td>7. Frequency of Riffles (or bends)</td> <td>0-20</td> <td>5</td> </tr> <tr> <td>8. Bank Stability (LB &amp; RB)</td> <td>0-20</td> <td>12</td> </tr> <tr> <td>9. Vegetative Protection (LB &amp; RB)</td> <td>0-20</td> <td>14</td> </tr> <tr> <td>10. Riparian Vegetative Zone Width (LB &amp; RB)</td> <td>0-20</td> <td>16</td> </tr> <tr> <td>Total RBP Score</td> <td>Suboptimal</td> <td></td> <td>113</td> </tr> <tr> <td>Sub-Total</td> <td></td> <td></td> <td>0.565</td> </tr> <tr> <td colspan="4">CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)</td> </tr> <tr> <td colspan="4">WVDEP Water Quality Indicators (General)</td> </tr> <tr> <td>Specific Conductivity</td> <td></td> <td rowspan="4" style="text-align: center; vertical-align: middle;">0-1</td> <td>40</td> </tr> <tr> <td>&lt;=99 - 90 points</td> <td>0-90</td> <td></td> </tr> <tr> <td>pH</td> <td></td> <td>7.41</td> </tr> <tr> <td>6.0-8.0 = 80 points</td> <td>0-80</td> <td></td> </tr> <tr> <td>DO</td> <td></td> <td></td> <td>10.53</td> </tr> <tr> <td></td> <td>10-30</td> <td></td> <td></td> </tr> <tr> <td>Sub-Total</td> <td></td> <td></td> <td>1</td> </tr> <tr> <td colspan="4">BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)</td> </tr> <tr> <td colspan="4">WV Stream Condition Index (WVSCI)</td> </tr> <tr> <td>Good</td> <td>0-100</td> <td>0-1</td> <td>74.1</td> </tr> <tr> <td>Sub-Total</td> <td></td> <td></td> <td>0.741</td> </tr> </table>					HGM Score (attach data forms):		Average		Hydrology	0.75	0.79333333		Biogeochemical Cycling	0.81			Habitat	0.82			<b>PART I - Physical, Chemical and Biological Indicators</b>					Points Scale	Range	Site Score	PHYSICAL INDICATOR (Applies to all streams classifications)				USEPA RBP (High Gradient Data Sheet)				1. Epifaunal Substrate/Available Cover	0-20	0-1	10	2. Embeddedness	0-20	10	3. Velocity/ Depth Regime	0-20	8	4. Sediment Deposition	0-20	15	5. Channel Flow Status	0-20	7	6. Channel Alteration	0-20	16	7. Frequency of Riffles (or bends)	0-20	5	8. Bank Stability (LB & RB)	0-20	12	9. Vegetative Protection (LB & RB)	0-20	14	10. Riparian Vegetative Zone Width (LB & RB)	0-20	16	Total RBP Score	Suboptimal		113	Sub-Total			0.565	CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				WVDEP Water Quality Indicators (General)				Specific Conductivity		0-1	40	<=99 - 90 points	0-90		pH		7.41	6.0-8.0 = 80 points	0-80		DO			10.53		10-30			Sub-Total			1	BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				WV Stream Condition Index (WVSCI)				Good	0-100	0-1	74.1	Sub-Total			0.741
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Sub-Total			0																																																																																																																									

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.781	220	171.82

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

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

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

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

# West Virginia Stream and Wetland Valuation Metric

UT4 of RFCB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.35145		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.307466667		

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

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.439916667	220	316.7816667	\$253,425.33

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	316.7816667	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT4 of RFCB, Intermittent	316.7816667	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT4 of RFCB, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 53.64"	Lon.	82° 14' 54.15"	WEATHER:	70 Sunny	DATE:	19-May-10	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT4 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	230	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.61	0.76	
Biogeochemical Cycling	0.84		
Habitat	0.83		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		10
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		12
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		5
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Marginal		76
Sub-Total			0.38
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
100-199 - 85 points	0-90		
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

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

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

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

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

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.6375	230	146.625

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

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

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

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



# West Virginia Stream and Wetland Valuation Metric

UT4 of RFCB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)									
Temporal Loss-Construction		Long-term Protection							
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).									
Years	15	% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)						
Sub-Total	0.286875		101						
		0 + 5/10 Year Monitoring	0						
		Sub-Total	0						
PART IV - Index to Unit Score Conversion									
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)						
1.130375	230	259.98625	\$207,989.00						
PART V - Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	259.98625	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	
Part VI - Mitigation Considerations (Incentives)									
Extent of Stream Restoration					Extended Upland Buffer Zone				
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).					*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type				
Level I Restoration					Buffer Width	Left Bank			
Level II Restoration						0-50			
Level III Restoration						51-150			
					Buffer Width	Right Bank			
						0-50			
						51-150			
					Average Buffer Width/Side	0			
Site			Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)					
UT4 of RFCB, Ephemeral			259.98625	#DIV/0!					

# West Virginia Stream and Wetland Valuation Metric

UT5 of RFCB, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 48.67"	Lon.	82° 15' 2.71"	WEATHER:	70 Sunny	DATE:	19-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT5 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	120	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.79333333	
Biogeochemical Cycling	0.81		
Habitat	0.82		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	7
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		1
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		1
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		1
8. Bank Stability (LB & RB)	0-20		10
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		91
Sub-Total			0.455
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	7.41
<=99 - 90 points	0-90		
pH			
6.0-8.0 = 80 points		0-80	10.53
DO		10-30	
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good		0-100	0-1
Sub-Total			74.1

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
<=99 - 90 points	0-90		
pH			
6.0-8.0 = 80 points		5-90	0
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good		0-100	0-1
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
<=99 - 90 points	0-90		
pH			
6.0-8.0 = 80 points		5-90	0
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good		0-100	0-1
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
<=99 - 90 points	0-90		
pH			
6.0-8.0 = 80 points		5-90	0
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good		0-100	0-1
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
<=99 - 90 points	0-90		
pH			
6.0-8.0 = 80 points		5-90	0
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good		0-100	0-1
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.76266667	120	91.52

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

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

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

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UT5 of RFCB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3432		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.2928		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.398666667	120	167.84	\$134,272.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	167.84	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT5 of RFCB, Intermittent	167.84	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT5 of RFCB, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 48.55"	Lon.	82° 15' 4.43"	WEATHER:	70 Sunny	DATE:	19-May-10		
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT5 of Right Fork of Conley Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	180	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.61	0.76	
Biogeochemical Cycling	0.84		
Habitat	0.83		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		17
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		18
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		16
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Marginal		103
Sub-Total			0.515
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
100-199 - 85 points	0-90		
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.67125	180	120.825

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UT5 of RFCB, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3020625		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.233		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.2063125	180	217.13625	\$173,709.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	217.13625	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT5 of RFCB, Ephemeral	217.13625	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

RFHC, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 36.54" N	Lon.	82° 13' 46.55" W	WEATHER:	75 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree				MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Same (Mitigation is restoration of temporary impacts)				
STREAM IMPACT LENGTH:	1245	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 36.54" N	Lon.	82° 13' 46.55" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	1245

Column No. 1- Impact Existing Condition (Debit)	Column No. 2- Mitigation Existing Condition - Baseline (Credit)	Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)	Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)	Column No. 5- Mitigation Projected At Maturity (Credit)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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Channel Flow Status</td> <td>0-20</td> <td>11</td> </tr> <tr> <td>6. Channel Alteration</td> <td>0-20</td> <td>7</td> </tr> <tr> <td>7. Frequency of Riffles (or bends)</td> <td>0-20</td> <td>5</td> </tr> <tr> <td>8. Bank Stability (LB &amp; RB)</td> <td>0-20</td> <td>3</td> </tr> <tr> <td>9. Vegetative Protection (LB &amp; RB)</td> <td>0-20</td> <td>3</td> </tr> <tr> <td>10. Riparian Vegetative Zone Width (LB &amp; RB)</td> <td>0-20</td> <td>5</td> </tr> <tr> <td>Total RBP Score</td> <td>Poor</td> <td>51</td> </tr> <tr> <td>Sub-Total</td> <td></td> <td>0.255</td> </tr> <tr> <td colspan="3">CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)</td> </tr> <tr> <td colspan="3">WVDEP Water Quality Indicators (General)</td> </tr> <tr> <td colspan="3">Specific Conductivity</td> </tr> <tr> <td>100-199 - 85 points</td> <td>0-90</td> <td>121</td> </tr> <tr> <td colspan="3">pH</td> </tr> <tr> <td>6.0-8.0 = 80 points</td> <td>0-80</td> <td>7.55</td> </tr> <tr> <td colspan="3">DO</td> </tr> <tr> <td></td> <td>10-30</td> <td>9.95</td> </tr> <tr> <td>Sub-Total</td> <td></td> <td>0.975</td> </tr> <tr> <td colspan="3">BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)</td> </tr> <tr> <td colspan="3">WV Stream Condition Index (WVSCI)</td> </tr> <tr> <td>Good</td> <td>0-100</td> <td>68.94</td> </tr> <tr> <td>Sub-Total</td> <td></td> <td>0.6894</td> </tr> </table>	HGM Score (attach data forms):		Average	Hydrology			Biogeochemical Cycling		0	Habitat			PART I - Physical, Chemical and Biological Indicators				Points Scale	Range Site Score	PHYSICAL INDICATOR (Applies to all streams classifications)			USEPA RBP (High Gradient Data Sheet)			1. Epifaunal Substrate/Available Cover	0-20	6	2. Embeddedness	0-20	2	3. Velocity/ Depth Regime	0-20	6	4. Sediment Deposition	0-20	3	5. Channel Flow Status	0-20	11	6. Channel Alteration	0-20	7	7. Frequency of Riffles (or bends)	0-20	5	8. Bank Stability (LB & RB)	0-20	3	9. Vegetative Protection (LB & RB)	0-20	3	10. Riparian Vegetative Zone Width (LB & RB)	0-20	5	Total RBP Score	Poor	51	Sub-Total		0.255	CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			WVDEP Water Quality Indicators (General)			Specific Conductivity			100-199 - 85 points	0-90	121	pH			6.0-8.0 = 80 points	0-80	7.55	DO				10-30	9.95	Sub-Total		0.975	BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			WV Stream Condition Index (WVSCI)			Good	0-100	68.94	Sub-Total		0.6894	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">HGM Score (attach data forms):</td> <td>Average</td> </tr> <tr> <td>Hydrology</td> <td></td> <td></td> </tr> <tr> <td>Biogeochemical Cycling</td> <td></td> <td>0</td> </tr> <tr> <td>Habitat</td> <td></td> <td></td> </tr> <tr> <td colspan="3" style="text-align: center;">PART I - Physical, Chemical and Biological Indicators</td> </tr> <tr> <td></td> <td>Points Scale</td> <td>Range Site Score</td> </tr> <tr> <td colspan="3">PHYSICAL INDICATOR (Applies to all streams classifications)</td> </tr> <tr> <td colspan="3">USEPA RBP (High Gradient Data Sheet)</td> </tr> <tr> <td>1. 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Epifaunal Substrate/Available Cover	0-20		2. Embeddedness	0-20		3. Velocity/ Depth Regime	0-20		4. Sediment Deposition	0-20		5. Channel Flow Status	0-20		6. Channel Alteration	0-20		7. Frequency of Riffles (or bends)	0-20		8. Bank Stability (LB & RB)	0-20		9. Vegetative Protection (LB & RB)	0-20		10. Riparian Vegetative Zone Width (LB & RB)	0-20		Total RBP Score	Poor	0	Sub-Total		0	CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			WVDEP Water Quality Indicators (General)			Specific Conductivity				0-90		pH				5-90		DO				10-30		Sub-Total		0	BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			WV Stream Condition Index (WVSCI)				0-100		Sub-Total		0	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">HGM Score (attach data forms):</td> <td>Average</td> </tr> <tr> <td>Hydrology</td> <td></td> <td></td> </tr> <tr> <td>Biogeochemical Cycling</td> <td></td> <td>0</td> </tr> <tr> <td>Habitat</td> <td></td> <td></td> </tr> <tr> <td colspan="3" style="text-align: center;">PART I - Physical, Chemical and Biological Indicators</td> </tr> <tr> <td></td> <td>Points Scale</td> <td>Range Site Score</td> </tr> <tr> <td colspan="3">PHYSICAL INDICATOR (Applies to all streams classifications)</td> </tr> <tr> <td colspan="3">USEPA RBP (High Gradient Data Sheet)</td> </tr> <tr> <td>1. 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PART I - Physical, Chemical and Biological Indicators																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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3. Velocity/ Depth Regime	0-20	13																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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5. Channel Flow Status	0-20	11																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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7. Frequency of Riffles (or bends)	0-20	15																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
8. Bank Stability (LB & RB)	0-20	18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
9. Vegetative Protection (LB & RB)	0-20	16																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
10. Riparian Vegetative Zone Width (LB & RB)	0-20	16																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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>5.0 = 30 points	10-30	9.95																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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		0.6398	1245	796.551																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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		0.605	1245	753.225																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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		0.715	1245	890.175																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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# West Virginia Stream and Wetland Valuation Metric

RFHC, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).			
Years	15		
Sub-Total	0.28791		
<b>Temporal Loss-Maturity</b>			
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.25592		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.18363	1245	1473.61935	\$1,178,895.48

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1473.61935	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	753.225	Mitigation Projected at Ten Years Post Completion (Credit)	890.175	Mitigation Projected At Maturity (Credit)	923.375
<b>FINAL PROJECTED NET BALANCE</b>					753.225		890.175		923.375

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <small>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</small> <small>*Note2: Place an "X" in the appropriate category (only select one).</small>		<b>Extended Upland Buffer Zone</b> <small>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</small> <small>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</small> <small>*Note<sup>3</sup>: Select the appropriate mitigation type</small>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RFHC, Temporary Perennial	1473.61935	923.375

# West Virginia Stream and Wetland Valuation Metric

RFHC, Permanent Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH/ Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 50.55"	Lon.	82° 13' 50.47"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)
STREAM IMPACT LENGTH:	2795	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	1245	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		9
3. Velocity/ Depth Regime	0-20		10
4. Sediment Deposition	0-20		8
5. Channel Flow Status	0-20		11
6. Channel Alteration	0-20		13
7. Frequency of Riffles (or bends)	0-20		12
8. Bank Stability (LB & RB)	0-20		7
9. Vegetative Protection (LB & RB)	0-20		7
10. Riparian Vegetative Zone Width (LB & RB)	0-20		12
Total RBP Score	Marginal		100
Sub-Total			0.5
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	121
100-199 = 85 points	0-90		
pH			
6.0-8.0 = 80 points	0-80	7.55	
DO		0-1	9.95
	10-30		
Sub-Total			0.975
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Very Good	0-100	0-1	85.62
Sub-Total			0.8562

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			
	5-90	0	
DO		0-1	0
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			
	5-90	0	
DO		0-1	0
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			
	5-90	0	
DO		0-1	0
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			
	5-90	0	
DO		0-1	0
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.777066667	2795	2171.90133

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	1245	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	1245	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	1245	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	1245	0



# West Virginia Stream and Wetland Valuation Metric

RFHC, Permanent Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
Temporal Loss-Construction		Long-term Protection	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).			
Years	15	% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
Sub-Total	0.34968	0 + 5/10 Year Monitoring	101
		Sub-Total	0
Temporal Loss-Maturity		PART IV - Index to Unit Score Conversion	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).			
% Add. Mitigation	Temporal Loss-Maturity (Years)	Final Index Score (Debit)	Linear Feet
30%	25	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
Sub-Total	0.310826667	1.437573333	2795
		4018.017467	\$3,214,413.97

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	4018.017467	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	0	Mitigation Projected at Ten Years Post Completion (Credit)	0	Mitigation Projected At Maturity (Credit)	0
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
Extent of Stream Restoration		Extended Upland Buffer Zone	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).		*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RFHC, Permanent Perennial	4018.017467	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

RFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 17.89"	Lon.	82° 13' 59.99"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	800	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75	0.88		
Biogeochemical Cycling	0.97			
Habitat	0.92			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	14	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		15	
4. Sediment Deposition	0-20		12	
5. Channel Flow Status	0-20		12	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		17	
8. Bank Stability (LB & RB)	0-20		14	
9. Vegetative Protection (LB & RB)	0-20		14	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		19	
Total RBP Score	Suboptimal		149	
Sub-Total			0.745	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
<=99 - 90 points	0-90			44
pH				0-1
6.0-8.0 = 80 points	0-80	6.86		
DO		0-1		
	10-30			10.07
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good		0-100	0-1	
Sub-Total			69.59	
Sub-Total			0.6959	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.846816667	800	677.453333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

RFHC, Intermittent (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.3810675
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.325453333

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.5533375	800	1242.67	\$994,136.00

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	1242.67	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
0-50		
51-150		
Buffer Width	Right Bank	
0-50		
51-150		
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RFHC, Intermittent	1242.67	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

RFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 11.43"	Lon.	82° 13' 58.43"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	685	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:		

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.85	
Biogeochemical Cycling	0.88		
Habitat	0.92		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		12
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		12
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		18
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		11
9. Vegetative Protection (LB & RB)	0-20		13
10. Riparian Vegetative Zone Width (LB & RB)	0-20		15
Total RBP Score	Marginal		81
Sub-Total			0.405
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
100-199 - 85 points	0-90		
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.68875	685	471.79375

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

RFHC, Ephemeral (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	25
Sub-Total	0.5165625
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
10%	10
Sub-Total	0.05275

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.2580625	685	861.7728125	\$689,418.25

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	861.7728125	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
RFHC, Ephemeral	861.7728125	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of RFHC, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 7.65" N	Lon.	82° 13' 59.69" W	WEATHER:	75 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1 - 1st UNT of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	535	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 7.65" N	Lon.	82° 13' 59.69" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	535

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	12
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		10
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		9
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		13
8. Bank Stability (LB & RB)	0-20		10
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		136
Sub-Total			0.68
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	100-199 = 85 points	0-90	121
pH			
	6.0-8.0 = 80 points	0-80	7.55
DO			
		10-30	9.95
Sub-Total			0.975
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	Very Good	0-100	85.62
Sub-Total			0.8562

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
		0-90	0
pH			
		5-90	0
DO			
		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		9
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		117
Sub-Total			0.585
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	500-599 = 50 points	0-90	500
pH			
	6.0-8.0 = 80 points	5-90	7.55
DO			
	>5.0 = 30 points	10-30	9.95
Sub-Total			0.55
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	Good	0-100	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		134
Sub-Total			0.67
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	500-599 = 50 points	0-90	500
pH			
	6.0-8.0 = 80 points	5-90	7.55
DO			
	>5.0 = 30 points	10-30	9.95
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	Good	0-100	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		150
Sub-Total			0.75
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	500-599 = 50 points	0-90	500
pH			
	6.0-8.0 = 80 points	5-90	7.55
DO			
	>5.0 = 30 points	10-30	9.95
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	Good	0-100	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.837066667	535	447.830667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	535	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.605	535	323.675

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.716666667	535	383.416667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.743333333	535	397.68333

# West Virginia Stream and Wetland Valuation Metric

UT1 of RFHC, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.37668		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.334826667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.548573333	535	828.4867333	\$662,789.39

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	828.4867333	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	323.675	Mitigation Projected at Ten Years Post Completion (Credit)	383.4166667	Mitigation Projected At Maturity (Credit)	397.6833333
<b>FINAL PROJECTED NET BALANCE</b>					323.675		383.4166667		397.6833333

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		50	0-50 51-150 Preservation and Re-vegetation
Level III Restoration		Buffer Width	Right Bank
		50	0-50 51-150 Preservation and Re-vegetation
		Average Buffer Width/Side	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 RFHC, Temporary Perennial	828.4867333	536.8725

# West Virginia Stream and Wetland Valuation Metric

UT1 RFHC, Permanent Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 6.95"	Lon.	82° 13' 55.64"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1 - 1st UNT of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)
STREAM IMPACT LENGTH:	1355	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:		

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology				
Biogeochemical Cycling			0	
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	9	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		8	
4. Sediment Deposition	0-20		12	
5. Channel Flow Status	0-20		9	
6. Channel Alteration	0-20		14	
7. Frequency of Riffles (or bends)	0-20		11	
8. Bank Stability (LB & RB)	0-20		10	
9. Vegetative Protection (LB & RB)	0-20		15	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		117	
Sub-Total			0.585	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
100-199 = 85 points	0-90	0-1	121	
pH				
6.0-8.0 = 80 points	0-80		7.55	
DO				
	10-30		9.95	
Sub-Total			0.975	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Very Good	0-100	0-1	85.62	
Sub-Total			0.8562	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology				
Biogeochemical Cycling			0	
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology				
Biogeochemical Cycling			0	
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology				
Biogeochemical Cycling			0	
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology				
Biogeochemical Cycling			0	
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.8054	1355	1091.317

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0



# West Virginia Stream and Wetland Valuation Metric

UT1 RFHC, Permanent Perennial (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.36243
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.32216

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.48999	1355	2018.93645	\$1,615,149.16

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	2018.93645	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of RFHC, Permanent Perennial	2018.93645	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of RFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 12.91"	Lon.	82° 14' 18.37"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1 - 1st UNT of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	350	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)					
HGM Score (attach data forms):		Average			
Hydrology	0.75	0.78333333			
Biogeochemical Cycling	0.88				
Habitat	0.72				
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	9		
2. Embeddedness	0-20		10		
3. Velocity/ Depth Regime	0-20		8		
4. Sediment Deposition	0-20		9		
5. Channel Flow Status	0-20		8		
6. Channel Alteration	0-20		15		
7. Frequency of Riffles (or bends)	0-20		11		
8. Bank Stability (LB & RB)	0-20		13		
9. Vegetative Protection (LB & RB)	0-20		17		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18		
Total RBP Score	Suboptimal		118		
Sub-Total			0.59		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
<=99 - 90 points	0-90			43	
pH				0-1	
6.0-8.0 = 80 points	0-80				
DO		0-1			
	10-30			9.95	
Sub-Total			1		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
Good		0-100	0-1		
Sub-Total			68.33		
Sub-Total			0.6833		

Column No. 2- Mitigation Existing Condition - Baseline (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total			0		

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total			0		

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total			0		

Column No. 5- Mitigation Projected At Maturity (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total			0		

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.77055	350	269.6925

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UT1 of RFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3467475		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.303106667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.420404167	350	497.1414583	\$397,713.17

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	497.1414583	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		<b>Buffer Width</b>	<b>Left Bank</b>
Level II Restoration			0-50
Level III Restoration			51-150
		<b>Buffer Width</b>	<b>Right Bank</b>
			0-50
			51-150
		<b>Average Buffer Width/Side</b>	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of RFHC, Intermittent	497.1414583	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of RFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 14.65"	Lon.	82° 14' 20.09"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1 - 1st UNT of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	250	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology	0.75		
Biogeochemical Cycling	0.88	0.78333333	
Habitat	0.72		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		5
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		12
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		78
Sub-Total			0.39
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	100-199 - 85 points	0-1	
pH	5.6-6.0 = 45 points		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.65166667	250	162.916667

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UT1 of RFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.29325		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.208		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.152916667	250	288.2291667	\$230,583.33

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	288.2291667	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of RFHC, Ephemeral	288.2291667	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT10 of UT1 of RFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 14.15"	Lon.	82° 14' 16.82"	WEATHER:	75 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT10 of UT1 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	80	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75		0.78	
Biogeochemical Cycling	0.78			
Habitat	0.81			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	2	
2. Embeddedness	0-20		2	
3. Velocity/ Depth Regime	0-20		2	
4. Sediment Deposition	0-20		1	
5. Channel Flow Status	0-20		3	
6. Channel Alteration	0-20		2	
7. Frequency of Riffles (or bends)	0-20		2	
8. Bank Stability (LB & RB)	0-20		10	
9. Vegetative Protection (LB & RB)	0-20		10	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		14	
Total RBP Score	Poor		48	
Sub-Total			0.24	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
<=99 - 90 points	0-90			43
pH				
6.0-8.0 = 80 points		0-80	7.07	
DO				
	10-30		9.95	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good		0-100	0-1	
Sub-Total			68.33	
Sub-Total			0.6833	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.71055	80	56.844

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT10 of UT1 of RFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3197475		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.25644		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.2867375	80	102.939	\$82,351.20

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	102.939	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT10 of UT1 of RFHC, Intermittent	102.939	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT11 of UT1 of RFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 11.54"	Lon.	82° 14' 18.22"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT11 of UT1 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	435	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology	0.75	0.78	
Biogeochemical Cycling	0.78		
Habitat	0.81		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	3
2. Embeddedness	0-20		4
3. Velocity/ Depth Regime	0-20		4
4. Sediment Deposition	0-20		3
5. Channel Flow Status	0-20		7
6. Channel Alteration	0-20		9
7. Frequency of Riffles (or bends)	0-20		4
8. Bank Stability (LB & RB)	0-20		11
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		77
Sub-Total			0.385
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	<=99 - 90 points	0-1	43
pH	6.0-8.0 = 80 points		7.07
DO	10-30		9.95
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	Good	0-100	0-1
Sub-Total			68.33
Sub-Total			0.6833

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	0
pH	5-90		0
DO	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	0
pH	5-90		0
DO	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	0
pH	5-90		0
DO	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	0
pH	5-90		0
DO	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.734716667	435	319.60175

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0



# West Virginia Stream and Wetland Valuation Metric

UT11 of UT1 of RFHC, Intermittent (2 of 2)

## PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.3306225
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.275773333

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.3411125	435	583.3839375	\$466,707.15

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	583.3839375	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT11 of UT1 of RFHC, Intermittent	583.3839375	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT11 of UT1 of RFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 49.06"	Lon.	82° 13' 51.12"	WEATHER:	70 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT4 - 4th UNT of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	645	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.78333333	
Biogeochemical Cycling	0.88		
Habitat	0.72		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		14
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		7
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		19
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		16
9. Vegetative Protection (LB & RB)	0-20		15
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Marginal		91
Sub-Total			0.455
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
100-199 - 85 points	0-90		
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.667916667	645	430.80625

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT11 of UT1 of RFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3005625		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.221		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.189479167	645	767.2140625	\$613,771.25

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	767.2140625	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT11 of UT1 of RFHC, Ephemeral	767.2140625	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT4 of RFHC, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 48.23" N	Lon.	82° 13' 53.11" W	WEATHER:	70 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	UT4 - 4th UNT of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)			
STREAM IMPACT LENGTH:	50	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 48.23" N	Lon.	82° 13' 53.11" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	50

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		16
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		10
10. Riparian Vegetative Zone Width (LB & RB)	0-20		17
Total RBP Score	Suboptimal		141
Sub-Total			0.705
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	121
100-199 - 85 points	0-90		
pH			7.55
6.0-8.0 = 80 points	0-80		
DO		10-30	9.95
Sub-Total			0.975
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Very Good	0-100	0-1	85.62
Sub-Total			0.8562

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		16
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		125
Sub-Total			0.625
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	500
500-599 - 50 points	0-90		
pH			7.55
6.0-8.0 = 80 points	5-90		
DO		10-30	9.95
Sub-Total			0.55
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		16
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		141
Sub-Total			0.705
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	500
500-599 - 50 points	0-90		
pH			7.55
6.0-8.0 = 80 points	5-90		
DO		10-30	9.95
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		16
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		157
Sub-Total			0.785
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	500
500-599 - 50 points	0-90		
pH			7.55
6.0-8.0 = 80 points	5-90		
DO		10-30	9.95
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.8454	50	42.27

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	50	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.618333333	50	30.916667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.728333333	50	36.416667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.755	50	37.75

# West Virginia Stream and Wetland Valuation Metric

UT4 of RFHC, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.38043		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.33816		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.56399	50	78.1995	\$62,559.60

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	78.1995	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	30.91666667	Mitigation Projected at Ten Years Post Completion (Credit)	36.41666667	Mitigation Projected At Maturity (Credit)	37.75
<b>FINAL PROJECTED NET BALANCE</b>					30.91666667	36.41666667			

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
Buffer Width	Left Bank		
0-50	51-150		
Buffer Width	Right Bank		
0-50	51-150		
Average Buffer Width/Side	0		

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT4 of RFHC, Temporary Perennial	78.1995	37.75

# West Virginia Stream and Wetland Valuation Metric

UT4 of RFHC, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 48.23" N	Lon.	82° 13' 53.11" W	WEATHER:	70 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT4 - 4th UNT of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		Same (Mitigation is restoration of temporary impacts)		
STREAM IMPACT LENGTH:	455	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 48.23" N	Lon.	82° 13' 53.11" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	455

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.89	
Biogeochemical Cycling	0.97		
Habitat	0.95		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		6
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		12
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		125
Sub-Total			0.625
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	44
pH			
6.0-8.0 = 80 points	0-80		6.86
DO			
	10-30	10.07	
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	69.59
Sub-Total			0.6959

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.69	0.61666667	
Biogeochemical Cycling	0.56		
Habitat	0.6		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		116
Sub-Total			0.58
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		6.86
DO			
	10-30	10.07	
Sub-Total			0.55
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.73	0.72	
Biogeochemical Cycling	0.78		
Habitat	0.65		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		134
Sub-Total			0.67
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		6.86
DO			
	10-30	10.07	
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.77	0.84	
Biogeochemical Cycling	0.88		
Habitat	0.87		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		150
Sub-Total			0.75
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
4.6-5.5 = 10 points	5-90		5
DO			
	10-30	10.07	
Sub-Total			0.45
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.831816667	455	378.476583

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	455	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.61	455	277.55

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.718333333	455	326.841667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.733333333	455	333.66667

# West Virginia Stream and Wetland Valuation Metric

UT4 of RFHC, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3743175		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.309453333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.5155875	455	689.5923125	\$551,673.85

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	689.5923125	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	277.55	Mitigation Projected at Ten Years Post Completion (Credit)	326.8416667	Mitigation Projected At Maturity (Credit)	333.6666667
<b>FINAL PROJECTED NET BALANCE</b>					277.55		326.8416667		333.6666667

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
50	50	50	50
Average Buffer Width/Side		50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT4 RFHC, Temporary Intermittent	689.5923125	450.45

# West Virginia Stream and Wetland Valuation Metric

UT4 of RFHC, Permanent Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 48.32"	Lon.	82° 13' 56.85"	WEATHER:	70 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT4 - 4th UNT of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)
STREAM IMPACT LENGTH:	1185	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75		0.89
Biogeochemical Cycling	0.97		
Habitat	0.95		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	14
2. Embeddedness	0-20		10
3. Velocity/ Depth Regime	0-20		7
4. Sediment Deposition	0-20		10
5. Channel Flow Status	0-20		9
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		12
8. Bank Stability (LB & RB)	0-20		9
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		115
Sub-Total			0.575
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
<=99 - 90 points	0-90		
pH			
6.0-8.0 = 80 points	0-80		6.86
DO		0-1	
	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	69.59
Sub-Total			0.6959

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO		0-1	
	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO		0-1	
	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO		0-1	
	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO		0-1	
	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.823483333	1185	975.82775

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0



# West Virginia Stream and Wetland Valuation Metric

UT4 of RFHC, Permanent Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3705675		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.302786667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.4968375	1185	1773.752438	\$1,419,001.95

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1773.752438	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration			0-50
Level III Restoration			51-150
		Buffer Width	Right Bank
			0-50
			51-150
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT4 of RFHC, Permanent Intermittent	1773.752438	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT4 of RFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 49.06"	Lon.	82° 13' 51.12"	WEATHER:	70 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT4 - 4th UNT of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	10	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.78333333	
Biogeochemical Cycling	0.88		
Habitat	0.72		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		10
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		87
Sub-Total			0.435
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
100-199 - 85 points	0-90	0-1	
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.662916667	10	6.62916667

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UT4 of RFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.2983125		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.217		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.178229167	10	11.78229167	\$9,425.83

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	11.78229167	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration			0-50
Level III Restoration			51-150
		Buffer Width	Right Bank
			0-50
			51-150
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT4 of RFHC, Ephemeral	11.78229167	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT4 of RFHC, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 48.08" N	Lon.	82° 13' 56.56" W	WEATHER:	70 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	UT1 of UT4 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Same (Mitigation is restoration of temporary impacts)					
STREAM IMPACT LENGTH:	90	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 48.08" N	Lon.	82° 13' 56.56" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	90

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75	0.89		
Biogeochemical Cycling	0.97			
Habitat	0.95			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	2	
2. Embeddedness	0-20		2	
3. Velocity/ Depth Regime	0-20		2	
4. Sediment Deposition	0-20		1	
5. Channel Flow Status	0-20		1	
6. Channel Alteration	0-20		6	
7. Frequency of Riffles (or bends)	0-20		3	
8. Bank Stability (LB & RB)	0-20		14	
9. Vegetative Protection (LB & RB)	0-20		15	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Marginal		64	
Sub-Total			0.32	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	43	
pH				
6.0-8.0 = 80 points	0-80		7.07	
DO				
	10-30		9.95	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68.33	
Sub-Total			0.6833	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.77883333	90	70.0995

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	90	0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.69	0.61666667		
Biogeochemical Cycling	0.56			
Habitat	0.6			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	11	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		11	
5. Channel Flow Status	0-20		8	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		6	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6	
Total RBP Score	Suboptimal		116	
Sub-Total			0.58	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	0-80		7.07	
DO				
>5.0 = 30 points	10-30		9.95	
Sub-Total			0.55	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.61	90	54.9

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.73	0.72		
Biogeochemical Cycling	0.78			
Habitat	0.65			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	13	
2. Embeddedness	0-20		13	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		13	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		11	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11	
Total RBP Score	Suboptimal		134	
Sub-Total			0.67	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	0-80		7.07	
DO				
>5.0 = 30 points	10-30		9.95	
Sub-Total			0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.71833333	90	64.65

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.77	0.84		
Biogeochemical Cycling	0.88			
Habitat	0.87			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	13	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		15	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	
Total RBP Score	Suboptimal		148	
Sub-Total			0.74	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	0-80		7.07	
DO				
>5.0 = 30 points	10-30		9.95	
Sub-Total			0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.79	90	71.1

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT4 of RFHC, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
Temporal Loss-Construction		Long-term Protection	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).		% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
Years	15		
Sub-Total	0.3504975	0 + 5/10 Year Monitoring	101
Sub-Total		Sub-Total	
0.267106667		0	
PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.3964875	90	125.683875	\$100,547.10
Temporal Loss-Maturity			
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).		% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25		
Sub-Total		Sub-Total	
0.267106667			

PART V- Comparison of Unit Scores and Projected Balance										
Final Unit Score (Debit) [No Net Loss Value]	125.683875	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	54.9	Mitigation Projected at Ten Years Post Completion (Credit)	64.65	Mitigation Projected At Maturity (Credit)	71.1	
<b>FINAL PROJECTED NET BALANCE</b>					54.9		64.65		71.1	

Part VI - Mitigation Considerations (Incentives)			
Extent of Stream Restoration		Extended Upland Buffer Zone	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).		*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note2: Enter the buffer width for each channel side (Left Bank and Right Bank) *Note3: Select the appropriate mitigation type	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		50	0-50 51-150
Level III Restoration		Buffer Width	Right Bank
		50	0-50 51-150
		Average Buffer Width/Side	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 UT4 RFHC, Temporary Intermittent	125.683875	95.985

# West Virginia Stream and Wetland Valuation Metric

UT3 of UT4 of RFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 43.97"	Lon.	82° 14' 6.03"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT3 of UT4 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	290	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.74	0.85	
Biogeochemical Cycling	1		
Habitat	0.81		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	10
2. Embeddedness	0-20		9
3. Velocity/ Depth Regime	0-20		8
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		15
7. Frequency of Riffles (or bends)	0-20		6
8. Bank Stability (LB & RB)	0-20		8
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		12
Total RBP Score	Marginal		103
Sub-Total			0.515
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	44
pH			6.77
DO			9.52
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Grey Zone	0-100	0-1	66.64
Sub-Total			0.6664

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
pH			0
DO			0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
pH			0
DO			0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
pH			0
DO			0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
pH			0
DO			0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.788566667	290	228.684333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT3 of UT4 of RFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.354855		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.290853333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.434275	290	415.93975	\$332,751.80

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	415.93975	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT3 of UT4 of RFHC, Intermittent	415.93975	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT3 of UT4 of RFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 44.59"	Lon.	82° 14' 8.40"	WEATHER:	75 Sunny	DATE:	20-May-10
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT3 of UT4 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree		MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	20	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:		

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75	0.78333333		
Biogeochemical Cycling	0.88			
Habitat	0.72			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		16	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		10	
9. Vegetative Protection (LB & RB)	0-20		12	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Marginal		87	
Sub-Total			0.435	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
100-199 - 85 points	0-90	0-1		
pH				
5.6-6.0 = 45 points	0-80			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
0	0-100	0-1		
Sub-Total			0	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.662916667	20	13.2583333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0



# West Virginia Stream and Wetland Valuation Metric

UT3 of UT4 of RFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.2983125		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.217		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.178229167	20	23.56458333	\$18,851.67

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	23.56458333	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT3 of UT4 of RFHC, Ephemeral	23.56458333	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT5 of RFHC, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 38.65" N	Lon.	82° 13' 45.23" W	WEATHER:	75 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT5 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	100	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 38.65" N	Lon.	82° 13' 45.23" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	100

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75	0.89		
Biogeochemical Cycling	0.97			
Habitat	0.95			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	7	
2. Embeddedness	0-20		5	
3. Velocity/ Depth Regime	0-20		5	
4. Sediment Deposition	0-20		14	
5. Channel Flow Status	0-20		8	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		7	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		14	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		10	
Total RBP Score	Marginal		102	
Sub-Total			0.51	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	43	
pH			0-1	7.07
6.0-8.0 = 80 points	0-80			
DO		0-1	9.95	
	10-30			
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good		0-100	0-1	68.33
Sub-Total				0.6833

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	0	
pH			0-1	0
6.0-8.0 = 80 points	0-80			
DO		0-1	0	
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good		0-100	0-1	0
Sub-Total				0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.69	0.6166667		
Biogeochemical Cycling	0.56			
Habitat	0.6			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	11	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		11	
5. Channel Flow Status	0-20		8	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		6	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6	
Total RBP Score	Suboptimal		116	
Sub-Total			0.58	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH			0-1	7.07
6.0-8.0 = 80 points	5-90			
DO		0-1	9.95	
>5.0 = 30 points	10-30			
Sub-Total			0.55	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good		0-100	0-1	68
Sub-Total				0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.73	0.72		
Biogeochemical Cycling	0.78			
Habitat	0.65			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	13	
2. Embeddedness	0-20		13	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		13	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		11	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11	
Total RBP Score	Suboptimal		134	
Sub-Total			0.67	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH			0-1	7.07
6.0-8.0 = 80 points	5-90			
DO		0-1	9.95	
>5.0 = 30 points	10-30			
Sub-Total			0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good		0-100	0-1	68
Sub-Total				0.68

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.77	0.84		
Biogeochemical Cycling	0.88			
Habitat	0.87			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	15	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		15	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	
Total RBP Score	Suboptimal		150	
Sub-Total			0.75	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH			0-1	7.07
6.0-8.0 = 80 points	5-90			
DO		0-1	9.95	
>5.0 = 30 points	10-30			
Sub-Total			0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good		0-100	0-1	68
Sub-Total				0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.81055	100	81.055

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	100	0	

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0.61	100	61		

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0.718333333	100	71.8333333		

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0.791666667	100	79.1666667		

# West Virginia Stream and Wetland Valuation Metric

UT5 of RFHC, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3647475		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.29244		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.4677375	100	146.77375	\$117,419.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	146.77375	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	61	Mitigation Projected at Ten Years Post Completion (Credit)	71.83333333	Mitigation Projected At Maturity (Credit)	79.16666667
<b>FINAL PROJECTED NET BALANCE</b>					61		71.83333333		79.16666667

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
<b>Buffer Width</b>		<b>Left Bank</b>	
50	0-50	Preservation and Re-vegetation	
50	51-150	Preservation and Re-vegetation	
<b>Buffer Width</b>		<b>Right Bank</b>	
50	0-50	Preservation and Re-vegetation	
50	51-150	Preservation and Re-vegetation	
<b>Average Buffer Width/Side</b>		50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT5 RFHC, Temporary Intermittent	146.77375	106.875

# West Virginia Stream and Wetland Valuation Metric

UT6 of RFHC, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:		LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)		Lat.	37° 43' 37.66" N	Lon.	82° 13' 45.46" W	WEATHER:		75 Sunny	DATE:		20-May-10														
STREAM CLASSIFICATION:		Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				UT6 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree				MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				Same (Mitigation is restoration of temporary impacts)													
STREAM IMPACT LENGTH:		100	FORM OF MITIGATION:		Permittee Responsible-Onsite		MIT COORDINATES: (in Decimal Degrees)		Lat.	37° 43' 37.66" N	Lon.	82° 13' 45.46" W	PRECIPITATION PAST 48 HRS:		0	Mitigation Length:		100											
Column No. 1- Impact Existing Condition (Debit)				Column No. 2- Mitigation Existing Condition - Baseline (Credit)				Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				Column No. 5- Mitigation Projected At Maturity (Credit)													
HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):				HGM Score (attach data forms):													
Average				Average				Average				Average				Average													
Hydrology		0.75			0.89		Hydrology		0.69			0.61666667		Hydrology		0.73			0.72		Hydrology		0.77			0.84			
Biogeochemical Cycling		0.97			0		Biogeochemical Cycling		0.56			0.78		Biogeochemical Cycling		0.78			0.88		Biogeochemical Cycling		0.88			0.87			
Habitat		0.95					Habitat		0.6			0.65		Habitat		0.65			0.87		Habitat		0.87						
PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators													
Points Scale				Points Scale				Points Scale				Points Scale				Points Scale													
Range				Range				Range				Range				Range													
Site Score				Site Score				Site Score				Site Score				Site Score													
PHYSICAL INDICATOR (Applies to all streams classifications)																													
USEPA RBP (High Gradient Data Sheet)																													
1. Epifaunal Substrate/Available Cover		0-20			12		1. Epifaunal Substrate/Available Cover		0-20			11		1. Epifaunal Substrate/Available Cover		0-20			13		1. Epifaunal Substrate/Available Cover		0-20			15			
2. Embeddedness		0-20			4		2. Embeddedness		0-20			11		2. Embeddedness		0-20			13		2. Embeddedness		0-20			15			
3. Velocity/ Depth Regime		0-20			6		3. Velocity/ Depth Regime		0-20			13		3. Velocity/ Depth Regime		0-20			13		3. Velocity/ Depth Regime		0-20			13			
4. Sediment Deposition		0-20			12		4. Sediment Deposition		0-20			11		4. Sediment Deposition		0-20			13		4. Sediment Deposition		0-20			15			
5. Channel Flow Status		0-20			8		5. Channel Flow Status		0-20			8		5. Channel Flow Status		0-20			10		5. Channel Flow Status		0-20			10			
6. Channel Alteration		0-20			17		6. Channel Alteration		0-20			17		6. Channel Alteration		0-20			17		6. Channel Alteration		0-20			17			
7. Frequency of Riffles (or bends)		0-20			6		7. Frequency of Riffles (or bends)		0-20			15		7. Frequency of Riffles (or bends)		0-20			15		7. Frequency of Riffles (or bends)		0-20			15			
8. Bank Stability (LB & RB)		0-20			10		8. Bank Stability (LB & RB)		0-20			18		8. Bank Stability (LB & RB)		0-20			18		8. Bank Stability (LB & RB)		0-20			18			
9. Vegetative Protection (LB & RB)		0-20			12		9. Vegetative Protection (LB & RB)		0-20			6		9. Vegetative Protection (LB & RB)		0-20			11		9. Vegetative Protection (LB & RB)		0-20			16			
10. Riparian Vegetative Zone Width (LB & RB)		0-20			8		10. Riparian Vegetative Zone Width (LB & RB)		0-20			6		10. Riparian Vegetative Zone Width (LB & RB)		0-20			11		10. Riparian Vegetative Zone Width (LB & RB)		0-20			16			
Total RBP Score		Marginal		95		Total RBP Score		Poor		0		Total RBP Score		Suboptimal		116		Total RBP Score		Suboptimal		134		Total RBP Score		Suboptimal		150	
Sub-Total				0.475		Sub-Total				0		Sub-Total				0.58		Sub-Total				0.67		Sub-Total				0.75	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)																													
WVDEP Water Quality Indicators (General)																													
Specific Conductivity				43		Specific Conductivity				500		Specific Conductivity				500		Specific Conductivity				500		Specific Conductivity				500	
pH				7.07		pH				7.07		pH				7.07		pH				7.07		pH				7.07	
DO				9.95		DO				9.95		DO				9.95		DO				9.95		DO				9.95	
Sub-Total				1		Sub-Total				0		Sub-Total				0.55		Sub-Total				0.8		Sub-Total				0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)																													
WV Stream Condition Index (WVSCI)																													
Good		0-100	0-1	68.33		Good		0-100	0-1	68		Good		0-100	0-1	68		Good		0-100	0-1	68		Good		0-100	0-1	68	
Sub-Total				0.6833		Sub-Total				0		Sub-Total				0.68		Sub-Total				0.68		Sub-Total				0.68	
PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score													
Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score	
0.804716667		100		80.4716667		0		100		0		0.61		100		61		0.718333333		100		71.8333333		0.791666667		100		79.1666667	

# West Virginia Stream and Wetland Valuation Metric

UT6 of RFHC, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3621225		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.287773333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.4546125	100	145.46125	\$116,369.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	145.46125	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	61	Mitigation Projected at Ten Years Post Completion (Credit)	71.83333333	Mitigation Projected At Maturity (Credit)	79.16666667
<b>FINAL PROJECTED NET BALANCE</b>					61		71.83333333		79.16666667

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
<b>Buffer Width</b>		<b>Left Bank</b>	
50		0-50	Preservation and Re-vegetation
50		51-150	Preservation and Re-vegetation
<b>Buffer Width</b>		<b>Right Bank</b>	
50		0-50	Preservation and Re-vegetation
50		51-150	Preservation and Re-vegetation
<b>Average Buffer Width/Side</b>		50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT6 RFHC, Temporary Intermittent	145.46125	106.875

# West Virginia Stream and Wetland Valuation Metric

UT7 of RFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 30.31"	Lon.	82° 13' 52.21"	WEATHER:	78 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT7 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	135	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.74	0.85		
Biogeochemical Cycling	1			
Habitat	0.81			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	1	
2. Embeddedness	0-20		1	
3. Velocity/ Depth Regime	0-20		1	
4. Sediment Deposition	0-20		19	
5. Channel Flow Status	0-20		9	
6. Channel Alteration	0-20		18	
7. Frequency of Riffles (or bends)	0-20		1	
8. Bank Stability (LB & RB)	0-20		14	
9. Vegetative Protection (LB & RB)	0-20		14	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20	
Total RBP Score	Marginal		98	
Sub-Total			0.49	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	41	
<=99 - 90 points	0-90			
pH				
6.0-8.0 = 80 points		0-80	7.58	
DO		10-30	10.25	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good		0-100	0-1	68.77
Sub-Total				0.6877

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	0	
	0-90			
pH				
		5-90	0	
DO		10-30	0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	0
Sub-Total				0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	0	
	0-90			
pH				
		5-90	0	
DO		10-30	0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	0
Sub-Total				0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	0	
	0-90			
pH				
		5-90	0	
DO		10-30	0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	0
Sub-Total				0

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	0	
	0-90			
pH				
		5-90	0	
DO		10-30	0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	0
Sub-Total				0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.78795	135	106.37325

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UT7 of RFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3545775		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.29036		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.4328875	135	193.4398125	\$154,751.85

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	193.4398125	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT7 RFHC, Intermittent	193.4398125	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT7 of RFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 27.82"	Lon.	82° 13' 39.25"	WEATHER:	78 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT7 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	385	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology	0.75	0.78333333	
Biogeochemical Cycling	0.88		
Habitat	0.72		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		5
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		18
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		13
9. Vegetative Protection (LB & RB)	0-20		13
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Marginal		82
Sub-Total			0.41
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	100-199 = 85 points	0-1	
pH	5.6-6.0 = 45 points		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.65666667	385	252.816667

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0	0	0

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0	0	0

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0	0	0



# West Virginia Stream and Wetland Valuation Metric

UT7 of RFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.2955		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.212		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.164166667	385	448.2041667	\$358,563.33

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	448.2041667	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT7 of RFHC, Ephemeral	448.2041667	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT10 of RFHC, Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 19.23"	Lon.	82° 13' 56.12"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT10 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	50	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	8
2. Embeddedness	0-20		6
3. Velocity/ Depth Regime	0-20		5
4. Sediment Deposition	0-20		4
5. Channel Flow Status	0-20		9
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		6
8. Bank Stability (LB & RB)	0-20		10
9. Vegetative Protection (LB & RB)	0-20		8
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		90
Sub-Total			0.45
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
<=99 - 90 points	0-90		42
pH			
6.0-8.0 = 80 points	0-80		7.18
DO			
	10-30	9.89	
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	67.71
Sub-Total			0.6771

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.709033333	50	35.4516667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT10 of RFHC, Perennial (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.319065
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.283613333

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.311711667	50	65.58558333	\$52,468.47

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	65.58558333	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT10 of RFHC, Perennial	65.58558333	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT10 of RFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 19.63"	Lon.	82° 13' 56.88"	WEATHER:	75 Sunny	DATE:	20-May-10
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT10 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		
STREAM IMPACT LENGTH:	325	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):	Average			
Hydrology	0.74			
Biogeochemical Cycling	1	0.85		
Habitat	0.81			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	7	
2. Embeddedness	0-20		10	
3. Velocity/ Depth Regime	0-20		9	
4. Sediment Deposition	0-20		10	
5. Channel Flow Status	0-20		11	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		6	
8. Bank Stability (LB & RB)	0-20		4	
9. Vegetative Protection (LB & RB)	0-20		10	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		8	
Total RBP Score	Marginal		91	
Sub-Total			0.455	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	43	
pH				
6.0-8.0 = 80 points	0-80		7.07	
DO				
	10-30		9.95	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68.33	
Sub-Total			0.6833	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):	Average			
Hydrology				
Biogeochemical Cycling		0		
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):	Average			
Hydrology				
Biogeochemical Cycling		0		
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):	Average			
Hydrology				
Biogeochemical Cycling		0		
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):	Average			
Hydrology				
Biogeochemical Cycling		0		
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.781383333	325	253.949583

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT10 of RFHC, Intermittent (2 of 2)

## PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.3516225
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.285106667

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.4181125	325	460.8865625	\$368,709.25

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	460.8865625	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT10 of RFHC, Intermittent	460.8865625	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT10 of RFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 18.76"	Lon.	82° 13' 54.08"	WEATHER:	75 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT10 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	10	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.78333333	
Biogeochemical Cycling	0.88		
Habitat	0.72		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		6
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		4
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		10
9. Vegetative Protection (LB & RB)	0-20		8
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		62
Sub-Total			0.31
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
100-199 - 85 points	0-90	0-1	
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.631666667	10	6.31666667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT10 of RFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.28425		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.192		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.107916667	10	11.07916667	\$8,863.33

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	11.07916667	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT10 of RFHC, Ephemeral	11.07916667	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT11 of RFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 13.54"	Lon.	82° 14' 1.86"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT11 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	120	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.89	
Biogeochemical Cycling	0.97		
Habitat	0.95		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	8
2. Embeddedness	0-20		9
3. Velocity/ Depth Regime	0-20		6
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		4
6. Channel Alteration	0-20		14
7. Frequency of Riffles (or bends)	0-20		9
8. Bank Stability (LB & RB)	0-20		13
9. Vegetative Protection (LB & RB)	0-20		15
10. Riparian Vegetative Zone Width (LB & RB)	0-20		17
Total RBP Score	Marginal		106
Sub-Total			0.53
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	43
pH			
DO			
6.0-8.0 = 80 points		0-80	7.07
		10-30	9.95
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good		0-100	0-1
Sub-Total			68.33
Sub-Total			0.6833

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
pH			
DO			
		5-90	0
		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
pH			
DO			
		5-90	0
		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
pH			
DO			
		5-90	0
		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
pH			
DO			
		5-90	0
		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.813883333	120	97.666

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	



# West Virginia Stream and Wetland Valuation Metric

UT11 of RFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3662475		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.295106667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.4752375	120	177.0285	\$141,622.80

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	177.0285	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT11 of RFHC, Intermittent	177.0285	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT11 of RFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 12.67"	Lon.	82° 14' 4.82"	WEATHER:	75 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT11 of Right Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	380	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology	0.75		
Biogeochemical Cycling	0.88	0.78333333	
Habitat	0.72		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		17
Total RBP Score	Marginal		85
Sub-Total			0.425
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	100-199 = 85 points	0-1	
pH	5.6-6.0 = 45 points		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.660416667	380	250.958333

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT11 of RFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.2971875		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.215		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.172604167	380	445.5895833	\$356,471.67

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	445.5895833	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT11 of RFHC, Ephemeral	445.5895833	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

LFHC, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 49.08" N	Lon.	82° 13' 10.26" W	WEATHER:	65 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Same (Mitigation is restoration of temporary impacts)					
STREAM IMPACT LENGTH:	1140	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 49.08" N	Lon.	82° 13' 10.26" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	1140

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	14
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		10
5. Channel Flow Status	0-20		16
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		8
8. Bank Stability (LB & RB)	0-20		15
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Suboptimal		140
Sub-Total			0.7
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	43
pH			
>9.1 = 10 points	0-80		10.15
DO			
	10-30		11.17
Sub-Total			0.65
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Fair	0-100	0-1	53.63
Sub-Total			0.4363

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		16
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		125
Sub-Total			0.625
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
>9.1 = 10 points	5-90		10.15
DO			
	10-30		11.17
Sub-Total			0.2
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Fair	0-100	0-1	53.63
Sub-Total			0.4363

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		16
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		141
Sub-Total			0.705
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
>9.1 = 10 points	5-90		10.15
DO			
	10-30		11.17
Sub-Total			0.45
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Fair	0-100	0-1	53.63
Sub-Total			0.4363

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		14
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		16
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		157
Sub-Total			0.785
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
>9.1 = 10 points	5-90		10.15
DO			
	10-30		11.17
Sub-Total			0.45
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Fair	0-100	0-1	53.63
Sub-Total			0.4363

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.595433333	1140	678.794

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	1140	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.420433333	1140	479.294

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.530433333	1140	604.694

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.5571	1140	635.094

# West Virginia Stream and Wetland Valuation Metric

LFHC, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.267945		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.238173333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.101551667	1140	1255.7689	\$1,004,615.12

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1255.7689	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	479.294	Mitigation Projected at Ten Years Post Completion (Credit)	604.694	Mitigation Projected At Maturity (Credit)	635.094
<b>FINAL PROJECTED NET BALANCE</b>					479.294		604.694		635.094

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
<b>Buffer Width</b>		<b>Left Bank</b>	
50	50	51-150	Preservation and Re-vegetation
<b>Buffer Width</b>		<b>Right Bank</b>	
50	50	51-150	Preservation and Supplemental Planting
<b>Average Buffer Width/Side</b>		50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
LFHC, Temporary Perennial	1255.7689	809.74485

# West Virginia Stream and Wetland Valuation Metric

LFHC, Permanent Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 53.05"	Lon.	82° 13' 10.02"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)
STREAM IMPACT LENGTH:	1110	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	12
2. Embeddedness	0-20		14
3. Velocity/ Depth Regime	0-20		11
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		10
8. Bank Stability (LB & RB)	0-20		15
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		17
Total RBP Score	Suboptimal		137
Sub-Total			0.685
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	19
<=99 - 90 points	0-90		
pH			9.12
>9.1 = 10 points	0-80		
DO		10-30	10.15
Sub-Total			0.65
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	70.73
Sub-Total			0.7073

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			0
	5-90		
DO		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			0
	5-90		
DO		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			0
	5-90		
DO		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			0
	5-90		
DO		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.680766667	1110	755.651

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

LFHC, Permanent Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.306345		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.272306667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.259418333	1110	1397.95435	\$1,118,363.48

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1397.95435	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
LFHC, Permanent Perennial	1397.95435	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

LFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 36.78"	Lon.	82° 13' 22.94"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	615	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology	0.75	0.89333333	
Biogeochemical Cycling	0.97		
Habitat	0.96		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	16
2. Embeddedness	0-20		12
3. Velocity/ Depth Regime	0-20		10
4. Sediment Deposition	0-20		14
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		7
8. Bank Stability (LB & RB)	0-20		16
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		135
Sub-Total			0.675
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	42
<=99 - 90 points	0-90		
pH			7.99
6.0-8.0 = 80 points	0-80		
DO		0-1	10.73
	10-30		
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Poor	0-100	0-1	33.69
Sub-Total			0.2369

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			0
	5-90		
DO		0-1	0
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			0
	5-90		
DO		0-1	0
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			0
	5-90		
DO		0-1	0
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
	0-90		
pH			0
	5-90		
DO		0-1	0
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.765316667	615	470.66975

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0



# West Virginia Stream and Wetland Valuation Metric

LFHC, Intermittent (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.3443925
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.25492

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.364629167	615	839.2469375	\$671,397.55

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	839.2469375	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
LFHC, Intermittent	839.2469375	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

LFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 26.85"	Lon.	82° 13' 19.97"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	255	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.85	
Biogeochemical Cycling	0.88		
Habitat	0.92		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		10
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		12
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		82
Sub-Total			0.41
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
100-199 - 85 points	0-90	0-1	
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.69	255	175.95

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

LFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3105		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.212		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.2125	255	309.1875	\$247,350.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	309.1875	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
LFHC, Ephemeral	309.1875	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of LFHC, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 19.14" N	Lon.	82° 13' 23.22" W	WEATHER:	65 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	UT1 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)			
STREAM IMPACT LENGTH:	785	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 19.14" N	Lon.	82° 13' 23.22" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	785

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	8
2. Embeddedness	0-20		9
3. Velocity/ Depth Regime	0-20		11
4. Sediment Deposition	0-20		8
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		10
7. Frequency of Riffles (or bends)	0-20		12
8. Bank Stability (LB & RB)	0-20		15
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		13
Total RBP Score	Marginal		110
Sub-Total			0.55
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	19
pH			
>9.1 = 10 points	0-80		9.12
DO			
	10-30		10.65
Sub-Total			0.65
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	70.73
Sub-Total			0.7073

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		118
Sub-Total			0.59
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
>9.1 = 10 points	5-90		9.12
DO			
	10-30		10.65
Sub-Total			0.2
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		134
Sub-Total			0.67
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
>9.1 = 10 points	5-90		9.12
DO			
	10-30		10.65
Sub-Total			0.45
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		150
Sub-Total			0.75
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
>9.1 = 10 points	5-90		9.12
DO			
	10-30		10.65
Sub-Total			0.45
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.635766667	785	499.076833

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	785	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.49	785	384.65

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.6	785	471

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.626666667	785	491.93333

# West Virginia Stream and Wetland Valuation Metric

UT1 of LFHC, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.286095		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.254306667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.176168333	785	923.2921417	\$738,633.71

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	923.2921417	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	384.65	Mitigation Projected at Ten Years Post Completion (Credit)	471	Mitigation Projected At Maturity (Credit)	491.9333333
<b>FINAL PROJECTED NET BALANCE</b>					384.65		471		491.9333333

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		<b>Buffer Width</b>	<b>Left Bank</b>
Level II Restoration		50	0-50 51-150
Level III Restoration		<b>Buffer Width</b>	<b>Right Bank</b>
		50	0-50 51-150
		<b>Average Buffer Width/Side</b>	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of LFHC, Temporary Perennial	923.2921417	664.11

# West Virginia Stream and Wetland Valuation Metric

UT1 of LFHC, Permanent Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 19.75"	Lon.	82° 13' 22.00"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	UT1 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)		
STREAM IMPACT LENGTH:	1385	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:		0	Mitigation Length:	0	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	9
2. Embeddedness	0-20		9
3. Velocity/ Depth Regime	0-20		9
4. Sediment Deposition	0-20		9
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		13
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		15
9. Vegetative Protection (LB & RB)	0-20		15
10. Riparian Vegetative Zone Width (LB & RB)	0-20		15
Total RBP Score	Suboptimal		121
Sub-Total			0.605
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	19
<=99 = 90 points	0-90		
pH			9.12
>9.1 = 10 points	0-80		
DO		10-30	10.65
Sub-Total			0.65
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	70.73
Sub-Total			0.7073

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
<=99 = 90 points	0-90		
pH			0
>9.1 = 10 points	0-80		
DO		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	0
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
<=99 = 90 points	0-90		
pH			0
>9.1 = 10 points	0-80		
DO		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	0
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
<=99 = 90 points	0-90		
pH			0
>9.1 = 10 points	0-80		
DO		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	0
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			0
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
<=99 = 90 points	0-90		
pH			0
>9.1 = 10 points	0-80		
DO		10-30	0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.6541	1385	905.9285

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT1 of LFHC, Permanent Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.294345		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.26164		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.210085	1385	1675.967725	\$1,340,774.18

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1675.967725	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of LFHC, Permanent Perennial	1675.967725	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of LFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 19.75"	Lon.	82° 13' 22.00"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			1st Unnamed Trib of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	1180	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.71		0.87	
Biogeochemical Cycling	0.95			
Habitat	0.95			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	12	
2. Embeddedness	0-20		8	
3. Velocity/ Depth Regime	0-20		11	
4. Sediment Deposition	0-20		9	
5. Channel Flow Status	0-20		11	
6. Channel Alteration	0-20		14	
7. Frequency of Riffles (or bends)	0-20		12	
8. Bank Stability (LB & RB)	0-20		13	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		124	
Sub-Total			0.62	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
<=99 - 90 points	0-90			42
pH				0-1
6.0-8.0 = 80 points	0-80	7.99		
DO		0-1		
	10-30			10.73
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Poor		0-100	0-1	
Sub-Total			33.69	
Sub-Total			0.2369	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.744483333	1180	878.490333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0



# West Virginia Stream and Wetland Valuation Metric

UT1 of LFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3350175		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.247586667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.3270875	1180	1565.96325	\$1,252,770.60

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1565.96325	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of LFHC, Intermittent	1565.96325	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of LFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 58.39"	Lon.	82° 13' 40.99"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			1st Unnamed Trib of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	250	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)			PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology	0.75		
Biogeochemical Cycling	0.88	0.85	
Habitat	0.92		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		18
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		18
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Marginal		107
Sub-Total			0.535
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	100-199 - 85 points	0-1	
pH	5.6-6.0 = 45 points		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.72125	250	180.3125

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT1 of LFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3245625		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.237		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.2828125	250	320.703125	\$256,562.50

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	320.703125	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of LFHC, Ephemeral	320.703125	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT2 of UT1 of LFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 18.26"	Lon.	82° 13' 32.74"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT2 of UT1 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	300	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)					
HGM Score (attach data forms):		Average			
Hydrology	0.63	0.81			
Biogeochemical Cycling	0.93				
Habitat	0.87				
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	5		
2. Embeddedness	0-20		3		
3. Velocity/ Depth Regime	0-20		3		
4. Sediment Deposition	0-20		2		
5. Channel Flow Status	0-20		5		
6. Channel Alteration	0-20		11		
7. Frequency of Riffles (or bends)	0-20		4		
8. Bank Stability (LB & RB)	0-20		14		
9. Vegetative Protection (LB & RB)	0-20		16		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		19		
Total RBP Score	Marginal		82		
Sub-Total			0.41		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
<=99 - 90 points	0-90			55	
pH				0-1	
8.1-9.0 = 45 points	0-80				
DO		0-1			
	10-30			10.73	
Sub-Total			0.825		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
Grey Zone		0-100	0-1	64.53	
Sub-Total				0.6453	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	0		
2. Embeddedness	0-20		0		
3. Velocity/ Depth Regime	0-20		0		
4. Sediment Deposition	0-20		0		
5. Channel Flow Status	0-20		0		
6. Channel Alteration	0-20		0		
7. Frequency of Riffles (or bends)	0-20		0		
8. Bank Stability (LB & RB)	0-20		0		
9. Vegetative Protection (LB & RB)	0-20		0		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0		
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90			0	
pH				0-1	
	5-90				
DO		0-1			
	10-30			0	
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1	0	
Sub-Total				0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	0		
2. Embeddedness	0-20		0		
3. Velocity/ Depth Regime	0-20		0		
4. Sediment Deposition	0-20		0		
5. Channel Flow Status	0-20		0		
6. Channel Alteration	0-20		0		
7. Frequency of Riffles (or bends)	0-20		0		
8. Bank Stability (LB & RB)	0-20		0		
9. Vegetative Protection (LB & RB)	0-20		0		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0		
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90			0	
pH				0-1	
	5-90				
DO		0-1			
	10-30			0	
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1	0	
Sub-Total				0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	0		
2. Embeddedness	0-20		0		
3. Velocity/ Depth Regime	0-20		0		
4. Sediment Deposition	0-20		0		
5. Channel Flow Status	0-20		0		
6. Channel Alteration	0-20		0		
7. Frequency of Riffles (or bends)	0-20		0		
8. Bank Stability (LB & RB)	0-20		0		
9. Vegetative Protection (LB & RB)	0-20		0		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0		
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90			0	
pH				0-1	
	5-90				
DO		0-1			
	10-30			0	
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1	0	
Sub-Total				0	

Column No. 5- Mitigation Projected At Maturity (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	0		
2. Embeddedness	0-20		0		
3. Velocity/ Depth Regime	0-20		0		
4. Sediment Deposition	0-20		0		
5. Channel Flow Status	0-20		0		
6. Channel Alteration	0-20		0		
7. Frequency of Riffles (or bends)	0-20		0		
8. Bank Stability (LB & RB)	0-20		0		
9. Vegetative Protection (LB & RB)	0-20		0		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0		
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90			0	
pH				0-1	
	5-90				
DO		0-1			
	10-30			0	
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1	0	
Sub-Total				0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.718383333	300	215.515

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT2 of UT1 of LFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3232725		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.250706667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.2923625	300	387.70875	\$310,167.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	387.70875	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
Buffer Width	Left Bank		
0-50	51-150		
Buffer Width	Right Bank		
0-50	51-150		
Average Buffer Width/Side	0		

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT2 of UT1 of LFHC, Intermittent	387.70875	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT5 of UT1 of LFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 59.88"	Lon.	82° 13' 39.43"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT5 of UT1 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	80	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.63	0.81		
Biogeochemical Cycling	0.93			
Habitat	0.87			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	13	
2. Embeddedness	0-20		16	
3. Velocity/ Depth Regime	0-20		5	
4. Sediment Deposition	0-20		16	
5. Channel Flow Status	0-20		6	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		5	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20	
Total RBP Score	Suboptimal		129	
Sub-Total			0.645	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	55	
pH			8.64	
DO			10.67	
Sub-Total				0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Grey Zone		0-100	0-1	64.53
Sub-Total				0.6453

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
pH				
DO				
Sub-Total				0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
pH				
DO				
Sub-Total				0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
pH				
DO				
Sub-Total				0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
pH				
DO				
Sub-Total				0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.75755	80	60.604

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT5 of UT1 of LFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3408975		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.28204		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.3804875	80	110.439	\$88,351.20

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	110.439	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT5 of UT1 of LFHC, Intermittent	110.439	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT5 of UT1 of LFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:		LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07			IMPACT COORDINATES: (in Decimal Degrees)		Lat.	37° 42' 59.13"		Lon.	82° 13' 37.87"		WEATHER:		65 Sunny		DATE:		20-May-10		
STREAM CLASSIFICATION:		Ephemeral			IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				UT5 of UT1 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree				MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)								
STREAM IMPACT LENGTH:		120		FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)		Lat.			Lon.			PRECIPITATION PAST 48 HRS:		0		Mitigation Length:		0	

Column No. 1- Impact Existing Condition (Debit)				Column No. 2- Mitigation Existing Condition - Baseline (Credit)				Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				Column No. 5- Mitigation Projected At Maturity (Credit)							
HGM Score (attach data forms):		Average		HGM Score (attach data forms):		Average		HGM Score (attach data forms):		Average		HGM Score (attach data forms):		Average		HGM Score (attach data forms):		Average					
Hydrology	0.75			Hydrology		0		Hydrology		0		Hydrology		0		Hydrology		0					
Biogeochemical Cycling	0.97	0.87		Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling				Biogeochemical Cycling							
Habitat	0.89			Habitat				Habitat				Habitat				Habitat							
PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators				PART I - Physical, Chemical and Biological Indicators							
		Points Scale	Range	Site Score			Points Scale	Range	Site Score			Points Scale	Range	Site Score			Points Scale	Range	Site Score				
PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)				PHYSICAL INDICATOR (Applies to all streams classifications)							
USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)				USEPA RBP (High Gradient Data Sheet)							
1. Epifaunal Substrate/Available Cover	0-20			1. Epifaunal Substrate/Available Cover	0-20			1. Epifaunal Substrate/Available Cover	0-20			1. Epifaunal Substrate/Available Cover	0-20			1. Epifaunal Substrate/Available Cover	0-20						
2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20			2. Embeddedness	0-20						
3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20			3. Velocity/ Depth Regime	0-20						
4. Sediment Deposition	0-20			4. Sediment Deposition	0-20			4. Sediment Deposition	0-20			4. Sediment Deposition	0-20			4. Sediment Deposition	0-20						
5. Channel Flow Status	0-20			5. Channel Flow Status	0-20			5. Channel Flow Status	0-20			5. Channel Flow Status	0-20			5. Channel Flow Status	0-20						
6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20			6. Channel Alteration	0-20						
7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20			7. Frequency of Riffles (or bends)	0-20						
8. Bank Stability (LB & RB)	0-20			8. Bank Stability (LB & RB)	0-20			8. Bank Stability (LB & RB)	0-20			8. Bank Stability (LB & RB)	0-20			8. Bank Stability (LB & RB)	0-20						
9. Vegetative Protection (LB & RB)	0-20			9. Vegetative Protection (LB & RB)	0-20			9. Vegetative Protection (LB & RB)	0-20			9. Vegetative Protection (LB & RB)	0-20			9. Vegetative Protection (LB & RB)	0-20						
10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20			10. Riparian Vegetative Zone Width (LB & RB)	0-20						
Total RBP Score	Marginal	62		Total RBP Score	Poor	0		Total RBP Score	Poor	0		Total RBP Score	Poor	0		Total RBP Score	Poor	0					
Sub-Total			0.31	Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0				
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)							
WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)				WVDEP Water Quality Indicators (General)							
Specific Conductivity				Specific Conductivity				Specific Conductivity				Specific Conductivity				Specific Conductivity							
100-199 - 85 points	0-90				0-90				0-90				0-90				0-90						
pH				pH				pH				pH				pH							
5.6-6.0 = 45 points	0-80				5-90				5-90				5-90				5-90						
DO				DO				DO				DO				DO							
	10-30				10-30				10-30				10-30				10-30						
Sub-Total				Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0				
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)							
WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)				WV Stream Condition Index (WVSCI)							
	0	0-100	0-1			0-100	0-1			0-100	0-1			0-100	0-1			0-100	0-1				
Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0				
PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score				PART II - Index and Unit Score							
Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score		Index		Linear Feet		Unit Score	
0.675		120		81		0		0		0		0		0		0		0		0		0	



# West Virginia Stream and Wetland Valuation Metric

UT5 of UT1 of LFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.30375		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.192		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.17075	120	140.49	\$112,392.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	140.49	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT5 of UT1 of LFHC, Ephemeral	140.49	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT8 of LFHC, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 50.28" N	Lon.	82° 13' 9.87" W	WEATHER:	65 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		8th Unnamed Trib of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		Same (Mitigation is restoration of temporary impacts)			
STREAM IMPACT LENGTH:	115	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 50.28" N	Lon.	82° 13' 9.87" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	115

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):	Average			
Hydrology	0.75	0.88666667		
Biogeochemical Cycling	0.97			
Habitat	0.94			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	9	
2. Embeddedness	0-20		10	
3. Velocity/ Depth Regime	0-20		7	
4. Sediment Deposition	0-20		12	
5. Channel Flow Status	0-20		6	
6. Channel Alteration	0-20		13	
7. Frequency of Riffles (or bends)	0-20		5	
8. Bank Stability (LB & RB)	0-20		11	
9. Vegetative Protection (LB & RB)	0-20		11	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		17	
Total RBP Score	Marginal		101	
Sub-Total			0.505	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	55	
pH				
8.1-9.0 = 45 points	0-80		8.64	
DO				
	10-30		10.67	
Sub-Total			0.825	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Grey Zone	0-100	0-1	64.53	
Sub-Total			0.6453	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.77255	115	88.84325

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):	Average			
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	115	0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):	Average			
Hydrology	0.7	0.62666667		
Biogeochemical Cycling	0.56			
Habitat	0.62			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	11	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		12	
5. Channel Flow Status	0-20		8	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		6	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6	
Total RBP Score	Suboptimal		117	
Sub-Total			0.585	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
8.1-9.0 = 45 points	5-90		8.64	
DO				
>5.0 = 30 points	10-30		10.67	
Sub-Total			0.375	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Grey Zone	0-100	0-1	64.53	
Sub-Total			0.6453	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.580883333	115	66.80158333

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):	Average			
Hydrology	0.73	0.72666667		
Biogeochemical Cycling	0.78			
Habitat	0.67			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	13	
2. Embeddedness	0-20		13	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		14	
5. Channel Flow Status	0-20		9	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		11	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11	
Total RBP Score	Suboptimal		134	
Sub-Total			0.67	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
8.1-9.0 = 45 points	5-90		8.64	
DO				
>5.0 = 30 points	10-30		10.67	
Sub-Total			0.625	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Grey Zone	0-100	0-1	64.53	
Sub-Total			0.6453	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.686716667	115	78.9724167

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):	Average			
Hydrology	0.77	0.85333333		
Biogeochemical Cycling	0.88			
Habitat	0.91			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	15	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		15	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	
Total RBP Score	Suboptimal		150	
Sub-Total			0.75	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
8.1-9.0 = 45 points	5-90		8.64	
DO				
>5.0 = 30 points	10-30		10.67	
Sub-Total			0.625	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Grey Zone	0-100	0-1	64.53	
Sub-Total			0.6453	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.763383333	115	87.789083

# West Virginia Stream and Wetland Valuation Metric

UT8 of LFHC, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
Temporal Loss-Construction		Long-term Protection	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).			
Years	15	% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
Sub-Total	0.3476475	0 + 5/10 Year Monitoring	101
Sub-Total			
0			
PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.383570833	115	159.1106458	\$127,288.52
Sub-Total			
0.263373333			
Temporal Loss-Maturity			
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total			
0.263373333			

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	159.1106458	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	66.80158333	Mitigation Projected at Ten Years Post Completion (Credit)	78.97241667	Mitigation Projected At Maturity (Credit)	87.78908333
<b>FINAL PROJECTED NET BALANCE</b>					66.80158333	78.97241667	87.78908333		

Part VI - Mitigation Considerations (Incentives)			
Extent of Stream Restoration		Extended Upland Buffer Zone	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).		*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note2: Enter the buffer width for each channel side (Left Bank and Right Bank) *Note3: Select the appropriate mitigation type	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		50	0-50
Level III Restoration		50	51-150
		Buffer Width	Right Bank
		50	0-50
		50	51-150
		Average Buffer Width/Side	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT8 of LFHC, Temporary Intermittent	159.1106458	118.5152625

# West Virginia Stream and Wetland Valuation Metric

UT9 of LFHC, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 49.03" N	Lon.	82° 13' 10.59" W	WEATHER:	65 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	9th Unnamed Trib of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Same (Mitigation is restoration of temporary impacts)					
STREAM IMPACT LENGTH:	135	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 49.03" N	Lon.	82° 13' 10.59" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	135

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology	0.75	0.89333333	
Biogeochemical Cycling	0.97		
Habitat	0.96		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	8
2. Embeddedness	0-20		8
3. Velocity/ Depth Regime	0-20		6
4. Sediment Deposition	0-20		8
5. Channel Flow Status	0-20		4
6. Channel Alteration	0-20		14
7. Frequency of Riffles (or bends)	0-20		7
8. Bank Stability (LB & RB)	0-20		12
9. Vegetative Protection (LB & RB)	0-20		13
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		98
Sub-Total			0.49
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	55
pH			
8.1-9.0 = 45 points	0-80		8.64
DO			
	10-30	10.67	
Sub-Total			0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Grey Zone	0-100	0-1	64.53
Sub-Total			0.6453

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology	0.7	0.62666667	
Biogeochemical Cycling	0.56		
Habitat	0.62		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		116
Sub-Total			0.58
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.64
DO			
>5.0 = 30 points	10-30	10.67	
Sub-Total			0.375
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Grey Zone	0-100	0-1	64.53
Sub-Total			0.6453

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology	0.73	0.72666667	
Biogeochemical Cycling	0.78		
Habitat	0.67		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		132
Sub-Total			0.66
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.64
DO			
>5.0 = 30 points	10-30	10.67	
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Grey Zone	0-100	0-1	64.53
Sub-Total			0.6453

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology	0.76	0.84666667	
Biogeochemical Cycling	0.88		
Habitat	0.9		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		150
Sub-Total			0.75
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.64
DO			
>5.0 = 30 points	10-30	10.67	
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Grey Zone	0-100	0-1	64.53
Sub-Total			0.6453

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.773383333	135	104.40675

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	135	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.58005	135	78.30675

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.68505	135	92.48175

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.76005	135	102.60675

# West Virginia Stream and Wetland Valuation Metric

UT9 of LFHC, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3480225		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.261373333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.382779167	135	186.6751875	\$149,340.15

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	186.6751875	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	78.30675	Mitigation Projected at Ten Years Post Completion (Credit)	92.48175	Mitigation Projected At Maturity (Credit)	102.60675
<b>FINAL PROJECTED NET BALANCE</b>					78.30675		92.48175		102.60675

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		50	0-50 51-150 Preservation and Re-vegetation
Level III Restoration		Buffer Width	Right Bank
		50	0-50 51-150 Preservation and Re-vegetation
		Average Buffer Width/Side	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT9 of LFHC, Temporary Intermittent	186.6751875	138.5191125

# West Virginia Stream and Wetland Valuation Metric

UT10 of LFHC, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 44.13" N	Lon.	82° 13' 12.83" W	WEATHER:	65 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			10th Unnamed Trib of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	35	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 44.13" N	Lon.	82° 13' 12.83" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	35

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology		<b>0</b>	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		14
3. Velocity/ Depth Regime	0-20		11
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		7
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		<b>138</b>
Sub-Total			<b>0.69</b>
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	19
pH	<=99 - 90 points		9.12
DO	>9.1 = 10 points		10.15
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	70.73
Sub-Total			<b>0.7073</b>

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		<b>0</b>	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		<b>0</b>
Sub-Total			<b>0</b>
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	0
pH	5-90		0
DO	10-30		0
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	0
Sub-Total			<b>0</b>

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		<b>0</b>	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		14
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		<b>122</b>
Sub-Total			<b>0.61</b>
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	500-599 - 50 points	0-1	500
pH	>9.1 = 10 points		9.12
DO	>5.0 = 30 points		10.15
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			<b>0.68</b>

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		<b>0</b>	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		14
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		<b>138</b>
Sub-Total			<b>0.69</b>
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	500-599 - 50 points	0-1	500
pH	>9.1 = 10 points		9.12
DO	>5.0 = 30 points		10.15
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			<b>0.68</b>

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		<b>0</b>	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		14
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		<b>154</b>
Sub-Total			<b>0.77</b>
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	500-599 - 50 points	0-1	500
pH	>9.1 = 10 points		9.12
DO	>5.0 = 30 points		10.15
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			<b>0.68</b>

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.682433333	35	23.8851667

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	35	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.496666667	35	17.3833333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.606666667	35	21.2333333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.633333333	35	22.1666667

# West Virginia Stream and Wetland Valuation Metric

UT10 of LFHC, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.307095		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.272973333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.262501667	35	44.18755833	\$35,350.05

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	44.18755833	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	17.38333333	Mitigation Projected at Ten Years Post Completion (Credit)	21.23333333	Mitigation Projected At Maturity (Credit)	22.16666667
<b>FINAL PROJECTED NET BALANCE</b>					17.38333333		21.23333333		22.16666667

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
50	50	50	50
Average Buffer Width/Side		50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT10 of LFHC, Temporary Perennial	44.18755833	29.925

# West Virginia Stream and Wetland Valuation Metric

UT10 of LFHC, Permanent Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 43.24"	Lon.	82° 13' 12.66"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			10th Unnamed Trib of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)
STREAM IMPACT LENGTH:	1415	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		14
3. Velocity/ Depth Regime	0-20		11
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		7
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		138
Sub-Total			0.69
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
<=99 - 90 points	0-90		19
pH			
>9.1 = 10 points	0-80		9.12
DO			
	10-30		10.15
Sub-Total			0.65
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	70.73
Sub-Total			0.7073

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.682433333	1415	965.643167

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0



# West Virginia Stream and Wetland Valuation Metric

UT10 of LFHC, Permanent Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.307095		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.272973333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.262501667	1415	1786.439858	\$1,429,151.89

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1786.439858	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT10 of LFHC, Permanent Perennial	1786.439858	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT10 of LFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 29.21"	Lon.	82° 13' 7.99"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			10th Unnamed Trib of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	1480	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:		

Column No. 1- Impact Existing Condition (Debit)	Column No. 2- Mitigation Existing Condition - Baseline (Credit)	Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)	Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)	Column No. 5- Mitigation Projected At Maturity (Credit)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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Epifaunal Substrate/Available Cover	0-20	0-1		2. Embeddedness	0-20		3. Velocity/ Depth Regime	0-20		4. Sediment Deposition	0-20		5. Channel Flow Status	0-20		6. Channel Alteration	0-20		7. Frequency of Riffles (or bends)	0-20		8. Bank Stability (LB & RB)	0-20		9. Vegetative Protection (LB & RB)	0-20		10. 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Riparian Vegetative Zone Width (LB & RB)	0-20		Total RBP Score	Poor		0	Sub-Total			0	CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				WVDEP Water Quality Indicators (General)				Specific Conductivity					0-90	0-1		pH					5-90		DO					10-30			Sub-Total			0	BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				WV Stream Condition Index (WVSCI)					0-100	0-1		Sub-Total			0	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">HGM Score (attach data forms):</td> <td colspan="2">Average</td> </tr> <tr> <td>Hydrology</td> <td></td> <td rowspan="3" style="text-align: center; vertical-align: middle;">0</td> <td></td> </tr> <tr> <td>Biogeochemical Cycling</td> <td></td> <td></td> </tr> <tr> <td>Habitat</td> <td></td> <td></td> </tr> <tr> <td colspan="4" style="text-align: center;">PART I - Physical, Chemical and Biological Indicators</td> </tr> <tr> <td style="text-align: center;">Points Scale</td> <td style="text-align: center;">Range</td> <td style="text-align: center;">Site Score</td> <td></td> </tr> <tr> <td colspan="4">PHYSICAL INDICATOR (Applies to all streams classifications)</td> </tr> <tr> <td colspan="4">USEPA RBP (High Gradient Data Sheet)</td> </tr> <tr> <td>1. 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Riparian Vegetative Zone Width (LB &amp; RB)</td> <td>0-20</td> <td></td> </tr> <tr> <td>Total RBP Score</td> <td>Poor</td> <td></td> <td>0</td> </tr> <tr> <td>Sub-Total</td> <td></td> <td></td> <td>0</td> </tr> <tr> <td colspan="4">CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)</td> </tr> <tr> <td colspan="4">WVDEP Water Quality Indicators (General)</td> </tr> <tr> <td colspan="4">Specific Conductivity</td> </tr> <tr> <td></td> <td>0-90</td> <td rowspan="3" style="text-align: center; vertical-align: middle;">0-1</td> <td></td> </tr> <tr> <td colspan="4">pH</td> </tr> <tr> <td></td> <td>5-90</td> <td></td> </tr> <tr> <td colspan="4">DO</td> </tr> <tr> <td></td> <td>10-30</td> <td></td> <td></td> </tr> <tr> <td>Sub-Total</td> <td></td> <td></td> <td>0</td> </tr> <tr> <td colspan="4">BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)</td> </tr> <tr> <td colspan="4">WV Stream Condition Index (WVSCI)</td> </tr> <tr> <td></td> <td>0-100</td> <td>0-1</td> <td></td> </tr> <tr> <td>Sub-Total</td> <td></td> <td></td> <td>0</td> </tr> </table>					HGM Score (attach data forms):		Average		Hydrology		0		Biogeochemical Cycling			Habitat			PART I - Physical, Chemical and Biological Indicators				Points Scale	Range	Site Score		PHYSICAL INDICATOR (Applies to all streams classifications)				USEPA RBP (High Gradient Data Sheet)				1. Epifaunal Substrate/Available Cover	0-20	0-1		2. Embeddedness	0-20		3. Velocity/ Depth Regime	0-20		4. Sediment Deposition	0-20		5. Channel Flow Status	0-20		6. Channel Alteration	0-20		7. Frequency of Riffles (or bends)	0-20		8. Bank Stability (LB & RB)	0-20		9. Vegetative Protection (LB & RB)	0-20		10. Riparian Vegetative Zone Width (LB & RB)	0-20		Total RBP Score	Poor		0	Sub-Total			0	CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				WVDEP Water Quality Indicators (General)				Specific Conductivity					0-90	0-1		pH					5-90		DO					10-30			Sub-Total			0	BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				WV Stream Condition Index (WVSCI)					0-100	0-1		Sub-Total			0	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">HGM Score (attach data forms):</td> <td colspan="2">Average</td> </tr> <tr> <td>Hydrology</td> <td></td> <td rowspan="3" style="text-align: center; vertical-align: middle;">0</td> <td></td> </tr> <tr> <td>Biogeochemical Cycling</td> <td></td> <td></td> </tr> <tr> <td>Habitat</td> <td></td> <td></td> </tr> <tr> <td colspan="4" style="text-align: center;">PART I - Physical, Chemical and Biological Indicators</td> </tr> <tr> <td style="text-align: center;">Points Scale</td> <td style="text-align: center;">Range</td> <td style="text-align: center;">Site Score</td> <td></td> </tr> <tr> <td colspan="4">PHYSICAL INDICATOR (Applies to all streams classifications)</td> </tr> <tr> <td colspan="4">USEPA RBP (High Gradient Data Sheet)</td> </tr> <tr> <td>1. 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Epifaunal Substrate/Available Cover	0-20	0-1		2. Embeddedness	0-20		3. Velocity/ Depth Regime	0-20		4. Sediment Deposition	0-20		5. Channel Flow Status	0-20		6. Channel Alteration	0-20		7. Frequency of Riffles (or bends)	0-20		8. Bank Stability (LB & RB)	0-20		9. Vegetative Protection (LB & RB)	0-20		10. Riparian Vegetative Zone Width (LB & RB)	0-20		Total RBP Score	Poor		0	Sub-Total			0	CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				WVDEP Water Quality Indicators (General)				Specific Conductivity					0-90	0-1		pH					5-90		DO					10-30			Sub-Total			0	BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				WV Stream Condition Index (WVSCI)					0-100	0-1		Sub-Total			0
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PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.742816667	1480	1099.36867

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT10 of LFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3342675		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.246253333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.3233375	1480	1958.5395	\$1,566,831.60

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1958.5395	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT10 of LFHC, Intermittent	1958.5395	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT10 of LFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 22.50"	Lon.	82° 13' 00.67"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			10th Unnamed Trib of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	30	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75		0.87
Biogeochemical Cycling	0.97		
Habitat	0.89		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		10
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		10
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		77
Sub-Total			0.385
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
100-199 - 85 points	0-90		
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.69375	30	20.8125

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT10 of LFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3121875		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.207		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.2129375	30	36.388125	\$29,110.50

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	36.388125	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT10 of LFHC, Ephemeral	36.388125	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT10 of LFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 38.15"	Lon.	82° 13' 7.52"	WEATHER:	65 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1-UT10 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	475	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)					
HGM Score (attach data forms):		Average			
Hydrology	0.75	0.88666667			
Biogeochemical Cycling	0.97				
Habitat	0.94				
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	10		
2. Embeddedness	0-20		12		
3. Velocity/ Depth Regime	0-20		8		
4. Sediment Deposition	0-20		12		
5. Channel Flow Status	0-20		5		
6. Channel Alteration	0-20		14		
7. Frequency of Riffles (or bends)	0-20		5		
8. Bank Stability (LB & RB)	0-20		13		
9. Vegetative Protection (LB & RB)	0-20		13		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		17		
Total RBP Score	Marginal		109		
Sub-Total			0.545		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
<=99 - 90 points	0-90			48.5	
pH				0-1	
8.1-9.0 = 45 points	0-80				
DO		0-1			
	10-30			10.7	
Sub-Total			0.825		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
Fair	0-100	0-1	49.11		
Sub-Total			0.3911		

Column No. 2- Mitigation Existing Condition - Baseline (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
	0-100	0-1			
Sub-Total			0		

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
	0-100	0-1			
Sub-Total			0		

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
	0-100	0-1			
Sub-Total			0		

Column No. 5- Mitigation Projected At Maturity (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
	0-100	0-1			
Sub-Total			0		

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.73685	475	350.00375

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT10 of LFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3315825		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.234813333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.303245833	475	619.0417708	\$495,233.42

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	619.0417708	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of UT10 of LFHC, Intermittent	619.0417708	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT10 of LFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 40.88"	Lon.	82° 13' 3.63"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1-UT10 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	91	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.87	
Biogeochemical Cycling	0.97		
Habitat	0.89		
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Marginal	89	
Sub-Total	0.445		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	100-199 - 85 points	0-1	
pH	5.6-6.0 = 45 points		
DO	10-30		
Sub-Total	0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Sub-Total	0		

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor	0	
Sub-Total	0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total	0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Sub-Total	0		

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor	0	
Sub-Total	0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total	0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Sub-Total	0		

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor	0	
Sub-Total	0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total	0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Sub-Total	0		

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor	0	
Sub-Total	0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total	0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Sub-Total	0		

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.70875	91	64.49625

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	



# West Virginia Stream and Wetland Valuation Metric

UT1 of UT10 of LFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)											
<b>Temporal Loss-Construction</b>		<b>Long-term Protection</b>									
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).		% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)								
Years	15										
Sub-Total	0.3189375										
<b>Temporal Loss-Maturity</b>		<b>PART IV - Index to Unit Score Conversion</b>									
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).		0 + 5/10 Year Monitoring	101								
% Add. Mitigation	Temporal Loss-Maturity (Years)	Sub-Total	0								
30%	25	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #FFFFE0;"> <th style="text-align: center;">Final Index Score (Debit)</th> <th style="text-align: center;">Linear Feet</th> <th style="text-align: center;">Unit Score (Debit)</th> <th style="text-align: center;">ILF Costs (Offsetting Debit Units)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.2466875</td> <td style="text-align: center;">91</td> <td style="text-align: center;">113.4485625</td> <td style="text-align: center;">\$90,758.85</td> </tr> </tbody> </table>		Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)	1.2466875	91	113.4485625	\$90,758.85
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)								
1.2466875	91	113.4485625	\$90,758.85								
Sub-Total	0.219										

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	113.4485625	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0			

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).		*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note2: Enter the buffer width for each channel side (Left Bank and Right Bank) *Note3: Select the appropriate mitigation type	
Level I Restoration		<b>Buffer Width</b>	<b>Left Bank</b>
Level II Restoration		0-50	
Level III Restoration		51-150	
		<b>Buffer Width</b>	<b>Right Bank</b>
		0-50	
		51-150	
		<b>Average Buffer Width/Side</b>	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of UT10 of LFHC, Ephemeral	113.4485625	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT1 of UT10 of LFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 38.64"	Lon.	82° 13' 3.79"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT1-UT1-UT10 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	337	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):	Average			
Hydrology	0.75			
Biogeochemical Cycling	0.97	0.89333333		
Habitat	0.96			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	4	
2. Embeddedness	0-20		6	
3. Velocity/ Depth Regime	0-20		5	
4. Sediment Deposition	0-20		5	
5. Channel Flow Status	0-20		3	
6. Channel Alteration	0-20		11	
7. Frequency of Riffles (or bends)	0-20		4	
8. Bank Stability (LB & RB)	0-20		12	
9. Vegetative Protection (LB & RB)	0-20		14	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	
Total RBP Score	Marginal		80	
Sub-Total			0.4	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	48.5	
pH				
8.1-9.0 = 45 points	0-80		8.32	
DO				
	10-30		10.7	
Sub-Total			0.825	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Fair	0-100	0-1	49.11	
Sub-Total			0.3911	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):	Average			
Hydrology				
Biogeochemical Cycling		0		
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1	0	
pH				
	5-90		0	
DO				
	10-30		0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1	0	
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):	Average			
Hydrology				
Biogeochemical Cycling		0		
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1	0	
pH				
	5-90		0	
DO				
	10-30		0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1	0	
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):	Average			
Hydrology				
Biogeochemical Cycling		0		
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1	0	
pH				
	5-90		0	
DO				
	10-30		0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1	0	
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):	Average			
Hydrology				
Biogeochemical Cycling		0		
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1	0	
pH				
	5-90		0	
DO				
	10-30		0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1	0	
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.716016667	337	241.297617

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT1 of UT10 of LFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3222075		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.21548		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.253704167	337	422.4983042	\$337,998.64

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	422.4983042	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of UT1 of UT10 of LFHC, Intermittent	422.4983042	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT2 of UT10 of LFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 21.63"	Lon.	82° 13' 4.72"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT2-UT10 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	350	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)					
HGM Score (attach data forms):		Average			
Hydrology	0.75	0.89333333			
Biogeochemical Cycling	0.97				
Habitat	0.96				
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	8		
2. Embeddedness	0-20		16		
3. Velocity/ Depth Regime	0-20		7		
4. Sediment Deposition	0-20		15		
5. Channel Flow Status	0-20		10		
6. Channel Alteration	0-20		17		
7. Frequency of Riffles (or bends)	0-20		8		
8. Bank Stability (LB & RB)	0-20		15		
9. Vegetative Protection (LB & RB)	0-20		15		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		17		
Total RBP Score	Suboptimal		128		
Sub-Total			0.64		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
<=99 - 90 points	0-90			55	
pH				0-1	
8.1-9.0 = 45 points	0-80				
DO		0-1			
	10-30			10.67	
Sub-Total			0.825		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
Grey Zone		0-100	0-1	64.53	
Sub-Total				0.6453	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

Column No. 5- Mitigation Projected At Maturity (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.798383333	350	279.434167

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UT2 of UT10 of LFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3592725		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.281373333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.439029167	350	503.6602083	\$402,928.17

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	503.6602083	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT2 of UT10 of LFHC, Intermittent	503.6602083	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT2 of UT10 of LFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 19.77"	Lon.	82° 13' 2.54"	WEATHER:	65 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT2-UT10 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	10	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.87	
Biogeochemical Cycling	0.97		
Habitat	0.89		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		97
Sub-Total			0.485
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
100-199 - 85 points	0-90	0-1	
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.71875	10	7.1875

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0	0	0

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0	0	0

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT2 of UT10 of LFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3234375		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.227		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.2691875	10	12.691875	\$10,153.50

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	12.691875	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT2 of UT10 of LFHC, Ephemeral	12.691875	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT11 of LFHC, Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 40.76"	Lon.	82° 13' 22.77"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT11 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	250	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	7
2. Embeddedness	0-20		6
3. Velocity/ Depth Regime	0-20		4
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		12
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		9
8. Bank Stability (LB & RB)	0-20		10
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Marginal		105
Sub-Total			0.525
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	<=99 - 90 points	0-90	46
pH	>9.1 = 10 points	0-80	10.07
DO		10-30	10.48
Sub-Total			0.65
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Grey Zone	0-100	0-1	66.73
Sub-Total			0.6673

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.6141	250	153.525

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	0



# West Virginia Stream and Wetland Valuation Metric

UT11 of LFHC, Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.276345		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.24564		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.136085	250	284.02125	\$227,217.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	284.02125	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT11 of LFHC, Perennial	284.02125	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT11 of LFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 40.38"	Lon.	82° 13' 27.91"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT11 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	745	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75			
Biogeochemical Cycling	0.97	0.88666667		
Habitat	0.94			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	9	
2. Embeddedness	0-20		9	
3. Velocity/ Depth Regime	0-20		9	
4. Sediment Deposition	0-20		12	
5. Channel Flow Status	0-20		9	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		5	
8. Bank Stability (LB & RB)	0-20		12	
9. Vegetative Protection (LB & RB)	0-20		12	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		14	
Total RBP Score	Marginal		107	
Sub-Total			0.535	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	55	
pH				
8.1-9.0 = 45 points	0-80		8.64	
DO				
	10-30		10.67	
Sub-Total			0.825	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Grey Zone	0-100	0-1	64.53	
Sub-Total			0.6453	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling			0	
Habitat			0	
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1	0	
pH				
	5-90		0	
DO				
	10-30		0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1	0	
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling			0	
Habitat			0	
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1	0	
pH				
	5-90		0	
DO				
	10-30		0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1	0	
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling			0	
Habitat			0	
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1	0	
pH				
	5-90		0	
DO				
	10-30		0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1	0	
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling			0	
Habitat			0	
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		0	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		0	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		0	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		0	
9. Vegetative Protection (LB & RB)	0-20		0	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0	
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1	0	
pH				
	5-90		0	
DO				
	10-30		0	
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1	0	
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.77755	745	579.27475

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT11 of LFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3498975		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.267373333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.394820833	745	1039.141521	\$831,313.22

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1039.141521	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT11 of LFHC, Intermittent	1039.141521	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT11 of LFHC, Ephemeral (1 of 1)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 39.27"	Lon.	82° 13' 35.07"	WEATHER:	65 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT11 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree		MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)					
STREAM IMPACT LENGTH:	5	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):	Average			
Hydrology	0.75		0.85	
Biogeochemical Cycling	0.88			
Habitat	0.92			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		6	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		11	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		12	
9. Vegetative Protection (LB & RB)	0-20		12	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	
Total RBP Score	Marginal		73	
Sub-Total			0.365	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
100-199 - 85 points	0-90	0-1		
pH				
5.6-6.0 = 45 points	0-80			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
0	0-100	0-1		
Sub-Total			0	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):	Average			
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):	Average			
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):	Average			
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):	Average			
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.67875	5	3.39375

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT11 of LFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3054375		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.203		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.1871875	5	5.9359375	\$4,748.75

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	5.9359375	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT11 of LFHC, Ephemeral	5.9359375	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT12 of LFHC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42'31.07"	Lon.	82° 13' 24.49"	WEATHER:	65 Sunny	DATE:	20-May-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT12 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	167	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)					
HGM Score (attach data forms):		Average			
Hydrology	0.75	0.88666667			
Biogeochemical Cycling	0.97				
Habitat	0.94				
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	9		
2. Embeddedness	0-20		5		
3. Velocity/ Depth Regime	0-20		3		
4. Sediment Deposition	0-20		14		
5. Channel Flow Status	0-20		5		
6. Channel Alteration	0-20		3		
7. Frequency of Riffles (or bends)	0-20		1		
8. Bank Stability (LB & RB)	0-20		8		
9. Vegetative Protection (LB & RB)	0-20		10		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		8		
Total RBP Score	Marginal		66		
Sub-Total			0.33		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
<=99 - 90 points	0-90			55	
pH				0-1	
8.1-9.0 = 45 points	0-80				
DO		0-1			
	10-30			10.67	
Sub-Total			0.825		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
Grey Zone		0-100	0-1	64.53	
Sub-Total				0.6453	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

Column No. 5- Mitigation Projected At Maturity (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
	0-90				
pH				0-1	
	5-90				
DO		0-1			
	10-30				
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.743383333	167	124.145017

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0		

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0		

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0		

# West Virginia Stream and Wetland Valuation Metric

UT12 of LFHC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3345225		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.24004		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.317945833	167	220.0969542	\$176,077.56

PART V- Comparison of Unit Scores and Projected Balance										
Final Unit Score (Debit) [No Net Loss Value]	220.0969542	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)		
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
Buffer Width	Left Bank		
0-50	Right Bank		
51-150	Average Buffer Width/Side		
0-50	0		
51-150			

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT12 of LFHC, Intermittent	220.0969542	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT12 of LFHC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 29.08"	Lon.	82° 13' 27.29"	WEATHER:	65 Sunny	DATE:	20-May-10		
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				UT12 of Left Fork of Hell Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	138	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75		0.87	
Biogeochemical Cycling	0.97			
Habitat	0.89			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	
2. Embeddedness	0-20		7	
3. Velocity/ Depth Regime	0-20		0	
4. Sediment Deposition	0-20		10	
5. Channel Flow Status	0-20		0	
6. Channel Alteration	0-20		8	
7. Frequency of Riffles (or bends)	0-20		0	
8. Bank Stability (LB & RB)	0-20		4	
9. Vegetative Protection (LB & RB)	0-20		8	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		7	
Total RBP Score	Poor		44	
Sub-Total			0.22	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
100-199 - 85 points	0-90	0-1		
pH				
5.6-6.0 = 45 points	0-80			
DO				
	10-30			
Sub-Total				
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
0	0-100	0-1		
Sub-Total			0	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology			0	
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.6525	138	90.045

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0



# West Virginia Stream and Wetland Valuation Metric

UT12 of LFHC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.293625		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.174		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.120125	138	154.57725	\$123,661.80

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	154.57725	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT12 of LFHC, Ephemeral	154.57725	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UTPC, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 11.45" N	Lon.	82° 12' 19.23" W	WEATHER:	65 Cloudy	DATE:	May 19, 2010		
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UTPC - Unnamed Tributary of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	552	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 11.45" N	Lon.	82° 12' 19.23" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	552	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.72	0.88666667		
Biogeochemical Cycling	0.98			
Habitat	0.96			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	8	
2. Embeddedness	0-20		7	
3. Velocity/ Depth Regime	0-20		10	
4. Sediment Deposition	0-20		7	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		13	
7. Frequency of Riffles (or bends)	0-20		13	
8. Bank Stability (LB & RB)	0-20		11	
9. Vegetative Protection (LB & RB)	0-20		12	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		14	
Total RBP Score	Marginal		105	
Sub-Total			0.525	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
<=99 - 90 points	0-90	0-1	44	
pH				
6.0-8.0 = 80 points	0-80		6.66	
DO				
	10-30		10.28	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Very Good	0-100	0-1	82.72	
Sub-Total			0.8272	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
	0-90	0-1		
pH				
	5-90			
DO				
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.69	0.63		
Biogeochemical Cycling	0.57			
Habitat	0.63			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	11	
2. Embeddedness	0-20		11	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		11	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		6	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6	
Total RBP Score	Suboptimal		118	
Sub-Total			0.59	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	5-90		6.66	
DO				
>5.0 = 30 points	10-30		10.28	
Sub-Total			0.55	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.73	0.73666667		
Biogeochemical Cycling	0.8			
Habitat	0.68			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	13	
2. Embeddedness	0-20		13	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		13	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		11	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11	
Total RBP Score	Suboptimal		134	
Sub-Total			0.67	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	5-90		6.66	
DO				
>5.0 = 30 points	10-30		10.28	
Sub-Total			0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology	0.78	0.85666667		
Biogeochemical Cycling	0.9			
Habitat	0.89			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	15	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		13	
4. Sediment Deposition	0-20		15	
5. Channel Flow Status	0-20		10	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		15	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		16	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	
Total RBP Score	Suboptimal		150	
Sub-Total			0.75	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity				
500-599 - 50 points	0-90	0-1	500	
pH				
6.0-8.0 = 80 points	5-90		6.66	
DO				
>5.0 = 30 points	10-30		10.28	
Sub-Total			0.8	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good	0-100	0-1	68	
Sub-Total			0.68	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.835366667	552	461.1224

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	552	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.618333333	552	341.32

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.726666667	552	401.12

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.8	552	441.6

# West Virginia Stream and Wetland Valuation Metric

UTPC, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.375915		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.313626667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.524908333	552	841.7494	\$673,399.52

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	841.7494	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	341.32	Mitigation Projected at Ten Years Post Completion (Credit)	401.12	Mitigation Projected At Maturity (Credit)	441.6
<b>FINAL PROJECTED NET BALANCE</b>					341.32		401.12		441.6

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
50	50	Average Buffer Width/Side	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UTPC, Temporary Intermittent	841.7494	596.16

# West Virginia Stream and Wetland Valuation Metric

UTPC, Permanent Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 12.62"	Lon.	82° 12' 21.22"	WEATHER:	65 Cloudy	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UTPC - Unnamed Tributary of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)
STREAM IMPACT LENGTH:	883	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology	0.72		
Biogeochemical Cycling	0.98	0.88666667	
Habitat	0.96		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	7
2. Embeddedness	0-20		7
3. Velocity/ Depth Regime	0-20		9
4. Sediment Deposition	0-20		7
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		14
7. Frequency of Riffles (or bends)	0-20		12
8. Bank Stability (LB & RB)	0-20		13
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Marginal		109
Sub-Total			0.545
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	<=99 - 90 points	0-1	45
pH	6.0-8.0 = 80 points		6.59
DO	10-30		10.45
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	Very Good	0-100	0-1
Sub-Total			79.67
Sub-Total			0.7967

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	0
pH	5-90		0
DO	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	0
pH	5-90		0
DO	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	0
pH	5-90		0
DO	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			
Biogeochemical Cycling		0	
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	0
pH	5-90		0
DO	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.833616667	883	736.083517

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UTPC, Permanent Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3751275		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.312226667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.520970833	883	1343.017246	\$1,074,413.80

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1343.017246	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UTPC, Permanent Intermittent	1343.017246	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UTPC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 0.70"	Lon.	82° 12' 10.32"	WEATHER:	60 Cloudy	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UTPC - Unnamed Tributary of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	447	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.67	0.80333333	
Biogeochemical Cycling	0.86		
Habitat	0.88		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		9
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		9
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		9
9. Vegetative Protection (LB & RB)	0-20		10
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		71
Sub-Total			0.355
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
100-199 - 85 points	0-90	0-1	
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Very Good	0-100	0-1	80
Sub-Total			0.8

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7025	447	314.0175

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UTPC, Ephemeral (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.316125
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	25
30%	25
Sub-Total	0.240666667

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.259291667	447	562.903375	\$450,322.70

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	562.903375	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0	0		

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UTPC, Ephemeral	562.903375	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT6 of UTPC, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 10.89" N	Lon.	82° 12' 28.82" W	WEATHER:	60 Cloudy	DATE:	May 19, 2010														
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	UT6 of UTPC - 6th Unnamed Tributary of UNT of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree				MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Same (Mitigation is restoration of temporary impacts)																
STREAM IMPACT LENGTH:	55	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 10.89" N	Lon.	82° 12' 28.82" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	55													
<b>Column No. 1- Impact Existing Condition (Debit)</b>			<b>Column No. 2- Mitigation Existing Condition - Baseline (Credit)</b>			<b>Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)</b>			<b>Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)</b>			<b>Column No. 5- Mitigation Projected At Maturity (Credit)</b>													
HGM Score (attach data forms):			HGM Score (attach data forms):			HGM Score (attach data forms):			HGM Score (attach data forms):			HGM Score (attach data forms):													
Average			Average			Average			Average			Average													
Hydrology	0.67	0.84666667		Hydrology		0		Hydrology	0.68	0.626666667		Hydrology	0.74	0.75		Hydrology	0.81	0.89							
Biogeochemical Cycling	0.97			Biogeochemical Cycling				Biogeochemical Cycling	0.57			Biogeochemical Cycling	0.8			Biogeochemical Cycling	0.91								
Habitat	0.9			Habitat				Habitat	0.63			Habitat	0.71			Habitat	0.95								
PART I - Physical, Chemical and Biological Indicators			PART I - Physical, Chemical and Biological Indicators			PART I - Physical, Chemical and Biological Indicators			PART I - Physical, Chemical and Biological Indicators			PART I - Physical, Chemical and Biological Indicators													
Points Scale Range Site Score			Points Scale Range Site Score			Points Scale Range Site Score			Points Scale Range Site Score			Points Scale Range Site Score													
PHYSICAL INDICATOR (Applies to all streams classifications)			PHYSICAL INDICATOR (Applies to all streams classifications)			PHYSICAL INDICATOR (Applies to all streams classifications)			PHYSICAL INDICATOR (Applies to all streams classifications)			PHYSICAL INDICATOR (Applies to all streams classifications)													
USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)													
1. Epifaunal Substrate/Available Cover	0-20	0-1	2	1. Epifaunal Substrate/Available Cover	0-20	0-1		1. Epifaunal Substrate/Available Cover	0-20	0-1	11	1. Epifaunal Substrate/Available Cover	0-20	0-1	13	1. Epifaunal Substrate/Available Cover	0-20	0-1	15						
2. Embeddedness	0-20		2	2. Embeddedness	0-20			11	2. Embeddedness		0-20		13		2. Embeddedness	0-20			15						
3. Velocity/ Depth Regime	0-20		3	3. Velocity/ Depth Regime	0-20			10	3. Velocity/ Depth Regime		0-20		10		3. Velocity/ Depth Regime	0-20			10						
4. Sediment Deposition	0-20		3	4. Sediment Deposition	0-20			10	4. Sediment Deposition		0-20		10		4. Sediment Deposition	0-20			10						
5. Channel Flow Status	0-20		5	5. Channel Flow Status	0-20			5	5. Channel Flow Status		0-20		5		5. Channel Flow Status	0-20			5						
6. Channel Alteration	0-20		14	6. Channel Alteration	0-20			15	6. Channel Alteration		0-20		15		6. Channel Alteration	0-20			15						
7. Frequency of Riffles (or bends)	0-20		11	7. Frequency of Riffles (or bends)	0-20			13	7. Frequency of Riffles (or bends)		0-20		13		7. Frequency of Riffles (or bends)	0-20			13						
8. Bank Stability (LB & RB)	0-20		14	8. Bank Stability (LB & RB)	0-20			18	8. Bank Stability (LB & RB)		0-20		18		8. Bank Stability (LB & RB)	0-20			18						
9. Vegetative Protection (LB & RB)	0-20		15	9. Vegetative Protection (LB & RB)	0-20			6	9. Vegetative Protection (LB & RB)		0-20		11		9. Vegetative Protection (LB & RB)	0-20			16						
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	10. Riparian Vegetative Zone Width (LB & RB)	0-20			11	10. Riparian Vegetative Zone Width (LB & RB)		0-20		11		10. Riparian Vegetative Zone Width (LB & RB)	0-20			16						
Total RBP Score	Marginal		87	Total RBP Score	Poor		0	Total RBP Score	Marginal		105	Total RBP Score	Suboptimal		119	Total RBP Score	Suboptimal		133						
Sub-Total			0.435	Sub-Total			0	Sub-Total			0.525	Sub-Total			0.595	Sub-Total			0.665						
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)													
WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General)													
Specific Conductivity			Specific Conductivity			Specific Conductivity			Specific Conductivity			Specific Conductivity													
<=99 - 90 points	0-90	0-1	45	<=99 - 90 points	0-90	0-1		500-599 - 50 points	0-90	0-1	500	500-599 - 50 points	0-90	0-1	500	500-599 - 50 points	0-90	0-1	500						
pH				pH					pH						pH					pH					
6.0-8.0 = 80 points	0-80		6.59	6.0-8.0 = 80 points	5-90		6.59	6.0-8.0 = 80 points	5-90		6.59	6.0-8.0 = 80 points	5-90		6.59	6.0-8.0 = 80 points	5-90		6.59	6.0-8.0 = 80 points	5-90	6.59	6.0-8.0 = 80 points	5-90	6.59
DO	10-30		10.45	DO	10-30		10.45	DO	10-30		10.45	DO	10-30		10.45	DO	10-30		10.45	DO	10-30	10.45	DO	10-30	10.45
Sub-Total			1	Sub-Total			0	Sub-Total			0.55	Sub-Total			0.8	Sub-Total			0.8						
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)													
WV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)													
Very Good	0-100	0-1	79.67	Very Good	0-100	0-1		Good	0-100	0-1	68	Good	0-100	0-1	68	Good	0-100	0-1	68						
Sub-Total			0.7967	Sub-Total			0	Sub-Total			0.68	Sub-Total			0.68	Sub-Total			0.68						
PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score													
Index	Linear Feet	Unit Score		Index	Linear Feet	Unit Score		Index	Linear Feet	Unit Score		Index	Linear Feet	Unit Score		Index	Linear Feet	Unit Score							
0.795283333	55	43.7405833		0	55	0		0.605833333	55	33.32083333		0.720833333	55	39.6458333		0.8025	55	44.1375							



# West Virginia Stream and Wetland Valuation Metric

UT6 of UTPC, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.3578775		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.29756		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.450720833	55	79.78964583	\$63,831.72

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	79.78964583	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	33.32083333	Mitigation Projected at Ten Years Post Completion (Credit)	39.64583333	Mitigation Projected At Maturity (Credit)	44.1375
<b>FINAL PROJECTED NET BALANCE</b>					33.32083333		39.64583333		44.1375

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
50	50	50	50
Average Buffer Width/Side		50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT6 UTPC, Temporary Intermittent	79.78964583	59.585625

# West Virginia Stream and Wetland Valuation Metric

UT6 of UTPC, Temporary Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 10.89" N	Lon.	82° 12' 28.82" W	WEATHER:	60 Cloudy	DATE:	May 19, 2010											
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT6 of UTPC - 6th Unnamed Tributary of UNT of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		Same (Mitigation is restoration of temporary impacts)												
STREAM IMPACT LENGTH:	40	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 10.89" N	Lon.	82° 12' 28.82" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	40										
<b>Column No. 1- Impact Existing Condition (Debit)</b>			<b>Column No. 2- Mitigation Existing Condition - Baseline (Credit)</b>			<b>Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)</b>			<b>Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)</b>			<b>Column No. 5- Mitigation Projected At Maturity (Credit)</b>										
HGM Score (attach data forms):			HGM Score (attach data forms):			HGM Score (attach data forms):			HGM Score (attach data forms):			HGM Score (attach data forms):										
Average			Average			Average			Average			Average										
Hydrology	0.67	0.80333333		Hydrology		0		Hydrology	0.7	0.603333333		Hydrology	0.78	0.73666667		Hydrology	0.79	0.83333333				
Biogeochemical Cycling	0.86			Biogeochemical Cycling				Biogeochemical Cycling	0.52			Biogeochemical Cycling	0.74			Biogeochemical Cycling	0.81					
Habitat	0.88			Habitat				Habitat	0.59			Habitat	0.69			Habitat	0.9					
PART I - Physical, Chemical and Biological Indicators			PART I - Physical, Chemical and Biological Indicators			PART I - Physical, Chemical and Biological Indicators			PART I - Physical, Chemical and Biological Indicators			PART I - Physical, Chemical and Biological Indicators										
Points Scale Range Site Score			Points Scale Range Site Score			Points Scale Range Site Score			Points Scale Range Site Score			Points Scale Range Site Score										
PHYSICAL INDICATOR (Applies to all streams classifications)			PHYSICAL INDICATOR (Applies to all streams classifications)			PHYSICAL INDICATOR (Applies to all streams classifications)			PHYSICAL INDICATOR (Applies to all streams classifications)			PHYSICAL INDICATOR (Applies to all streams classifications)										
USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)			USEPA RBP (High Gradient Data Sheet)										
1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0	1. Epifaunal Substrate/Available Cover	0-20	0-1	0			
2. Embeddedness	0-20		8	2. Embeddedness	0-20		11	2. Embeddedness	0-20		13	2. Embeddedness	0-20		15	2. Embeddedness	0-20		13	2. Embeddedness	0-20	15
3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20		0	3. Velocity/ Depth Regime	0-20	0
4. Sediment Deposition	0-20		11	4. Sediment Deposition	0-20		13	4. Sediment Deposition	0-20		13	4. Sediment Deposition	0-20		13	4. Sediment Deposition	0-20		13	4. Sediment Deposition	0-20	13
5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20		0	5. Channel Flow Status	0-20	0
6. Channel Alteration	0-20		16	6. Channel Alteration	0-20		16	6. Channel Alteration	0-20		16	6. Channel Alteration	0-20		16	6. Channel Alteration	0-20		16	6. Channel Alteration	0-20	16
7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20		0	7. Frequency of Riffles (or bends)	0-20	0
8. Bank Stability (LB & RB)	0-20		16	8. Bank Stability (LB & RB)	0-20		18	8. Bank Stability (LB & RB)	0-20		18	8. Bank Stability (LB & RB)	0-20		18	8. Bank Stability (LB & RB)	0-20		18	8. Bank Stability (LB & RB)	0-20	18
9. Vegetative Protection (LB & RB)	0-20		16	9. Vegetative Protection (LB & RB)	0-20		6	9. Vegetative Protection (LB & RB)	0-20		6	9. Vegetative Protection (LB & RB)	0-20		11	9. Vegetative Protection (LB & RB)	0-20		16	9. Vegetative Protection (LB & RB)	0-20	16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	10. Riparian Vegetative Zone Width (LB & RB)	0-20		6	10. Riparian Vegetative Zone Width (LB & RB)	0-20		11	10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	10. Riparian Vegetative Zone Width (LB & RB)	0-20		16	10. Riparian Vegetative Zone Width (LB & RB)	0-20	16
Total RBP Score	Marginal		83	Total RBP Score	Poor		0	Total RBP Score	Marginal		70	Total RBP Score	Marginal		82	Total RBP Score	Marginal		94			
Sub-Total			0.415	Sub-Total			0	Sub-Total			0.35	Sub-Total			0.41	Sub-Total			0.47			
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)										
WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General)			WVDEP Water Quality Indicators (General)										
Specific Conductivity			Specific Conductivity			Specific Conductivity			Specific Conductivity			Specific Conductivity										
100-199 - 85 points	0-90	0-1		100-199 - 85 points	0-90	0-1		100-199 - 85 points	0-90	0-1		100-199 - 85 points	0-90	0-1		100-199 - 85 points	0-90	0-1				
pH			pH				pH				pH				pH							
5.6-6.0 = 45 points	0-80			5.6-6.0 = 45 points	0-80			5.6-6.0 = 45 points	0-80			5.6-6.0 = 45 points	0-80			5.6-6.0 = 45 points	0-80			5.6-6.0 = 45 points	0-80	
DO			DO				DO				DO				DO							
	10-30				10-30				10-30				10-30				10-30					
Sub-Total				Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0			
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)										
WV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)			WV Stream Condition Index (WVSCI)										
0	0-100	0-1		0	0-100	0-1		0	0-100	0-1		0	0-100	0-1		0	0-100	0-1				
Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0	Sub-Total			0			
PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score			PART II - Index and Unit Score										
Index	Linear Feet	Unit Score		Index	Linear Feet	Unit Score		Index	Linear Feet	Unit Score		Index	Linear Feet	Unit Score		Index	Linear Feet	Unit Score				
0.667916667	40	26.7166667		0	40	0		0.389166667	40	15.5666667		0.470833333	40	18.8333333		0.534166667	40	21.366667				

# West Virginia Stream and Wetland Valuation Metric

UT6 of UTPC, Temporary Ephemeral (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.3005625
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.213

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.181479167	40	47.25916667	\$37,807.33

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	47.25916667	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	15.56666667	Mitigation Projected at Ten Years Post Completion (Credit)	18.83333333	Mitigation Projected At Maturity (Credit)	21.36666667
<b>FINAL PROJECTED NET BALANCE</b>					15.56666667		18.83333333		21.36666667

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
50	0-50	Preservation and Re-vegetation
	51-150	
Buffer Width	Right Bank	
50	0-50	Preservation and Re-vegetation
	51-150	
Average Buffer Width/Side	50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT6 UTPC, Temporary Ephemeral	47.25916667	28.845

# West Virginia Stream and Wetland Valuation Metric

PRC, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 50.26" N	Lon.	82° 12' 37.08" W	WEATHER:	65 Sunny	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Perennial		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		Same (Mitigation is restoration of temporary impacts)			
STREAM IMPACT LENGTH:	858	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 50.26" N	Lon.	82° 12' 37.08" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	858

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	7
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		7
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		6
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		134
Sub-Total			0.67
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	38
<=99 - 90 points	0-90		
pH			6.53
6.0-8.0 = 80 points	0-80		
DO			10.81
	10-30		
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Very Good	0-100	0-1	78.58
Sub-Total			0.7858

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		123
Sub-Total			0.615
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	500
500-599 - 50 points	0-90		
pH			6.53
6.0-8.0 = 80 points	5-90		
DO			10.81
	10-30		
Sub-Total			0.55
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		139
Sub-Total			0.695
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	500
500-599 - 50 points	0-90		
pH			6.53
6.0-8.0 = 80 points	5-90		
DO			10.81
	10-30		
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		15
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		155
Sub-Total			0.775
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	500
500-599 - 50 points	0-90		
pH			6.53
6.0-8.0 = 80 points	5-90		
DO			10.81
	10-30		
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.8186	858	702.3588

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	858	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.615	858	527.67

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.725	858	622.05

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.75166667	858	644.93

# West Virginia Stream and Wetland Valuation Metric

PRC, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
Temporal Loss-Construction		Long-term Protection	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).		% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
Years	15		
Sub-Total	0.36837		
Temporal Loss-Maturity		0 + 5/10 Year Monitoring	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).			101
% Add. Mitigation	Temporal Loss-Maturity (Years)	Sub-Total	0
30%	25		
Sub-Total	0.32744		

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.51441	858	1299.36378	\$1,039,491.02

PART V- Comparison of Unit Scores and Projected Balance										
Final Unit Score (Debit) [No Net Loss Value]	1299.36378	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	527.67	Mitigation Projected at Ten Years Post Completion (Credit)	622.05	Mitigation Projected At Maturity (Credit)	644.93	
<b>FINAL PROJECTED NET BALANCE</b>					527.67		622.05		644.93	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <small>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</small> <small>*Note2: Place an "X" in the appropriate category (only select one).</small>		<b>Extended Upland Buffer Zone</b> <small>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</small> <small>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</small> <small>*Note3: Select the appropriate mitigation type</small>	
Level I Restoration		<b>Buffer Width</b>	<b>Left Bank</b>
Level II Restoration		50	0-50 51-150 Preservation and Re-vegetation
Level III Restoration		<b>Buffer Width</b>	<b>Right Bank</b>
		50	0-50 51-150 Preservation and Re-vegetation
		<b>Average Buffer Width/Side</b>	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
PRC, Temporary Perennial	1299.36378	870.6555

# West Virginia Stream and Wetland Valuation Metric

PRC, Permanent Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 55.14"	Lon.	82° 12' 36.15"	WEATHER:	65 Sunny	DATE:	May 19, 2010		
STREAM CLASSIFICATION:	Perennial		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	241	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)			Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology				
Biogeochemical Cycling			0	
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	9	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		7	
4. Sediment Deposition	0-20		14	
5. Channel Flow Status	0-20		13	
6. Channel Alteration	0-20		17	
7. Frequency of Riffles (or bends)	0-20		7	
8. Bank Stability (LB & RB)	0-20		17	
9. Vegetative Protection (LB & RB)	0-20		14	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		131	
Sub-Total			0.655	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	38	
<=99 - 90 points	0-90			
pH				
6.0-8.0 = 80 points		0-80	6.53	
DO		10-30	10.81	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Very Good		0-100	0-1	78.58
Sub-Total				0.7858

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology				
Biogeochemical Cycling			0	
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
		5-90		
DO		10-30		
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology				
Biogeochemical Cycling			0	
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
		5-90		
DO		10-30		
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology				
Biogeochemical Cycling			0	
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
		5-90		
DO		10-30		
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology				
Biogeochemical Cycling			0	
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
		5-90		
DO		10-30		
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.8136	241	196.0776

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

PRC, Permanent Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.36612		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.32544		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.50516	241	362.74356	\$290,194.85

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	362.74356	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		<b>Buffer Width</b>	<b>Left Bank</b>
Level II Restoration		0-50	
Level III Restoration		51-150	
		<b>Buffer Width</b>	<b>Right Bank</b>
		0-50	
		51-150	
		<b>Average Buffer Width/Side</b>	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
PRC, Permanent Perennial	362.74356	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

PRC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 37.14"	Lon.	82° 12' 35.53"	WEATHER:	65 Sunny	DATE:	May 19, 2010		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	1855	FORM OF MITIGATION:		MIT COORDINATES: (in Decimal Degrees)	Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.9	
Biogeochemical Cycling	0.99		
Habitat	0.96		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		5
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		7
6. Channel Alteration	0-20		19
7. Frequency of Riffles (or bends)	0-20		6
8. Bank Stability (LB & RB)	0-20		11
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		19
Total RBP Score	Suboptimal		116
Sub-Total			0.58
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	39
pH			
8.1-9.0 = 45 points	0-80		8.81
DO			
	10-30		13.68
Sub-Total			0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good		0-100	0-1
			75.82
Sub-Total			0.7582

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	0
pH			
	5-90		0
DO			
	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
			0
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	0
pH			
	5-90		0
DO			
	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
			0
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	0
pH			
	5-90		0
DO			
	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
			0
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	0
pH			
	5-90		0
DO			
	10-30		0
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
			0
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.810533333	1855	1503.53933

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0		

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0		

PART II - Index and Unit Score				
Index	Linear Feet	Unit Score		
0	0	0		



# West Virginia Stream and Wetland Valuation Metric

PRC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.36474		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.288426667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.4637	1855	2715.1635	\$2,172,130.80

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	2715.1635	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
PRC, Intermittent	2715.1635	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

PRC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 25.59"	Lon.	82° 12' 39.26"	WEATHER:	65 Sunny	DATE:	May 19, 2010
STREAM CLASSIFICATION:	Ephemeral		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		
STREAM IMPACT LENGTH:	35	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)			Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):			Average
Hydrology	0.75		0.83
Biogeochemical Cycling	0.88		
Habitat	0.86		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		18
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		14
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Marginal		103
Sub-Total			0.515
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	100-199 - 85 points	0-90	
pH	5.6-6.0 = 45 points	0-80	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0	0-100	0-1
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):			Average
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):			Average
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):			Average
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):			Average
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
		0-100	0-1
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.70625	35	24.71875

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

PRC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>		<b>Long-term Protection</b>	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).		% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
Years	15		
Sub-Total	0.3178125		
<b>Temporal Loss-Maturity</b>		<b>PART IV - Index to Unit Score Conversion</b>	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).		0 + 5/10 Year Monitoring	101
% Add. Mitigation	Temporal Loss-Maturity (Years)	Sub-Total	0
30%	25	Final Index Score (Debit)	Linear Feet
Sub-Total	0.233	1.2570625	35
		Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
		43.9971875	\$35,197.75

PART V- Comparison of Unit Scores and Projected Balance										
Final Unit Score (Debit) [No Net Loss Value]	43.9971875	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)		
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0	0			

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).		*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note2: Enter the buffer width for each channel side (Left Bank and Right Bank) *Note3: Select the appropriate mitigation type	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
PRC, Ephemeral	43.9971875	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

LFPRC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 34.78"	Lon.	82° 12' 33.04"	WEATHER:	65 Sunny	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				Left Fork of Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree				MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	
STREAM IMPACT LENGTH:	30	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75	0.9		
Biogeochemical Cycling	0.99			
Habitat	0.96			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	11	
2. Embeddedness	0-20		16	
3. Velocity/ Depth Regime	0-20		7	
4. Sediment Deposition	0-20		16	
5. Channel Flow Status	0-20		6	
6. Channel Alteration	0-20		16	
7. Frequency of Riffles (or bends)	0-20		6	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		18	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20	
Total RBP Score	Suboptimal		134	
Sub-Total			0.67	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	8.81	
<=99 - 90 points	0-90			
pH				
8.1-9.0 = 45 points	0-80			
DO			13.68	
Sub-Total			0.825	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Good		0-100	0-1	75.82
Sub-Total				0.7582

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
	5-90			
DO				
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
	5-90			
DO				
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
	5-90			
DO				
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
	5-90			
DO				
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.825533333	30	24.766

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

LFPRC, Intermittent (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.37149
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.300426667

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.49745	30	44.9235	\$35,938.80

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	44.9235	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
LFPRC, Intermittent	44.9235	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

LFPRC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 39.50"	Lon.	82° 11' 57.86"	WEATHER:	65 Sunny	DATE:	May 19, 2010		
STREAM CLASSIFICATION:	Ephemeral		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Left Fork of Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	110	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)			Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)					
HGM Score (attach data forms):		Average			
Hydrology	0.75	0.83			
Biogeochemical Cycling	0.88				
Habitat	0.86				
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	0		
2. Embeddedness	0-20		18		
3. Velocity/ Depth Regime	0-20		0		
4. Sediment Deposition	0-20		16		
5. Channel Flow Status	0-20		0		
6. Channel Alteration	0-20		16		
7. Frequency of Riffles (or bends)	0-20		0		
8. Bank Stability (LB & RB)	0-20		18		
9. Vegetative Protection (LB & RB)	0-20		18		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20		
Total RBP Score	Marginal	106			
Sub-Total	0.53				
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity					
100-199 - 85 points	0-90	0-1			
pH					
5.6-6.0 = 45 points	0-80				
DO					
	10-30				
Sub-Total	0				
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
0	0-100	0-1			
Sub-Total	0				

Column No. 2- Mitigation Existing Condition - Baseline (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	0		
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor	0			
Sub-Total	0				
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity					
	0-90	0-1			
pH					
	5-90				
DO					
	10-30				
Sub-Total	0				
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
	0-100	0-1			
Sub-Total	0				

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	0		
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor	0			
Sub-Total	0				
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity					
	0-90	0-1			
pH					
	5-90				
DO					
	10-30				
Sub-Total	0				
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
	0-100	0-1			
Sub-Total	0				

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	0		
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor	0			
Sub-Total	0				
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity					
	0-90	0-1			
pH					
	5-90				
DO					
	10-30				
Sub-Total	0				
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
	0-100	0-1			
Sub-Total	0				

Column No. 5- Mitigation Projected At Maturity (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	0		
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor	0			
Sub-Total	0				
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity					
	0-90	0-1			
pH					
	5-90				
DO					
	10-30				
Sub-Total	0				
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
	0-100	0-1			
Sub-Total	0				

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.71	110	78.1

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

LFPRC, Ephemeral (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.3195
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.236

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.2655	110	139.205	\$111,364.00

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	139.205	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0	0	0

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
	0-50	
	51-150	
Buffer Width	Right Bank	
	0-50	
	51-150	
Average Buffer Width/Side	0	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
LFPRC, Ephemeral	139.205	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT1 of UT1 of PRC, Temporary Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 5.35" N	Lon.	82° 12' 43.58" W	WEATHER:	65 Sunny	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Ephemeral		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)	UT1 of UT1 of Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		Same (Mitigation is restoration of temporary impacts)			
STREAM IMPACT LENGTH:	55	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 43' 5.35" N	Lon.	82° 12' 43.58" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	55

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.83	
Biogeochemical Cycling	0.88		
Habitat	0.86		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		12
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		12
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		8
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		79
Sub-Total			0.395
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
100-199 - 85 points	0-90		
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.58	0.51	
Biogeochemical Cycling	0.51		
Habitat	0.44		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Marginal		69
Sub-Total			0.345
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.64	0.64	
Biogeochemical Cycling	0.71		
Habitat	0.57		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Marginal		83
Sub-Total			0.415
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.71	0.78	
Biogeochemical Cycling	0.81		
Habitat	0.82		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Marginal		97
Sub-Total			0.485
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.67625	55	37.19375

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	55	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.34125	55	18.76875

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.42375	55	23.30625

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.51125	55	28.11875



# West Virginia Stream and Wetland Valuation Metric

UT1 of UT1 of PRC, Temporary Ephemeral (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.3043125
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.209

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.1895625	55	65.4259375	\$52,340.75

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	65.4259375	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	18.76875	Mitigation Projected at Ten Years Post Completion (Credit)	23.30625	Mitigation Projected At Maturity (Credit)	28.11875
<b>FINAL PROJECTED NET BALANCE</b>					18.76875		23.30625		28.11875

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
50	0-50	Preservation and Re-vegetation
	51-150	
Buffer Width	Right Bank	
50	0-50	Preservation and Re-vegetation
	51-150	
Average Buffer Width/Side	50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT1 of UT1 of PRC, Temporary Ephemeral	65.4259375	37.9603125

# West Virginia Stream and Wetland Valuation Metric

UT2 of PRC, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 51.95" N	Lon.	82° 12' 37.06" W	WEATHER:	65 Sunny	DATE:	May 19, 2010		
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT2 of Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	159	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 51.95" N	Lon.	82° 12' 37.06" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	159	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.72	0.81666667	
Biogeochemical Cycling	0.96		
Habitat	0.77		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	16
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		10
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		14
7. Frequency of Riffles (or bends)	0-20		6
8. Bank Stability (LB & RB)	0-20		16
9. Vegetative Protection (LB & RB)	0-20		18
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		138
Sub-Total			0.69
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	39
pH			
8.1-9.0 = 45 points	0-80		8.81
DO			
	10-30		13.68
Sub-Total			0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	75.82
Sub-Total			0.7582

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.58	0.51	
Biogeochemical Cycling	0.51		
Habitat	0.44		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		116
Sub-Total			0.58
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.81
DO			
	10-30		13.68
Sub-Total			0.375
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.64	0.64	
Biogeochemical Cycling	0.71		
Habitat	0.57		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		134
Sub-Total			0.67
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.81
DO			
	10-30		13.68
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.71	0.78	
Biogeochemical Cycling	0.81		
Habitat	0.82		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		150
Sub-Total			0.75
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.81
DO			
	10-30		13.68
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7872	159	125.1648

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	159	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.5275	159	83.8725

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.649166667	159	103.2175

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7325	159	116.4675

# West Virginia Stream and Wetland Valuation Metric

UT2 of PRC, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.35424		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.303093333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.444533333	159	229.6808	\$183,744.64

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	229.6808	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	83.8725	Mitigation Projected at Ten Years Post Completion (Credit)	103.2175	Mitigation Projected At Maturity (Credit)	116.4675
<b>FINAL PROJECTED NET BALANCE</b>					83.8725		103.2175		116.4675

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		50	0-50 51-150 Preservation and Re-vegetation
Level III Restoration		Buffer Width	Right Bank
		50	0-50 51-150 Preservation and Re-vegetation
		Average Buffer Width/Side	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT2 of PRC, Temporary Intermittent	229.6808	157.231125

# West Virginia Stream and Wetland Valuation Metric

UT3 of PRC, Temporary Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 48.56"	Lon.	82° 12' 38.18"	WEATHER:	65 Sunny	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT3 of Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)
STREAM IMPACT LENGTH:	117	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 47.92" N	Lon.	82° 12' 37.44" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	117

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.83	
Biogeochemical Cycling	0.88		
Habitat	0.86		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		19
3. Velocity/ Depth Regime	0-20		2
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		2
6. Channel Alteration	0-20		19
7. Frequency of Riffles (or bends)	0-20		2
8. Bank Stability (LB & RB)	0-20		12
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		2
Total RBP Score	Marginal		101
Sub-Total			0.505
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	39
pH			
8.1-9.0 = 45 points	0-80		8.81
DO			
	10-30		13.68
Sub-Total			0.825
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	75.82
Sub-Total			0.7582

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.6	0.52	
Biogeochemical Cycling	0.51		
Habitat	0.45		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		116
Sub-Total			0.58
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.81
DO			
>5.0 = 30 points	10-30		13.68
Sub-Total			0.375
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.63	0.63666667	
Biogeochemical Cycling	0.71		
Habitat	0.57		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		134
Sub-Total			0.67
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.81
DO			
>5.0 = 30 points	10-30		13.68
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology	0.69	0.77	
Biogeochemical Cycling	0.81		
Habitat	0.81		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		10
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		150
Sub-Total			0.75
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
8.1-9.0 = 45 points	5-90		8.81
DO			
>5.0 = 30 points	10-30		13.68
Sub-Total			0.625
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.763033333	117	89.2749

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	117	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.5325	117	62.3025

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.6475	117	75.7575

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7275	117	85.1175

# West Virginia Stream and Wetland Valuation Metric

UT3 of PRC, Temporary Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.343365		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.278426667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.384825	117	162.024525	\$129,619.62

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	162.024525	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	62.3025	Mitigation Projected at Ten Years Post Completion (Credit)	75.7575	Mitigation Projected At Maturity (Credit)	85.1175
<b>FINAL PROJECTED NET BALANCE</b>					62.3025	75.7575			

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i> <i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<b>Extended Upland Buffer Zone</b> <i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i> <i>*Note2: Enter the buffer width for each channel side (Left Bank and Right Bank)</i> <i>*Note3: Select the appropriate mitigation type</i>	
Level I Restoration	Level II Restoration	Level III Restoration	
<b>Buffer Width</b>		<b>Left Bank</b>	
50	0-50	Preservation and Re-vegetation	
50	51-150	Preservation and Re-vegetation	
<b>Buffer Width</b>		<b>Right Bank</b>	
50	0-50	Preservation and Re-vegetation	
50	51-150	Preservation and Re-vegetation	
<b>Average Buffer Width/Side</b>		50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT3 of PRC, Temporary Intermittent	162.024525	114.908625

# West Virginia Stream and Wetland Valuation Metric

UT5 of PRC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No, S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 34.78"	Lon.	82° 12' 33.04"	WEATHER:	65 Sunny	DATE:	May 19, 2010		
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			UT5 of Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	1800	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)			Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)					
HGM Score (attach data forms):		Average			
Hydrology	0.72	0.81666667			
Biogeochemical Cycling	0.96				
Habitat	0.77				
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1	12		
2. Embeddedness	0-20		16		
3. Velocity/ Depth Regime	0-20		9		
4. Sediment Deposition	0-20		16		
5. Channel Flow Status	0-20		12		
6. Channel Alteration	0-20		17		
7. Frequency of Riffles (or bends)	0-20		7		
8. Bank Stability (LB & RB)	0-20		15		
9. Vegetative Protection (LB & RB)	0-20		15		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		19		
Total RBP Score	Suboptimal		138		
Sub-Total			0.69		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1	39		
<=99 - 90 points				0-90	
pH				5-90	8.81
8.1-9.0 = 45 points					
DO		10-30	13.68		
Sub-Total			0.825		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
Good		0-100	0-1	75.82	
Sub-Total				0.7582	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
				0-90	
pH				5-90	
DO		10-30			
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
				0-90	
pH				5-90	
DO		10-30			
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
				0-90	
pH				5-90	
DO		10-30			
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

Column No. 5- Mitigation Projected At Maturity (Credit)					
HGM Score (attach data forms):		Average			
Hydrology		0			
Biogeochemical Cycling					
Habitat					
PART I - Physical, Chemical and Biological Indicators					
	Points Scale	Range	Site Score		
PHYSICAL INDICATOR (Applies to all streams classifications)					
USEPA RBP (High Gradient Data Sheet)					
1. Epifaunal Substrate/Available Cover	0-20	0-1			
2. Embeddedness	0-20				
3. Velocity/ Depth Regime	0-20				
4. Sediment Deposition	0-20				
5. Channel Flow Status	0-20				
6. Channel Alteration	0-20				
7. Frequency of Riffles (or bends)	0-20				
8. Bank Stability (LB & RB)	0-20				
9. Vegetative Protection (LB & RB)	0-20				
10. Riparian Vegetative Zone Width (LB & RB)	0-20				
Total RBP Score	Poor		0		
Sub-Total			0		
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WVDEP Water Quality Indicators (General)					
Specific Conductivity		0-1			
				0-90	
pH				5-90	
DO		10-30			
Sub-Total			0		
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)					
WV Stream Condition Index (WVSCI)					
		0-100	0-1		
Sub-Total				0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7872	1800	1416.96

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT5 of PRC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.35424		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.303093333		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.444533333	1800	2600.16	\$2,080,128.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	2600.16	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note2: Enter the buffer width for each channel side (Left Bank and Right Bank) *Note3: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT5 of PRC, Intermittent	2600.16	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT5 of PRC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 25.59"	Lon.	82° 12' 25.57"	WEATHER:	65 Sunny	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				UT5 of Pigeonroost Creek of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)		
STREAM IMPACT LENGTH:	100	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.83	
Biogeochemical Cycling	0.88		
Habitat	0.86		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		18
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		16
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Marginal		102
Sub-Total			0.51
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
100-199 - 85 points	0-90		
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
	0-90		
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.705	100	70.5

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0



# West Virginia Stream and Wetland Valuation Metric

UT5 of PRC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.31725		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.232		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.25425	100	125.425	\$100,340.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	125.425	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT5 of PRC, Ephemeral	125.425	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UTSB, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 42' 27.70"	Lon.	82° 11' 53.66"	WEATHER:	60 Cloudy	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Unnamed Tributary of StoneCoal Branch of Pigeon Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	100	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.66	0.82		
Biogeochemical Cycling	0.94			
Habitat	0.86			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	5	
2. Embeddedness	0-20		13	
3. Velocity/ Depth Regime	0-20		6	
4. Sediment Deposition	0-20		16	
5. Channel Flow Status	0-20		1	
6. Channel Alteration	0-20		18	
7. Frequency of Riffles (or bends)	0-20		11	
8. Bank Stability (LB & RB)	0-20		18	
9. Vegetative Protection (LB & RB)	0-20		18	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		124	
Sub-Total			0.62	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
<=99 - 90 points	0-90			31
pH				0-1
6.0-8.0 = 80 points	0-80	6.89		
DO		0-1		
	10-30			10.2
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Poor		0-100	0-1	
Sub-Total			24.5	
Sub-Total			0.145	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				0-1
	5-90			
DO		0-1		
	10-30			
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
	0-100	0-1		
Sub-Total			0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.704166667	100	70.4166667

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UTSB, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
Temporal Loss-Construction		Long-term Protection	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).			
Years	15	% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
Sub-Total	0.316875	0 + 5/10 Year Monitoring	101
		Sub-Total	0
PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.256375	100	125.6375	\$100,510.00
Temporal Loss-Maturity			
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.235333333		

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	125.6375	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b> <small>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</small> <small>*Note2: Place an "X" in the appropriate category (only select one).</small>		<b>Extended Upland Buffer Zone</b> <small>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</small> <small>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</small> <small>*Note<sup>3</sup>: Select the appropriate mitigation type</small>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UTSB, Intermittent	125.6375	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT4 of MC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07		IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 39.19"	Lon.	82° 15' 00.97"	WEATHER:	60 Cloudy	DATE:	May 19, 2010		
STREAM CLASSIFICATION:	Intermittent		IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			4th Unnamed Tributary of Miller Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				
STREAM IMPACT LENGTH:	72	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)			Lat.		Lon.		PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0

Column No. 1- Impact Existing Condition (Debit)				
HGM Score (attach data forms):		Average		
Hydrology	0.75	0.86333333		
Biogeochemical Cycling	0.97			
Habitat	0.87			
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1	11	
2. Embeddedness	0-20		15	
3. Velocity/ Depth Regime	0-20		9	
4. Sediment Deposition	0-20		15	
5. Channel Flow Status	0-20		13	
6. Channel Alteration	0-20		15	
7. Frequency of Riffles (or bends)	0-20		5	
8. Bank Stability (LB & RB)	0-20		16	
9. Vegetative Protection (LB & RB)	0-20		14	
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18	
Total RBP Score	Suboptimal		131	
Sub-Total			0.655	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1	31	
<=99 - 90 points	0-90			
pH				
6.0-8.0 = 80 points		0-80	6.89	
DO		10-30	10.2	
Sub-Total			1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
Poor		0-100	0-1	24.5
Sub-Total				0.145

Column No. 2- Mitigation Existing Condition - Baseline (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
		5-90		
DO		10-30		
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
		5-90		
DO		10-30		
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
		5-90		
DO		10-30		
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

Column No. 5- Mitigation Projected At Maturity (Credit)				
HGM Score (attach data forms):		Average		
Hydrology		0		
Biogeochemical Cycling				
Habitat				
PART I - Physical, Chemical and Biological Indicators				
	Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)				
USEPA RBP (High Gradient Data Sheet)				
1. Epifaunal Substrate/Available Cover	0-20	0-1		
2. Embeddedness	0-20			
3. Velocity/ Depth Regime	0-20			
4. Sediment Deposition	0-20			
5. Channel Flow Status	0-20			
6. Channel Alteration	0-20			
7. Frequency of Riffles (or bends)	0-20			
8. Bank Stability (LB & RB)	0-20			
9. Vegetative Protection (LB & RB)	0-20			
10. Riparian Vegetative Zone Width (LB & RB)	0-20			
Total RBP Score	Poor		0	
Sub-Total			0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WVDEP Water Quality Indicators (General)				
Specific Conductivity		0-1		
	0-90			
pH				
		5-90		
DO		10-30		
Sub-Total			0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)				
WV Stream Condition Index (WVSCI)				
		0-100	0-1	
Sub-Total				0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.731666667	72	52.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT4 of MC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.32925		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.24		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.300916667	72	93.666	\$74,932.80

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	93.666	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT4 of MC, Intermittent	93.666	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT4 of MC, Ephemeral (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 39.44"	Lon.	82° 14' 59.41"	WEATHER:	60 Cloudy	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Ephemeral	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			4th Unnamed Tributary of Miller Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	60	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.86333333	
Biogeochemical Cycling	0.97		
Habitat	0.87		
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		18
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		18
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		101
Sub-Total			0.505
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	100-199 = 85 points	0-1	
pH	5.6-6.0 = 45 points		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Sub-Total	0	0-100	0-1
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Sub-Total		0-100	0-1
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Sub-Total		0-100	0-1
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Sub-Total		0-100	0-1
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	0-90	0-1	
pH	5-90		
DO	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Sub-Total		0-100	0-1
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.720416667	60	43.225

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

PART II - Index and Unit Score			
Index	Linear Feet	Unit Score	
0	0	0	

# West Virginia Stream and Wetland Valuation Metric

UT4 of MC, Ephemeral (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>		<b>Long-term Protection</b>	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).			
Years	15	% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
Sub-Total	0.3241875	0 + 5/10 Year Monitoring	101
		Sub-Total	0
<b>Temporal Loss-Maturity</b>		<b>PART IV - Index to Unit Score Conversion</b>	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).			
% Add. Mitigation	Temporal Loss-Maturity (Years)	Final Index Score (Debit)	Linear Feet
30%	25	1.275604167	60
Sub-Total	0.231	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
		76.53625	\$61,229.00

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	76.53625	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)	
<b>FINAL PROJECTED NET BALANCE</b>				0		0		0	

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).		*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note2: Enter the buffer width for each channel side (Left Bank and Right Bank) *Note3: Select the appropriate mitigation type	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT4 of MC, Ephemeral	76.53625	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT5 of MC, Temporary Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 20.36" N	Lon.	82° 14' 40.17" W	WEATHER:	60 Cloudy	DATE:	May 19, 2010			
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)				5th Unnamed Tributary of Miller Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)	
STREAM IMPACT LENGTH:	495	FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 20.36" N	Lon.	82° 14' 40.17" W	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	495	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	16
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		10
4. Sediment Deposition	0-20		9
5. Channel Flow Status	0-20		11
6. Channel Alteration	0-20		13
7. Frequency of Riffles (or bends)	0-20		6
8. Bank Stability (LB & RB)	0-20		16
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Suboptimal		124
Sub-Total			0.62
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	34
pH			
6.0-8.0 = 80 points	0-80		6.29
DO			
	10-30		10.36
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Fair	0-100	0-1	45.46
Sub-Total			0.3546

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	
pH			
6.0-8.0 = 80 points	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Fair	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		11
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		119
Sub-Total			0.595
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		6.89
DO			
>5.0 = 30 points	10-30		10.36
Sub-Total			0.55
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Fair	0-100	0-1	45.46
Sub-Total			0.3546

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		13
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		11
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Suboptimal		135
Sub-Total			0.675
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		6.89
DO			
>5.0 = 30 points	10-30		10.36
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Fair	0-100	0-1	45.46
Sub-Total			0.3546

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		15
3. Velocity/ Depth Regime	0-20		13
4. Sediment Deposition	0-20		15
5. Channel Flow Status	0-20		11
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Suboptimal		151
Sub-Total			0.755
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
500-599 - 50 points	0-90	0-1	500
pH			
6.0-8.0 = 80 points	5-90		6.89
DO			
>5.0 = 30 points	10-30		10.36
Sub-Total			0.8
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Fair	0-100	0-1	45.46
Sub-Total			0.3546

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.6582	495	325.809

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	495	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.499866667	495	247.434

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.609866667	495	301.884

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.636533333	495	315.084



# West Virginia Stream and Wetland Valuation Metric

UT5 of MC, Temporary Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>		<b>Long-term Protection</b>	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).		% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
Years	15	0 + 5/10 Year Monitoring	101
Sub-Total	0.29619		
<b>Temporal Loss-Maturity</b>		<b>PART IV - Index to Unit Score Conversion</b>	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).		Final Index Score (Debit)	Linear Feet
% Add. Mitigation	Temporal Loss-Maturity (Years)	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
30%	25	1.21767	495
Sub-Total	0.26328	602.74665	\$482,197.32

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	602.74665	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	247.434	Mitigation Projected at Ten Years Post Completion (Credit)	301.884	Mitigation Projected At Maturity (Credit)	315.084
<b>FINAL PROJECTED NET BALANCE</b>				247.434	301.884				

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).		*Note1: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note2: Enter the buffer width for each channel side (Left Bank and Right Bank) *Note3: Select the appropriate mitigation type	
Level I Restoration		<b>Buffer Width</b>	<b>Left Bank</b>
Level II Restoration		50	0-50 51-150
Level III Restoration		<b>Buffer Width</b>	<b>Right Bank</b>
		50	0-50 51-150
		<b>Average Buffer Width/Side</b>	50

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT5 of MC, Temporary Perennial	602.74665	425.3634

# West Virginia Stream and Wetland Valuation Metric

UT5 of MC, Permanent Perennial (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 24.42"	Lon.	82° 14' 27.51"	WEATHER:	60 Cloudy	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Perennial	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			5th Unnamed Tributary of Miller Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Same (Mitigation is restoration of temporary impacts)
STREAM IMPACT LENGTH:	1067	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:	0		

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		8
3. Velocity/ Depth Regime	0-20		11
4. Sediment Deposition	0-20		11
5. Channel Flow Status	0-20		11
6. Channel Alteration	0-20		13
7. Frequency of Riffles (or bends)	0-20		7
8. Bank Stability (LB & RB)	0-20		13
9. Vegetative Protection (LB & RB)	0-20		13
10. Riparian Vegetative Zone Width (LB & RB)	0-20		17
Total RBP Score	Suboptimal		119
Sub-Total			0.595
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity	<=99 - 90 points	0-90	34
pH	6.0-8.0 = 80 points	0-80	6.29
DO		10-30	10.36
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Fair	0-100	0-1	45.46
Sub-Total			0.3546

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-90	
pH		5-90	
DO		10-30	
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.649866667	1067	693.407733

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT5 of MC, Permanent Perennial (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.29244		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.259946667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.202253333	1067	1282.804307	\$1,026,243.45

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1282.804307	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT5 of MC, Permanent Perennial	1282.804307	#DIV/0!

# West Virginia Stream and Wetland Valuation Metric

UT5 of MC, Intermittent (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	37° 44' 29.13"	Lon.	82° 14' 19.42"	WEATHER:	60 Cloudy	DATE:	May 19, 2010	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			5th Unnamed Tributary of Miller Creek % Streambed Slope, Acre Watershed, Mature Tree			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			
STREAM IMPACT LENGTH:	888	FORM OF MITIGATION:	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.	PRECIPITATION PAST 48 HRS:	0	Mitigation Length:			

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):		Average	
Hydrology	0.75	0.86333333	
Biogeochemical Cycling	0.97		
Habitat	0.87		
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		14
3. Velocity/ Depth Regime	0-20		10
4. Sediment Deposition	0-20		16
5. Channel Flow Status	0-20		11
6. Channel Alteration	0-20		14
7. Frequency of Riffles (or bends)	0-20		6
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		12
Total RBP Score	Suboptimal	126	
Sub-Total		0.63	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	31
pH			6.89
6.0-8.0 = 80 points	0-80		10.2
DO		10.2	
Sub-Total		1	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Poor		0-100	0-1
Sub-Total		24.5	
Sub-Total		0.145	

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor	0	
Sub-Total		0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	0
pH			0
6.0-8.0 = 80 points	0-80		0
DO		0	
Sub-Total		0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Poor		0-100	0-1
Sub-Total		0	
Sub-Total		0	

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor	0	
Sub-Total		0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	0
pH			0
6.0-8.0 = 80 points	0-80		0
DO		0	
Sub-Total		0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Poor		0-100	0-1
Sub-Total		0	
Sub-Total		0	

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor	0	
Sub-Total		0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	0
pH			0
6.0-8.0 = 80 points	0-80		0
DO		0	
Sub-Total		0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Poor		0-100	0-1
Sub-Total		0	
Sub-Total		0	

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):		Average	
Hydrology		0	
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
Points Scale	Range	Site Score	
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		0
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		0
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		0
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		0
9. Vegetative Protection (LB & RB)	0-20		0
10. Riparian Vegetative Zone Width (LB & RB)	0-20		0
Total RBP Score	Poor	0	
Sub-Total		0	
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	0
pH			0
6.0-8.0 = 80 points	0-80		0
DO		0	
Sub-Total		0	
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Poor		0-100	0-1
Sub-Total		0	
Sub-Total		0	

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.7275	888	646.02

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	0	0

# West Virginia Stream and Wetland Valuation Metric

UT5 of MC, Intermittent (2 of 2)

PART III - Impact Factors (See instruction page to insert default values for MITIGATION BANKING and ILF)			
<b>Temporal Loss-Construction</b>			
<i>*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).</i>			
Years	15		
Sub-Total	0.327375		
<b>Temporal Loss-Maturity</b>			
<i>*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).</i>			
% Add. Mitigation	Temporal Loss-Maturity (Years)		
30%	25		
Sub-Total	0.236666667		

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

PART IV - Index to Unit Score Conversion			
Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
1.291541667	888	1146.889	\$917,511.20

PART V- Comparison of Unit Scores and Projected Balance									
Final Unit Score (Debit) [No Net Loss Value]	1146.889	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)	
<b>FINAL PROJECTED NET BALANCE</b>					0		0		0

Part VI - Mitigation Considerations (Incentives)			
<b>Extent of Stream Restoration</b>		<b>Extended Upland Buffer Zone</b>	
<i>*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project</i>		<i>*Note<sup>1</sup>: Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below)</i>	
<i>*Note2: Place an "X" in the appropriate category (only select one).</i>		<i>*Note<sup>2</sup>: Enter the buffer width for each channel side (Left Bank and Right Bank)</i>	
		<i>*Note<sup>3</sup>: Select the appropriate mitigation type</i>	
Level I Restoration		Buffer Width	Left Bank
Level II Restoration		0-50	
Level III Restoration		51-150	
		Buffer Width	Right Bank
		0-50	
		51-150	
		Average Buffer Width/Side	0

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
UT5 of MC, Intermittent	1146.889	#DIV/0!

**SWVM WORKSHEETS –  
PROPOSED OFF-SITE AND ON-SITE  
ESTABLISHMENT CHANNELS**



# West Virginia Stream and Wetland Valuation Metric

Off-site Intermittent Establishment (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	N/A	Lon.	N/A	WEATHER:	N/A	DATE:	1-Jun-10	
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Tributaries of Pigeon Creek Watershed >4% Streambed Slope, < 1 Acre Watershed, Mature Tree			
STREAM IMPACT LENGTH:		Permittee Responsible-Offsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	Lon.		PRECIPITATION PAST 48 HRS:	N/A	Mitigation Length:	16,345	

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
100-199 = 85 points	0-90	0-1	
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			0
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology	0.5		0.606666667
Biogeochemical Cycling	0.61		
Habitat	0.71		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	10
2. Embeddedness	0-20		8
3. Velocity/ Depth Regime	0-20		8
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		7
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		13
10. Riparian Vegetative Zone Width (LB & RB)	0-20		9
Total RBP Score	Marginal		107
Sub-Total			0.535
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 = 90 points	0-90	0-1	40.56
pH			
6.0-8.0 = 80 points	5-90		7.44
DO			
>5.0 = 30 points	10-30		10.36
Sub-Total			0.55
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology	0.6		0.68
Biogeochemical Cycling	0.71		
Habitat	0.73		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	10
2. Embeddedness	0-20		10
3. Velocity/ Depth Regime	0-20		10
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		7
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		13
10. Riparian Vegetative Zone Width (LB & RB)	0-20		10
Total RBP Score	Marginal		112
Sub-Total			0.56
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 = 90 points	0-90	0-1	40.56
pH			
6.0-8.0 = 80 points	5-90		7.44
DO			
>5.0 = 30 points	10-30		10.36
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology	0.61		0.68666667
Biogeochemical Cycling	0.72		
Habitat	0.73		
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	10
2. Embeddedness	0-20		10
3. Velocity/ Depth Regime	0-20		10
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		17
7. Frequency of Riffles (or bends)	0-20		7
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		13
10. Riparian Vegetative Zone Width (LB & RB)	0-20		10
Total RBP Score	Marginal		112
Sub-Total			0.56
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 = 90 points	0-90	0-1	40.56
pH			
6.0-8.0 = 80 points	5-90		7.44
DO			
>5.0 = 30 points	10-30		10.36
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.325	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	16345	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.5975	16345	9766.1375

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.713333333	16345	11659.4333

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.716666667	16345	11713.917



# West Virginia Stream and Wetland Valuation Metric

Off-site Establishment Intermittent (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.14625
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.13

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.60125	0	0	\$0.00

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	0	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	9766.1375	Mitigation Projected at Ten Years Post Completion (Credit)	11659.43333	Mitigation Projected At Maturity (Credit)	11713.91667
<b>FINAL PROJECTED NET BALANCE</b>					9766.1375		11659.43333		11713.91667

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
50	0-50	Preservation
	51-150	
Buffer Width	Right Bank	
50	0-50	Preservation
	51-150	
Average Buffer Width/Side	50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
Off-site Establishment Intermittent	0	12885.30833

# West Virginia Stream and Wetland Valuation Metric

On-site Intermittent Establishment (1 of 2)

USACE FILE NO./Project Name:	LRH /Buffalo Mt. Surface Mine WVDEP Permit No. S-5018-07	IMPACT COORDINATES: (in Decimal Degrees)	Lat.	N/A	Lon.	N/A	WEATHER:	N/A	DATE:	1-Jun-10		
STREAM CLASSIFICATION:	Intermittent	IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			MITIGATION STREAM CLASS/SITE ID AND SITE DESCRIPTION: (% stream slope, watershed size (acreage), unaltered or impairments)			Tributaries of Pigeon Creek Watershed 1.1% Streambed Slope, < 1 Acre Watershed, Mature Tree				
STREAM IMPACT LENGTH:		FORM OF MITIGATION:	Permittee Responsible-Onsite	MIT COORDINATES: (in Decimal Degrees)	Lat.	Varies	Lon.	Varies	PRECIPITATION PAST 48 HRS:	N/A	Mitigation Length:	29,079

Column No. 1- Impact Existing Condition (Debit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
100-199 - 85 points	0-90	0-1	
pH			
5.6-6.0 = 45 points	0-80		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	
Sub-Total			0

Column No. 2- Mitigation Existing Condition - Baseline (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	
2. Embeddedness	0-20		
3. Velocity/ Depth Regime	0-20		
4. Sediment Deposition	0-20		
5. Channel Flow Status	0-20		
6. Channel Alteration	0-20		
7. Frequency of Riffles (or bends)	0-20		
8. Bank Stability (LB & RB)	0-20		
9. Vegetative Protection (LB & RB)	0-20		
10. Riparian Vegetative Zone Width (LB & RB)	0-20		
Total RBP Score	Poor		0
Sub-Total			0
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
	0-90	0-1	
pH			
	5-90		
DO			
	10-30		
Sub-Total			0
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
	0-100	0-1	
Sub-Total			0

Column No. 3- Mitigation Projected at Five Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	11
2. Embeddedness	0-20		8
3. Velocity/ Depth Regime	0-20		11
4. Sediment Deposition	0-20		8
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		15
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		6
10. Riparian Vegetative Zone Width (LB & RB)	0-20		2
Total RBP Score	Marginal		102
Sub-Total			0.51
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	40.56
pH			
6.0-8.0 = 80 points	5-90		7.44
DO			
>5.0 = 30 points	10-30		10.36
Sub-Total			0.55
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	13
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		11
4. Sediment Deposition	0-20		10
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		15
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		11
10. Riparian Vegetative Zone Width (LB & RB)	0-20		6
Total RBP Score	Suboptimal		118
Sub-Total			0.59
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	40.56
pH			
6.0-8.0 = 80 points	5-90		7.44
DO			
>5.0 = 30 points	10-30		10.36
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

Column No. 5- Mitigation Projected At Maturity (Credit)			
HGM Score (attach data forms):	Average		
Hydrology			0
Biogeochemical Cycling			
Habitat			
PART I - Physical, Chemical and Biological Indicators			
	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	15
2. Embeddedness	0-20		11
3. Velocity/ Depth Regime	0-20		11
4. Sediment Deposition	0-20		10
5. Channel Flow Status	0-20		8
6. Channel Alteration	0-20		15
7. Frequency of Riffles (or bends)	0-20		15
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		8
Total RBP Score	Suboptimal		127
Sub-Total			0.635
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity			
<=99 - 90 points	0-90	0-1	40.56
pH			
6.0-8.0 = 80 points	5-90		7.44
DO			
>5.0 = 30 points	10-30		10.36
Sub-Total			1
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
Good	0-100	0-1	68
Sub-Total			0.68

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.325	0	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0	29079	0

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.58	29079	16865.82

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.756666667	29079	22003.11

PART II - Index and Unit Score		
Index	Linear Feet	Unit Score
0.771666667	29079	22439.295

# West Virginia Stream and Wetland Valuation Metric

On-site Intermittent Establishment (2 of 2)

## PART III - Impact Factors

(See instruction page to insert default values for MITIGATION BANKING and ILF)

Temporal Loss-Construction	
*Note: Reflects duration of aquatic functional loss between the time of an impact (debit) and completion of compensatory mitigation (credit).	
Years	15
Sub-Total	0.14625
Temporal Loss-Maturity	
*Note: Period between completion of compensatory mitigation measures and the time required for maturity, as it relates to function (i.e. maturity of tree stratum to provide organic matter and detritus within riparian stream or wetland buffer corridor).	
% Add. Mitigation	Temporal Loss-Maturity (Years)
30%	25
Sub-Total	0.13

Long-term Protection	
% Add. Mitigation and Monitoring Period	Long-Term Protection (Years)
0 + 5/10 Year Monitoring	101
Sub-Total	0

## PART IV - Index to Unit Score Conversion

Final Index Score (Debit)	Linear Feet	Unit Score (Debit)	ILF Costs (Offsetting Debit Units)
0.60125	0	0	\$0.00

## PART V- Comparison of Unit Scores and Projected Balance

Final Unit Score (Debit) [No Net Loss Value]	0	Mitigation Existing Condition - Baseline (Credit)	0	Mitigation Projected at Five Years Post Completion (Credit)	16865.82	Mitigation Projected at Ten Years Post Completion (Credit)	22003.11	Mitigation Projected At Maturity (Credit)	22439.295
<b>FINAL PROJECTED NET BALANCE</b>					16865.82		22003.11		22439.295

## Part VI - Mitigation Considerations (Incentives)

Extent of Stream Restoration	
*Note1: Reference the Instructional handout to determine the correct Restoration Levels (below) for your project *Note2: Place an "X" in the appropriate category (only select one).	
Level I Restoration	
Level II Restoration	
Level III Restoration	

Extended Upland Buffer Zone		
*Note <sup>1</sup> : Reference Instructional handout for the definitions of the Buffer Zone Mitigation Extents and Types (below) *Note <sup>2</sup> : Enter the buffer width for each channel side (Left Bank and Right Bank) *Note <sup>3</sup> : Select the appropriate mitigation type		
Buffer Width	Left Bank	
50	0-50	Preservation and Re-vegetation
	51-150	
Buffer Width	Right Bank	
50	0-50	Preservation and Re-vegetation
	51-150	
Average Buffer Width/Side	50	

Site	Impact Unit Yield (Debit)	Mitigation Unit Yield (Credit)
On-Site Establishment Intermittent	0	30293.04825